



**Maryland**  
Department of  
the Environment

# GGRA Modeling Update

This presentation does not represent any state policy positions nor does it represent a proposed state climate plan. This is simply the first of several model runs that examine different scenarios to be used to guide the state in developing a climate plan. These materials are informational only and should not be used for any other purpose.

Mitigation Working Group  
August 30, 2018

# Economic Impact of Policy Scenario One

August 30, 2018

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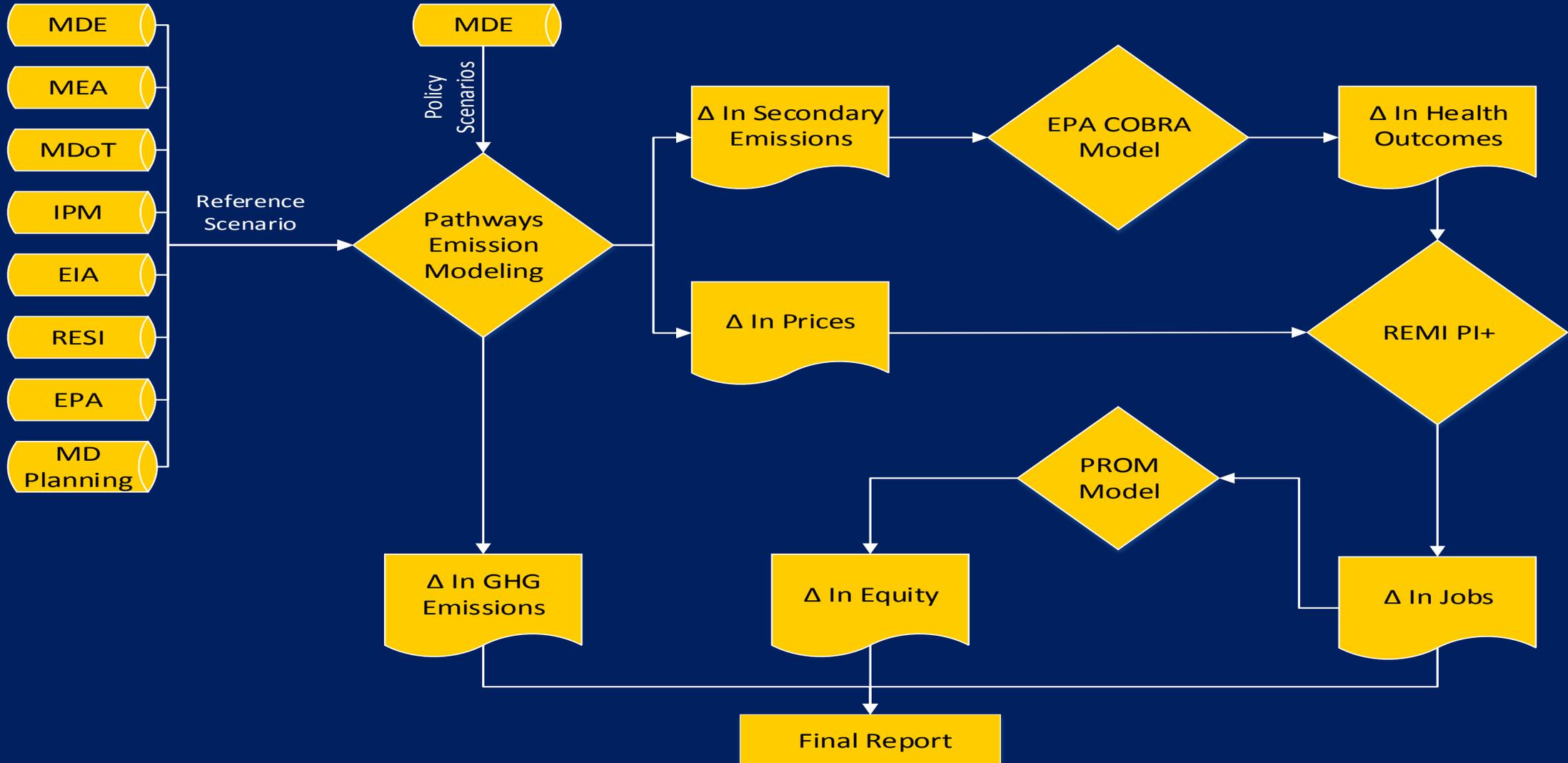
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# Analysis Framework



# How is Economic Modeling Done?

- REMI PI+
- Four primary inputs:
  - Capital Costs by Sector from Pathways/LEAP
  - Fuel Costs by Sector from Pathways/LEAP
  - Health Costs/Benefits from EPA's COBRA
  - Additional Programming Cost from State Agencies

# Capital Costs and Fuel Costs Make Up Most of the Costs Entered into REMI PI+

## Capital Costs

- Increase demand for manufacturing/producers
- Increase cost of production to all sectors
- Increase future energy efficiency

## Fuel Costs

- Alter demand for utilities/petroleum manufacturing
- Increase cost of electricity or other fuel types

# Consumer Spending Patterns are Modeled Similarly

- Only change to model is shift in spending patterns
- Relative to the reference case, absolute income and taxes are held constant
  - Income does change within the model due to market shifts
- Example: Consumer purchases more expensive energy efficient appliance.
  - Model as increase in spending on household appliances and decrease in spending on all other goods.
  - Separately model decrease in household spending on electricity bills

# Modeling Health Benefits of Cleaner Air

- Model Changes in Secondary Emissions using EPA's COBRA model
  - Pathways/LEAP modeling provides estimates of fuel burn reductions
- Translate reductions in negative health outcomes to economic impacts
  - Decreased hospital revenue, but increased insurance revenue, household income, and federal and state revenue
  - Increased labor productivity
  - Increased survival rate
  - Increased quality of life

# Modeling Health Benefits of Cleaner Air

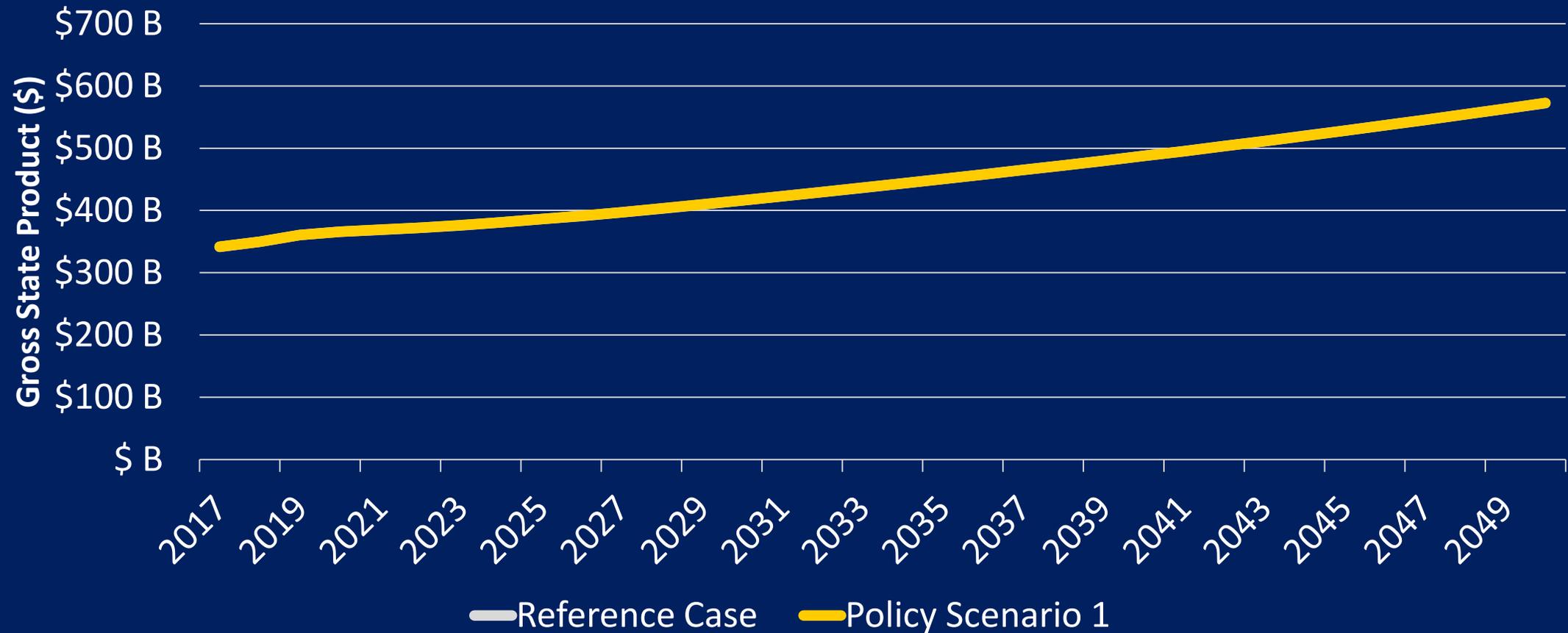
Health Effect	2017	2030
Revenue Reallocation (\$)	\$78,998.32	\$ 155,343
Hospitals Revenue	\$ (78,998)	\$ (155,343)
Private Insurance Revenue	\$ 20,429	\$ 40,182
Federal Revenue	\$ 45,997	\$ 40,182
State & Local Revenue	\$ 11,125	\$ 23,510
Consumer Savings	\$ 1,447	\$ 2,460
Labor Productivity (Average % Increase)	0.003%	0.0006%
Survival Rate (Average % Increase)	0.00002%	0.00016%
Quality of Life Increase (\$ Increase)	\$13,578	\$24,362

# Modeling Other Spending

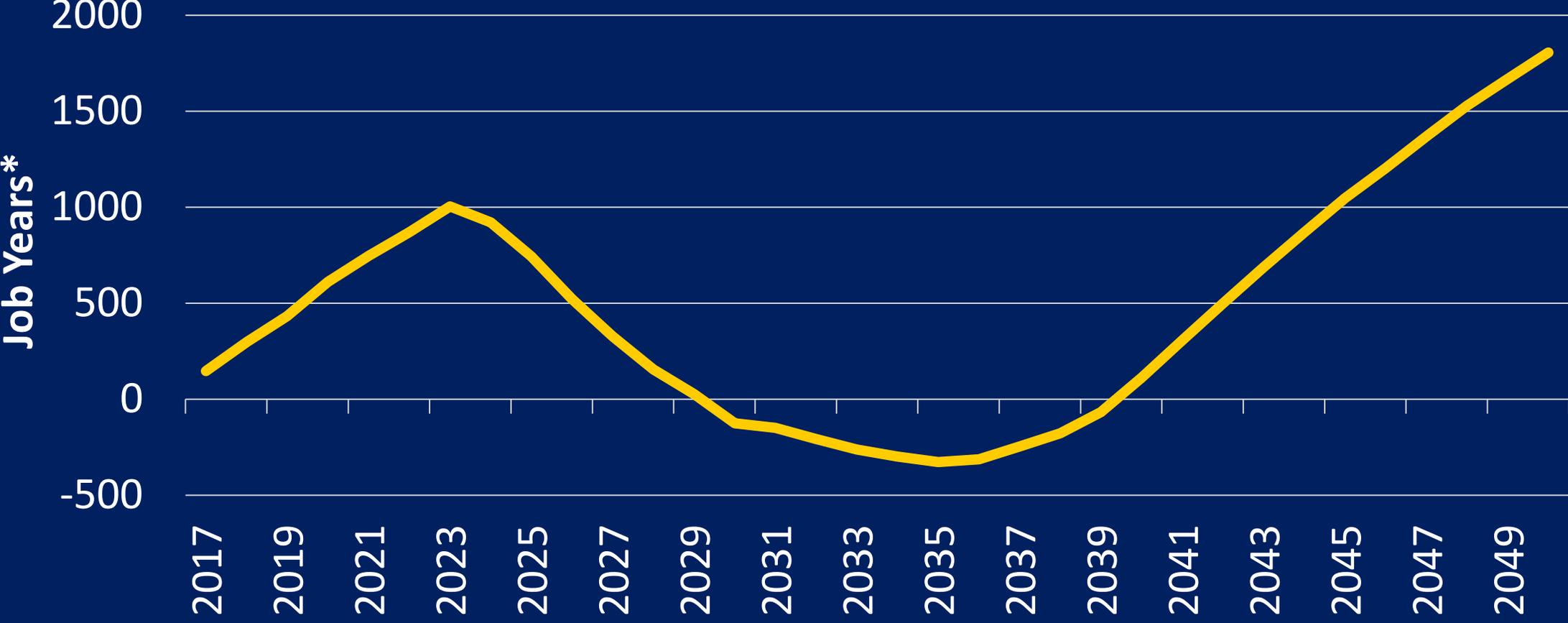
- Not all programs and policies can be explicitly modeled within Pathways/LEAP
- Additional program costs beyond normal spending levels captured within REMI
- Example of spending added in pending further data:
  - Additional spending for forestry management
  - Additional spending for major transportation projects

# Results Overview

# Overall, Maryland's Economy Grows Year Over Year in both the Reference Case and Policy Scenario One, and Differences Between the Two Cases are Minimal

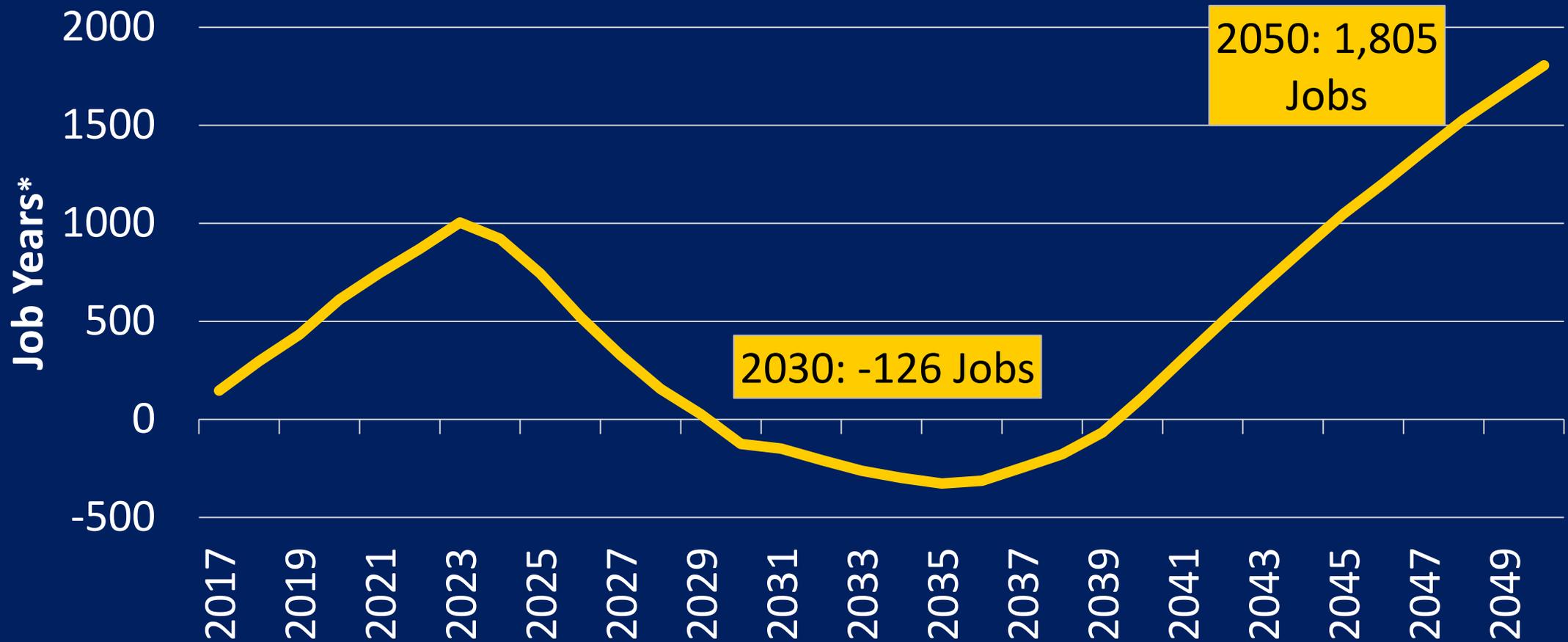


# Jobs Supported by Policy Scenario One Follow a Distinct Polynomial Pattern



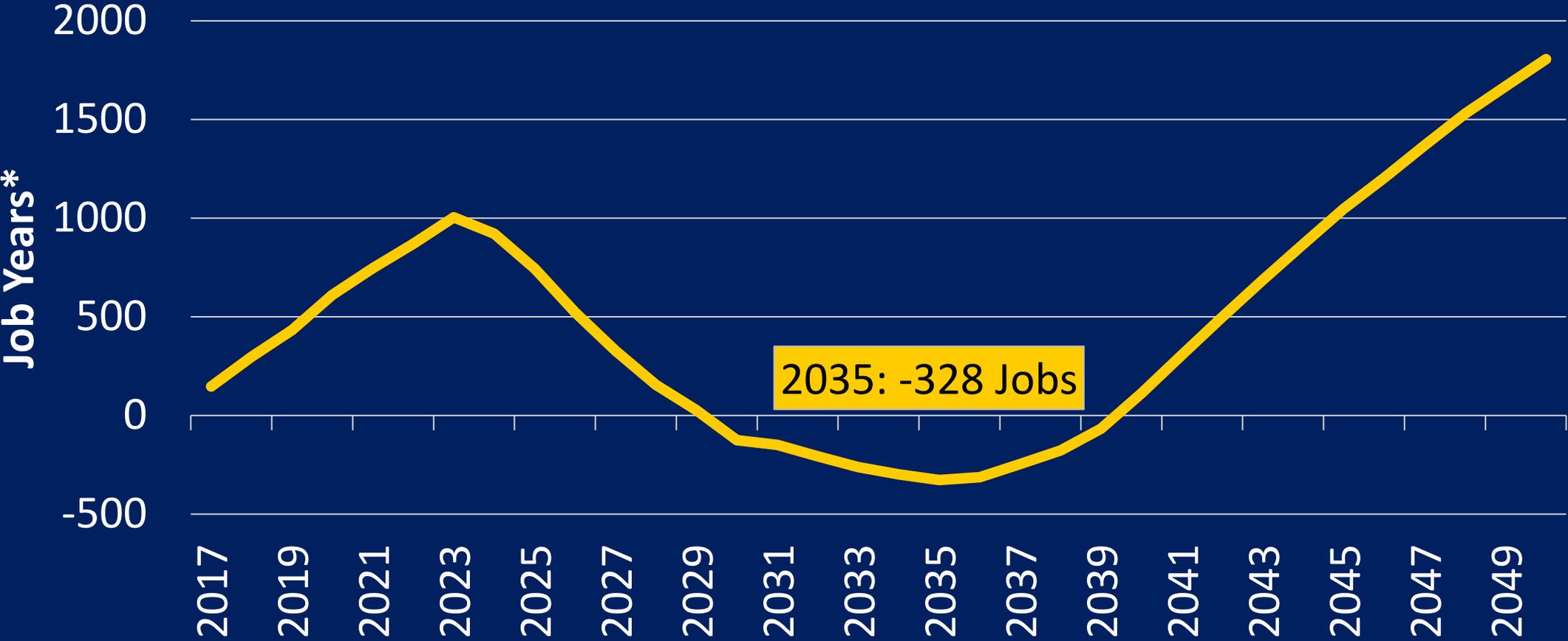
\*Difference between policy scenario one and reference case

# Job Growth Is Slightly Negative in 2030 and Positive in 2050, Relative to the Reference Case



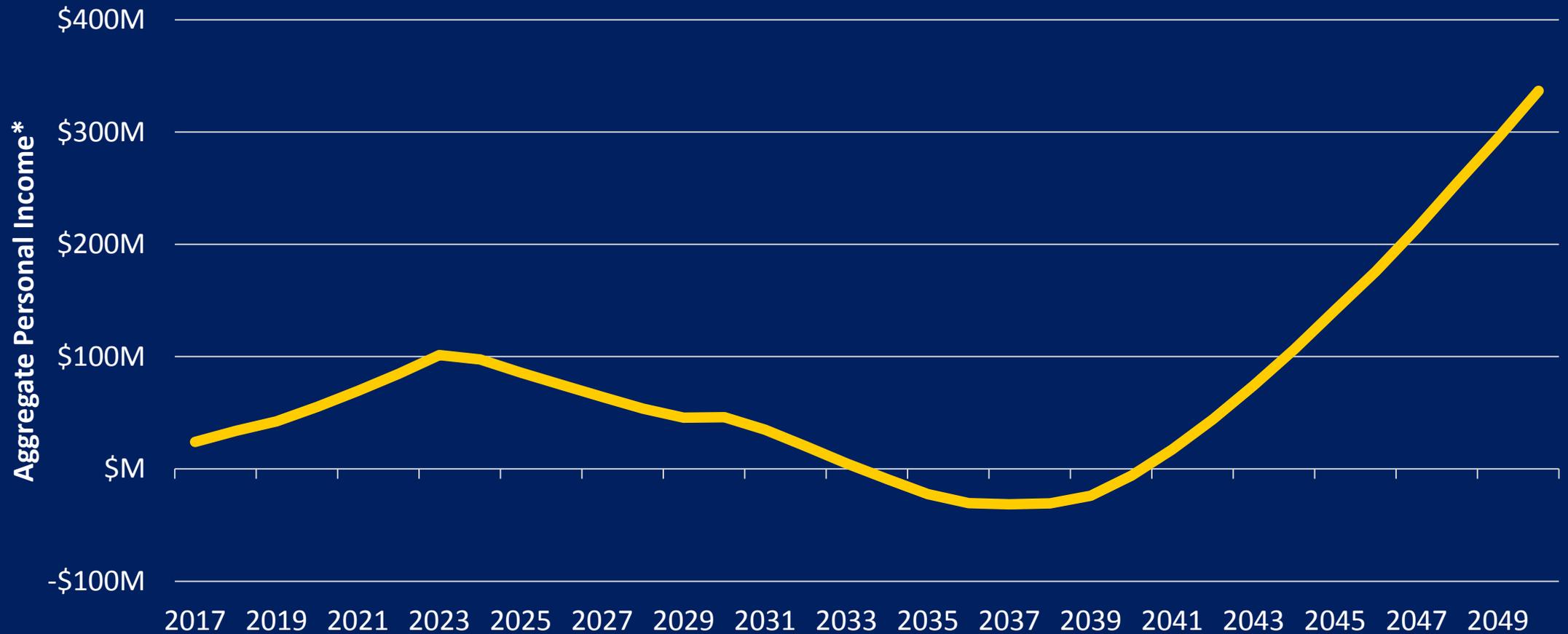
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# Job Growth is Lowest Relative to the Reference Case in 2035



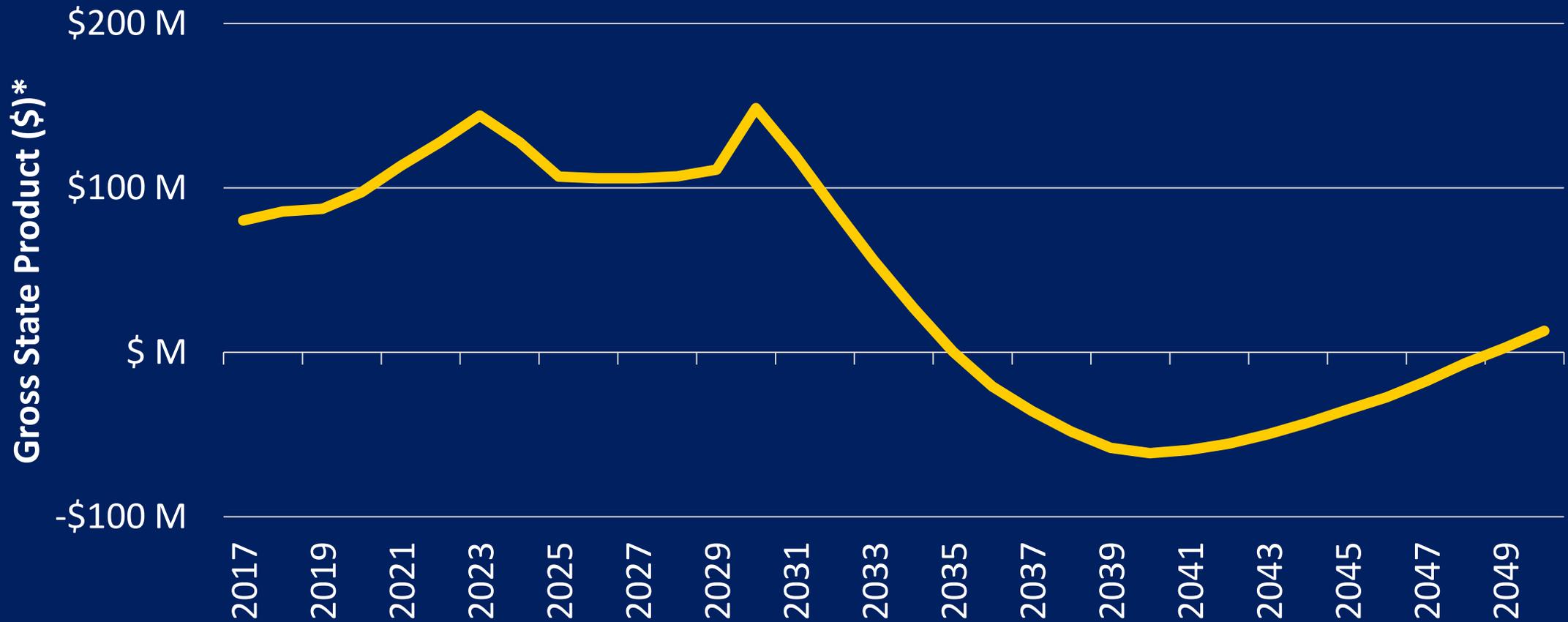
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# Personal Income Growth Relative to the Reference Case Follows a Similar Pattern to Job Growth and is Positive in 2030



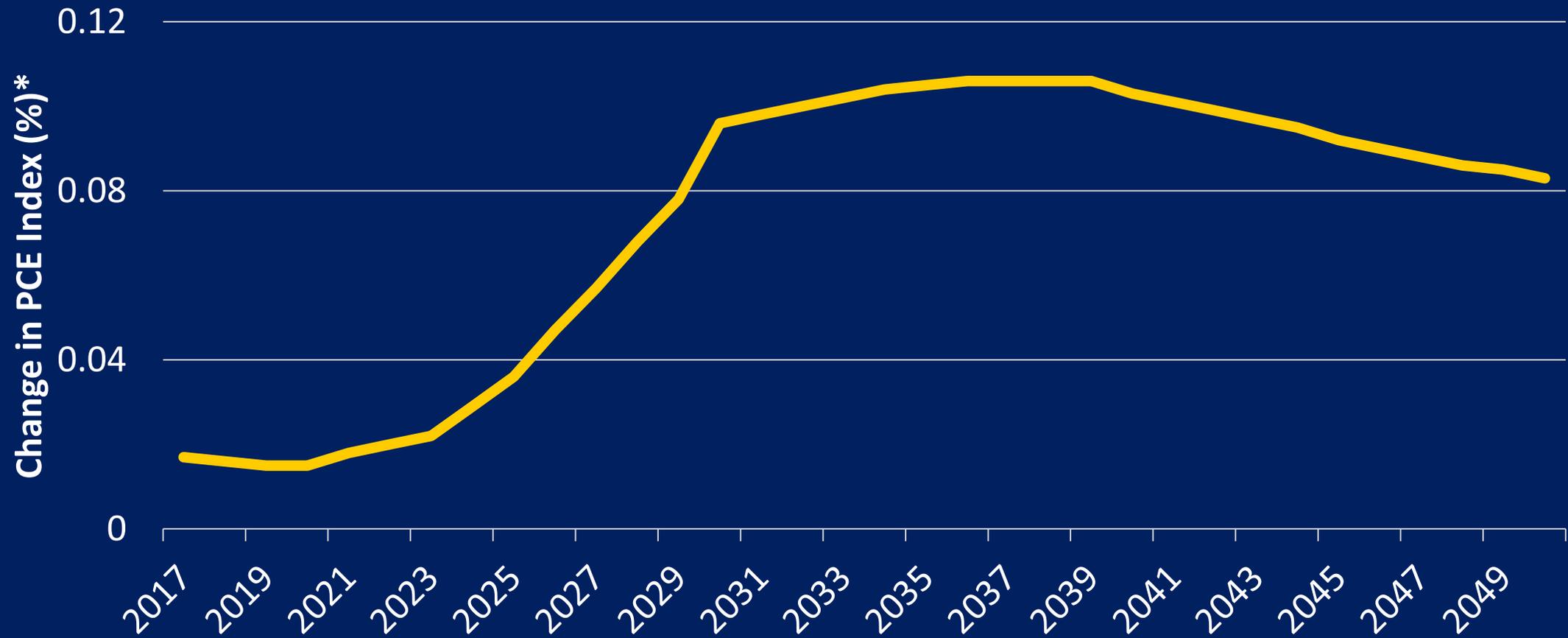
\*Difference between policy scenario one and reference case

# GSP Growth Remains Positive Through 2035, but is Projected to be Lower Than the Reference Case Between 2036 and 2048



\*Difference between policy scenario one and reference case

# Inflation (Measured as Change in PCE Index) Remains Relatively Low



\*Difference between policy scenario one and reference case

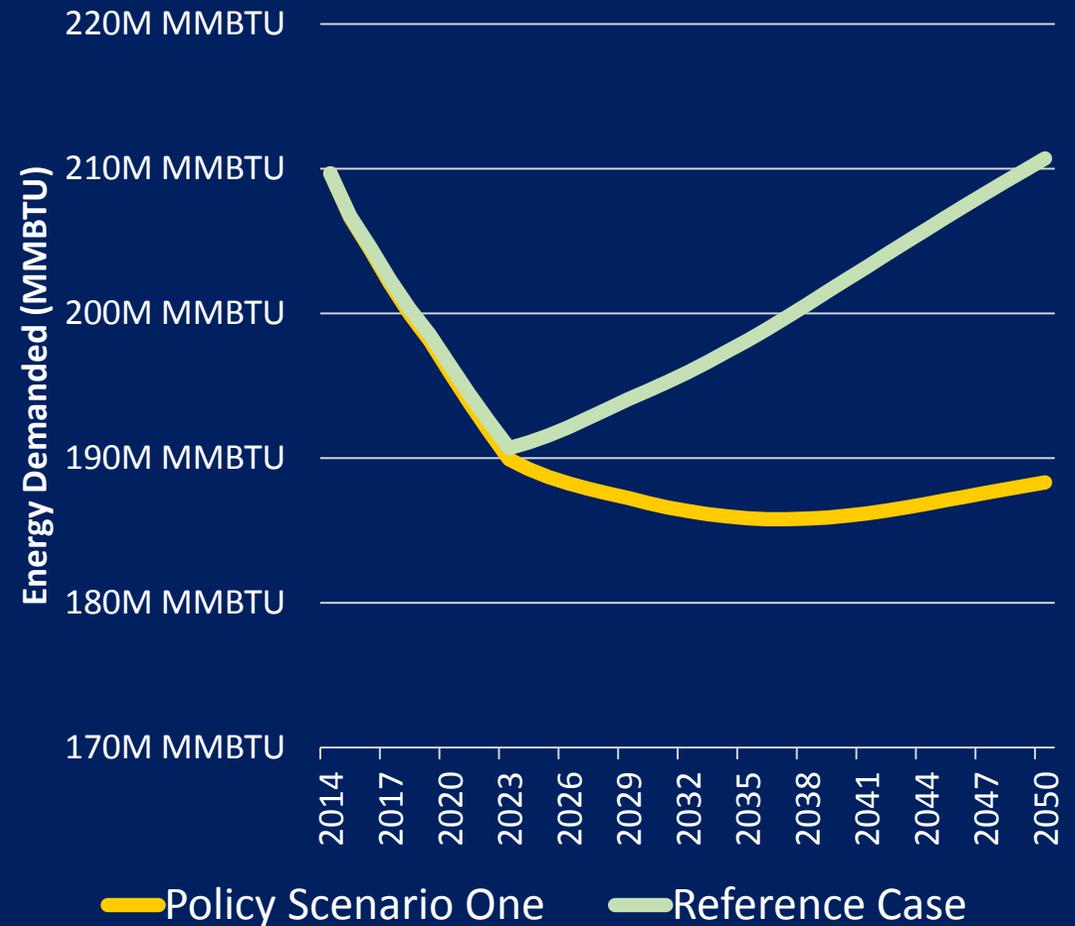
# On Average, Jobs, GSP, and Wages are Higher than in the Reference Case

Indicator	2030	Average Through 2030	2050	Average Through 2050
Total Employment	-126	477	1,805	462
Gross State Product	\$148.6 M	\$110.7 M	\$13.2 M	\$39.3 M
Personal Income	\$46.1 M	\$62.3 M	\$336.7 M	\$71.9 M

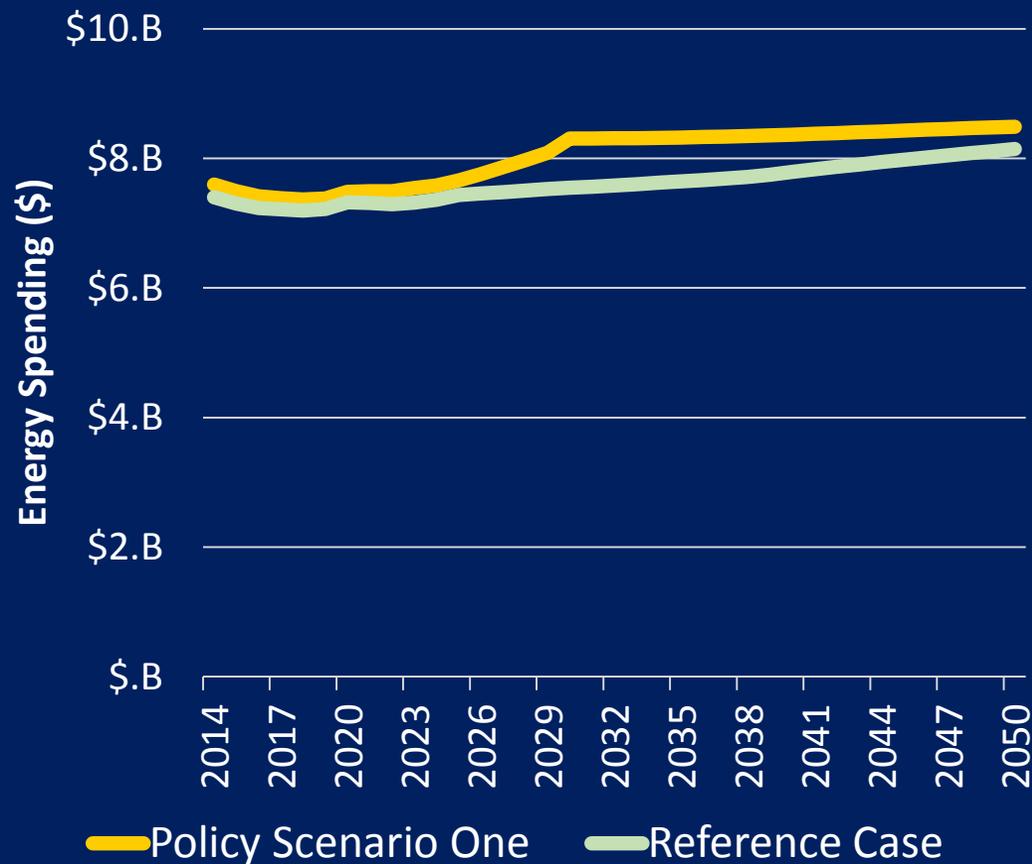
# Why do We See This Pattern?

# Electricity Consumption Declines in Policy Scenario One Relative to the Reference Case

- Energy consumption fails to spike in policy scenario one, mostly due to the extension of EmPOWER

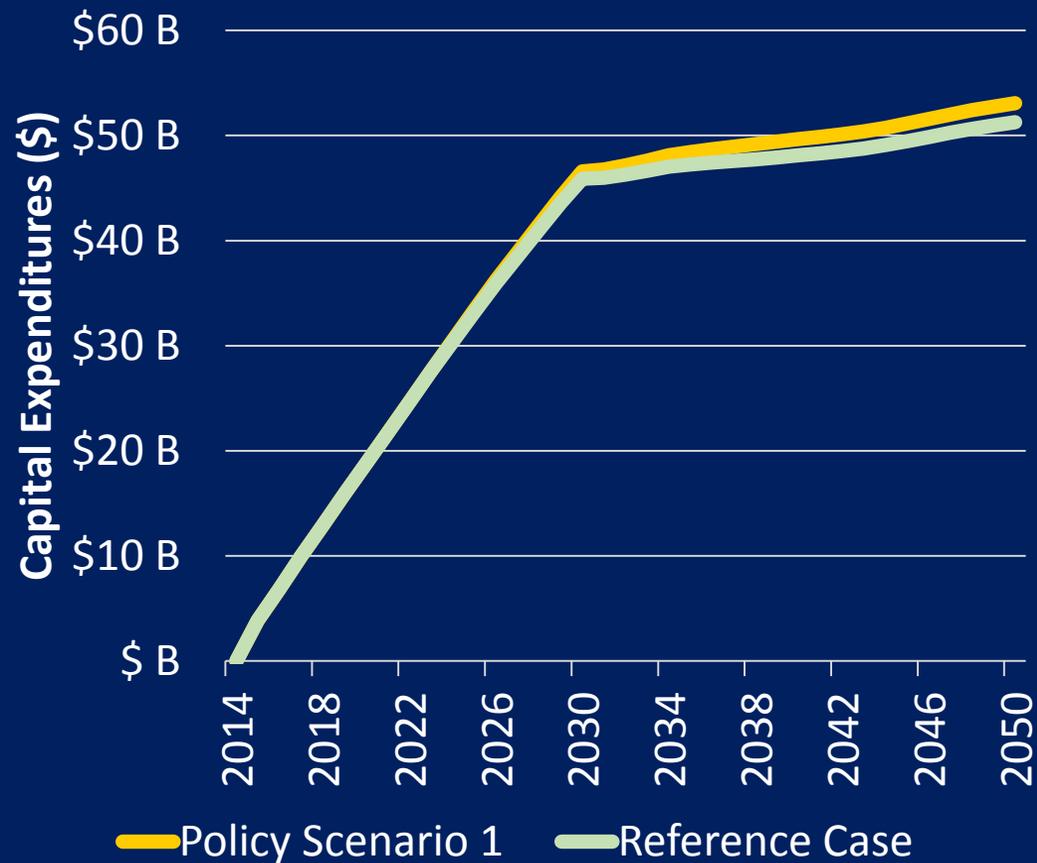


# ...Despite Lower Usage, the Total Amount Spent on Electricity is Higher in Policy Scenario One



- Across Residential, Commercial, and Industrial sectors, electricity spending is \$755 million greater in Policy Scenario 1 than in the reference case in 2030.
- This is primarily driven by goal of 50% RPS by 2030, which causes rates to increase, then plateau.

# Total Capital Costs in Policy Scenario One are Comparable to the Reference Case



- This helps to explain why inflation remains so low
- New capital spending is a small percentage of the overall level

# Capital Costs in Policy Scenario One Begin Rising Relative to the Reference Case in 2024

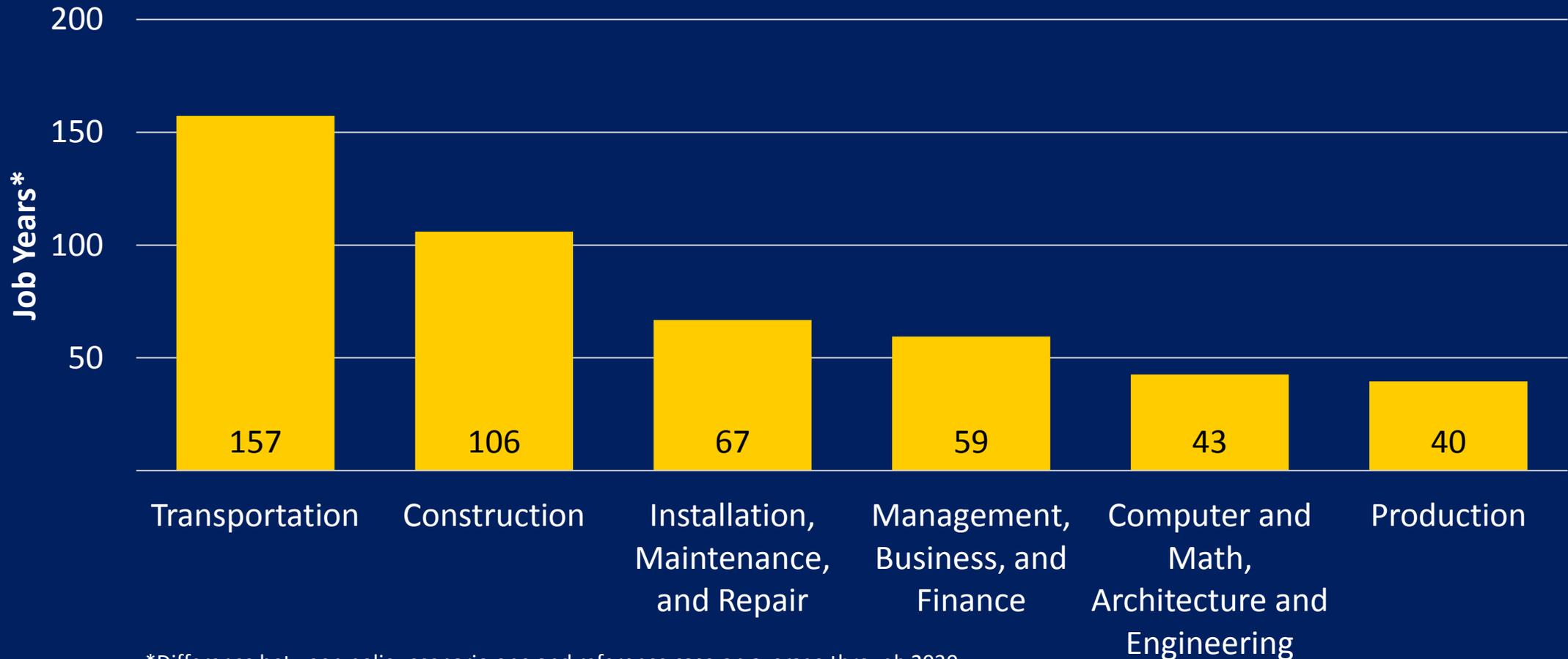
- When EmPOWER extension goes in effect, households and businesses spend more on energy efficient appliances.
  - For households – distributional impacts (less to spend on other goods)
  - For businesses – cost of production increases
- Electricity savings take several years to balance out up front costs



\*Difference between policy scenario one and reference case

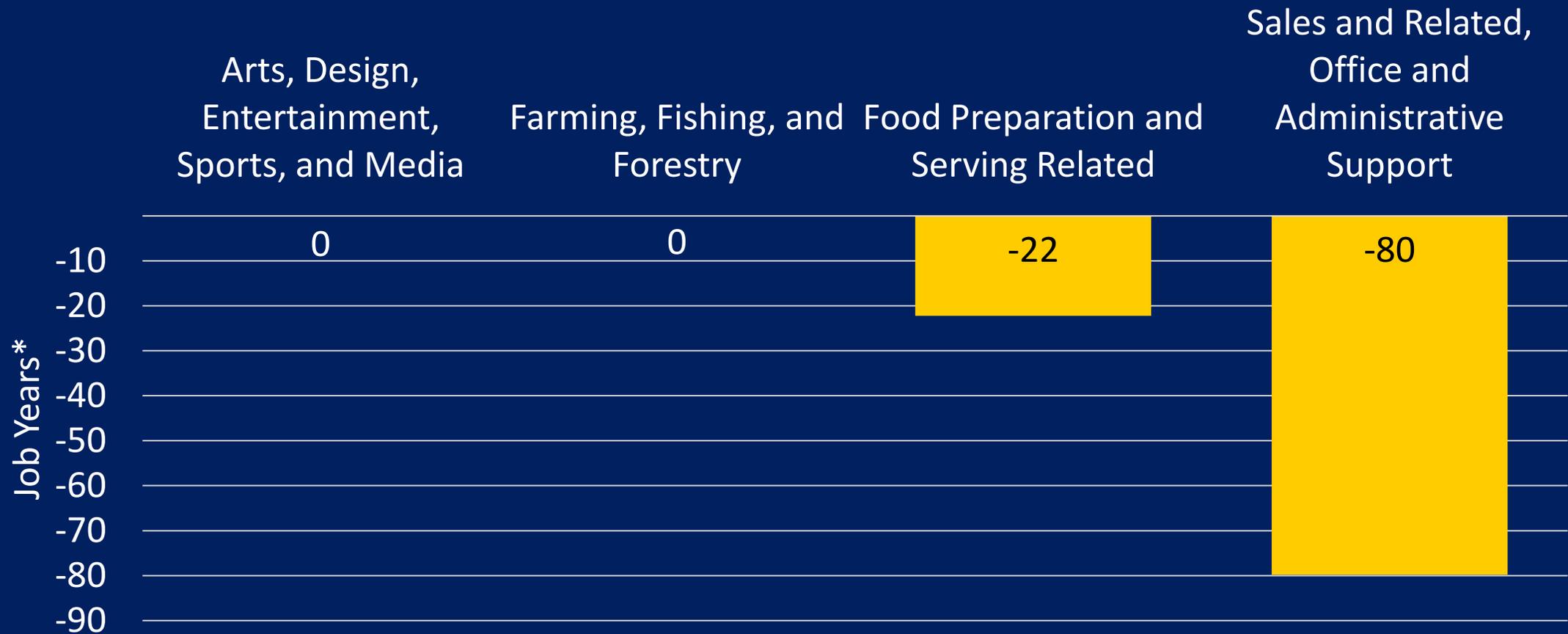
# What Jobs are Being Created/Sustained?

# Transportation and Construction Occupations Have the Most Job Gains on Average Through 2030



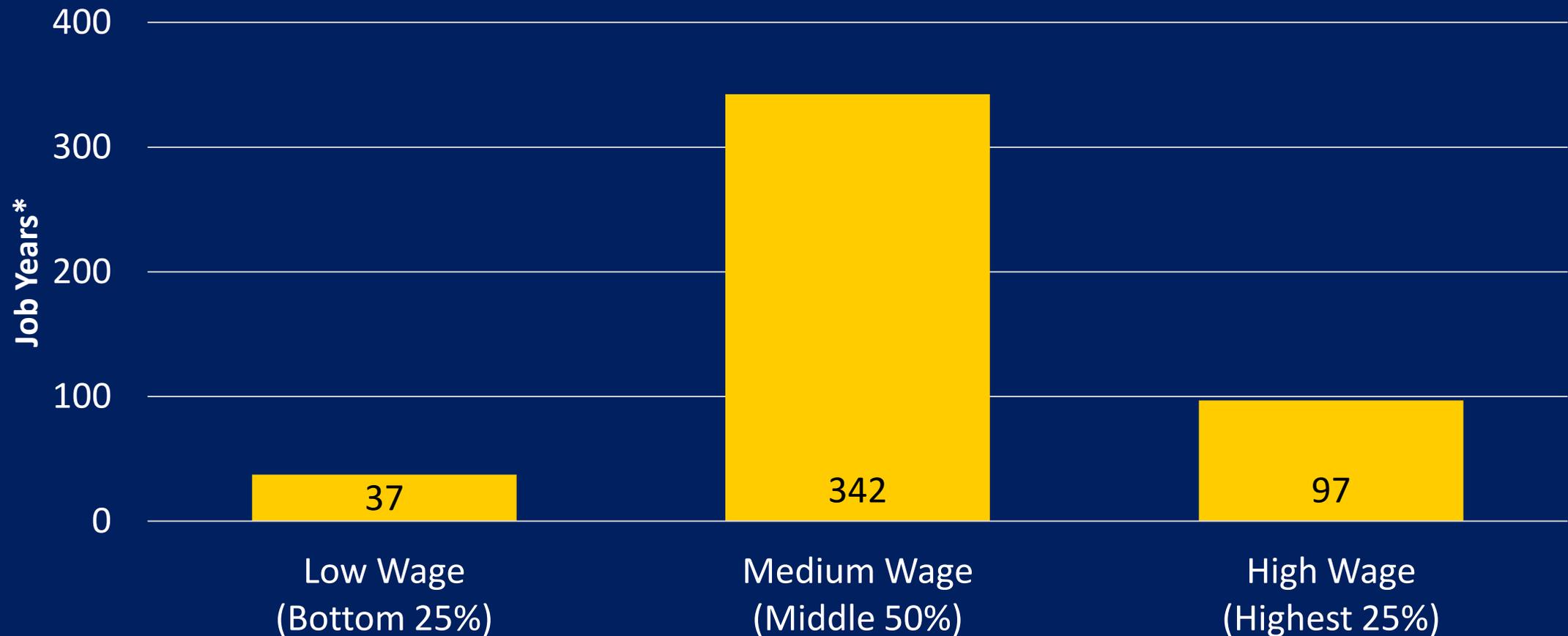
\*Difference between policy scenario one and reference case on average through 2030

# ...But Not All Occupations Experience Job Gains on Average Through 2030



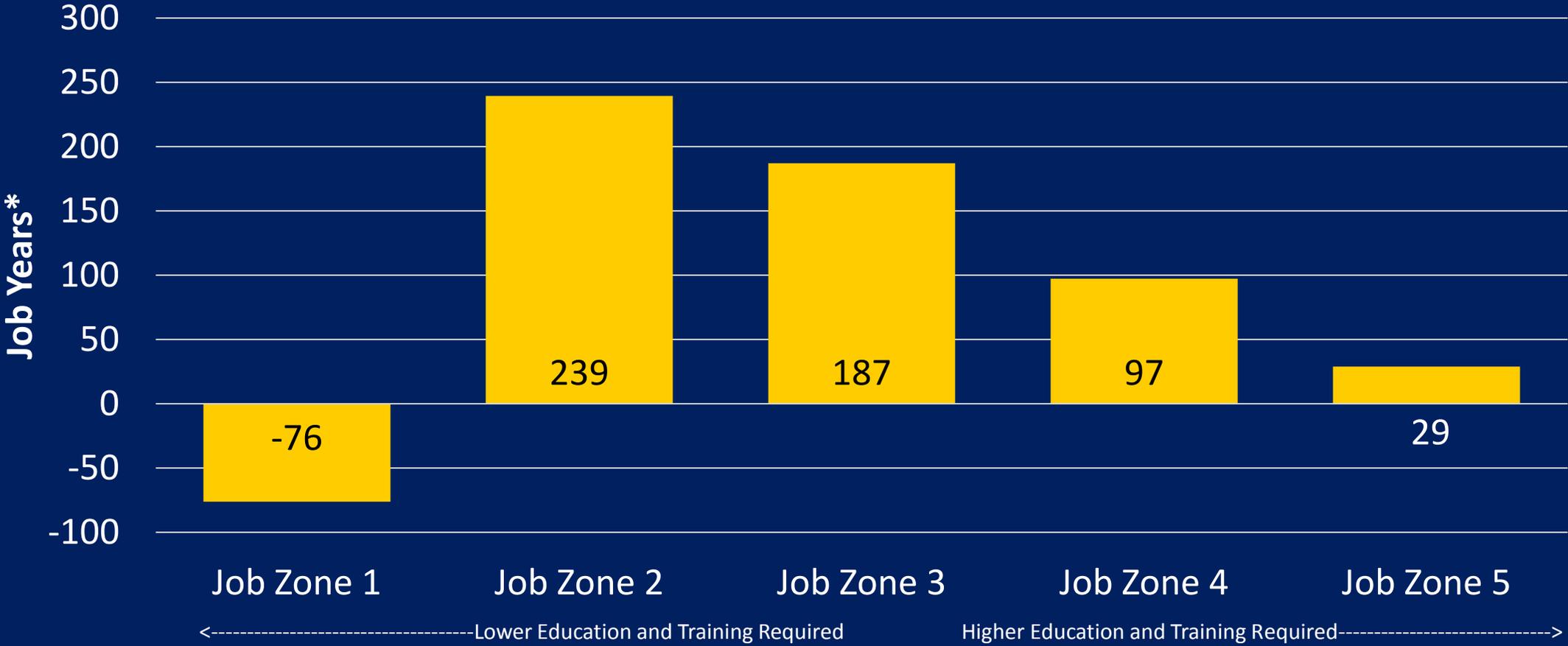
\*Difference between policy scenario one and reference case on average through 2030

# On Average Through 2030, Most Job Gains are in Medium Wage Jobs



\*Difference between policy scenario one and reference case on average through 2030

# New Jobs Typically Don't Require Much Training/Education

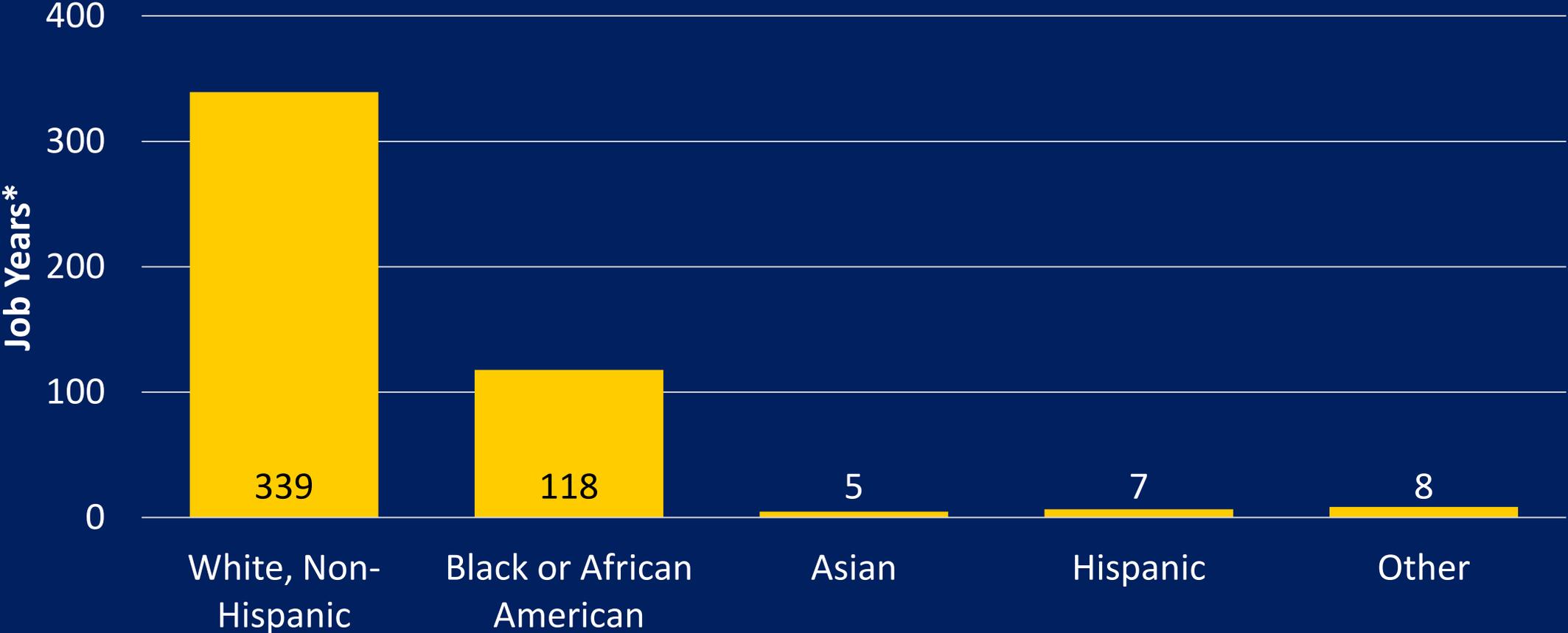


\*Difference between policy scenario one and reference case on average through 2030

# Studying Racial Equity

- RESI calculated expected employment by occupation by race for policy scenario one
- These results are an estimate of how employment by race will look for new jobs assuming current employment patterns hold in the future.
  - This analysis does not consider the impact of targeted retraining programs or a less-segregated workforce.
  - Estimates should be compared only to other policy scenarios to give a sense of distributional effects.

# Job Gains Are Primarily in Job Types Currently Held by Non-Hispanic Whites



\*Difference between policy scenario one and reference case on average through 2030

# Implications

- Policy Scenario One gets us close on emissions and meets economic 2030 goals.
  - Job, GSP, and income growth are positive on average through 2030 and 2050
  - Inflation remains low
- Reductions in VMTs seem to drive economic growth most
  - Although no one policy can be separated through modeling
  - Additional work needed on cost of transportation measures
- Most job gains are in medium-wage jobs with low training requirements
  - Good opportunity to transition new workers, or those who lose their jobs

# Next Steps

- Add in additional program costs from state agencies
- Sensitivity Analysis

# Questions?

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