



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.

Economic Impact of Policy Scenario One

September 18, 2018

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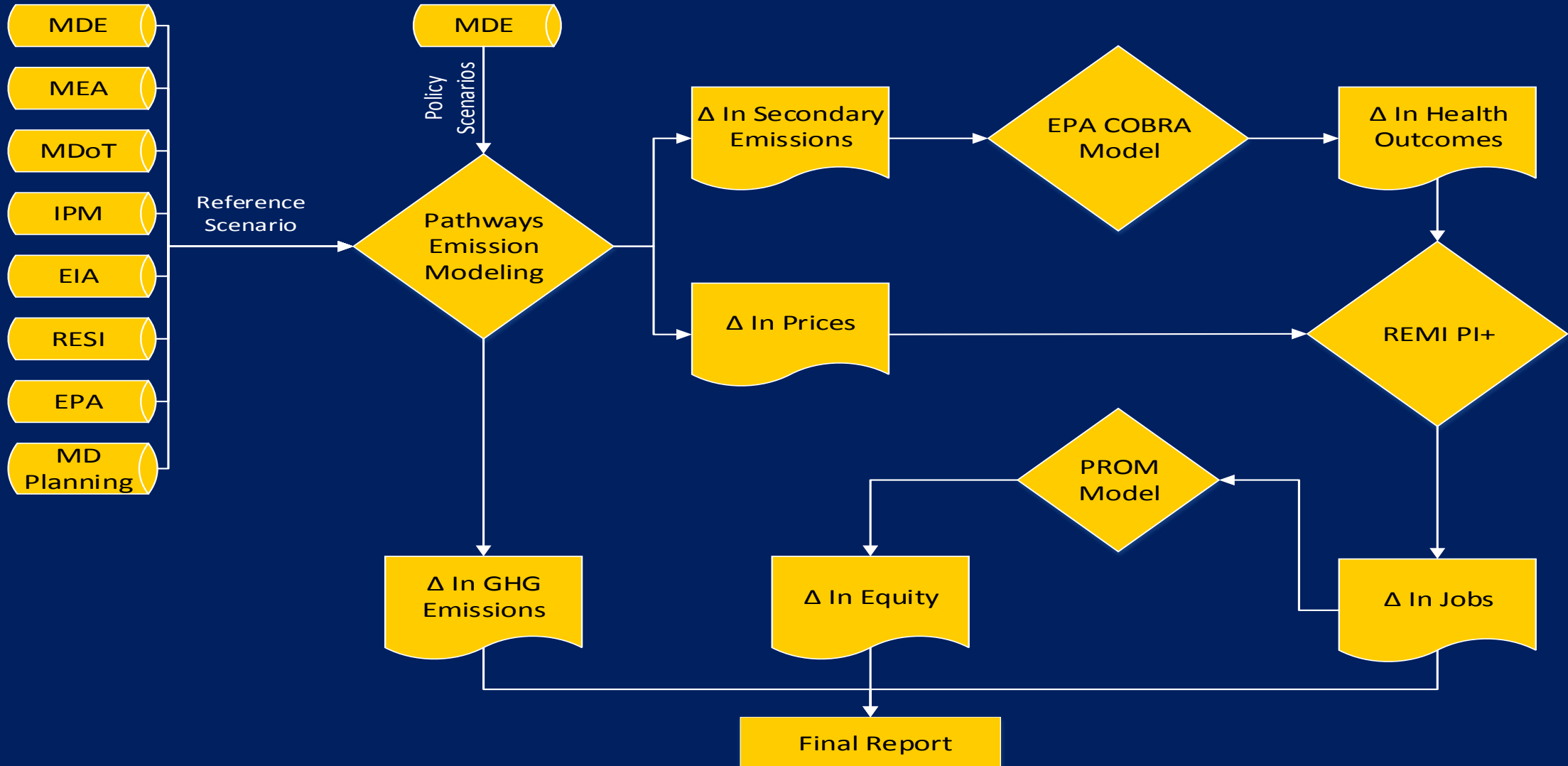
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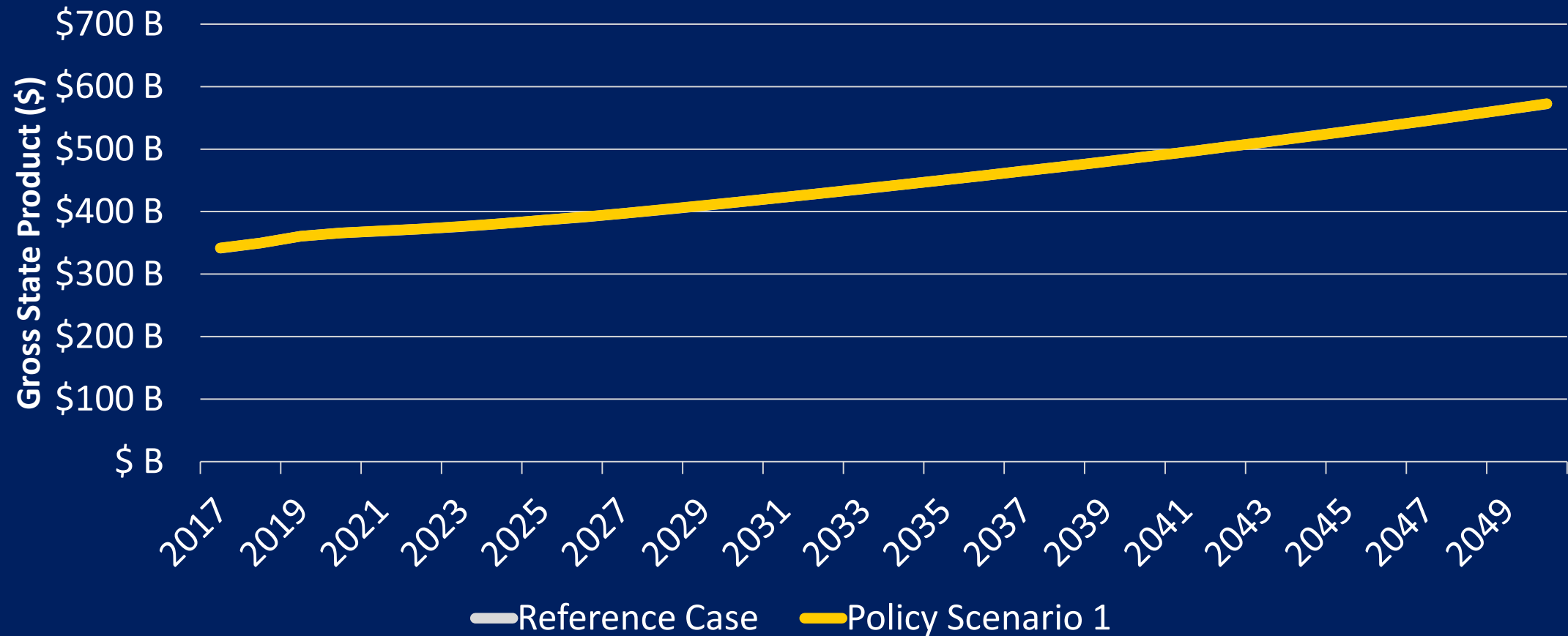


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Analysis Framework



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

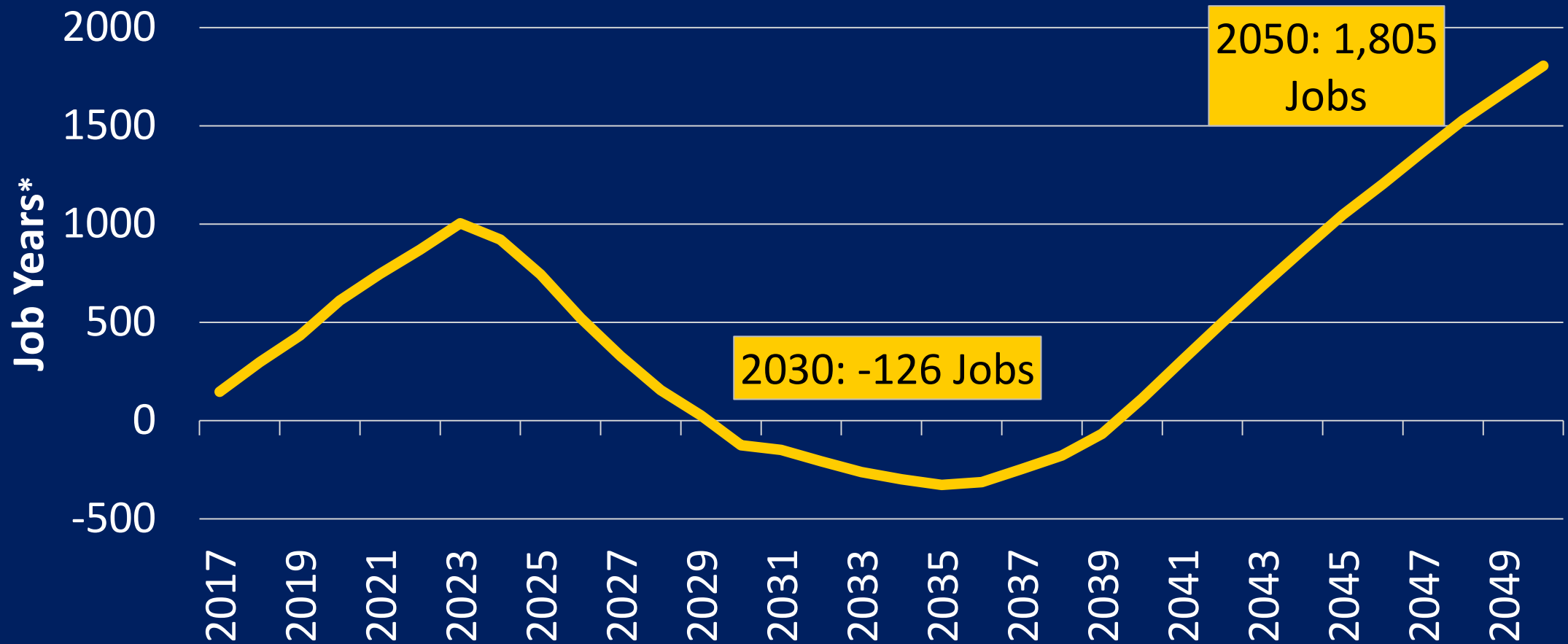


Jobs Supported by Policy Scenario One Follow a Distinct Polynomial Pattern



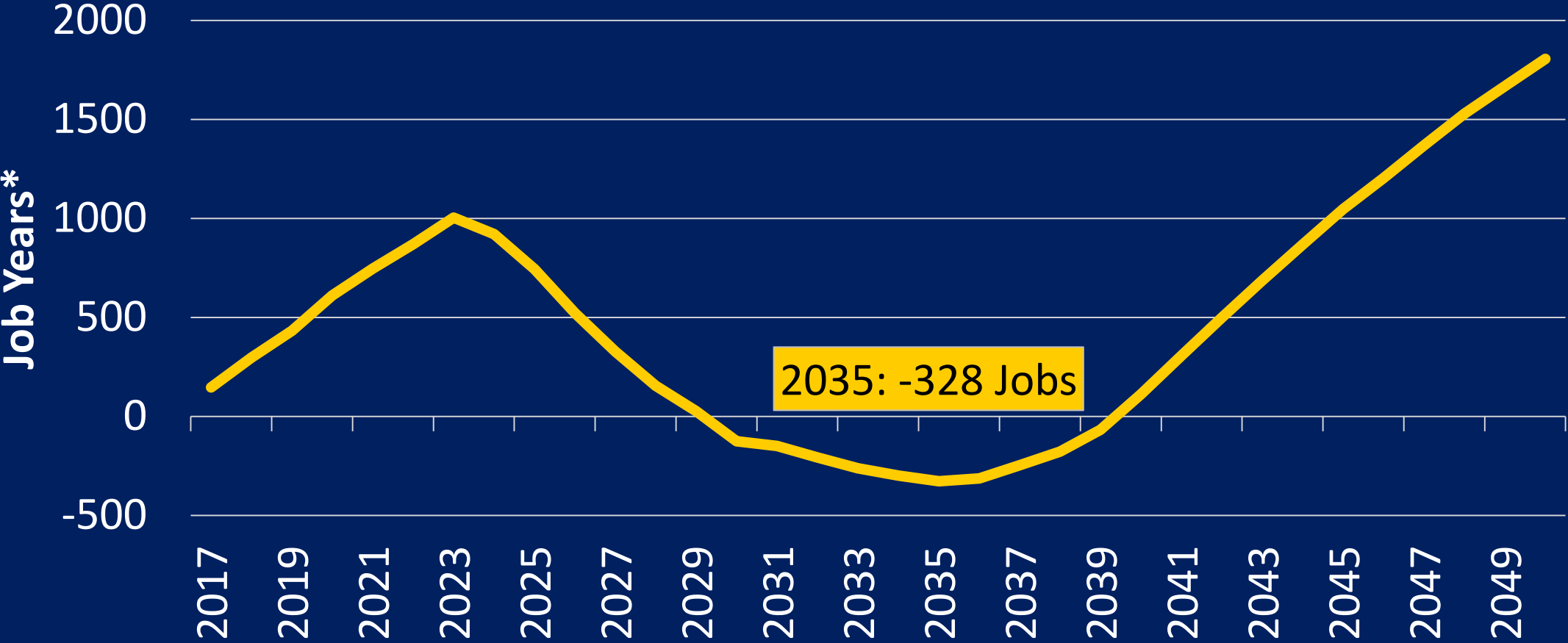
*Difference between policy scenario one and reference case

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



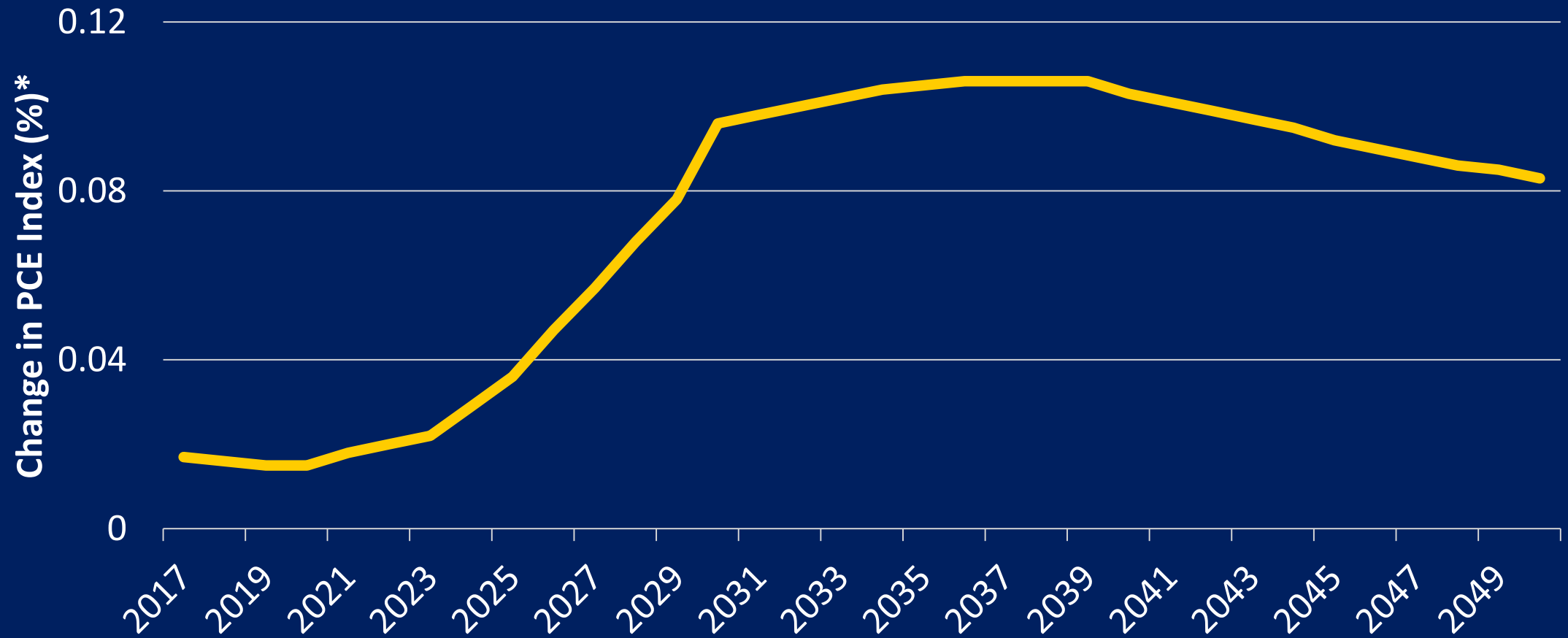
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Job Growth is Lowest Relative to the Reference Case in 2035



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



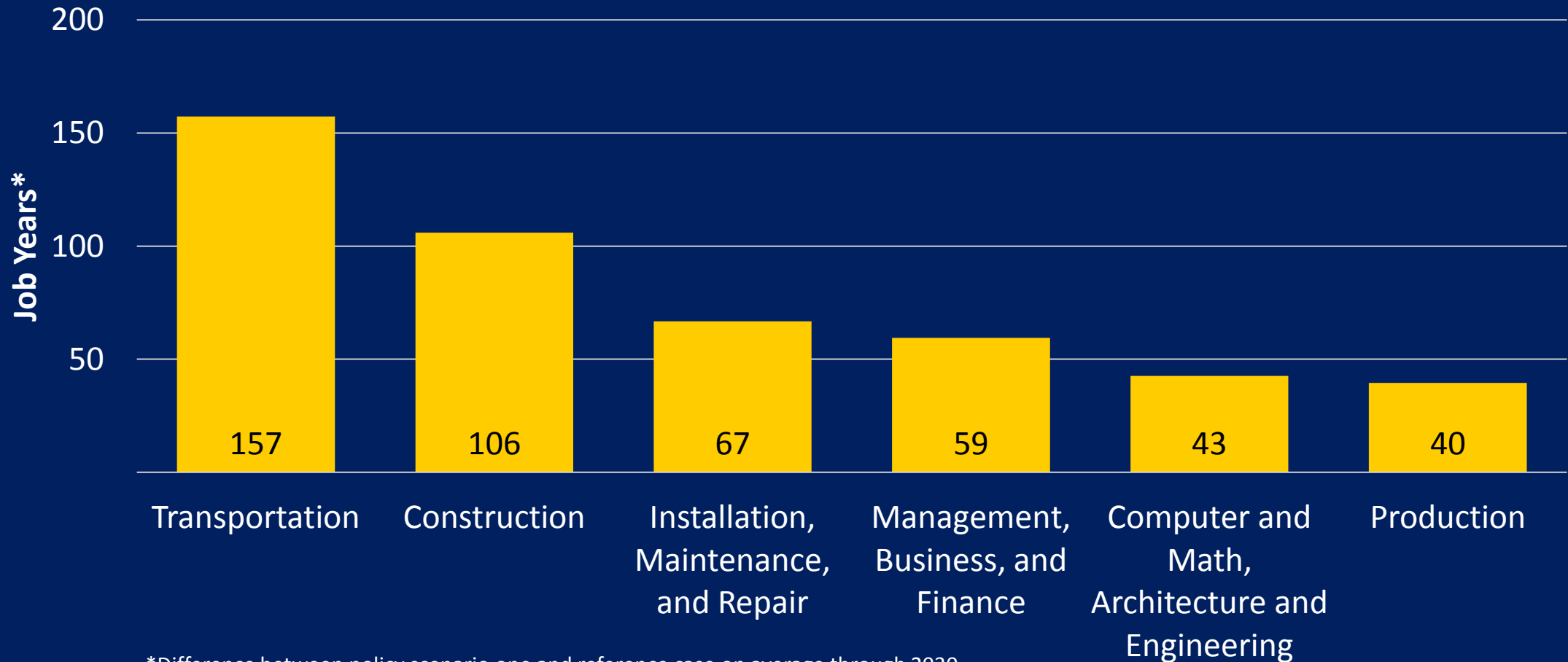
*Difference between policy scenario one and reference case

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

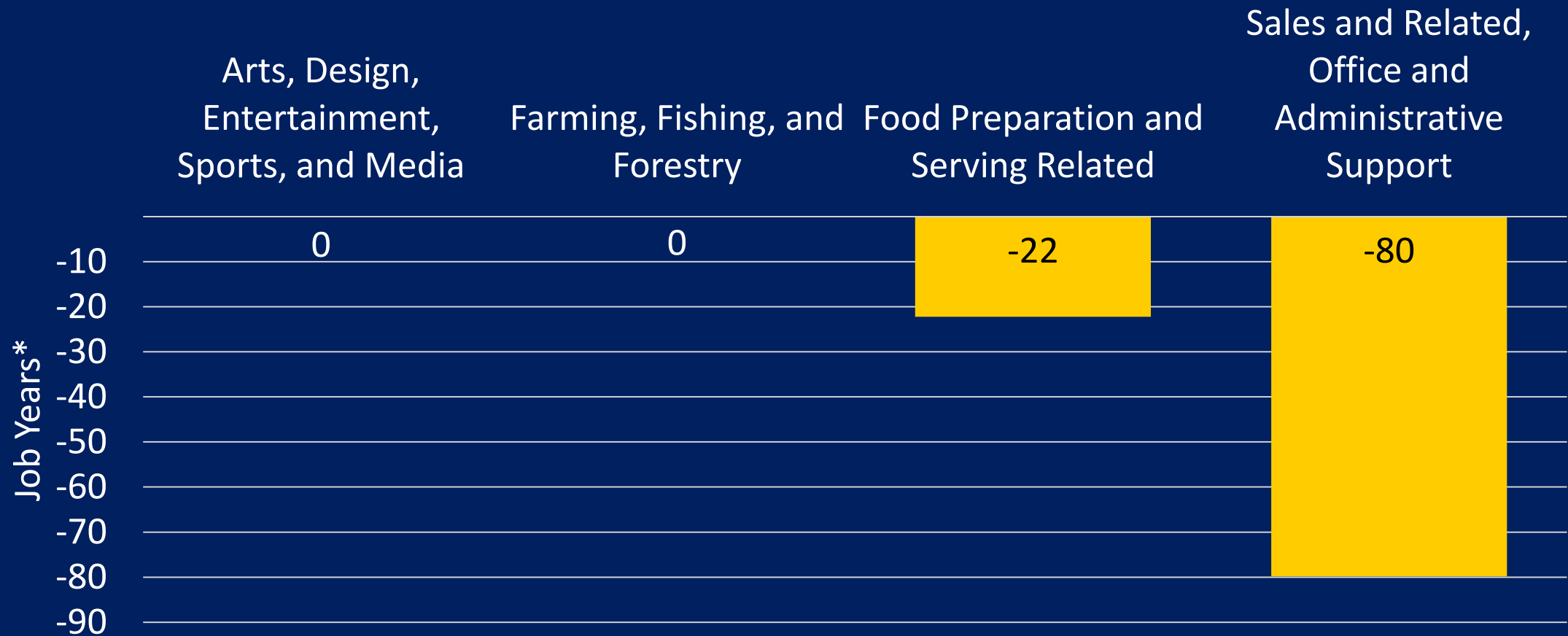
What Jobs are Being Created/Sustained?

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



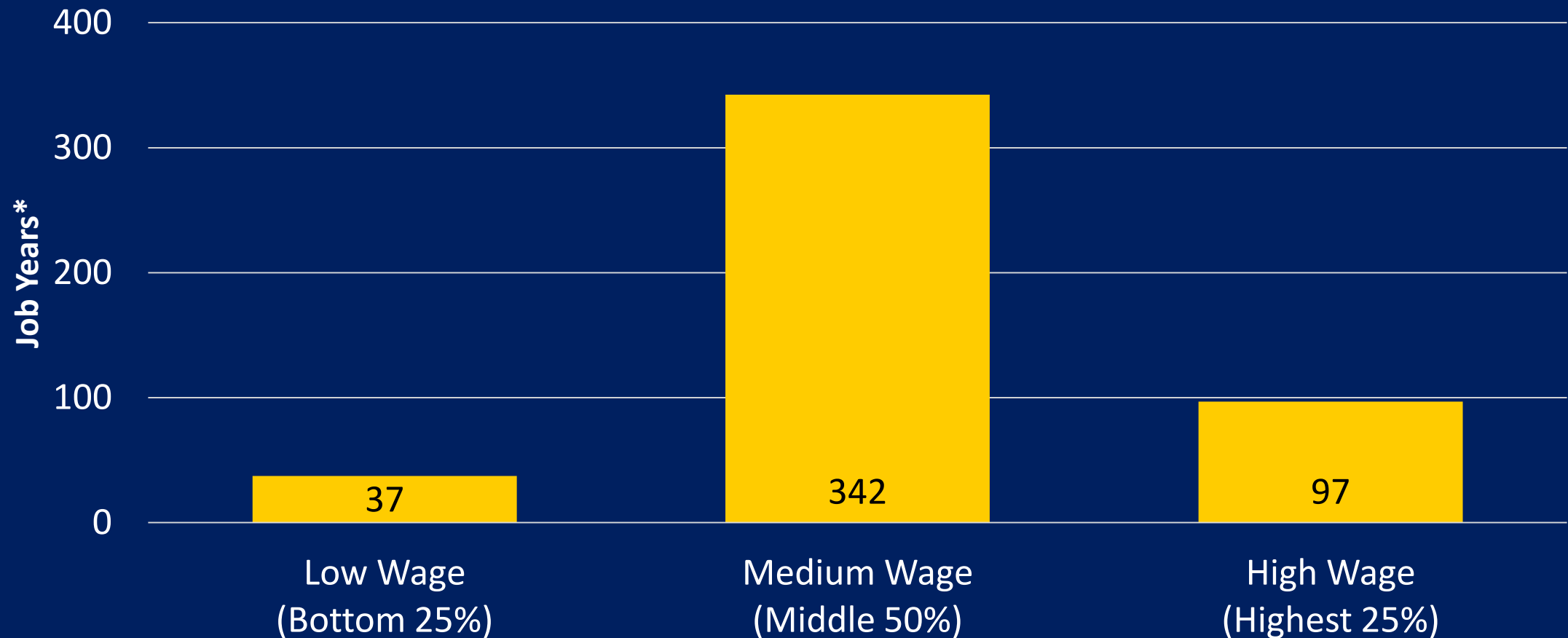
*Difference between policy scenario one and reference case on average through 2030

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



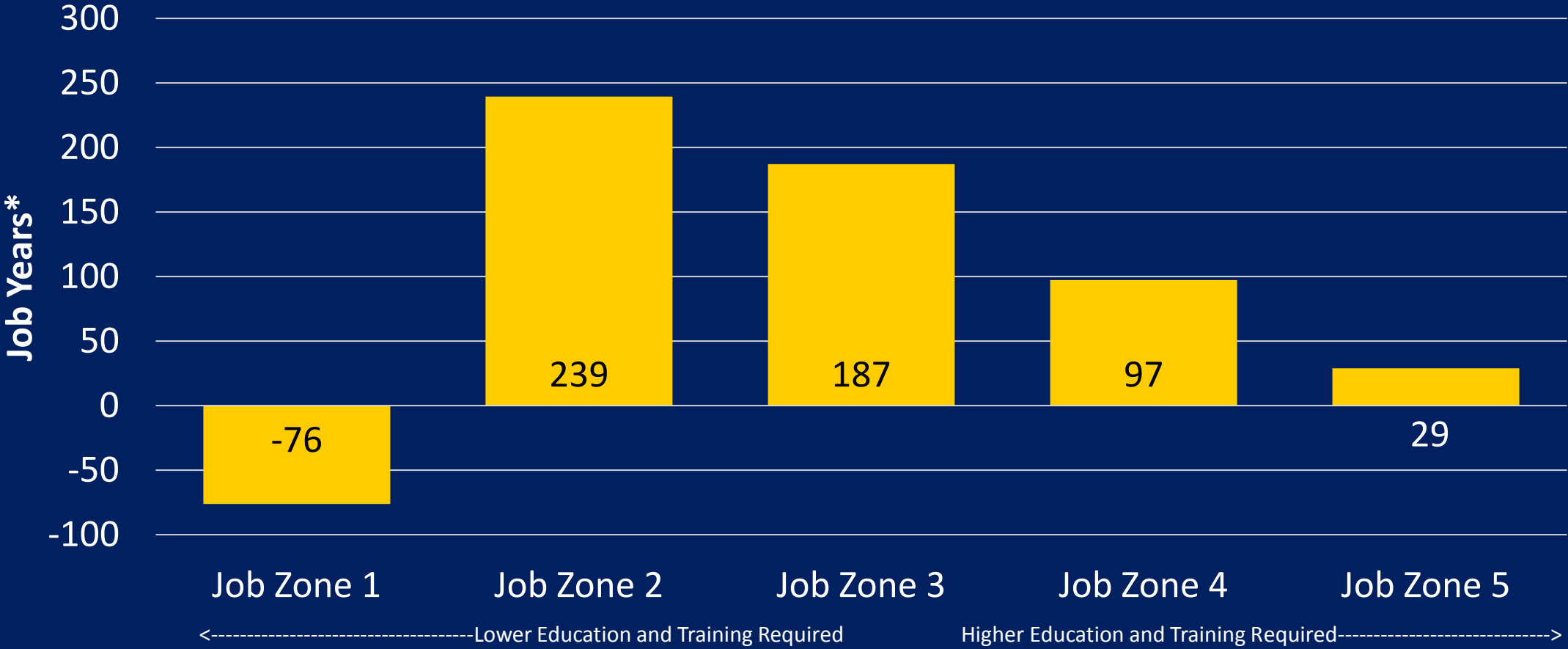
*Difference between policy scenario one and reference case on average through 2030

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

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

Questions?

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Appendix

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

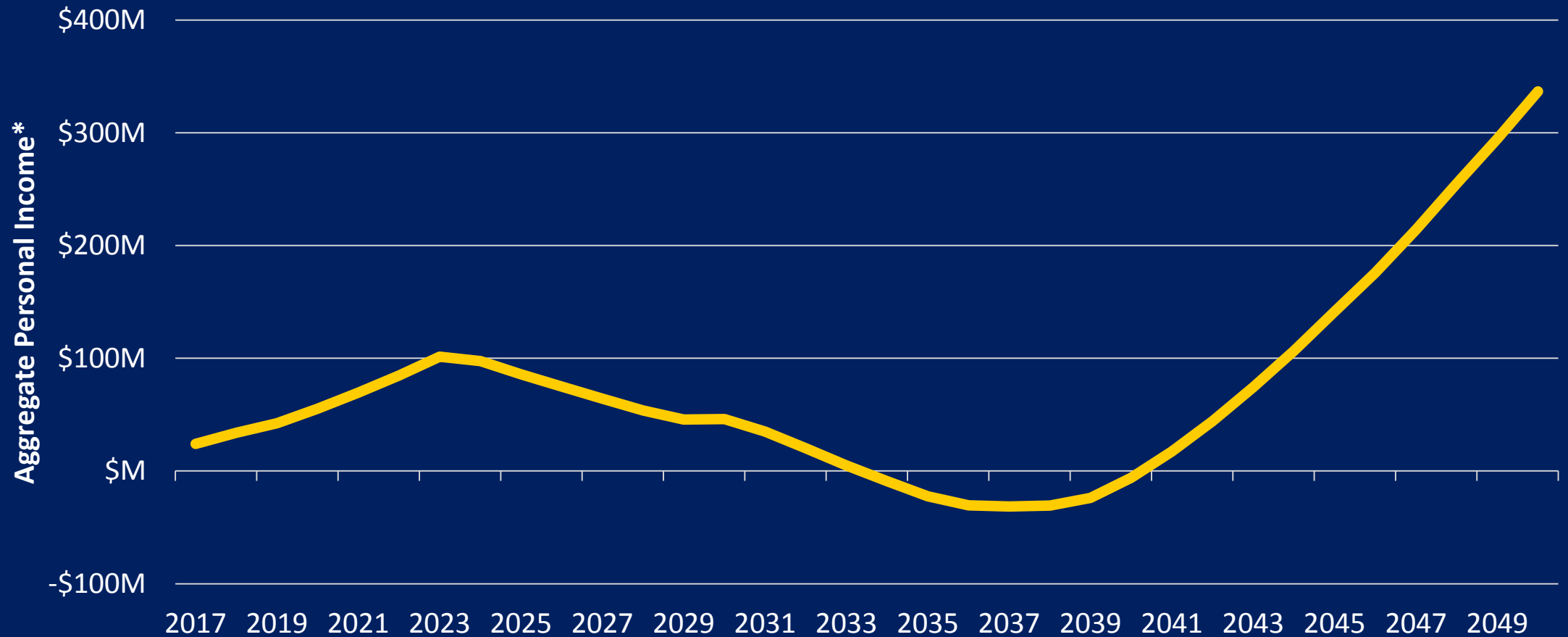
Modeling Health Benefits of Cleaner Air

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

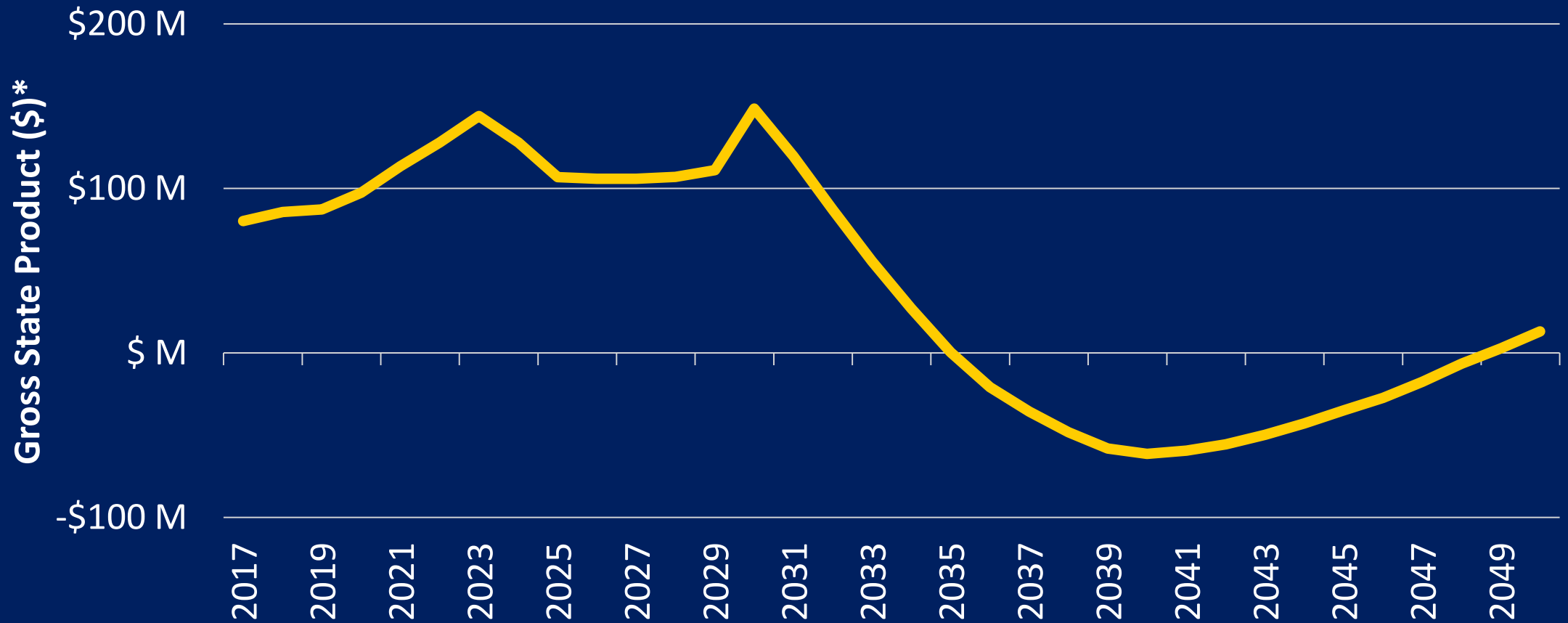
- Not all programs and policies can be explicitly modeled within Pathways/LEAP
- Additional program costs beyond normal spending levels captured within REMI
- Example of spending added in pending further data:
 - Additional spending for forestry management
 - Additional spending for major transportation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

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

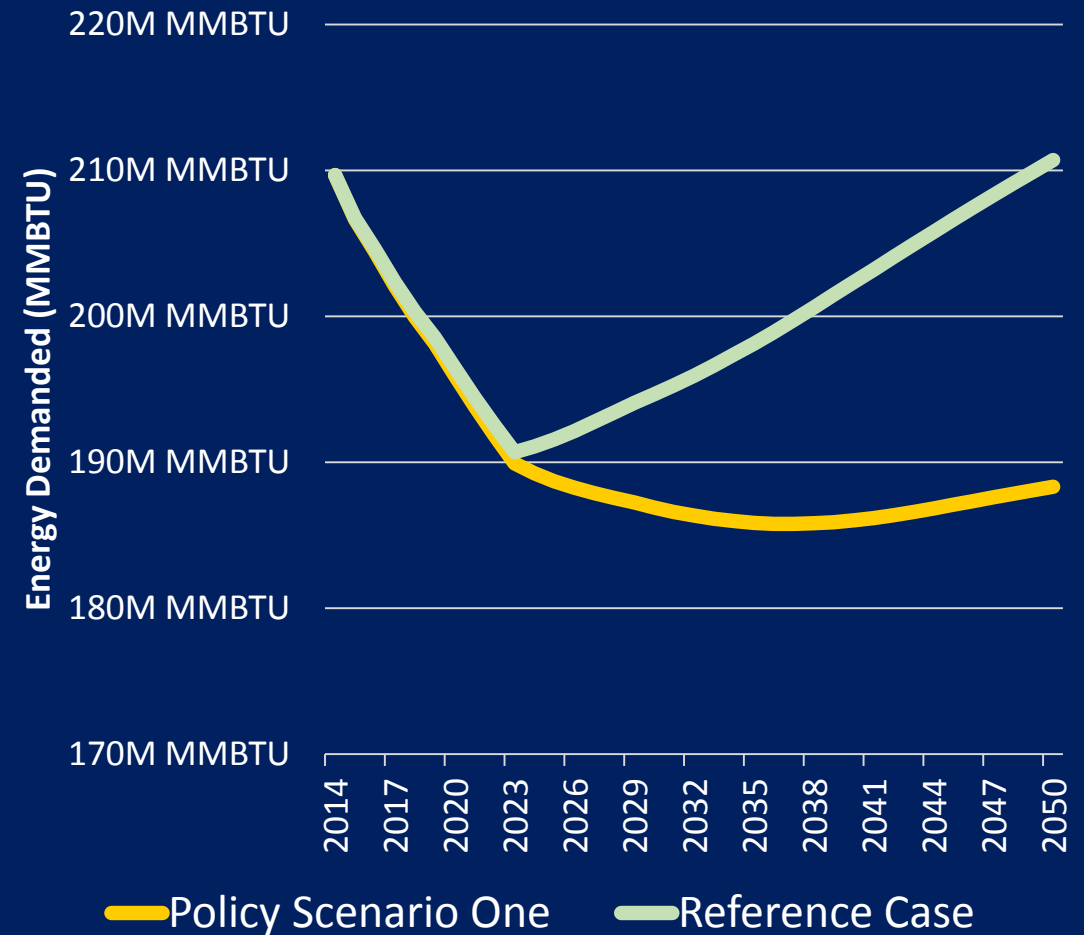


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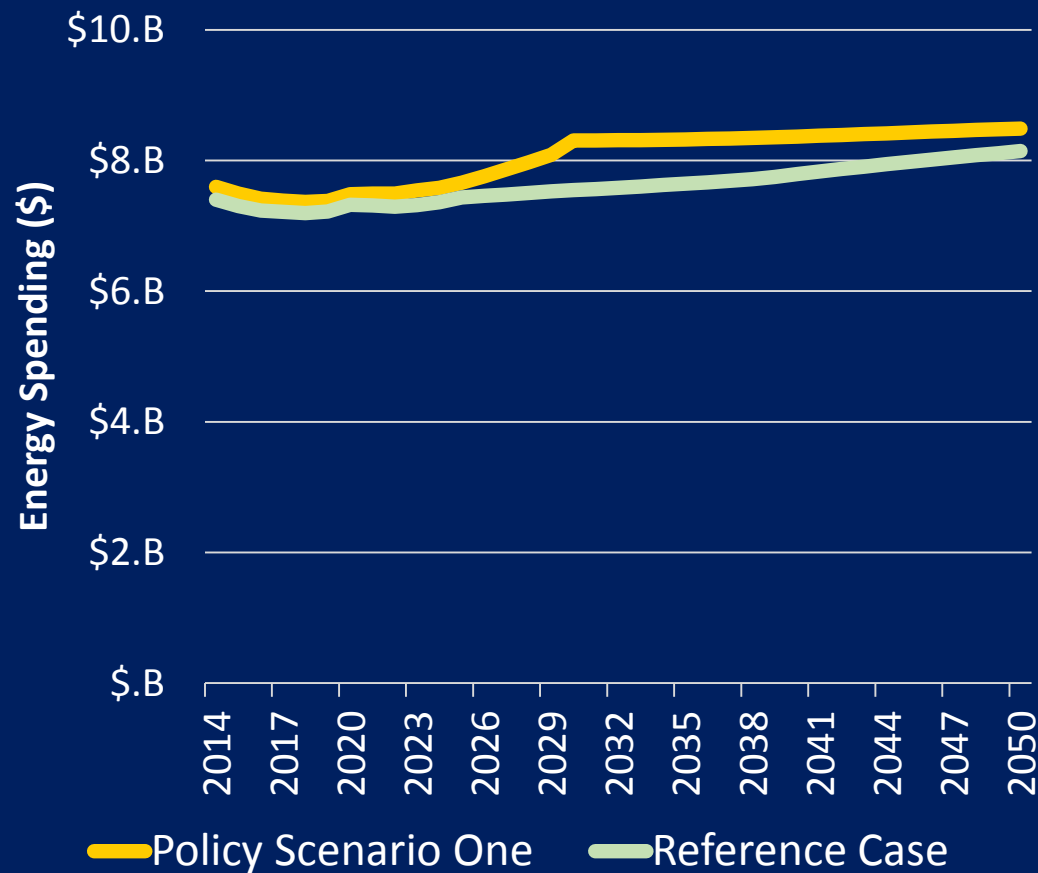
Why do We See This Pattern?

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

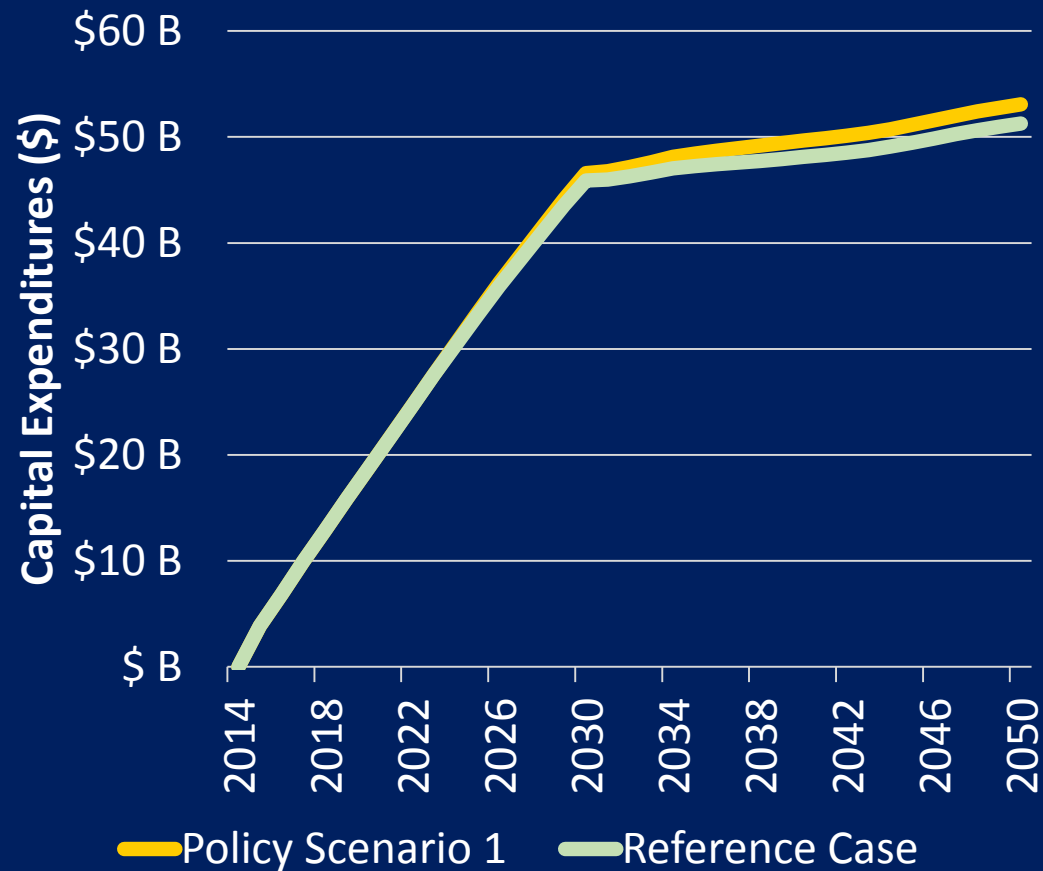


...Despite Lower Usage, the Total Amount Spent on Electricity is Higher in Policy Scenario One



- 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

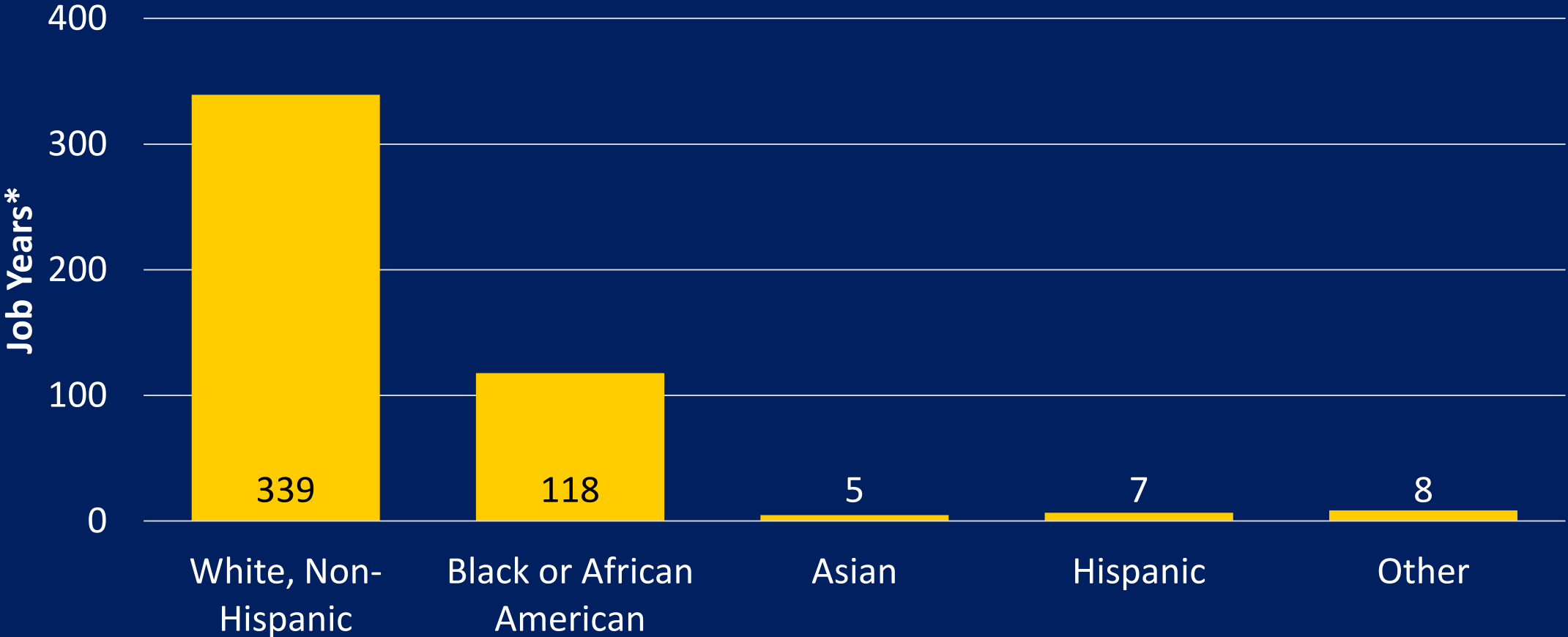


*Difference between policy scenario one and reference case

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

Next Steps

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