



November 12, 2020

# **An Overview of CBO's Work on Climate Change**

EY Corporate Carbon Forum

Phillip L. Swagel  
Director

# Questions That CBO Is Addressing About the Economic and Fiscal Effects of Climate Change and Climate Policy

How does climate change affect CBO's forecast of economic output?

How would a tax on greenhouse gases affect emissions and government revenues?

How would the burden of a tax on carbon dioxide (CO<sub>2</sub>) emissions be distributed?

How do climate change and climate change policy interact with the federal budget?

# **How Does Climate Change Affect CBO's Forecast of Economic Output?**

# Why Project the Effects of Climate Change on GDP Growth?

Climate change has many effects on the U.S. economy that are expected to reduce the growth of gross domestic product (GDP), on net.

Before publishing *The 2020 Long-Term Budget Outlook*, CBO used a long-term forecasting approach that accounted for the future effects of climate change on GDP by carrying forward trends in economic measures that were influenced by climate change.

Recent research suggests that the effects of climate change on GDP growth will increase over time, indicating that CBO's past approach would underestimate future effects.

## What Is Different in *The 2020 Long-Term Budget Outlook*?

CBO projects how real (inflation-adjusted) GDP growth would be affected by:

- Projected changes in average weather patterns (temperature and precipitation) and
- Projected increases in expected hurricane damage.

CBO separately identifies:

- The continuation of recent effects of climate change on economic growth rates (the amount previously incorporated in the agency's baseline projections) and
- Projected additional future effects on growth.

CBO projects that because of climate change, real GDP will grow more slowly each year than it would have under the climate of the late 20th century, accumulating to a 1.0 percent reduction in the projected level of real GDP in 2050.

# CBO Has Drawn on Four Econometric Studies to Estimate the Effects of Weather Patterns on Real GDP Growth

## The Studies

- The studies estimate the historical relationship between temperature and precipitation and economic output, using panel econometric methods.
- They use regional data from the United States.

## Overview of CBO's Approach

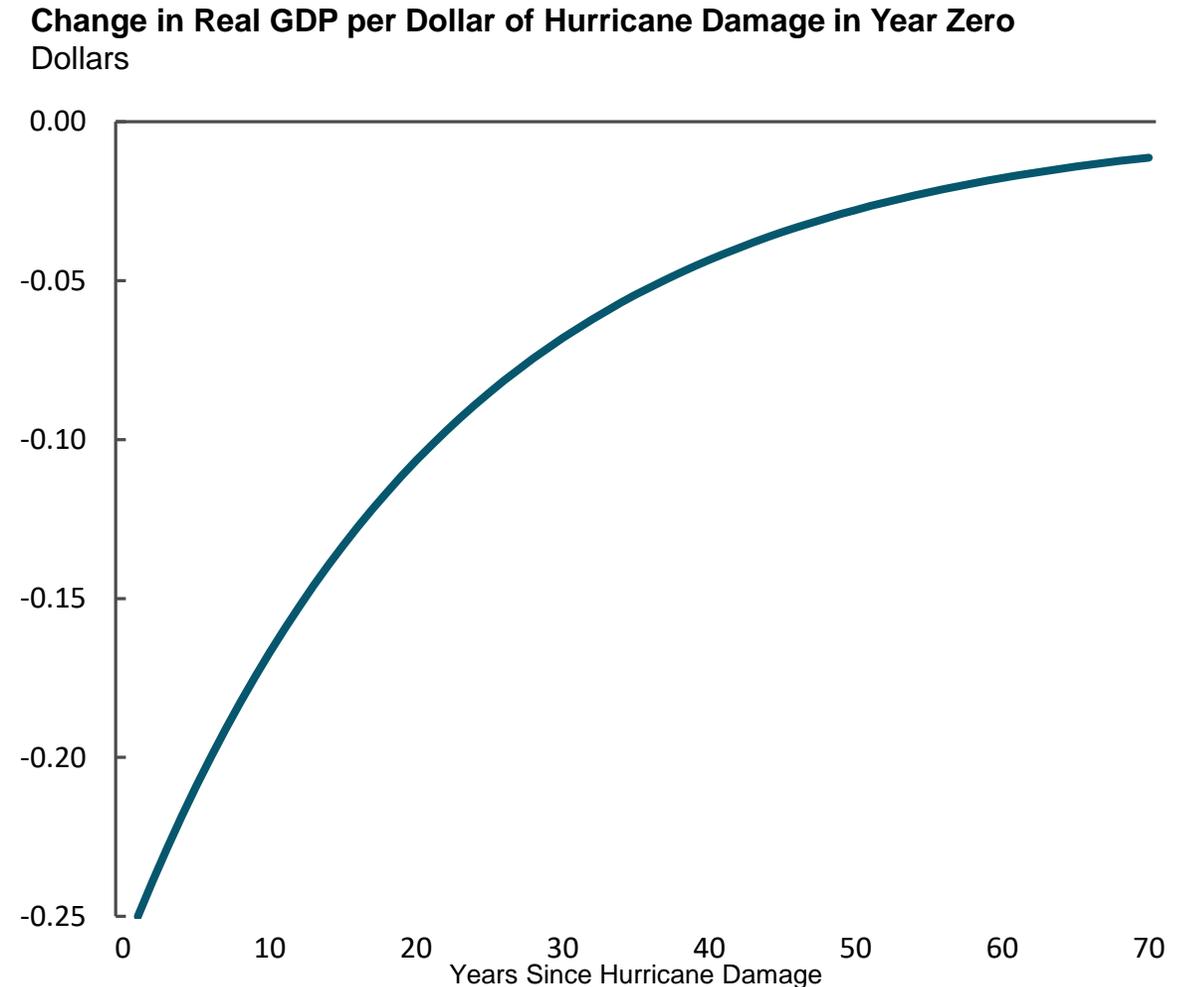
- For a given climate change scenario:
  - CBO applies each of the econometric estimates of the relationship between weather and output to project changes in economic growth.
  - Then CBO runs a meta-analysis to compute a single estimated growth effect for that climate scenario.
- Using that array of results, CBO projects the growth effect associated with the agency's central climate change scenario.

# CBO Has Drawn on Its Previous Work to Estimate the Effects of Hurricane Damage on Real GDP Growth

A 2016 report by CBO projected the effects of climate change on expected hurricane damage in 2050 on the basis of:

- An insurance industry model of damages and
- Climate scientists' projections of sea level rise and changes in hurricanes' frequency and intensity.

CBO has combined the 2050 projection with an impulse response function from a computable general equilibrium model, which translates the direct hurricane damage into effects on GDP in future years.



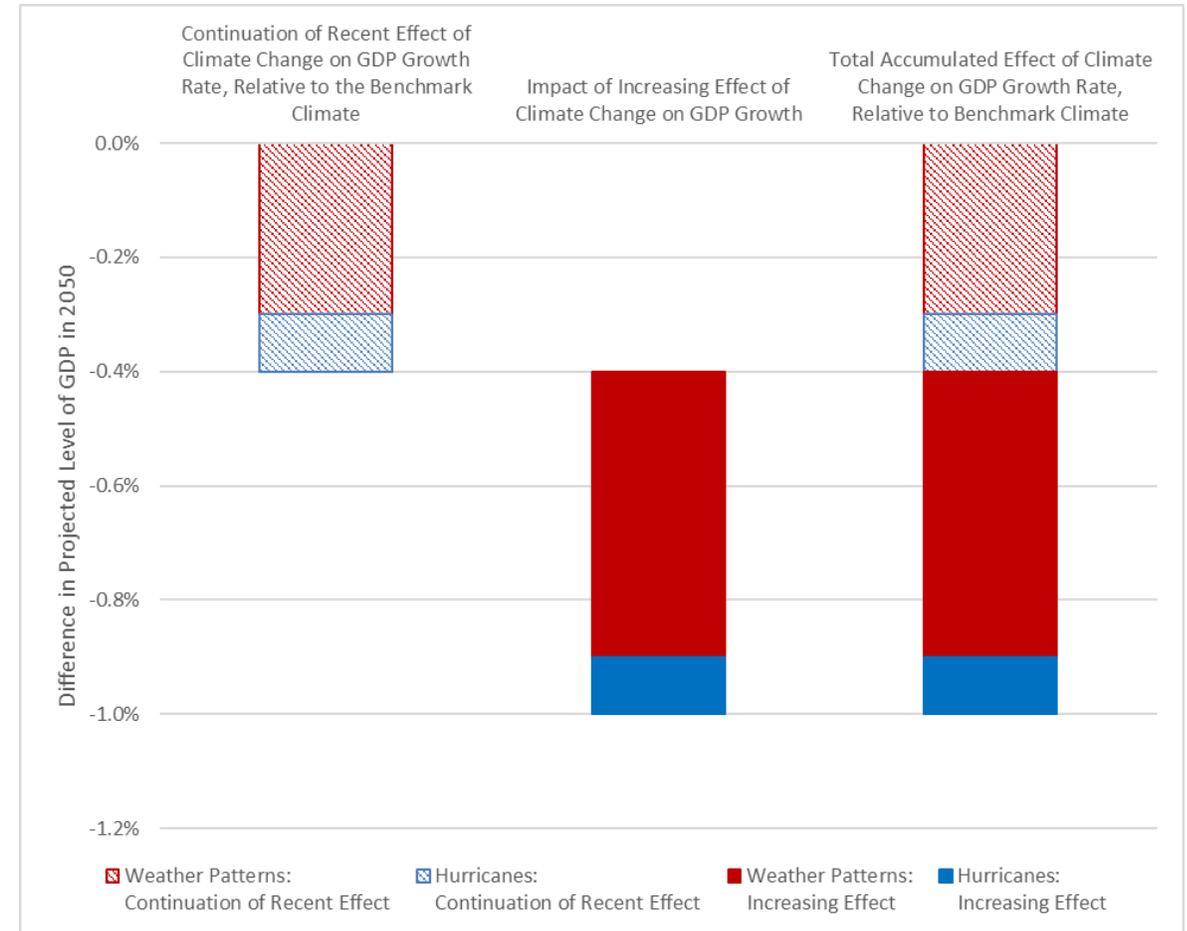
# CBO's Projections of the Effects of Changes in Weather and Increases in Hurricane Damage on Real GDP

In CBO's projections, the average growth rate of real GDP is 0.03 percentage points lower from 2020 to 2050 than it would have been under the climate of the late 20th century.

Of that amount, 0.01 percentage point was already included in CBO's earlier projections, which used the previous method.

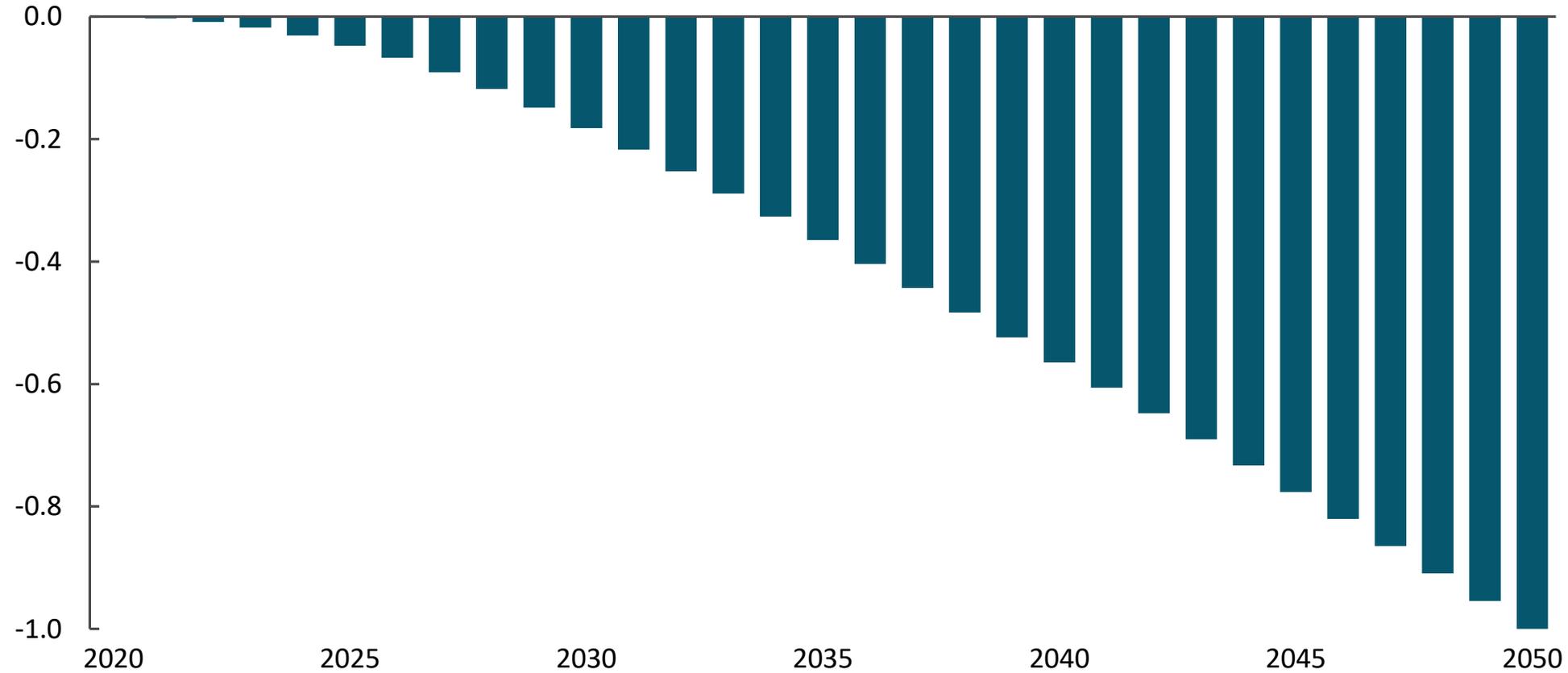
The effect on growth accumulates to the previously mentioned 1.0 percent reduction in the level of real GDP in 2050.

How Climate Change Is Expected to Change the Level of Real GDP in 2050  
Percentage of Real GDP

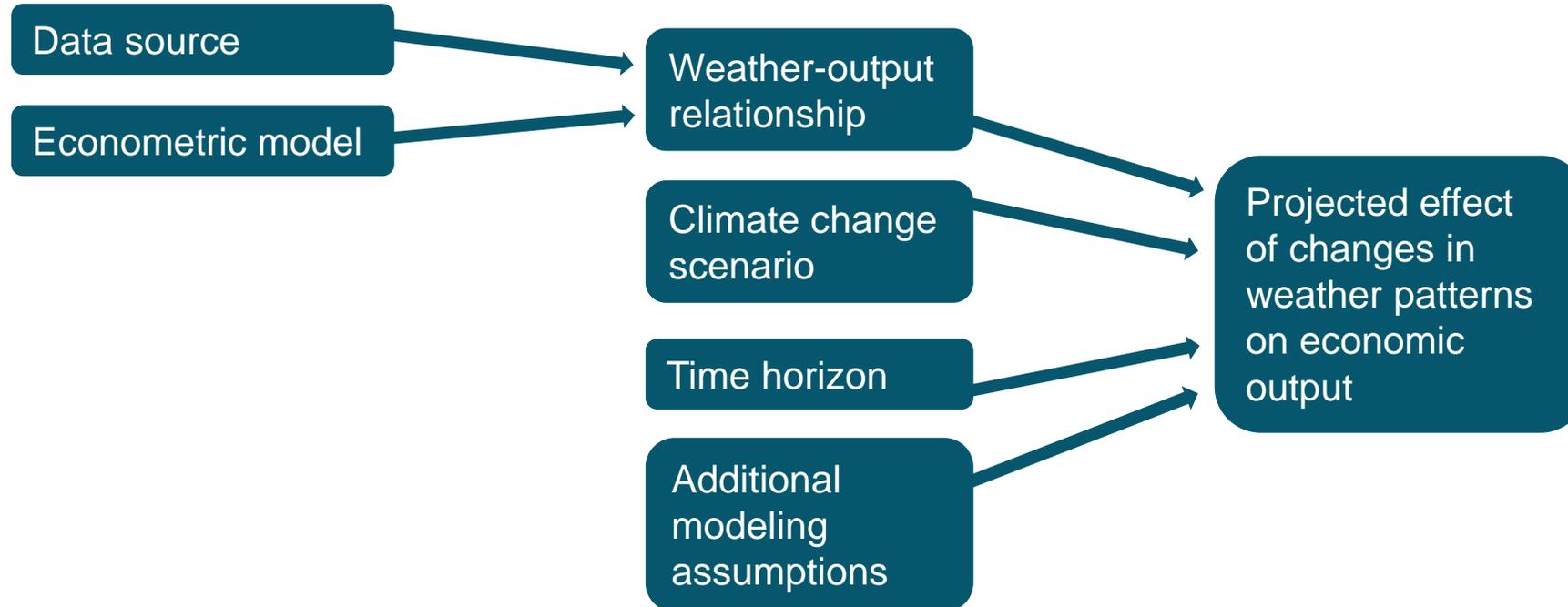


# CBO's Estimate of Forgone GDP

Percentage of Real GDP



# How CBO Used Studies of Weather Patterns and Output in Its Projection

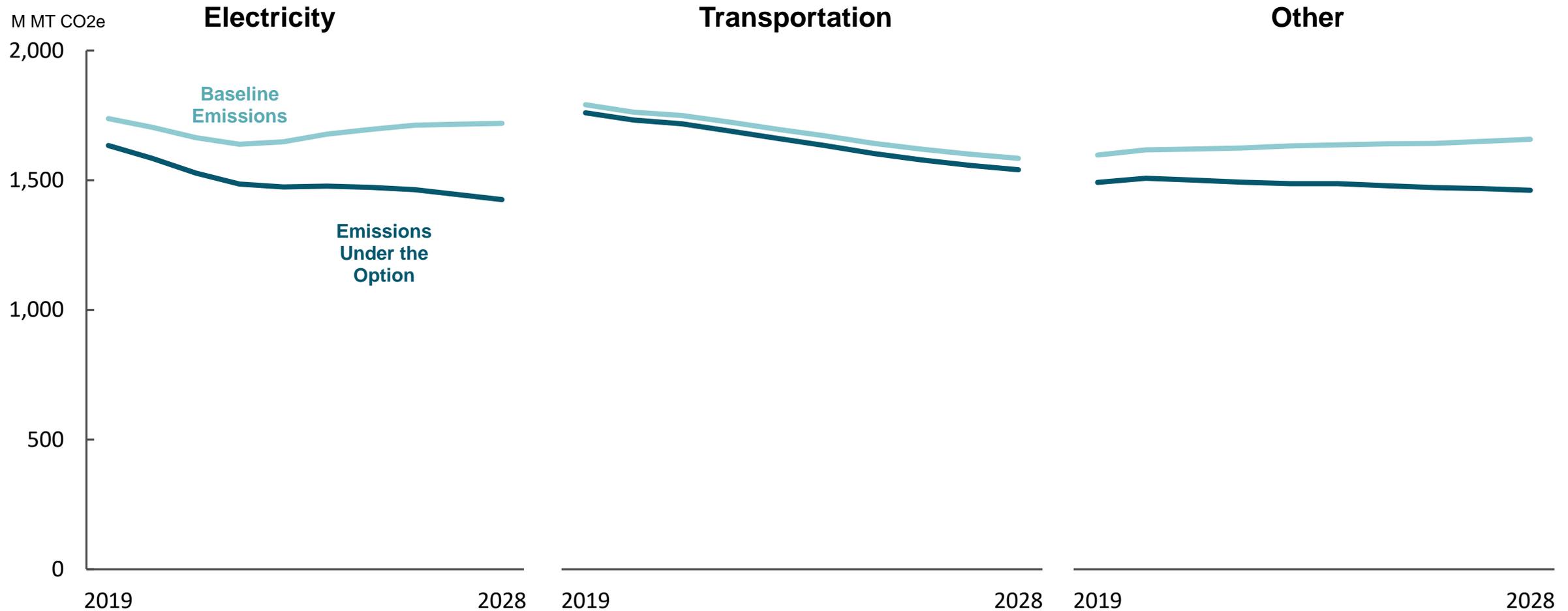


# **How Would a Tax on Greenhouse Gases Affect Emissions and Government Revenues?**

# Changes in Revenues and Emissions From a Tax on Greenhouse Gases That Starts at \$25 Per Ton and Rises at a Real Rate of 2 Percent per Year

	Projected Values									
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
<b>Tax on GHG Emissions (Nominal dollars per metric ton of carbon dioxide equivalent)</b>	25	26	27	28	29	31	32	33	35	36
<b>Total Covered Baseline GHG Emissions (Millions of metric tons of carbon dioxide equivalent)</b>	5,456	5,418	5,373	5,330	5,324	5,336	5,334	5,335	5,332	5,331
<b>Total Covered GHG Emissions Under the Option (Millions of metric tons of carbon dioxide equivalent)</b>	5,214	5,152	5,073	4,992	4,945	4,919	4,876	4,835	4,791	4,748
<b>Change in Fiscal Year Revenues (Billions of nominal dollars)</b>	66	103	106	108	111	115	119	120	123	127

# Reduction in Emissions From a Tax on Greenhouse Gases That Starts at \$25 per Ton and Rises at a Real Rate of 2 Percent per Year



See Congressional Budget Office, *Options for Reducing the Deficit: 2019 to 2028* (December 2018), [www.cbo.gov/publication/54667](http://www.cbo.gov/publication/54667). M MT CO<sub>2</sub>e = millions of metric tons of carbon dioxide equivalent.