

CBO

Public Spending on Transportation and Water Infrastructure, 1956 to 2014



MARCH 2015

Notes

Except where noted otherwise, dollar amounts are expressed in 2014 dollars. Nominal (current-dollar) spending was adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build, operate, and maintain transportation and water infrastructure.

Spending is reported by federal fiscal year, which runs from October 1 through September 30 and is designated by the calendar year in which it ends.

Numbers in the text and figures may not add up to totals because of rounding.

On the cover, the image of highway traffic is an altered version of a photograph from Flickr, where it is attributed to NCDOTcommunications and posted subject to the Creative Commons Attribution 2.0 license. The other three images are ©Shutterstock.

Detailed spending tables are available online as a supplement to this report (www.cbo.gov/publication/49910).



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Public Spending on Transportation and Water Infrastructure, 1956 to 2014

Summary

Public spending—spending by federal, state, and local governments—on transportation and water infrastructure totaled \$416 billion in 2014. Most of that spending came from state and local governments: They provided \$320 billion, and the federal government accounted for \$96 billion.

This report provides information on spending for six types of transportation and water infrastructure:

- Highways,
- Mass transit and rail,
- Aviation,
- Water transportation,
- Water resources, and
- Water utilities.

Such spending can also be divided into two broad categories—spending to purchase physical capital related to infrastructure (as well as the labor and other inputs necessary for improving and rehabilitating structures and equipment already in place) and

spending to operate and maintain infrastructure. In 2014, spending for capital accounted for 43 percent of total public spending on transportation and water infrastructure, and spending for operation and maintenance for 57 percent.

Prices of Materials and Other Inputs Used for Transportation and Water Infrastructure Began to Rise Rapidly in 2003

In 2003, the average price of materials (asphalt, concrete, and cement, for example) and other inputs used to build, operate, and maintain transportation and water infrastructure began to rise rapidly. Nominal public spending on that infrastructure increased by 44 percent between 2003 and 2014, but because prices of materials and other inputs rose more quickly than nominal spending, real (inflation-adjusted) public purchases decreased, falling by 9 percent from their peak in 2003 to their level in 2014 (see the figure on page 2).

This report is concerned primarily with real spending as calculated using infrastructure-specific price indexes. Such measurements most comprehensively illustrate changes in real purchases over time, with a decrease in real spending representing fewer

lane-miles of highways or fewer airport runways, for example.

Other measurements provide different perspectives on changes in public spending on transportation and water infrastructure, especially for the 2003–2014 period. Adjusting nominal spending to remove the effects of inflation using the gross domestic product (GDP) price index can be helpful when examining changes in the allocation of real budgetary resources over time. Because prices in the economy as a whole rose at less than half of the rate of prices of infrastructure-related materials from 2003 to 2014, real infrastructure spending adjusted with the GDP price index *rose* by 15 percent. By contrast, measured as a percentage of GDP, spending on transportation and water infrastructure *fell* by 5 percent during that period.

The decline in real public spending (adjusted using infrastructure-specific price indexes) on transportation and water infrastructure between 2003 and 2014 occurred almost exclusively within the category of capital purchases, which fell by 23 percent during those years. The construction and rehabilitation of highways, in particular, declined over the period. By contrast, real public spending for

the operation and maintenance of infrastructure continued its historical tendency to grow, rising by about 6 percent over that period, primarily because of increases at the state and local level.

Although all levels of government have spent less, in real terms, on transportation and water infrastructure in recent years than in the past, the greatest reduction has occurred at the federal level. Adjusted for inflation, federal purchases have fallen by about 19 percent since 2003, while purchases by states and localities have fallen by about 5 percent. The significant difference between those declines reflects the facts that a much larger portion of federal infrastructure spending than of state and local spending is for capital and that capital has become much more expensive to purchase over the period relative to operation and maintenance services.

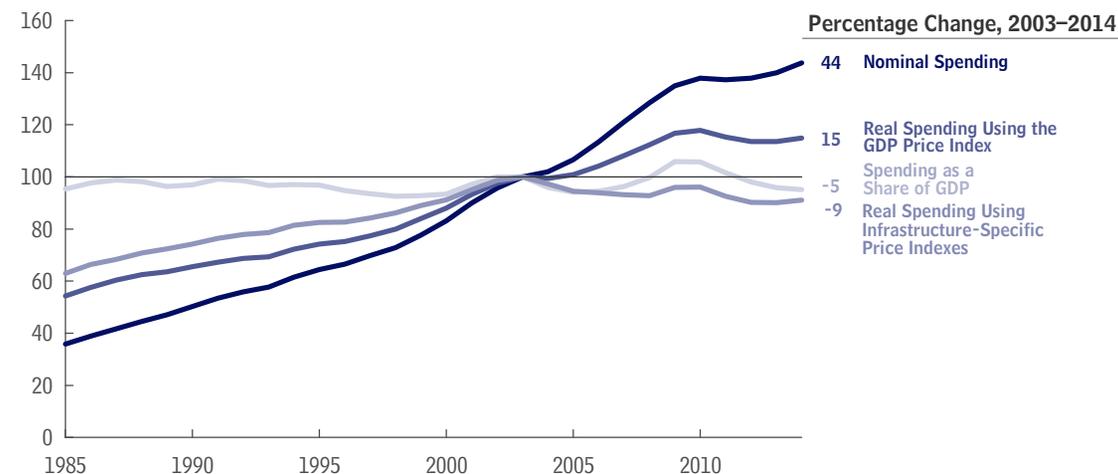
The costs of building transportation and water infrastructure in the future will depend on a number of factors, but at least one development—the recent decline in the price of oil—suggests that those costs might soon increase at a slower rate. Not only is petroleum used as fuel in construction vehicles, it also is an important component of the asphalt used to build highways and runways.

Public Spending on Transportation and Water Infrastructure Has Been a Fairly Constant Share of Economic Activity for 30 Years

As a share of GDP, public spending on transportation and water infrastructure over the past three decades has hovered at about 2.4 percent, which is 0.6 percentage points lower than the peak of 3.0 percent in 1959. That share rose briefly in 2009 and 2010, to 2.7 percent, as a result of the temporary increase in federal outlays brought about

Various Measures of Public Spending on Transportation and Water Infrastructure, 1985 to 2014

Index, 2003 = 100



Source: Congressional Budget Office.

Note: GDP = gross domestic product.

by the enacting of the American Recovery and Reinvestment Act of 2009 (ARRA). In nominal terms, total federal outlays under ARRA from 2009 to 2014 were \$55 billion, about one-half of which was spent in 2009 and 2010. More recently, the caps on federal funding established in the Budget Control Act of 2011 and subsequently amended may have exerted downward pressure on federal infrastructure spending by limiting the growth of discretionary spending; under current law, those caps will remain in effect through 2021.

Introduction

This report provides information on spending for transportation and water infrastructure funded by federal, state, and local governments; it updates

information provided in previous reports, the most recent of which was published in November 2010.¹ On several occasions in the past, infrastructure spending has been boosted by major legislation, often directed toward specific types of infrastructure. The public sector typically undertakes such spending for reasons related to economic efficiency, though a variety of other concerns, including promoting equity, may also serve as motivation. In the Congressional Budget Office’s view, that public investment has raised overall economic output, although the effects on output of particular investments have varied widely.

1. Congressional Budget Office, *Public Spending on Transportation and Water Infrastructure* (November 2010), www.cbo.gov/publication/21902.

What Types of Public Infrastructure Spending Does This Report Address?

To examine trends in infrastructure spending, CBO has compiled data on public spending on transportation and water infrastructure, which together account for the bulk of federal spending for infrastructure.²

Transportation infrastructure includes the following types of infrastructure:

- *Highways*—national, state, and local roads, including bridges and tunnels;³
- *Mass transit and rail*—buses, subways, commuter rail systems, and the intercity passenger system run by Amtrak;⁴
- *Aviation*—airport terminals, runways, taxiways, and the air traffic control system; and

2. For information on spending for other types of infrastructure, including energy and telecommunications infrastructure (which is provided primarily by private-sector firms) and school facilities and equipment (which are provided largely by state and local governments), see Congressional Budget Office, *Issues and Options in Infrastructure Investment* (May 2008), www.cbo.gov/publication/19633.

3. Although this report uses a broad definition of *highway* that includes all roads, in the context of federal spending the term is often used to refer only to those roads that are eligible for assistance under the Federal-Aid Highway program—the 160,000-mile network of the National Highway System (of which the Interstate Highway System is a subset) and 1 million additional miles of urban and rural roads.

- *Water transportation*—waterways, ports, and the equipment used to support sea-borne traffic (such as Coast Guard vessels).⁵

Water infrastructure comprises two main types of infrastructure:

- *Water resources*—water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers); and
- *Water utilities*—supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants.

Spending for all types of infrastructure can be further divided into two categories—spending for capital and spending for operation and maintenance—based on the purpose it serves. Capital spending includes outlays for the purchase of new structures (such as highways, dams, and waste-

4. Freight rail infrastructure is typically owned and operated by the private sector, but the public sector is responsible for oversight of the freight rail system. The Surface Transportation Board, a federal agency, is charged with resolving railroad rate and service disputes as well as with reviewing proposed railroad mergers. Since 2010, the federal government has provided funds for a range of transportation infrastructure projects, including some freight rail corridor improvements, through the TIGER (Transportation Investment Generating Economic Recovery) grant program. State and local governments do not report their expenditures for freight rail to the Census Bureau but do report expenditures for passenger rail under the mass transit category.

5. Although many of the costs associated with maintaining harbors and navigation channels are included in the water transportation category, all spending by the Army Corps of Engineers for water navigation projects is included in the water resources category.

water treatment facilities) and equipment (such as buses and railcars), as well as expenditures for the improvement and rehabilitation of structures and equipment already in place. Operation and maintenance costs include not only the costs of providing necessary operating services (such as administering the air traffic control system) and of maintaining and repairing existing capital but also the costs of funding various other infrastructure-related programs (education programs, such as those on highway safety, or research and development programs directly related to transportation and water infrastructure, for example).

Tax expenditures—tax revenues that governments forgo when they offer tax reductions for certain economic activities—are excluded from spending totals in this report. The revenue forgone for tax-preferred bonds, which state and local governments often issue to finance infrastructure projects, is one example of such an expenditure because those bonds allow investors to exclude from their income tax liabilities the interest earned on them. Although the estimates in this report do not include tax expenditures for infrastructure, evidence suggests that they amounted to between \$4 billion and \$6 billion in 2012 (estimates of tax expenditures at the state level are not available).⁶

6. See testimony of Joseph Kile, Assistant Director for Microeconomic Studies, Congressional Budget Office, before the Senate Committee on Finance, *The Status of the Highway Trust Fund and Options for Financing Highway Spending* (May 6, 2014), pp. 11–13, www.cbo.gov/publication/45315, and Congressional Budget Office, *Subsidizing Infrastructure Investment With Tax-Preferred Bonds* (October 2009), www.cbo.gov/publication/41359.

What Major Federal Legislation Has Affected Spending on Transportation and Water Infrastructure?

On several occasions in the past, legislative action has prompted significant increases in federal infrastructure spending, often directed toward specific types of infrastructure. The Federal-Aid Highway Act of 1956, which authorized construction of the Interstate Highway System, caused federal spending on highways to rise in the 1950s and 1960s. Similarly, federal spending on water utilities increased in the mid-1970s, after the Clean Water Act of 1972 committed federal funds to improving water quality. The Transportation Equity Act for the 21st Century, enacted in 1998, increased federal support for highways and mass transit projects. More recently, the American Recovery and Reinvestment Act of 2009 temporarily boosted federal spending on a variety of transportation and water infrastructure.

In 2011, the Budget Control Act established caps on discretionary funding for nondefense programs that have lowered aggregate funding for those programs relative to what it would have been had annual funding grown at the rate of inflation after 2011.⁷ Roughly half of the federal funding for transportation programs (including nearly all rail, most aviation, and some transit programs but only a few highway programs), as well as most of the

7. More precisely, the act limits budget authority (the authority to incur financial obligations) for programs funded by annual appropriations by triggering automatic funding cuts if those caps are not met. There are separate caps for defense and nondefense programs.

federal funding for water programs, is classified as discretionary and therefore is subject to the caps.⁸ Under current law, those caps will be in place through 2021.

Why Does the Public Sector Provide Transportation and Water Infrastructure?

Federal, state, and local governments spend resources to provide transportation and water infrastructure to their citizens for several reasons related to economic efficiency, though other concerns, such as promoting equity, may also motivate them to do so.

It may be difficult or economically inefficient to charge consumers for use of transportation and water infrastructure because that infrastructure exhibits characteristics of public goods. For example,

8. The budget authority for almost all federal highway programs, most transit programs, and some aviation programs, however, is classified as mandatory and therefore is not subject to the caps on discretionary budget authority. Furthermore, although funding for those programs is mandatory, outlays under those programs are classified as discretionary, so neither are they subject to the automatic enforcement procedures—known as sequestration—that would reduce mandatory outlays if the caps were not met. Because of that split budgetary treatment, nearly all federal spending for highway programs and most federal spending for transit programs is exempt from the provisions of the Budget Control Act of 2011 and from most of the standard mechanisms that the Congress uses to exert budgetary control. For more information about the budgetary treatment of highway and transit programs, see Congressional Budget Office, *The Highway Trust Fund and the Treatment of Surface Transportation Programs in the Federal Budget* (June 2014), www.cbo.gov/publication/45416.

dams and other natural resource projects provide various benefits, such as flood control and recreation, to a wide range of consumers, making it hard to know whom, and how much, to charge for those services. And in some cases—building an additional home in an area protected by a dam, for example—those services can be provided to an additional consumer at no extra cost.

Another reason for governments to provide transportation and water infrastructure is that some types of infrastructure generate economies of scale such that only one firm could profitably provide those services, rendering competition impractical. As a result, the public sector often chooses to operate (or at least to regulate) such “natural monopolies.”

In some cases, the economic benefits of a transportation or water infrastructure project—promoting commerce, for example—may extend beyond the places where that infrastructure is built and beyond the people who use it directly. Thus, the incentives for the private sector to provide such infrastructure may be limited, and relying on private companies to do so may result in less of that type of infrastructure than is socially desirable. In such cases, it may be preferable for governments to supply the infrastructure and cover the costs through general taxation.

The reasons for investing in infrastructure projects may be shared by all levels of government, but the respective contributions that the federal government and state and local governments make to those projects vary greatly. In terms of economic efficiency, whether the federal government or state

and local governments should fund certain infrastructure projects depends to a large extent on whether that funding benefits the nation as a whole or only particular states and localities. If those who benefit from a project do not bear its full costs, too large a project might be undertaken, or too many infrastructure services consumed relative to the resources used to provide the project or services. By contrast, if those who bear the costs of a project receive only some of the benefits, too small a project might be undertaken. To avoid those problems, the federal government could choose to fund projects undertaken by particular states or localities that were expected to generate benefits for taxpayers nationwide, while leaving the funding of projects that produced benefits only for the citizens of a given state or locality to their respective state or local governments.

In some cases, however, the federal government might choose to provide funding for infrastructure that offered only local benefits as a way to address other policy goals, including promoting equity. For example, there are certain types of facilities, such as those that provide clean drinking water, to which the federal government may want to guarantee equal access for all citizens, regardless of their income.

What Are the Benefits of Federal Spending on Transportation and Water Infrastructure?

Most federal spending on transportation and water infrastructure benefits society on an ongoing basis, often by improving economic productivity, although those benefits are generally difficult to quantify.⁹ From a purely economic perspective, the

availability of transportation infrastructure lowers the costs to firms of obtaining inputs for the goods and services they produce and of delivering those products to their customers, increasing the productivity of the labor and capital at work in those firms. Federal spending on infrastructure can also provide noneconomic benefits to society—for example, clean drinking water and adequate sanitation improve public health. But even such broad noneconomic benefits may have economic advantages; for example, improved public health can lead to more productive workers.

In CBO's view, the federal government has raised productivity by funding infrastructure projects that either would not have been pursued by the private sector or by state and local governments alone or that would have received smaller amounts of investment from those sectors than warranted by the broad public benefits they provide. According to CBO's review of the literature on the economic effects of infrastructure spending, returns on investment in public capital projects in the United States, where the infrastructure network is well developed, are generally positive; however, they are lower than they once were because returns from additional spending on a mature infrastructure network are typically smaller than those derived from the initial investments that established that network in the first place. In addition, although

returns on individual infrastructure projects vary considerably, they are typically higher when infrastructure-spending decisions are based on the anticipated economic effects of proposed projects.

A number of factors make it difficult to determine with precision the impact that public infrastructure projects have on the economy. When economic performance and public spending on infrastructure are measured at an aggregate level, it is difficult to distinguish the effects of infrastructure projects from those of other developments in the economy that occur simultaneously. It can also be difficult to pin down exactly when infrastructure spending begins to benefit the economy or to estimate how long the benefits last. Another challenge to estimating the impact of public spending on infrastructure is that, to the extent that such spending raises the price of materials and other inputs for construction, it can reduce private capital investment.¹⁰ Finally, in some cases, increases in federal outlays for infrastructure cause state and local governments to reduce their spending on infrastructure projects and to use those funds for other purposes; but in other cases, particularly when state and local governments must meet matching

9. Other types of federal spending—investment in research and development or in education and training, for example—also provide long-term benefits to the economy. See Congressional Budget Office, *Federal Investment* (December 2013), www.cbo.gov/publication/44974.

10. Infrastructure spending financed by government borrowing also affects the economy in the long run by reducing national saving (the total amount of saving by households, businesses, and governments) and hence the funds that are available for private investment in productive capital. See Jonathan Huntley, *The Long-Run Effects of Federal Budget Deficits on National Saving and Private Domestic Investment*, Working Paper 2014-02 (Congressional Budget Office, January 2014), www.cbo.gov/publication/45140.

requirements to receive federal grants, increased federal outlays lead state and local governments to increase their investments as well. Thus, it can be difficult to estimate the net return on federal infrastructure investments.

In light of the uncertainty surrounding estimates of the size of infrastructure returns, CBO uses a range of returns when estimating the effects of federal capital spending on transportation and water infrastructure (as it does when estimating the effects of other types of federal investment). At the high end, CBO estimates that capital spending on infrastructure by the federal government yields the same average return, in the form of subsequent private-sector output, as similar spending by private entities. At the low end, CBO estimates that federal investment has a net return of zero—that is, that it has no effect on future private-sector output. The actual net return for a particular investment could lie outside that range because a project might

have a negative return (lowering overall productivity) or, alternatively, yield a greater return than a similar investment made by the private sector.

How Is Public Spending on Transportation and Water Infrastructure Measured in This Report?

To measure public spending on infrastructure, CBO applied the method used in its previous reports on transportation and water infrastructure, with two exceptions. As in the past, federal spending data came from the Office of Management and Budget, and data on state and local governments' expenditures from the Census Bureau.¹¹ However, whereas previous reports included only those years

for which such data were available, in this report CBO provides estimates of spending by state and local governments in years for which such data are not yet available (2013 and 2014).

This report also includes CBO's estimates of state and local spending on water resources for all years after 1990, the last year for which such data are available; previous reports did not include any information on such spending for those years. The Census Bureau does report state and local spending on water resources, but it does so only within a broad category for other natural resources. The estimates provided here are based on the trend over time for that broader spending category applied to the 1990 data on spending for water resources. As a result of including those estimates, the amounts of total infrastructure spending reported here for 1991 and subsequent years differ from those published in previous CBO reports (see the Appendix for details).

11. For a discussion of the method CBO uses to calculate public spending on infrastructure, see Congressional Budget Office, *Public Spending on Transportation and Water Infrastructure* (November 2010), Appendix B, www.cbo.gov/publication/21902.

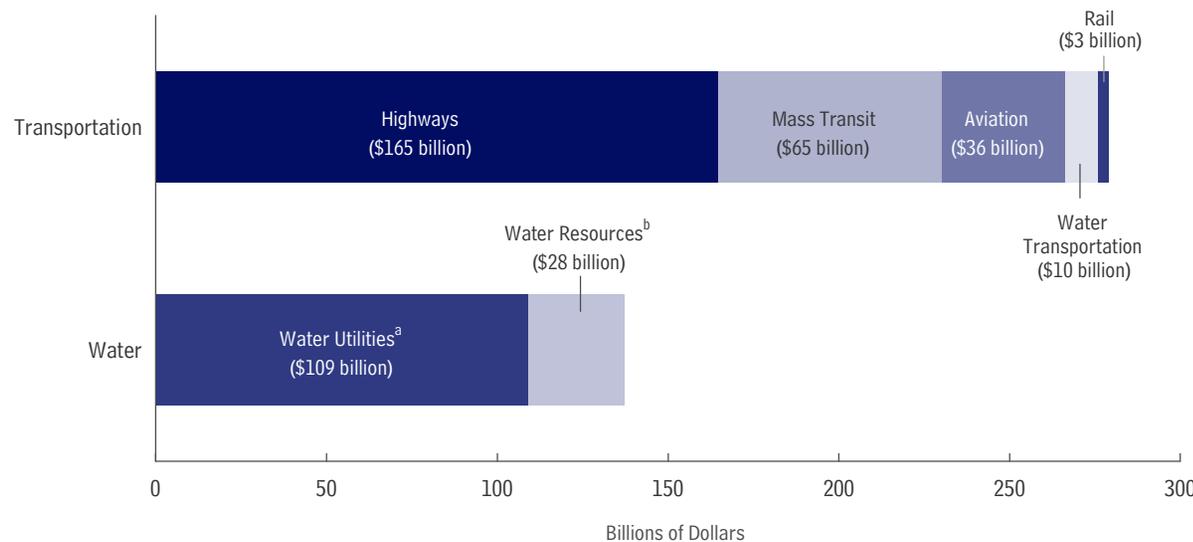


Public Spending on Transportation and Water Infrastructure



Exhibit 1.

Public Spending on Transportation and Water Infrastructure, 2014



Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

- a. Includes water supply and wastewater treatment facilities.
- b. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).

In 2014, public spending on transportation and water infrastructure totaled \$416 billion. That total includes spending by federal, state, and local governments for capital (structures and equipment) as well as their spending for operation and maintenance.

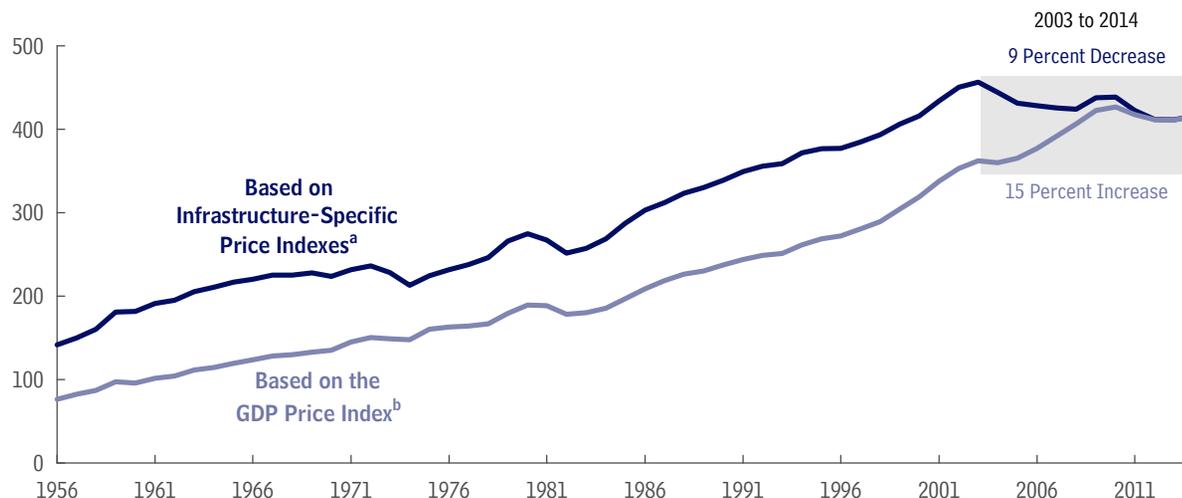
Transportation infrastructure accounted for about two-thirds (\$279 billion) of all public spending on transportation and water infrastructure. Highways (interstate and local roads) claimed \$165 billion, or about 60 percent of that spending on transportation (representing 40 percent of all public spending on transportation and water infrastructure). After highways, the amount of public spending allocated to other types of transportation infrastructure was much lower, with the second-highest recipient, mass transit, accounting for less than 25 percent of outlays for transportation (or 16 percent of total spending on transportation and water infrastructure).

The remaining one-third (\$137 billion) of total public spending on transportation and water infrastructure went to water infrastructure. At \$109 billion (or 26 percent of the total), spending on water utilities (water supply and wastewater treatment facilities) was second only to highways as a share of total public infrastructure spending. ♦

Exhibit 2.

Public Spending on Transportation and Water Infrastructure Under Alternative Adjustments for Inflation, 1956 to 2014

Billions of 2014 Dollars



Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

Note: GDP = gross domestic product.

- a. Those price indexes for government spending measure the prices of materials and other inputs used to build, operate, and maintain transportation and water infrastructure.
- b. That price index measures the prices of goods and services that make up the nation's GDP.

From the late 1950s to 2003, federal purchases of transportation and water infrastructure rose fairly steadily. Since 2003, the prices of materials (asphalt, concrete, and cement, for example) and other inputs used to build that infrastructure have grown much more rapidly than prices in the economy as a whole, but public spending did not keep pace with those rising prices.

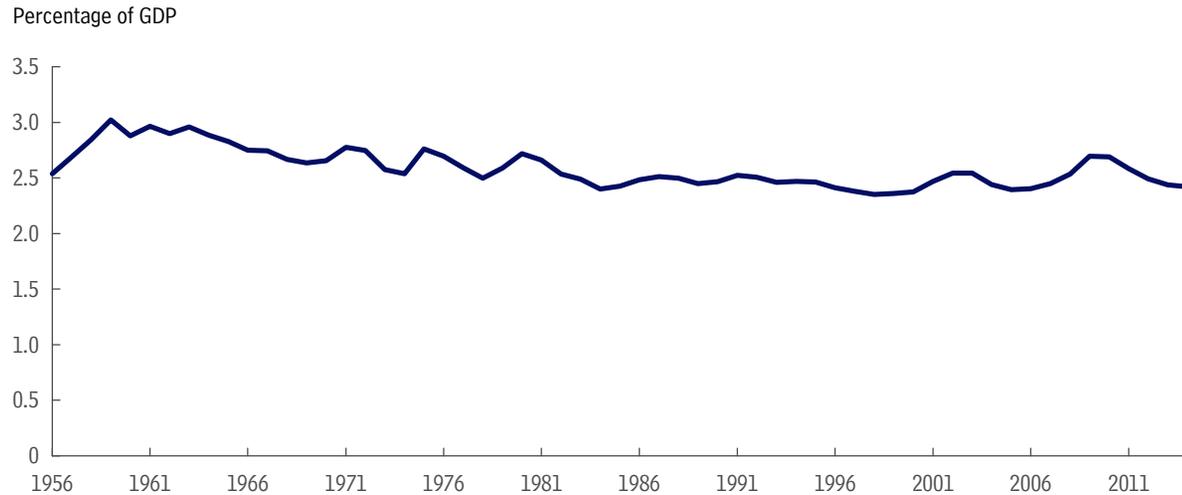
Because of the sharp increase in the cost of infrastructure, converting infrastructure spending from nominal to real terms using infrastructure-specific price indexes provides a different perspective than does using a single, economywide price index. Estimates based on infrastructure-specific price indexes more accurately show changes in the amount of infrastructure purchased over time. But, by allowing for standardization and more meaningful comparisons across all types of public spending, estimates made using price indexes for the goods and services that make up the nation's GDP better illustrate changes in the allocation of budgetary resources over time.

The two different adjustments sometimes indicate contradictory trends. Whereas estimates adjusted with the GDP price index show that public spending on infrastructure rose by 15 percent from 2003 to 2014, estimates based on the infrastructure-specific indexes indicate that such spending declined by about 9 percent over that same period (although that decline was temporarily reversed in 2009 and 2010 when federal outlays rose under ARRA).

Whether adjusted to real dollars using infrastructure-specific indexes or the GDP price index, public spending has generally fallen since 2011. ♦

Exhibit 3.

Public Spending on Transportation and Water Infrastructure as a Share of GDP, 1956 to 2014



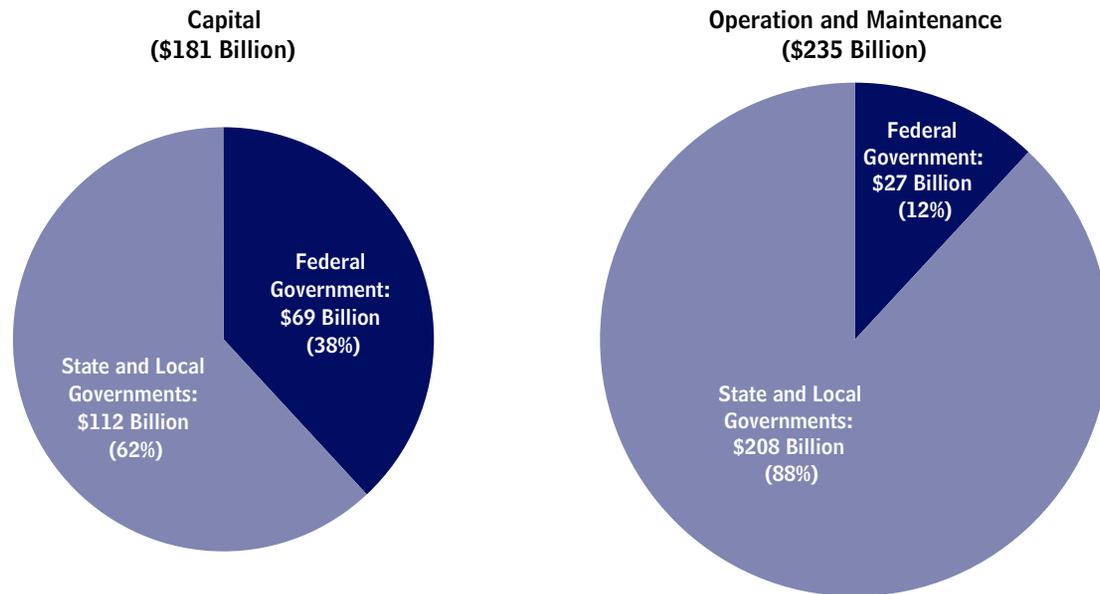
Public spending on transportation and water infrastructure accounted for 2.4 percent of GDP in 2014, down from 3.0 percent in 1959 (its largest share since construction of the Interstate Highway System began in 1956). Measured as a share of GDP, public spending over the past three decades has been fairly stable at 2.4 percent, although a combination of relatively slow growth in the economy and the higher federal outlays under the American Recovery and Reinvestment Act temporarily boosted spending to 2.7 percent from 2009 to 2010. ♦

Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

Note: GDP = gross domestic product.

Exhibit 4.

The Federal Government’s and State and Local Governments’ Shares of Spending on Transportation and Water Infrastructure, by Category of Spending, 2014



Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

Federal, state, and local governments spent \$181 billion—43 percent of total public infrastructure spending—on capital in 2014. Spending for operation and maintenance was \$235 billion, or 57 percent of public spending on infrastructure.

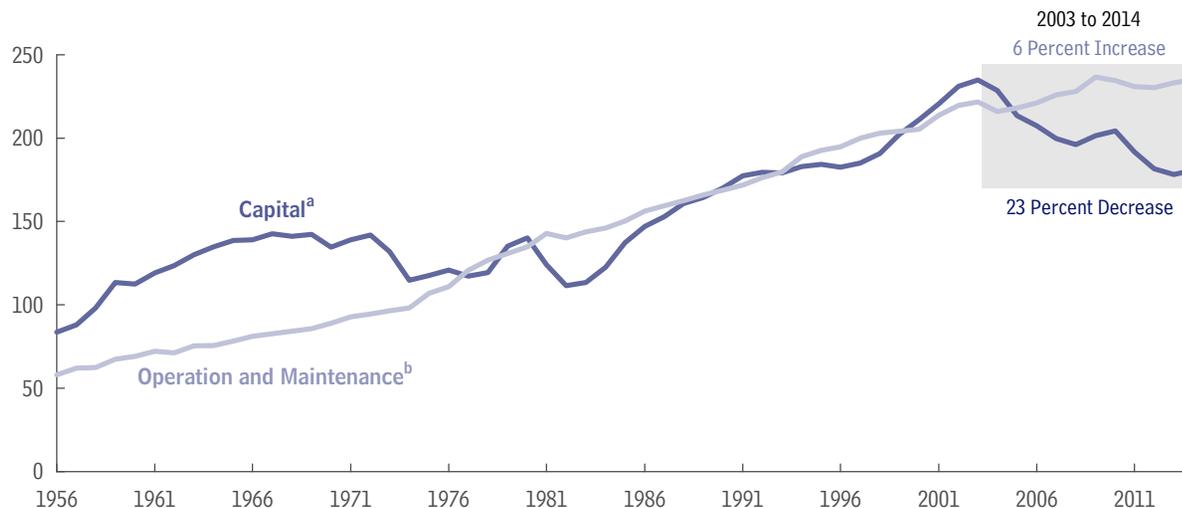
Spending for capital includes the purchase of new structures (such as highways or dams) and equipment (such as buses or railcars), as well as the improvement and rehabilitation of structures and equipment already in place. Spending for operation and maintenance includes the costs of providing services (administering the air traffic control system, for example), carrying out minor repairs to maintain existing capital, and engaging in various other activities, such as research and development.

The federal government and state and local governments allocate resources among categories of infrastructure spending differently. Both are important suppliers of capital: In 2014, state and local governments accounted for 62 percent of capital spending, and the federal government accounted for the remaining 38 percent. But state and local governments provide far more of the spending for the operation and maintenance of infrastructure, accounting for 88 percent of that spending in 2014. ♦

Exhibit 5.

Public Spending on Transportation and Water Infrastructure, by Category of Spending, 1956 to 2014

Billions of 2014 Dollars



Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

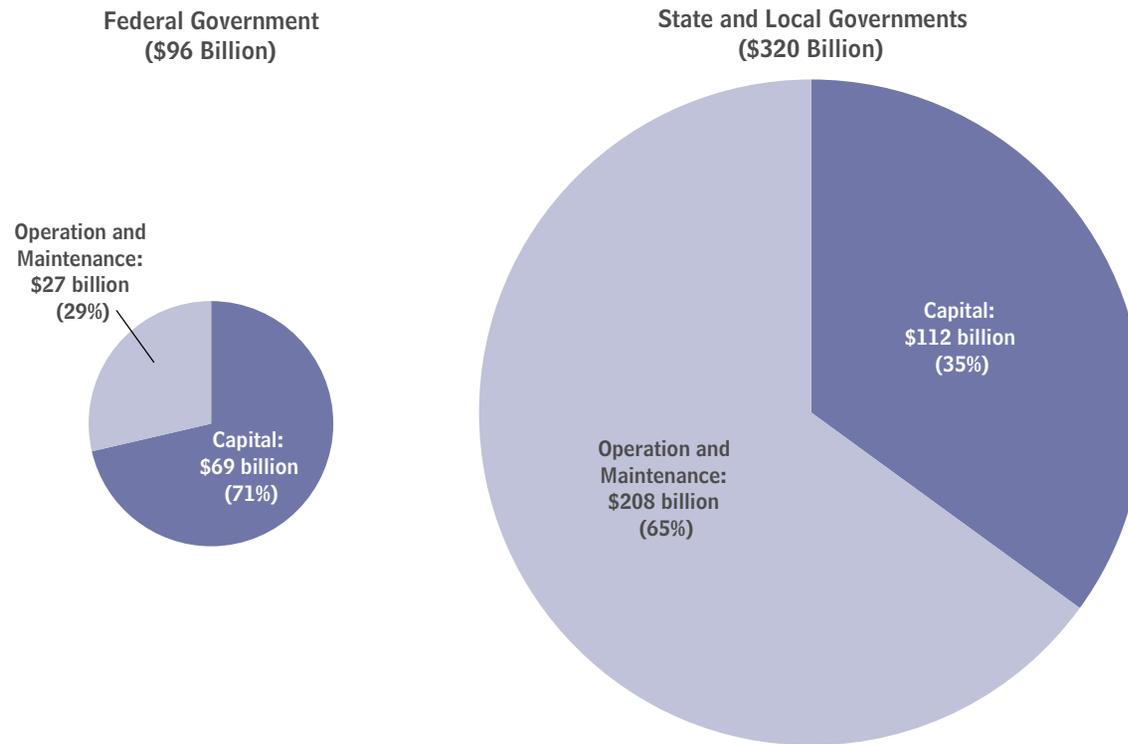
- a. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build transportation and water infrastructure.
- b. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of goods and services consumed by governments, including materials and other inputs used to operate and maintain transportation and water infrastructure.

Since 2003, real purchases of capital (adjusted using indexes specific to the cost of building that capital) have declined by about one-quarter as the prices of materials and other inputs used to build transportation and water infrastructure have rapidly increased. By contrast, real spending for operation and maintenance (adjusted using indexes that measure changes in the cost of providing those specific services) increased by 6 percent from 2003 to 2014. As a result of those divergent trends, the difference between spending for operation and maintenance (\$235 billion) and spending for capital (\$181 billion) reached \$54 billion in 2014.

That situation marks a break from past trends in the allocation of public infrastructure spending between capital and operation and maintenance. From the mid-1950s to the mid-1970s, capital spending exceeded operation and maintenance expenditures, reflecting in part the construction of dams and of the Interstate Highway System in the 1950s and 1960s as well as the increase in federal grants to state and local governments in the 1970s under the Clean Water Act. Spending for capital was then roughly comparable to spending for operation and maintenance from the mid-1970s to 2002, before the rising cost of construction materials, combined with only small increases in nominal capital spending, began to reduce real capital spending. ♦

Exhibit 6.

Shares of Public Spending for Capital and for the Operation and Maintenance of Transportation and Water Infrastructure, by Level of Government, 2014



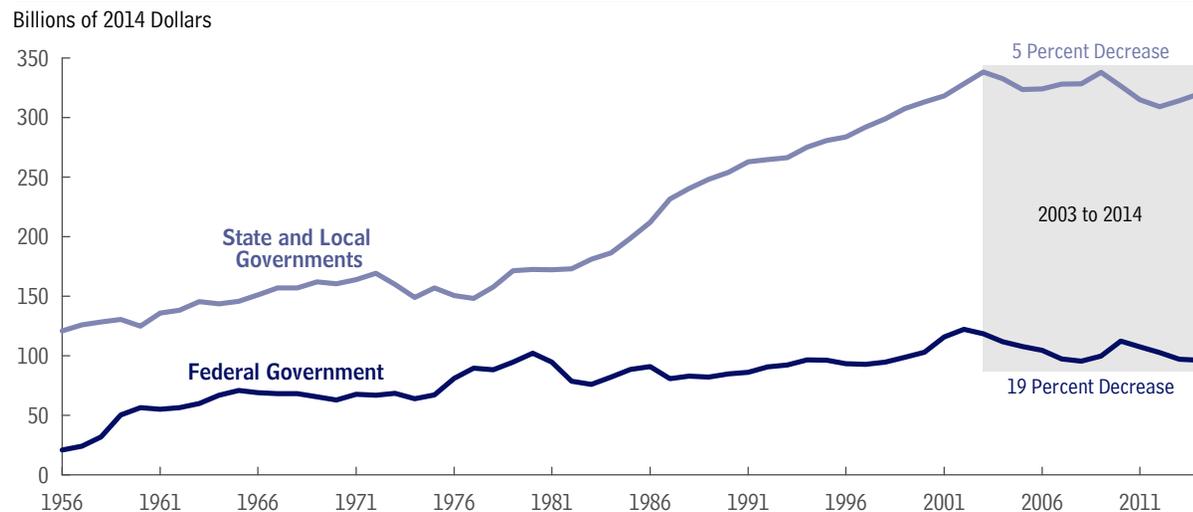
In 2014, federal outlays accounted for about one-quarter of total public spending (\$96 billion) on transportation and water infrastructure, and state and local expenditures accounted for three-quarters (\$320 billion).

The federal government and state and local governments differ in their allocation of infrastructure spending between capital and operation and maintenance. Over two-thirds (71 percent) of federal spending on infrastructure in 2014 was for capital, whereas only about one-third (35 percent) of state and local spending went to capital projects and two-thirds (65 percent) went to operation and maintenance. ♦

Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

Exhibit 7.

Public Spending on Transportation and Water Infrastructure, by Level of Government, 1956 to 2014



Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

Note: Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build, operate, and maintain transportation and water infrastructure.

The decline in real spending on transportation and water infrastructure in recent years has occurred at all levels of government, but it has been greatest at the federal level. Since 2003, federal spending has fallen by about 19 percent, and spending by states and localities, by about 5 percent.

Real federal spending on infrastructure has declined more than has real state and local spending because the share of federal spending devoted to capital is much larger than that of state and local governments and because real spending for capital has generally declined since 2003 as prices of materials and other inputs have risen significantly.

From the 1950s to the 1980s, the federal share of public infrastructure spending was typically much larger than it is today, reaching a high of 38 percent in 1977. But that share started to decrease in the 1980s, when state and local governments began to invest more in transportation and water infrastructure while federal spending on infrastructure remained relatively stable. Since 1987, federal spending has accounted for roughly one-quarter of public spending on transportation and water infrastructure. ♦

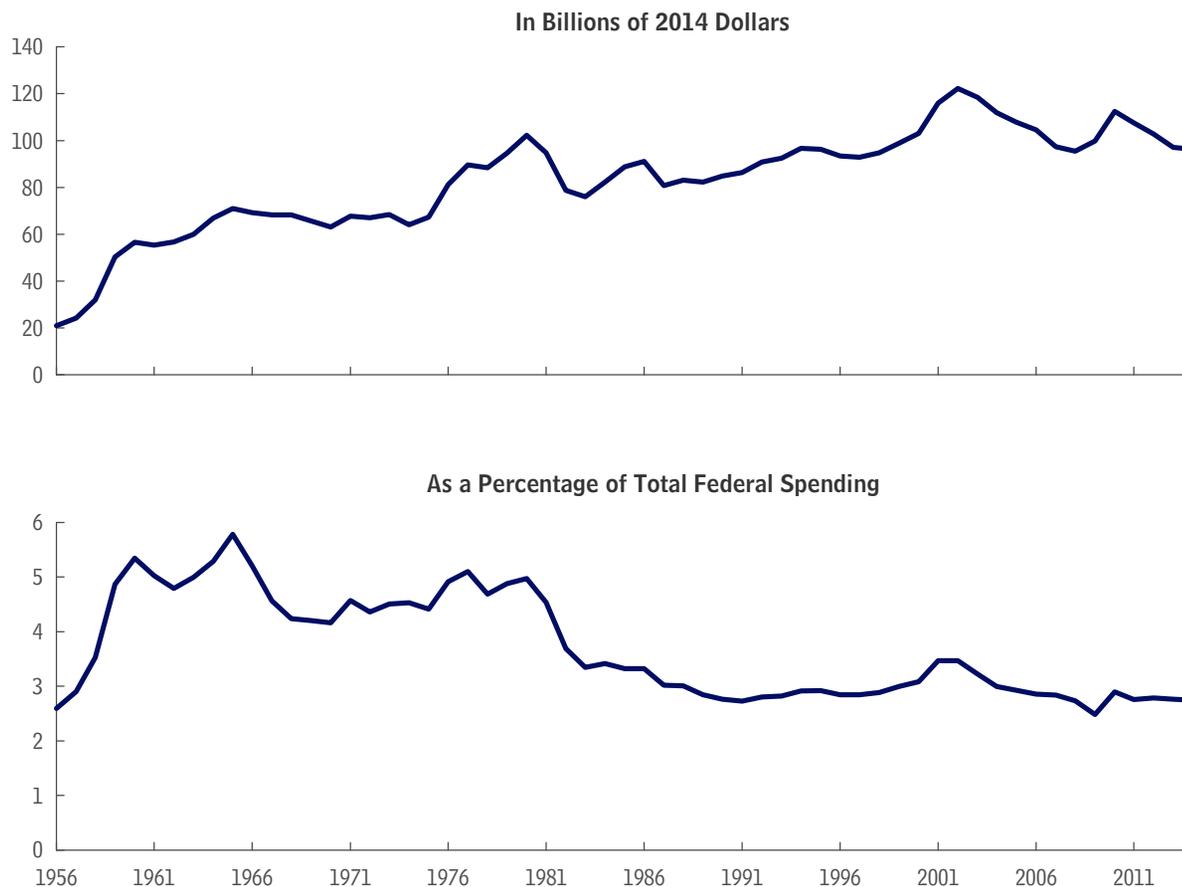


Federal Spending on Transportation and Water Infrastructure



Exhibit 8.

Federal Spending on Transportation and Water Infrastructure, 1956 to 2014



Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

Note: Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build, operate, and maintain transportation and water infrastructure.

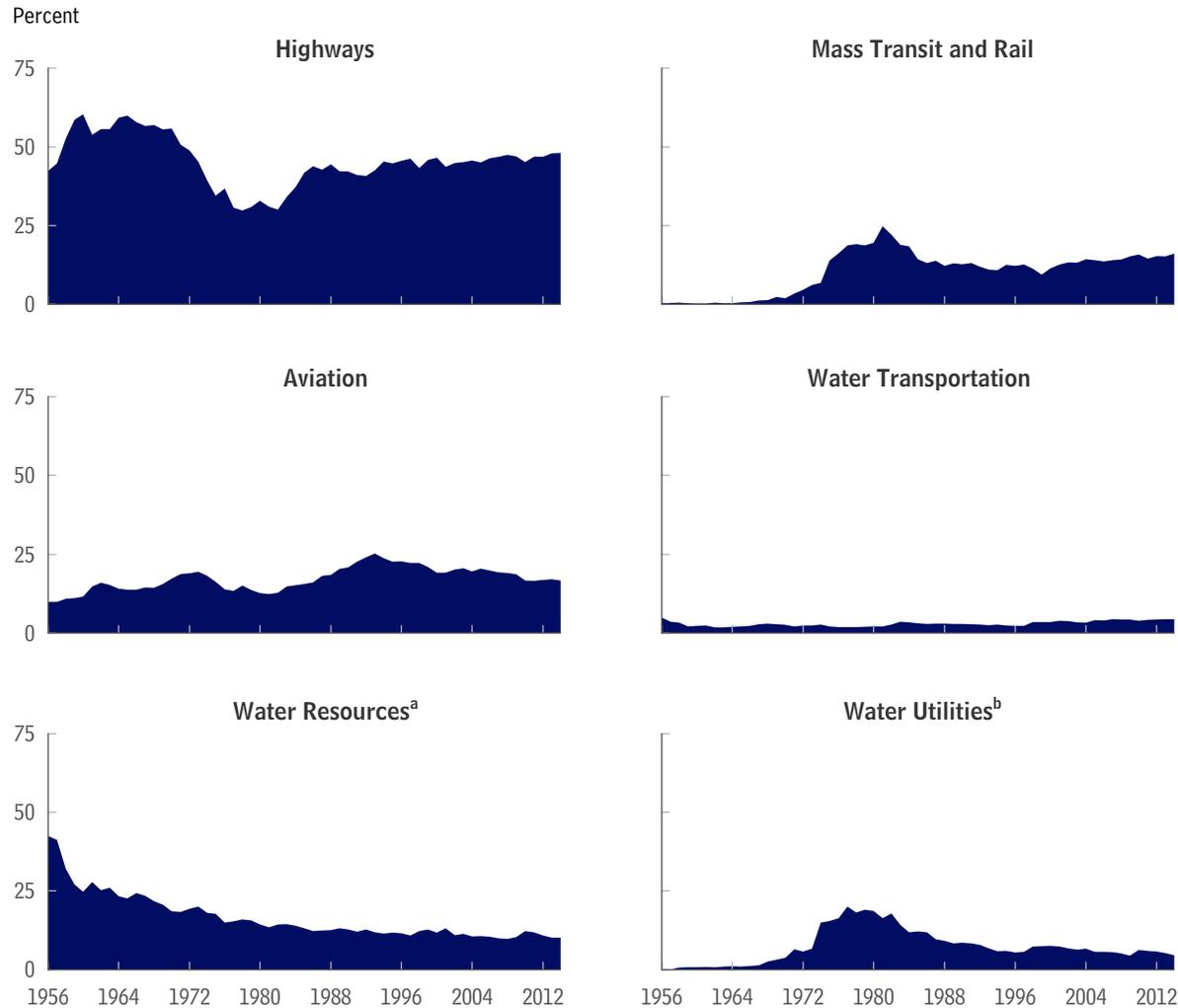
In 2014, the federal government spent \$96 billion on transportation and water infrastructure, marking a decline in real federal spending of 21 percent from its high of \$122 billion (in 2014 dollars) in 2002.

In the past, significant increases in federal spending on infrastructure often followed significant legislative action. Spending on highways increased under the Federal-Aid Highway Act of 1956 when the federal government funded construction of the Interstate Highway System. Likewise, spending on water utilities (for water supply and wastewater treatment facilities) increased in the mid-1970s when the federal government provided grants to state and local governments under the Clean Water Act of 1972. In the late 1990s, spending on highways and mass transit increased under the Transportation Equity Act for the 21st Century. The most recent spike in federal spending on transportation and water infrastructure occurred under the American Recovery and Reinvestment Act. ARRA temporarily boosted federal outlays for infrastructure by \$55 billion, in nominal terms, over the 2009–2014 period; about one-half of that amount was spent in 2009 and 2010.

Federal outlays for transportation and water infrastructure in 2014 accounted for 2.7 percent of total federal spending, which is only slightly below its average of 3 percent during the past three decades but less than one-half of its peak of almost 6 percent in 1965. ♦

Exhibit 9.

Federal Spending on Transportation and Water Infrastructure, by Type of Infrastructure, 1956 to 2014



Federal spending on transportation and water infrastructure is highly concentrated among a few types of infrastructure. In 2014, three types of transportation infrastructure accounted for four-fifths of that spending—48 percent went to highways; 17 percent, to aviation; and 16 percent, to mass transit and rail. Water-related infrastructure accounted for a considerably smaller share of federal infrastructure spending, with water resources claiming 10 percent of those outlays and water utilities and water transportation claiming 5 percent and 4 percent, respectively.

Over the past two decades, the allocation of federal spending among types of infrastructure has remained fairly stable, although mass transit and rail’s share has risen slightly and aviation’s has fallen.

Before then, there were a few dramatic shifts in the distribution of federal dollars among infrastructure types. In the late 1950s, the share of federal infrastructure funding allotted to dams and other water resources dropped significantly while funding for highways rose substantially as construction of the Interstate Highway System began. Another such shift occurred after passage of the Clean Water Act in 1972, which raised the share of federal infrastructure spending devoted to water utilities to between 15 percent and 20 percent for roughly a decade. ♦

Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

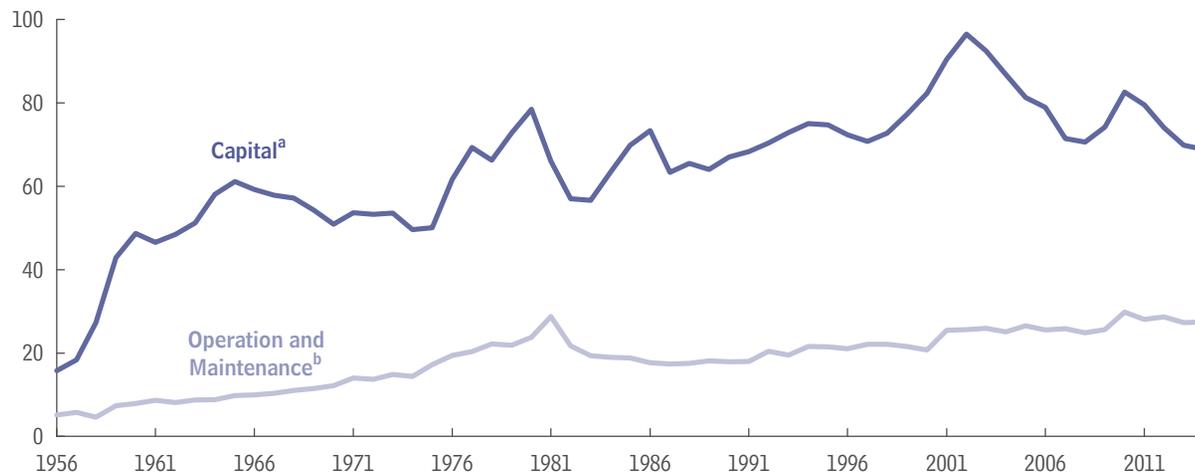
a. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).

b. Includes water supply and wastewater treatment facilities.

Exhibit 10.

Federal Spending on Transportation and Water Infrastructure, by Category of Spending, 1956 to 2014

Billions of 2014 Dollars



Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

- a. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build transportation and water infrastructure.
- b. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of goods and services consumed by governments, including materials and other inputs used to operate and maintain transportation and water infrastructure.

Since 1956, federal infrastructure outlays have gone primarily to capital projects. In 2014, capital spending was \$69 billion, more than twice the \$27 billion that went to operation and maintenance. The largest share of that capital spending went to highway construction and rehabilitation (66 percent), and the largest share of spending for operation and maintenance went to the administration of the air traffic control system (36 percent).

Over the last six decades, federal spending for capital has fluctuated much more than spending for operation and maintenance. Spikes in capital spending were often caused by new emphases in federal infrastructure policy—an interest in funding highways under the Federal-Aid Highway Act of 1956 or water utilities under the Clean Water Act of 1972, for example. After growing by more than 7 percent annually from 1998 to 2002, when it peaked at \$97 billion, real federal spending for capital began a steep decline, attributable primarily to the increase in prices for materials used in construction that began in 2003. For the period between 1956 and 2014, capital spending increased at an average annual rate of 2.6 percent.

By contrast, spending for operation and maintenance grew at a relatively stable rate over the 1956–2014 period, with an average increase of 3.0 percent per year. However, such spending spiked in 1981 as a result of the settlement of litigation related to the federal government’s acquisition of the assets of Conrail (a freight railroad). ♦



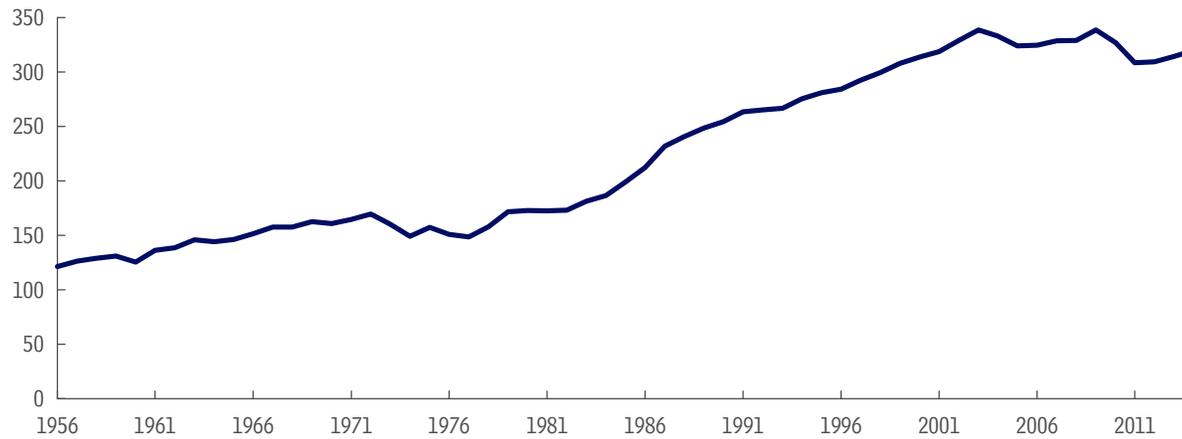
**State and Local Spending on
Transportation and Water Infrastructure**



Exhibit 11.

State and Local Spending on Transportation and Water Infrastructure, 1956 to 2014

Billions of 2014 Dollars



Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

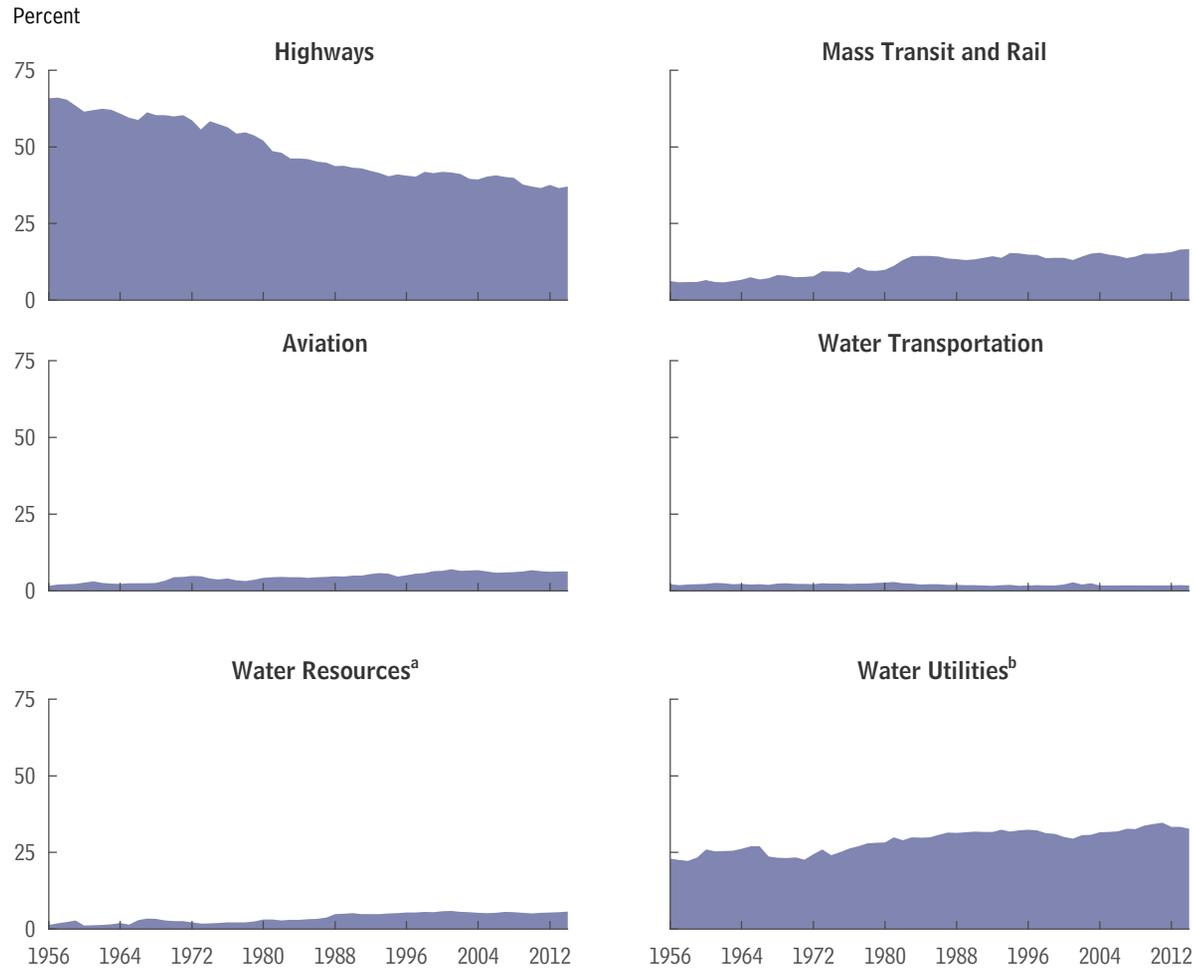
Note State and local spending is net of federal grants and loan subsidies.

In 2014, state and local governments spent \$320 billion on transportation and water infrastructure. That amount represented a decline of 5 percent from the peak in real spending in 2003.

Real state and local spending on transportation and water infrastructure has risen at an average annual rate of 1.7 percent since 1956, but its growth has not been steady. During some periods—the years from 1973 to 1977 and from 2004 to the present, for example—annual spending was more likely to fall or remain flat than to rise. In contrast, between 1956 and 1972 and again between 1978 and 2003, such spending tended to increase each year. ♦

Exhibit 12.

State and Local Spending on Transportation and Water Infrastructure, by Type of Infrastructure, 1956 to 2014



Highways and water utilities account for by far the largest shares of infrastructure spending by state and local governments. In 2014, states and localities allocated 37 percent of their infrastructure spending to highways and 33 percent to water utilities. (State governments direct most of the highway spending, and local governments are almost exclusively responsible for spending on water utilities.) Significantly smaller shares of states' and localities' infrastructure spending go to mass transit and rail (17 percent), aviation (6 percent), and water resources (6 percent). Only about 2 percent of state and local spending on infrastructure goes to water transportation.

The allocation of state and local spending among types of infrastructure has changed significantly over the past six decades. The share of spending going to highways has dropped from 66 percent in 1956 to 37 percent today, and the shares going to all other types of infrastructure except water transportation have risen over the same period. ♦

Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

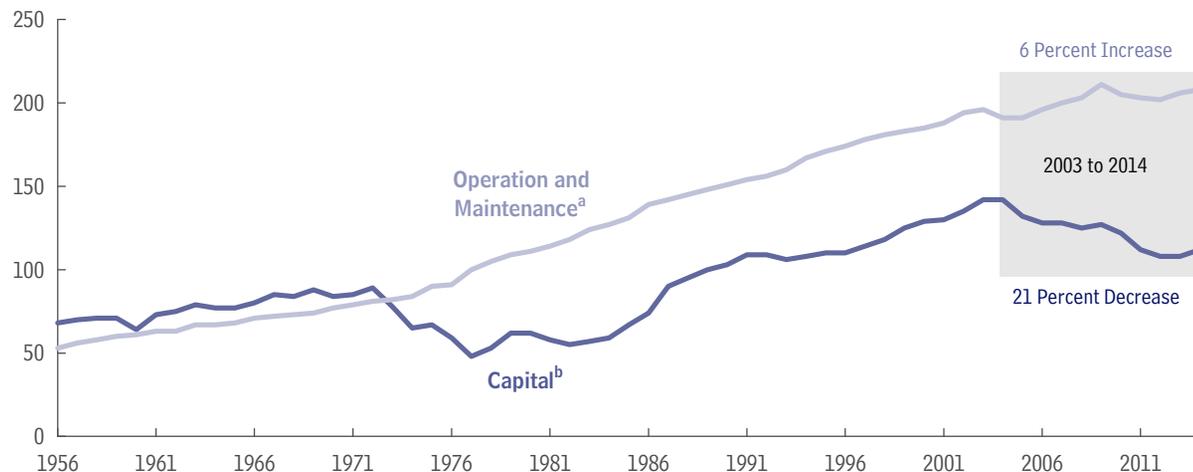
Note: State and local spending is net of federal grants and loan subsidies.

- a. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).
- b. Includes water supply and wastewater treatment facilities.

Exhibit 13.

State and Local Spending on Transportation and Water Infrastructure, by Category of Spending, 1956 to 2014

Billions of 2014 Dollars



Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

Note: State and local spending is net of federal grants and loan subsidies.

- a. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of goods and services consumed by governments, including materials and other inputs used to operate and maintain transportation and water infrastructure.
- b. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build transportation and water infrastructure.

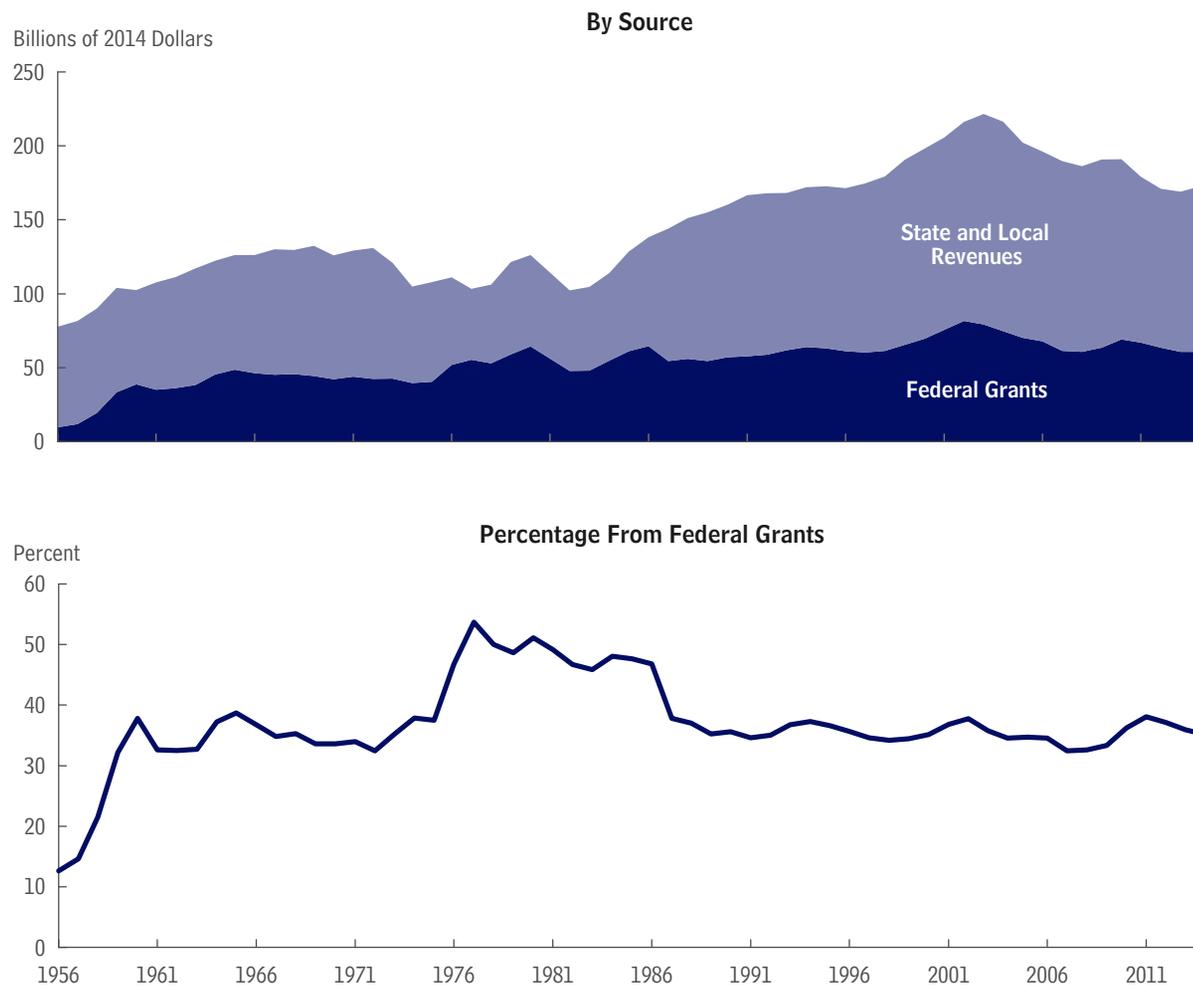
At \$208 billion, state and local governments’ spending for the operation and maintenance of infrastructure in 2014 was almost twice as large as their spending on capital (\$112 billion).

The difference between spending for capital and for operation and maintenance began to widen in 2003, when purchases of capital by states and localities (adjusted for changes in the price of infrastructure) began a persistent decline. As a result, purchases of capital by state and local governments were 21 percent lower in 2014 than they had been in 2003. Over that same period, however, spending for the operation and maintenance of infrastructure by state and local governments grew by 6 percent.

Since 1956, state and local governments’ expenditures for the operation and maintenance of infrastructure have grown at an average annual rate of 2.4 percent, roughly three times faster than the 0.9 percent average annual growth rate of spending on capital. As a result, although state and local governments spent more for capital than for operation and maintenance in 1956, state and local spending for operation and maintenance has exceeded capital spending each year since 1973. ♦

Exhibit 14.

State and Local Capital Spending on Transportation and Water Infrastructure, by Source of Funds, 1956 to 2014



Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

Note: Federal grants include the value of federal loan subsidies for the purchase of transportation and water infrastructure capital.

Although state and local governments rely primarily on their own revenues to purchase capital, federal grants also are an important source of funds. In some cases, particularly those in which federal grant programs require state and local governments to match a portion of the federal funds, federal grants encourage state and local governments to increase their spending for capital infrastructure. In other cases, however, grants have the opposite effect: State and local governments may spend less on infrastructure if the capital projects they were interested in pursuing could be covered by federal grants rather than their own revenues. Because many grant programs offer state and local governments some discretion in how to use federal funds, their spending may not conform as closely to federal priorities as spending that the federal government undertakes directly.

Since 1960, federal grants have accounted for one-third or more of the capital spending on infrastructure by states and localities. That share was considerably larger from the mid-1970s through the mid-1980s as a result of federal support for water utilities after passage of the Clean Water Act in 1972.

Throughout the 1956–2014 period, even during that decade when federal support for water utilities was so extensive, federal grants went primarily to support state and local spending on highways. In 2014, just under one-half of the \$92 billion spent by state and local governments on highway capital was provided through federal grants. ♦

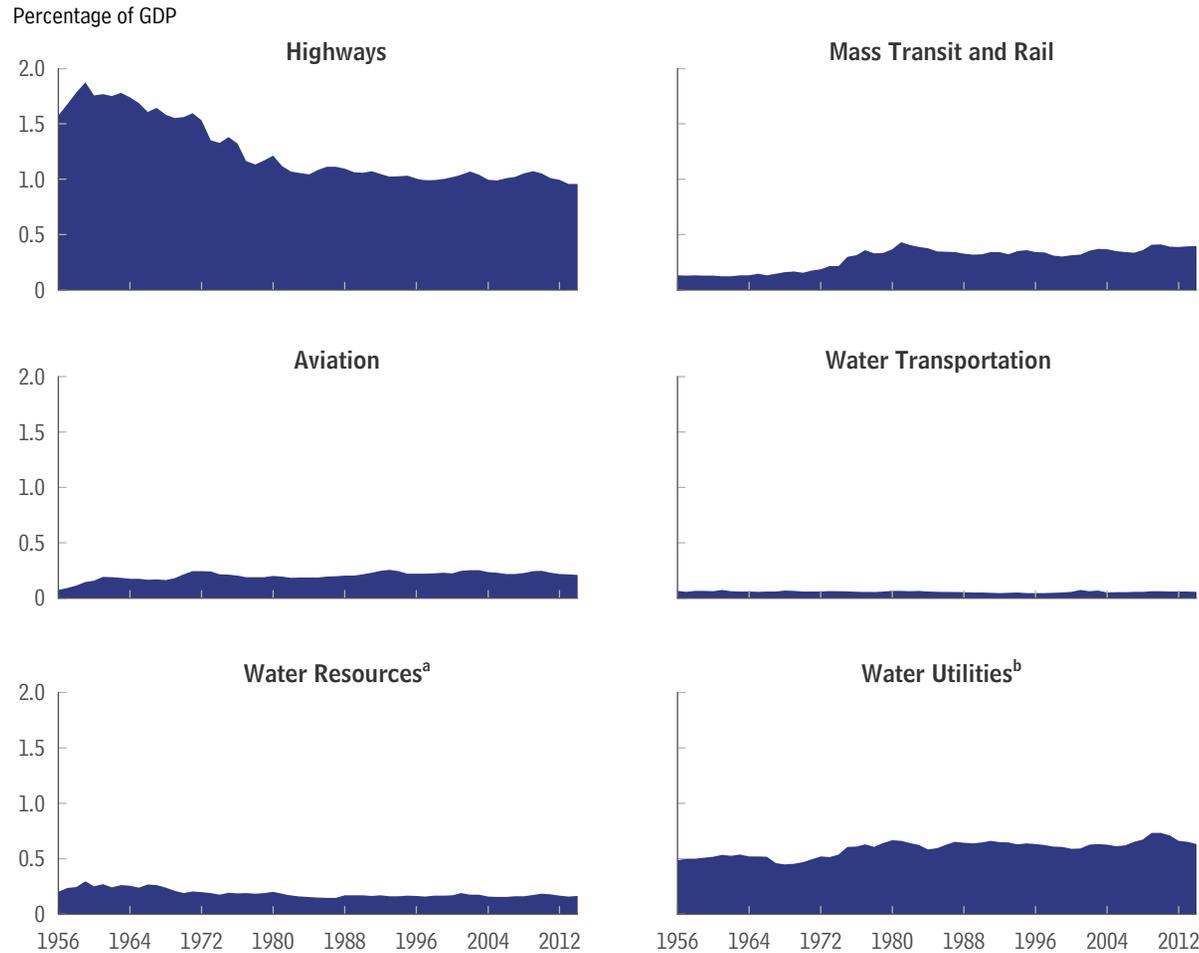


**Public Spending on Transportation and
Water Infrastructure, by Type of Infrastructure**



Exhibit 15.

Public Spending on Transportation and Water Infrastructure as a Share of GDP, by Type of Infrastructure, 1956 to 2014



Measured as a share of GDP, public spending on transportation and water infrastructure gradually declined from a high of 3.0 percent in 1959 to 2.4 percent in 2014 (see Exhibit 3 on page 10). Of all public spending on water and transportation infrastructure, spending on highways consistently accounted for the largest share of GDP throughout the 1956–2014 period, though it fell from its peak of almost 2 percent in 1959, during the construction of the Interstate Highway System, to just under 1 percent in 2014. By contrast, as a share of GDP, public spending on water utilities—the type of infrastructure that has consistently claimed the second-largest portion of total public infrastructure spending—rose slightly, from 0.5 percent in 1956 to 0.6 percent in 2014.

Public spending on each of the other types of infrastructure—mass transit and rail, aviation, water transportation, and water resources—has consistently been less than 0.5 percent of GDP. Real spending on mass transit and rail and on aviation has increased slightly over time, while the GDP share of public spending on water transportation and water resources has remained fairly constant. ♦

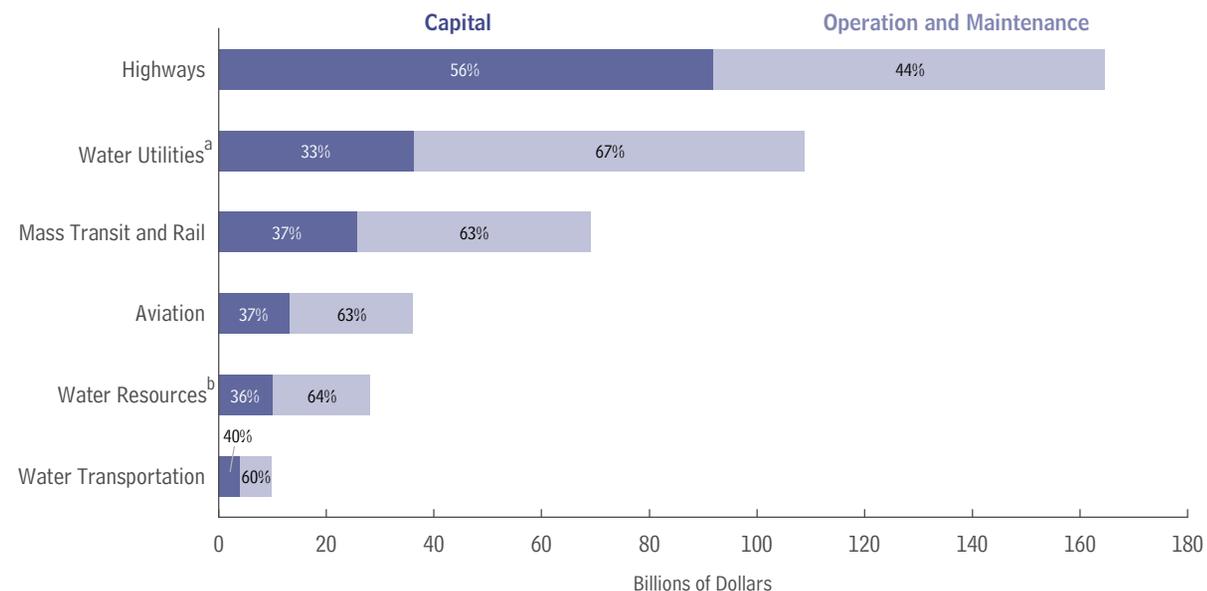
Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

Note: GDP = gross domestic product

- a. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).
- b. Includes water supply and wastewater treatment facilities.

Exhibit 16.

Public Spending for Capital and for the Operation and Maintenance of Transportation and Water Infrastructure, by Type of Infrastructure, 2014



In 2014, the share of spending for operation and maintenance was greater than the share of spending for capital for five of the six types of infrastructure. For water utilities, mass transit and rail, aviation, and water resources, approximately two-thirds of spending was for operation and maintenance. For water transportation infrastructure, 60 percent went to operation and maintenance.

Highways are the only type of infrastructure for which more than half of public spending in 2014 went to capital—the construction of new highways, rehabilitation of existing roads, and purchases of equipment. Capital purchases accounted for 56 percent of spending on highways, and spending for operation and maintenance made up the remaining 44 percent. ♦

Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

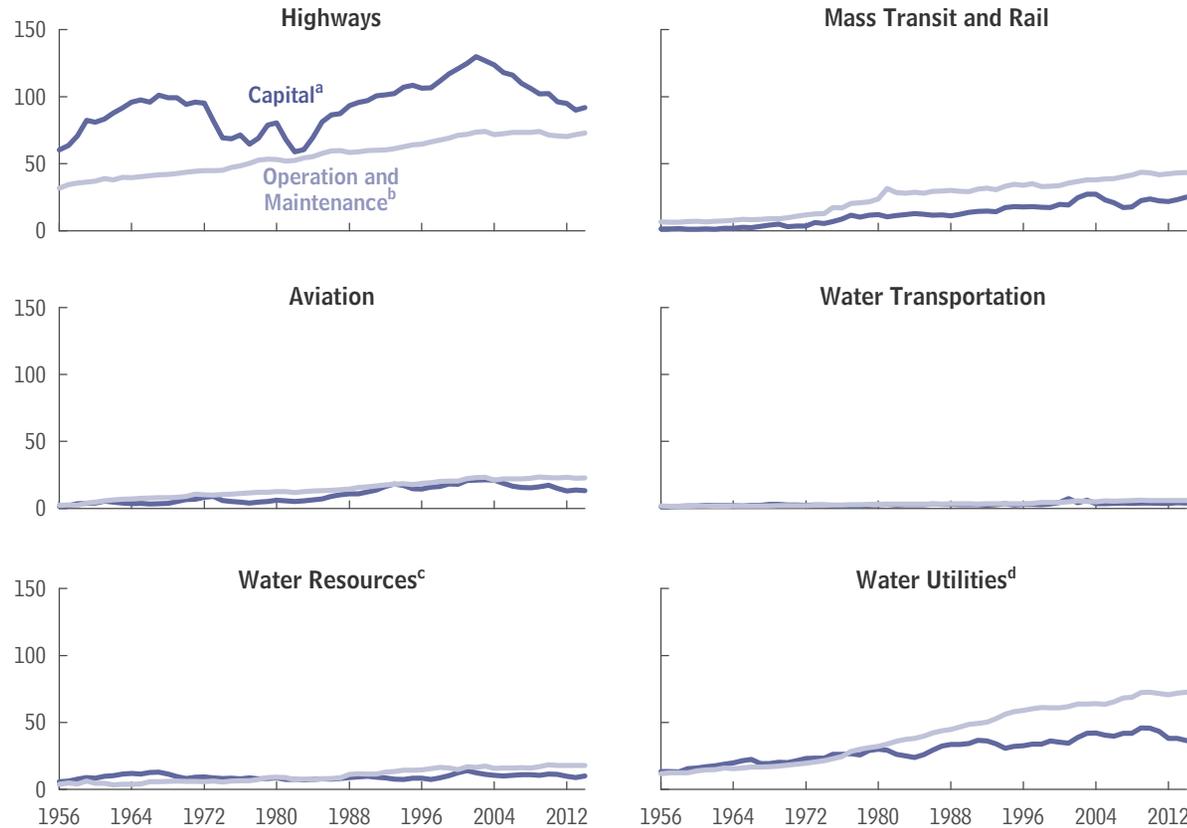
a. Includes water supply and wastewater treatment facilities.

b. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).

Exhibit 17.

Public Spending for Capital and for the Operation and Maintenance of Transportation and Water Infrastructure, by Type of Infrastructure, 1956 to 2014

Billions of 2014 Dollars



Spending for the operation and maintenance of all types of transportation and water infrastructure has increased steadily since 1956. Spending for capital—particularly for mass transit and rail, for aviation, and for water utilities—has also increased since then, but it has typically done so at a lower rate.

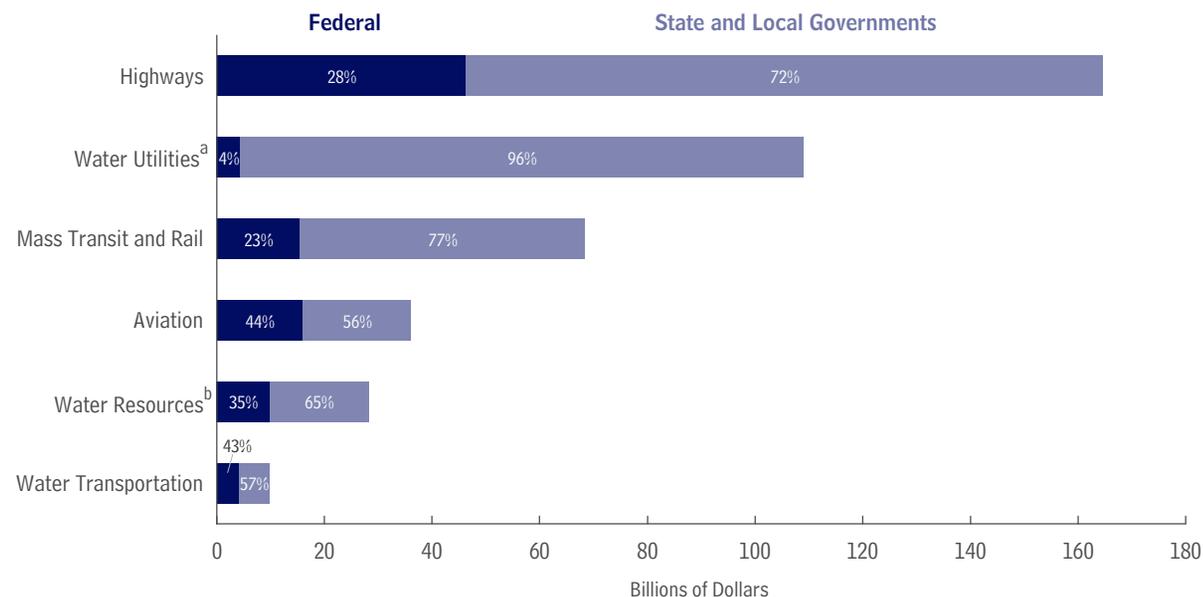
Despite sharp fluctuations in real capital purchases for highways from 1956 to 2014, highways are the only type of infrastructure for which capital spending exceeded spending for operation and maintenance every year over the period. However, the difference between spending for the two categories, measured in real terms, diminished between 2002 and 2014. That decline is primarily attributable to the near doubling of prices for materials used in construction: Although nominal capital spending on highways rose by nearly 40 percent over the period, that increase was outstripped by those price increases. ♦

Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

- a. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build transportation and water infrastructure.
- b. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of goods and services consumed by governments, including materials and other inputs used to operate and maintain transportation and water infrastructure.
- c. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).
- d. Includes water supply and wastewater treatment facilities.

Exhibit 18.

The Federal Government's and State and Local Governments' Spending on Transportation and Water Infrastructure, by Type of Infrastructure, 2014



Source: Congressional Budget Office based on data from the Office of Management and Budget and the Census Bureau.

- a. Includes water supply and wastewater treatment facilities.
- b. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).

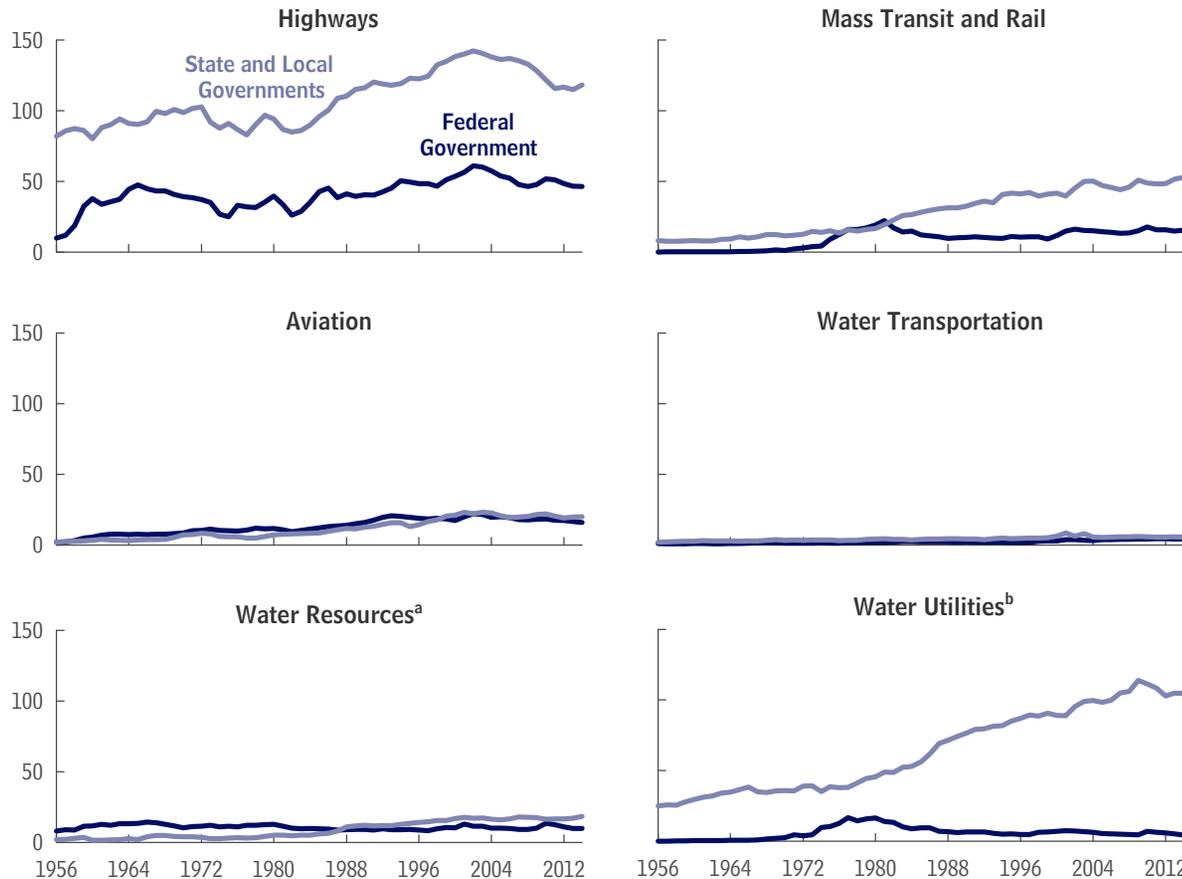
In 2014, the federal government spent less than state and local governments on each type of infrastructure. Its shares of total public spending were largest for aviation (44 percent), water transportation (43 percent), and water resources (35 percent). Most of the federal government's share of spending for aviation went to operating and maintaining the air traffic control system (about \$10 billion). Federal spending for water transportation includes some of the costs associated with maintaining harbors and navigation channels; however, because all of the Army Corps of Engineers' projects are classified as spending for water resources, many navigation projects are associated with that type of infrastructure.

Although the federal government spent substantially more on highways than on any other type of infrastructure, its share of total public spending on highways—at 28 percent—was much smaller than its share of spending on aviation, water transportation, and water resources. The federal share of spending on mass transit and rail infrastructure was slightly smaller, 23 percent, and its share of spending on water utilities was only 4 percent. ♦

Exhibit 19.

The Federal Government’s and State and Local Governments’ Spending on Transportation and Water Infrastructure, by Type of Infrastructure, 1956 to 2014

Billions of 2014 Dollars



Real spending on transportation and water infrastructure by state and local governments increased much more between 1956 and 2014 than did real spending on such infrastructure by the federal government (see Exhibit 7 on page 14). For highways and aviation—and, to a lesser extent, water transportation—spending by state and local governments and spending by the federal government generally followed similar paths. By contrast, for mass transit and rail and water utilities—and, to a lesser extent, water resources—spending by state and local governments increased much faster than spending by the federal government, especially since the mid-1970s. The demands of population growth and aging infrastructure pushed up state and local spending on water infrastructure, as did the requirements of the Clean Water Act of 1972. For a brief period during the 1970s, federal spending on water utilities also rose as a result of the Clean Water Act. ♦

Source: Congressional Budget Office based on data from the Office of Management and Budget, the Census Bureau, and the Bureau of Economic Analysis.

Note: Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build, operate, and maintain transportation and water infrastructure.

- a. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).
- b. Includes water supply and wastewater treatment facilities.

Appendix

In this report, the Congressional Budget Office provides information on public spending for transportation and water infrastructure. Detailed spending tables are available on CBO's website as a supplement to this report.

This report extends information provided in previous reports, the most recent of which was published in November 2010.¹ CBO used a method similar to that used in those previous reports. Namely, CBO obtained data on federal outlays from the Office of Management and Budget (OMB) and on state and local governments' outlays from the Census Bureau. It then converted those nominal (current-dollar) data to real (inflation-adjusted) data using two sets of price indexes created by the Bureau of Economic Analysis that track government expenditures and investment. One set of indexes measures the prices of materials and other inputs used by state and local governments to build transportation and water infrastructure and is applied to nominal capi-

tal spending to convert it to constant dollars; the other set measures the prices of materials and other inputs used to operate and maintain that infrastructure and is applied to spending for operation and maintenance.

The method used in this report differs from that used in past reports in two important ways, however.

First, in its previous studies, CBO reported public spending on infrastructure only for those years for which such data were available for all levels of government. Because state and local spending data are released by the Census Bureau a few years after that spending occurs, the most recent spending data in past reports were always a few years old at the time of publication. By contrast, this report provides estimates of state and local spending on infrastructure through the most recent fiscal year for which data on federal infrastructure outlays are available. That allows estimates of public spending on transportation and water infrastructure to be reported as currently as possible.

OMB data on federal outlays are available through federal fiscal year 2014. The most recent Census Bureau data include state and local spending on infrastructure only through 2012.² Thus, to report the most current public spending on infrastructure possible, CBO used two additional sources of data from the Census Bureau to estimate state and local spending through federal fiscal year 2014. To estimate state and local spending for capital, CBO used the Census Bureau's survey of construction spending by states and localities, which includes construction of each type of infrastructure considered here. Annual rates of change in infrastructure construction by state and local governments were applied to the most recent data on state and local spending to estimate spending through 2014. To estimate state and local spending for the operation and maintenance of infrastructure, CBO followed a similar procedure using data from the Bureau of

1. Congressional Budget Office, *Public Spending on Transportation and Water Infrastructure* (November 2010), www.cbo.gov/publication/21902.

2. State and local fiscal years typically begin and end three months earlier than federal fiscal years. CBO adjusts data on infrastructure spending by state and local governments to federal fiscal years so that they are comparable with data on federal spending.

Economic Analysis on consumption expenditures by state and local governments; however, those data are not infrastructure specific.³

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3. See Census Bureau, “Value of State and Local Construction Put in Place—Not Seasonally Adjusted” (updated December 2, 2014), <http://go.usa.gov/3cJWml>; and Bureau of Economic Analysis, “Table 3.9.5. Government Consumption Expenditures and Gross Investment,” *National Income and Product Accounts Tables* (updated December 23, 2014), <http://go.usa.gov/6qvT>.

The other change in method pertains to how CBO reports spending for water resources by state and local governments. Previous CBO reports did not provide such information for years after 1990 because those data were not available. Although spending for most other types of infrastructure is identified separately by the Census Bureau, water resource spending is included in a broad category for other natural resources. In this report, water resource spending by state and local governments is

estimated for 1991 and subsequent years by applying the annual rates of change for that broader category to the 1990 data on water resource spending. As a result of that change, beginning with 1991, the annual spending reported in this document differs from the corresponding values found in previous CBO reports.



About This Document

This Congressional Budget Office report was prepared at the request of the Ranking Member of the Senate Finance Committee. In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

Nathan Musick of CBO's Microeconomic Studies Division and Amy Petz of CBO's Budget Analysis Division wrote the report with guidance from Joseph Kile and Chad Shirley. Wendy Edelberg, Leo Lex, Sarah Puro, and Jon Sperl of CBO provided useful comments.

Jeffrey Kling, John Skeen, and Robert Sunshine reviewed the report; Bo Peery edited it; Jeanine Rees prepared the report for publication; and Maureen Costantino designed the cover. An electronic version is available on CBO's website (www.cbo.gov/publication/49910).

Douglas W. Elmendorf
Director

March 2015