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# AICGS POLICY REPORT

**FINANCING SUSTAINABLE  
TRANSPORTATION: AN OVERVIEW OF  
FINANCE MECHANISMS AND CASES  
FROM THE U.S. AND GERMANY**

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American Institute  
for Contemporary  
German Studies

JOHNS HOPKINS UNIVERSITY

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## FOREWORD

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In the past, sustainable transportation and mobility were seldom at the center of relations between Germany and the U.S. But the shared concerns about urbanization, economic development, energy, climate change, and social inclusion have moved policymakers on both sides of the Atlantic to look more closely at the development of innovative transportation practices and technologies that can find mutually beneficial exchanges and applications. The reasons are clear. Whether developing and managing light rail, creating pedestrian-oriented central business districts, or integrating bus rapid transit and regional fare systems, each is as vital to the health of Stuttgart region as it is to Northern Virginia. But it is at the policymaker's, elected official's, and technician's peril to assume that Ludwigsburg's Pedelec or Esslingen's fuel cell car-sharing programs can automatically transfer and fit into the unique political, economic, or environmental context of Fairfax County—or any other jurisdiction in the United States. Understanding how and ways in which these innovations can be traded and applied requires thoughtful attention to a range of special political, technical, and economic conditions.

Analyzing and comparing the opportunities to transfer and apply innovative transportation, land-use, and finance mechanism policies between Germany and the United States was the basis for two reports commissioned by the American Institute for Contemporary German Studies (AICGS). With financial support from the Daimler-Fonds im Stifterverband für die Deutsche Wissenschaft, five premier transportation planning and finance experts from Germany and the U.S. delved into the questions about what makes transportation and land-use planning and financing economic, sustainable, and inclusive. Special emphasis of these papers was the ways in which transportation, land-use, and financing innovations evolved in Germany and the U.S., how the performance indicators compare, and what pieces of the technical and policy innovations can be traded and applied in the unique contexts of Germany and the U.S. The authors included Drs. Ralph Buehler (Virginia Tech University) and Wolfgang June (KIT), Ms. Andrea Broaddus (University of California Berkeley), and Dominic Marcellino and Max Grünig (Ecologic).

This publication is an example of AICGS' commitment to comparative domestic and urban policy programs in Germany and the U.S., and the mutually beneficial applications of those transfers, especially in urban contexts. AICGS is grateful to the authors for their insights, the Daimler-Fonds im Stifterverband für die Deutsche Wissenschaft for its generous support of these reports, and to Kirsten Verclas, Kimberly Frank, and Jessica Riester Hart for their thoughtful investment of time and their editorial efforts.

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## ABOUT THE AUTHORS

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**Andrea Broaddus** is a transportation policy expert, whose research is focused on managing the demand for travel through behavioral incentives and land-use practices. As a Humboldt Foundation German Chancellor Fellow, she researched road pricing and transit-oriented development policy in Germany at the Hamburg University of Technology. Additionally, Ms. Broaddus has experience working on transportation policy with the Surface Transportation Policy Project and as a Senior Associate with Nelson/Nygaard Consulting Associates. She is currently a Ph.D. candidate at the Department of City and Regional Planning at the University of California, Berkeley.

**Max Grünig** joined Ecologic Institute in 2007 and focuses on the transformation of the transport and energy sectors, covering smart grids and electric mobility as well as consumer behavior. He conducted research on aspects of international environmental governance related to the inclusion of aviation and shipping in the EU Emissions Trading Scheme and was also responsible for the 2010 Smart Energy Dialogue. In addition, he works on the environmental impacts of electric vehicles and on possible improvements to the European car-labeling directive. In his most recent work, he compared approaches to sustainable urban mobility in the U.S. and Europe. As a specialist author, Mr. Grünig contributed to ETTAR (Environmental Technologies, Training and Awareness-Raising), a European transport research project coordinated by Ecologic Institute and sponsored by the European Commission (EC) within the 6th Framework Program (FP6), as well as to a project assessing the sectoral costs of environmental policy. Furthermore, he formulated the transport-related aspects of the position paper on the EU budget review. In 2004, Mr. Grünig received his degree in economics from the Humboldt-Universität zu Berlin (Germany). He has lived and worked in the U.S., Iceland, and Japan. He is a founding member of the European Institute for Sustainable Transport (EURIST) and a member of the Consumer Research Network run by the German Federal Ministry of Food, Agriculture, and Consumer Protection (BMELV).

**Dominic Marcellino** has been a Fellow at Ecologic Institute in Washington, DC, since the fall of 2008. In his work, he focuses primarily on energy policy (including bioenergy, energy efficiency, renewable energy, and transportation), climate policy in Europe and the U.S., as well as emissions trading systems. Mr. Marcellino is currently leading the project “Incubating Communities of Influence to Transform Economies and the Environment” (I-CITE), funded by the European Commission (EC). As part of I-CITE, he is working with the Atlantic Council of the U.S. (ACUS) to create a first-of-its-kind transatlantic social network for young leaders in environmental policy—Emerging Leaders in Energy and Environmental Policy (E-LEEP). After graduating from the University of Dayton (Ohio, U.S.) in 2002 with a degree in philosophy and a minor in economics, Mr. Marcellino studied environmental ethics at the University of Augsburg as a Fulbright Scholar from 2002 until 2004. He was also a Robert Bosch Fellow in Germany from 2008-2009.



## EXECUTIVE SUMMARY

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This Policy Report is an outcome of the American Institute for Contemporary German Studies' project "The Transatlantic Climate and Energy Dialogue: Urban and Regional Transportation and Energy Problems and Solution." This dialogue consisted of two workshops and two reports, one focusing on urban transportation and land-use in Germany and the U.S. and the other on financing urban transportation. A draft of this report was presented to participants of the Transatlantic Urban Climate Dialogue Workshop on "Sustainable Mobility" from November 26 – 28, 2012 in Stuttgart, Germany. The final paper reflects feedback gathered during the workshop.

The aim of the research was to compare the different approaches to financing sustainable modes of transportation in the U.S. and Germany and to present opportunities for improving the respective funding instruments in each country based on the experiences showcased in best practice case studies.

The Policy Report is organized in three main sections.

The first part presents key financing mechanisms for transportation in the U.S., with a focus on the financing of sustainable modes, examining the federal government's role, the contribution of states taking the example of the Commonwealth of Virginia, as well as the role of regional government here in the Washington, DC region. Finally, the role of local governments in financing transportation is presented. The section closes with a discussion of potential new revenue sources for sustainable modes.

The second part of the paper highlights the key financing instruments for sustainable transportation in Germany, focusing on regional transit and bicycling. This section also begins with an inventory of funding

instruments at the federal level, moving to the state level—here the example of the State of Baden-Württemberg—before going to the local level, in this case the city of Stuttgart. In its final step, the section introduces a potential restructuring of the financing instruments in Germany based on an assessment of the current structure.

The third section is dedicated to presenting six case studies which illustrate best practices for financing sustainable transportation in the U.S. and in Germany. The case studies were grouped with respect to their geographical scale—from urban to corridor to regional scale—and with respect to the financing approach: public funds only, public funds leveraging private funds, public private partnerships, and finally private funds only. The cases are briefly presented in Table 1 (page 9).

The relevant findings of the case studies for policy-makers are:

- Germany offers a model of pure public financing that ensures a common level and quality of transit service throughout urbanized regions. An extension of Stuttgart's regional rail system (S-Bahn S1 line) was used to illustrate how pooling resources from the federal, state, regional, and local municipalities adjoining the line can be a fair and efficient means of providing funding for public transportation infrastructure investments. This example reflects Germany's higher commitment to and prioritization of investments in transit. The state of Baden-Württemberg spent 68 percent of its transportation budget on public transit in FY2011, compared to 8 percent by the state of Virginia. Virginia is increasingly seeking to finance its highway-oriented transportation system with debt and sales taxes that shift the burden of highway building

onto non-drivers, a policy which is both regressive and not environmentally sustainable.

■ In the U.S., financing public transit investments more often involves the private sector. Most commonly, public investment is used to leverage private investment in the form of land development around stations. The Washington capital region's Silver Line was used as an example of two innovative financing mechanisms that are being used to finance the transit line extension: road tolls and value capture. Tolls paid by drivers using the Dulles Toll Road are financing approximately 54 percent of the Silver Line project cost, thus simultaneously serving as a disincentive to driving and a financing mechanism for transit. Local municipalities are financing their contributions to the Silver Line with value capture policies where businesses near the stations pay a higher tax rate.

■ Parking and registration fees are another way in which revenues collected from drivers are increasingly being used to cross-subsidize public transit. In the Washington capital region, car2go DC has made lump-sum payments to local municipalities for parking rights. The example of San Francisco, California was used to illustrate the largest-scale example of this type, the Transit First policy by which all parking revenues are dedicated to the city's transit system.

■ Germany's regional transportation associations, or *Verkehrsverbunden* (VVs), show how disparate local transit providers have formed organizations to enable sharing revenues across multiple transit operators within a region. For this reason, the Verkehrsverbund is often called a "fare union." In some cases, the Verkehrsverbund is also a regional transit agency, operating transit services that span the region. Allowing customers to switch between different services seamlessly with harmonized schedules and a

single ticket can increase overall revenue and improve cost-recovery. Stuttgart's Verkehrsverbund (VVS) was discussed as an example of how the region's transit services have become more efficient, cost effective, and customer-service oriented since it was formed in 1978.

■ Public private partnerships (PPPs) are an innovative financing model being used in both countries. PPPs generally take the form of a legal contract between the public and private entities, which sets a framework specifying the roles, responsibilities, and financial contribution of each, but can also be a cooperation without a binding contract. The Washington capital region's Capital Bikeshare is a traditional PPP, where public funding has covered up-front capital costs to build the system, and it is operated by a private company on a break-even basis.

■ In Stuttgart, the car2go car-sharing service illustrates a less formal cooperation between the city and the Daimler corporation that is similar to a PPP. In this case, public funds have been used to support the launch of car2go as an all-electric vehicle fleet. Bike-sharing and car-sharing both function as complementary services to the public transit system.

A final fourth section contains deeper analysis and recommendations and then outlines possible lessons learned from this comparison of the respective financing systems both in the U.S. and in Germany.

The authors would like to thank the American Institute for Contemporary German Studies at Johns Hopkins University and the Daimler-Fonds im Stifterverband für die Deutsche Wissenschaft for their generous support, which made this Policy Report and the participation in the workshop possible. The authors also wish to thank Nicholas Denhaan for his assistance in researching elements of this report.

Table 1: Overview of the Presented Case Studies

Geographical Scale				
		Urban	Corridor	Regional
Financing Approach	Pure Public		Stuttgart S-Bahn extension, where state government, Verband Region Stuttgart, and municipalities share the investment costs.	Verkehrsverbund Stuttgart (VVS), a regional transit agency where municipalities and transit providers pool costs and revenues.
	Leveraging (Inviting Private Investment)	San Francisco, where parking fees fund public transportation.	Silver Line construction project, where the Dulles Toll Road will provide the majority of funding.	
	Public Private Partnership	Capital Bikeshare DC, where federal and local funding covered up-front capital costs and a private contractor covers operating costs.		
	Pure Private			car2go flexible car-sharing systems in DC and Stuttgart, which is based solely on private funding for capital and operating costs.

# INTRODUCTION

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This Policy Report was motivated by a set of common challenges in the U.S. and Germany that also present opportunity for new ideas and policy changes. First, the economic crisis of the past several years has sapped public resources for transportation investment in both countries. Particularly in the U.S., where high unemployment has been linked to a decline in vehicle miles travelled (VMT), the traditional source for financing transportation—the gas tax—has proven inadequate for maintaining a sprawling and aging highway-oriented transportation system. States and localities are under pressure to find new sources of transportation funding.

Second, demographic shifts are changing transportation demand, such that driving is in decline. In both countries, an aging population is driving less, and so is the generation coming of age. Fewer young adults are acquiring driver's licenses and purchasing vehicles than their forebears, increasing demand for bicycling, car-sharing, and public transit.<sup>1</sup> The travel behavior of older adults is also changing toward increased demand for transit services.<sup>2</sup>

Finally, the new ubiquity of information and communication technologies are revolutionizing how people travel and making transit more customer friendly through services such as trip planning apps for mobile phones. They have made new services like car-sharing possible. But they are also being used to finance transportation infrastructure by charging per-use fees to travelers, for instance, using gantries that read in-vehicle units to charge a toll. Germany's Toll Collect system is a pioneer in this regard, using GPS units in commercial trucks to charge a per-kilometer fee for use of the national highway system.

In addition to and as a result of these changes, there is a slow but steady shift within transportation planning institutions and the political bodies that finance transportation. Transportation policy is increasingly linked to land-use policy, and to climate change outcomes. In the U.S. and Germany, there is an increased desire to improve the sustainability of the transportation system, both environmentally and financially.

In the U.S., despite a transportation funding crisis, politicians have been reluctant to raise fuel taxes, preferring to increase debt and expand the use of non-transportation sources like sales taxes and administrative fees. Some states have been forced to re-prioritize their long-range transportation plans in light of less public funding and shifting demand. Highways are still the biggest investment, but priorities are slowly shifting toward public transit and rail systems. The federal government has authorized new finance mechanisms to leverage private funding of transportation infrastructure and encourage public private partnerships. There is a trend toward wider use of tolls, value pricing, and other user fees to finance expansions of the transportation system. Urban areas that have historically been penalized by federal and state funding formulas are particularly active in seeking new finance mechanisms to adapt local streets for safer and more convenient walking, bicycling, and access to public transit.

## TRANSPORTATION FINANCE IN THE U.S.

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Approximately 50 percent of surface transportation funding in the U.S. comes from state sources, 20 percent from federal, and 30 percent from local sources.<sup>3</sup> The main sources are excise taxes on fuel sales, levied by the federal and by state governments. Much of the money collected is legislatively restricted for highway purposes only. Who controls how the money is spent—Congress, state legislatures, regional Metropolitan Planning Organizations, or local governments—and how much they control, has a great impact on financing for sustainable modes like public transit, rails, and bicycle and walking facilities.

### Federal Transportation Funding: In Crisis

Historically, transit has been funded at much lower levels in the U.S. than Germany. At the federal level, the U.S. still relies upon a transportation financing mechanism that was established in the 1950s in order to build the Interstate Highway System. The Eisenhower Interstate Highway Act of 1956 raised the federal gas tax to \$0.03 per gallon and dedicated tax revenues to the Highway Trust Fund. Prior to this time, roads were financed directly from the general fund, as they are in Germany. The Highway Act claimed fuel taxes as a “user fee” to be utilized for the exclusive purpose of building and maintaining highways. Currently, the federal gas tax is \$0.184 cents per gallon for gasoline and \$0.244 cents per gallon for diesel.<sup>4</sup> Total fuel tax receipts to the Highway Trust Fund amounted to approximately \$30 billion in fiscal year (FY) 2011.<sup>5</sup>

There was no federal finance mechanism for public transit until 1982, when a Mass Transit Account was created within the Highway Trust Fund. From that time, a portion of gas tax revenues have been dedicated to public transportation. For each gallon of fuel

sold, about 15 percent (\$0.0286 per gallon) goes to the Mass Transit Account. In 1991, a major transportation finance reform established the New Starts capital program for new light rail and other transit systems, to supplement the Mass Transit Account. Since then, transit supply has increased faster than demand in the U.S. The New Starts program has financed hundreds of transit system expansions around the U.S., with fierce competition by local governments for program funds. During the period 1997 to 2007, service kilometers of public transit increased, the overall number of transit trips increased, and government subsidies per trip also increased.<sup>6</sup> In fact, during this period the U.S. spent \$0.36 per passenger kilometer for public transit, nearly twice as much as Germany, at \$0.18 per passenger kilometer.<sup>7</sup> Partly this is due to German transit systems operating much more efficiently than those in the U.S., due to factors like denser land development yielding higher ridership. A typical farebox recovery ratio for a U.S. transit system is 33 percent, while in Germany a typical farebox recovery would be from 70 to 80 percent.<sup>8</sup>

Federal transportation monies are spent according to formulas and policies set forth in reauthorizations of the Highway Act. The most recent reauthorization was in July 2012 and is called the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21). Congress reauthorized the Highway Act every six years or so to rebalance priorities and address emerging needs but due to a lack of political consensus on priorities, MAP-21 authorized spending for only two years. It authorized roughly \$105 billion in spending in fiscal years (FY) 2013 and 2014, with about \$40 billion for highways and \$10 billion for public transit each year, plus \$2 billion more for New Starts transit capital projects.<sup>9</sup>

MAP-21 allocates funds to each state by program and sets the planning requirements for transportation projects. States have great flexibility in deciding how to allocate funds among highway and transit programs, and to local governments; most have used it to prioritize their highway networks. In recent years, approximately 70 percent of federal funds were spent on highways and roads, and 30 percent on public transit, trails, transportation “enhancements” (e.g., historic preservation), safety, planning, and research.<sup>10</sup>

Notably, MAP-21 greatly expanded programs that allow states to finance transportation investments with debt. For instance, the Transportation Infrastructure Financing and Innovation Act (TIFIA) program was increased ten-fold, from around \$100 million per year to nearly \$1 billion in FY2014.<sup>11</sup> Such loans must be repaid with a dedicated revenue stream, typically a user fee such as a fare or toll, and so it is likely that the use of more tolling, congestion charging, and other forms of value pricing will increase.

However, MAP-21 failed to address the major issue with transportation finance at the federal level: the bankruptcy of the Highway Trust Fund, which required subsidies to meet shortfalls approaching 10 percent in FY2010 and FY2011. The federal gas tax has been inadequate to meet desired spending levels for several reasons. First, it has not been raised since 1993 and has been declining in real terms. The costs of building and maintaining transportation infrastructure and services are constantly increasing. The federal gas tax is not indexed to inflation, meaning it has lost more than one-third its original purchasing power since 1993.<sup>12</sup> Second, fuel tax revenue collections have been in decline, as the average fuel efficiency of the U.S. vehicle fleet improves, and with Americans driving less in a sluggish economy.

One point of agreement among the politicians that approved MAP-21 was that they were not interested in raising the federal gas tax. It is as yet unclear whether the gap will ultimately be met by alternative sources of financing, by an increased role in transportation financing by the states, or by an overall reduction in spending. Some experts believe this indicates that federal transportation policy is currently in

a state of flux.

### State Funding Trends: Debt, Sales Taxes, and PPPs

Each state is responsible for building, maintaining, and operating its portion of the nation’s transportation system. During the highway-building era, states were primarily focused on road building, but this has slowly shifted as demand has changed and more federal funding for public transit and rail has become available. Today states provide about 20 percent of the funding for transit systems nationwide, on average.<sup>13</sup> To illustrate the role of the state, Virginia’s transportation financing mechanisms are discussed in detail in this section.

Virginia has the third largest state-maintained highway system in the United States with an annual operating budget of approximately \$3.3 billion.<sup>14</sup> It is built and maintained by the Virginia Department of Transportation (VDOT), which maintains over 57,000 miles of interstate, primary, and secondary roads and 12,600 bridges, tunnels, toll roads, and ferry services. The Virginia Department of Rail and Public Transportation (DRPT) is responsible for planning the state’s rail, public transit, and commuter services. DRPT works closely with local governments to develop and fund the state’s sixty public transit systems. State investment in passenger rail infrastructure and services is complicated by the historical ownership of heavy rail infrastructure by private freight companies. Regional and intercity passenger rail services using heavy rail often contract with private companies for the right to operate on certain routes. There are more than twenty privately owned and operated freight and shortline railroad companies in Virginia, and DRPT works with them to develop passenger rail services.

Virginia’s transportation investment decisions are influenced by the political process. VDOT and DRPT are run by a board of directors appointed by the Governor, the Commonwealth Transportation Board. They set priorities and govern the Commonwealth Transportation Fund (CTF), which finances most of the state’s transportation system via plans known as Six-Year Improvement Programs (SYIP). The Board approves annual allocations to VDOT and DRPT, and

to individual projects in the SYIP; however, the process is different for each agency. While VDOT (highway) projects are usually funded directly by the state, DRPT (rail and transit) projects are developed via partnerships with regional and local governments that bear the significant share of costs, with the state funding only a portion.

Figure 1 (page 20) shows Virginia's transportation revenue sources, which amounted to \$5.2 billion for FY2012.<sup>15</sup> Figure 2 (page 20) shows the relative magnitudes of these funding sources, and which are restricted for highway maintenance or new construction needs. Transportation revenues are split among Virginia's transportation system as shown in Figure 3 (page 21).

As shown in Figure 1, in 2012 approximately 23 percent of Virginia's budget came from the federal gas tax, and 40 percent from state sources—16 percent from the state fuel tax, and 24 percent from the motor vehicle sales tax and license fees; nearly a quarter of the budget was financed with bonds.<sup>16</sup> This amount will continue to grow as the state recently approved \$2 billion in new bonds to be issued over the next six years.

Virginia's transportation investments for FY2012 are shown in Figure 3. Highway construction, maintenance, and operations accounted for 71 percent of expenditures, while public transit accounted for 9 percent. Expenditures were 6 percent, but will increase as reliance on debt increases.

The budget for the DRPT amounted to \$481 million in FY2012, or about 9 percent of the state's total investment in its transportation system. Of that amount, about one-third was for transit capital projects, one-third was passed along as operating assistance for local public transportation systems, and 25 percent was for passenger rail service expansions. The DRPT budget has increased significantly in recent years as transportation funding has been shifted in an effort to bolster a more balanced and multimodal transportation system in Virginia. The FY2012 budget represents a 93 percent increase over the FY2005 budget of \$248 million. The nature of the projects supported by DRPT has also expanded to include major initiatives such as Norfolk

Light Rail Transit, Dulles Metrorail, and passenger rail in the I-95 and I-81 corridors.

#### STATE FUEL TAX

Each state imposes an excise tax on fuel sales in addition to the federal gas tax, but the amount varies greatly, depending upon the needs and politics of the state. State gas tax rates range from \$0.08 per gallon in Alaska to \$0.412 per gallon of gasoline to about \$0.49 per gallon in California, New York, and Connecticut, states with large urban transit systems.<sup>17</sup> Most states may add on additional sales taxes and environmental fees that affect the final price to consumers. Virginia established a gas tax in 1923 at \$0.03 per gallon, which would be equivalent to \$0.40 in 2011 dollars.<sup>18</sup> Today it is just \$0.175 per gallon for gas and diesel, well below the national average of \$0.209 per gallon. Maryland's gas tax is \$0.235 per gallon, last raised in 1992, and it has also been \$0.235 per gallon in Washington, DC since 2009.<sup>19</sup>

In twenty-six states, public transit receives little support from the state level because state fuel tax revenues are restricted for highway and road purposes only.<sup>20</sup> Virginia does not have a formal restriction in place, but tends to spend the bulk of its state-generated funds on its road network by choice, relying upon federal sources of funding for transit.

Similar to the federal level, gas tax revenues are the most important state-level source of financing transportation, and there is a funding crisis in most states as revenues cannot keep up with spending. In many states, lawmakers have sought to raise state gas tax rates to generate more money for diverse transportation purposes, although even those that have been successful may not have raised it enough to keep pace in real terms. Twenty-eight states raised their gas taxes an average of 8.7 percent between 1992 and 2002, but spending power decreased by 14 percent during this period, due to inflation.<sup>21</sup> In Virginia, where Governor Robert McDonnell pledged in 2011 to address the funding crisis and secure significant new long-term transportation funds, two proposals to raise the gas tax were raised in 2012—one by Democrats and the other by Republicans—but each party defeated the others' proposal; eleven other

funding proposals also failed.<sup>22</sup>

Virginia has managed to grow its transportation system to the third largest in the nation without raising the gas tax by continually creating new and dedicated revenue sources for transportation. In the past decade, Virginia has increasingly shifted to non-transportation related revenue sources like the sales tax and general funds. It has moved away from a “pay-as-you-go” model and made increasing use of debt as a means of financing the transportation system. New financing mechanisms are aimed at leveraging private capital, such as the sale of bonds, and creation of an infrastructure bank.

#### INNOVATIVE FINANCE

The federal government has given states progressively more opportunities to finance large-scale transportation projects in non-traditional ways. These so-called innovative financing mechanisms include bonding and debt instruments, federal debt financing, credit assistance, and public private financing—all designed to use public funding to leverage private investments, and to build transportation infrastructure more rapidly than would be possible through general revenue bond financing. They usually require state enabling legislation, and Virginia has acted to adopt several innovative finance mechanisms.

Virginia's debt has grown 40 percent over the past decade, exceeding \$25 billion as of 2008.<sup>23</sup> In 2000, the Virginia Transportation Act financed \$546 million of high priority projects selected by the Governor and CTB (87 percent highway projects).<sup>24</sup> It allowed the sale of bonds, and re-allocated insurance premium tax revenues from the general fund to service the debt. The 2007 Transportation Initiative authorized \$3 billion in state bonds for public transit and rail, and re-allocated a portion of the recordation tax from the general fund to the Mass Transit Fund. In 2011, two major bond sales were approved by Virginia lawmakers to support a six-year construction program including over 900 highway, rail, and public transit projects; \$1.8 billion of normal capital project revenue bonds; and \$1.1 billion of Grant Anticipation Revenue Vehicle (GARVEE) Bonds.<sup>25</sup> GARVEE bonds dedicate the state's future federal tax funds to debt service, without guaranteeing that the federal

government will provide the expected financing, thereby introducing risk.

Virginia has taken advantage of another financing mechanism allowed by federal law, the creation of a state infrastructure bank. A state infrastructure bank is a revolving loan fund that can be used as a mechanism to provide funding for transportation projects through loans and credit enhancement. The purpose of the bank is to encourage the investment of private funds in the development of transportation projects and to provide an alternative source of financing. As a revolving loan fund, the bank's capital grows as loan repayments and interest charges are used to support a new cycle of projects. Virginia's infrastructure bank was created in 1995 as part of a federal pilot program, and made very few loans in its first decade. Its management, program guidelines, and selection criteria are overseen by the Commonwealth Transportation Board (CTB). As of June 2009, Virginia's infrastructure bank had \$36.5 million available to lend to private partners in transportation projects.<sup>26</sup> This amount increased to \$283 million with the passage of the state's 2012-2017 six-year transportation plan.<sup>27</sup>

#### PUBLIC PRIVATE PARTNERSHIPS

Virginia has also taken advantage of provisions in federal law allowing the state to partner with private parties to construct transportation infrastructure. The Public Private Transportation Act (PPTA) of 1995 encourages private sector investment in provision of public services, particularly major capital-intensive mega-projects.<sup>28</sup> This law sets the legislative framework allowing the state, regional, and local governments to enter into contracting agreements with private parties to construct, improve, maintain, and operate transportation facilities, including public transit. It allows flexibility for the development of financing methods, including user fees and service payment mechanisms, combining private financing with public funds/financing and issuing debt, equity, or other financial securities. PPTA allows for projects to be initiated by the state or by local governments or private parties.

Virginia's current six-year investment plan includes \$1.4 billion for public-private transportation projects,

which are expected to leverage an additional \$4 billion in resources from the private sector.<sup>29</sup> To date, only one of the fifteen or so projects financed using the PPTA is a non-highway project, Dulles Metrorail. The remainder are highway capacity expansions, although two of the projects include tolled express lanes, Interstates 95 and 495. It remains to be seen whether the PPTA will realize its potential to be a significant source of financing for sustainable modes.

### Role of Regional Government

In the transportation planning process, the Metropolitan Planning Organization (MPO) is the primary planning body at the regional level. Since 1991, federal transportation law requires that urbanized areas with populations of 50,000 or more people have an MPO to coordinate short- and long-term transportation planning. Each of the nation's 384 MPOs must produce a Long Range Transportation Plan (typically twenty years), and a regional project list for funding, or six-year Transportation Improvement Plan (TIP). Federal funds may not be disbursed for a project unless it is included in both of these documents. The MPO must ensure that the long range plan and TIP are in compliance with these federal laws: the region will have adequate funds to build the projects listed in these two documents (financial constraint), regional projects will collectively keep the region in compliance with federal air quality standards, and ensure that the projects will not have disproportionately adverse impacts on low income or minority communities in adverse ways.

The key roles of the MPO are technical assistance and coordination of decision-makers in the region to promote an integrated and multi-modal system. MPOs conduct a range of studies and analyses, such as travel surveys, regional travel models, and travel forecasts, for decision support. MPOs do not exercise direct control over funding and do not implement projects. In large urbanized areas, however, MPOs have authority over certain federal funds normally programmed by the state, including Congestion Mitigation and Air Quality (CMAQ) funds. Other funds available for disbursement by MPOs vary by region and are generally much smaller amounts, coming from sources like state gas taxes, sales taxes, vehicle fees, and tolls.

The Washington, DC region's MPO is the Transportation Planning Board (TPB). The region is the seventh-largest metropolitan region in the U.S., with 5.3 million people and 3.2 million jobs.<sup>30</sup> As shown in Figure 5 (page 22), it includes eight counties in two states, the federal capital district, and twelve independent cities. The transportation network in the TPB planning area includes 15,000 lane miles of highways, 106 miles of the Metro commuter rail system, and 226 miles of regional passenger rail services. Most workers (73 percent) commute by driving alone and 5 percent carpool, while about 18 percent take some form of public transit. It is a prosperous, diverse, and rapidly developing region that is expected to grow by 1.5 million people (28%) and 1.2 million jobs (37%) by 2040.<sup>31</sup>

The TPB was established by the region's state and local governments in 1965 and became associated with the Metropolitan Washington Council of Governments (COG) in 1966. It was later designated as the region's MPO by the governors of Maryland and Virginia, and the mayor of Washington, DC. The TPB is an independent body that is housed and staffed by the COG. It has twenty-two members, each an appointed representative of local, state, and federal governments, state transportation agencies, the regional Washington Metropolitan Area Transit Authority (WMATA), and local transit agencies. The region's long range plan is for a twenty-five year time horizon, and is called the Financially Constrained Long-range Transportation Plan (CLRPP). The TPB is required to update the CLRPP every four years, including the financial plan.

The most recent long range plan for 2011-2040 projects the region will generate \$223 billion for transportation from public and private revenue sources, as shown in Figure 6 (page 22). As can be seen, only 7 percent (\$16 billion) is expected from private financing sources and tolls over this twenty-five year timeframe. The funds from Virginia are from state sources as detailed in the previous section; Maryland and Washington, DC have similar state sources. An additional boost comes from the federal Passenger Rail Investment and Improvement Act of 2008, which provides an additional \$3 billion (\$1.5 billion federal and \$1.5 billion state/local match) for WMATA's future maintenance needs. However, this source is

set to expire in 2020.

Figure 7 (page 23) shows how this money is proposed to be invested. The regional long-range plan commits about 70 percent of funding to the operation and preservation of the existing system, while the remaining 30 percent would be for new transit and road construction. The larger system expansion projects have generated much public attention and discussion, including Dulles Metrorail, the Purple Line light rail connector in Maryland, toll lanes on I-95 and I-495, and new streetcar service in Washington, DC. In light of scarce transportation funds, some major projects have already been removed from the CLRP, and the remainder will be prioritized according to a “fix it first” approach for roads and allowing the Metrorail system to keep pace with demand. A recent financial analysis revealed the extent to which priorities have shifted in recent years. In 2006, highway expenditures formed 43 percent of the CLRP budget and WMATA expenditures 43 percent, while in 2010 highways were 36 percent and WMATA 51 percent.<sup>32</sup>

The long-range plan for the National Capital Region echoes the themes of the national transportation funding debate, and the debate at the state level. Existing financing sources are considered inadequate to meet the expense of maintaining a large system while also expanding to meet growing demand. The TPB names identifying financing as one of the key issues facing the region:

“The Financial Plan for the CLRP focuses on long-term trends. One trend that has been clear for most of the last decade is some of the traditional revenue streams that used to pay for construction, operation and maintenance of the region’s transportation system have not kept pace with growing needs. [...] One of the key issues that will need to be addressed in future plans is how to finance proposed facilities that go beyond those included in this plan. Several regional projects that have been proposed exceeded the financial constraints on the plan that are required by federal regulations. Depending on the specific modal configuration and design chosen, the cost of these additional proposed projects could be more than twice that of those included in this plan for implementation. To construct many of these projects would

require billions of dollars, requiring the region to identify major new sources of funding. This could mean substantial increases in user fees, such as tolls, gas taxes and parking charges.”<sup>33</sup>

This last line points the way toward the new potential sources of funding that have been identified by the TPB, and other state and federal agencies facing the same political impasse on raising fuel taxes—increased reliance on user fees such as tolls, gas taxes, and parking charges. These are discussed in more detail in the section on new revenue sources, below.

### Role of Local Government

Local governments—cities, counties, and townships—own about 77 percent of all roadway miles in the U.S.<sup>34</sup> The majority of daily travel, including virtually all bicycle and pedestrian trips, takes place on these local streets and roads. This means local governments are very important players in the provision of sustainable modes—public transit, bicycle, and walking facilities.

Transportation decisions at the local level are made by elected officials serving either on the County Board or City or Town Council. City officials are also responsible for the local streets, public transit, and walking and biking facilities within their corporate boundaries. County officials are responsible for the secondary highway system in their county, as well as all the local streets and so forth in unincorporated urban areas.

Yet urban areas tend to be disadvantaged in terms of transportation financing in most states, as most revenue sources are collected and controlled by the state and federal government. Almost all states allocate transportation funds to local governments by statutory formulas and legislative appropriations. The level of funding to respective local governments is usually based on factors like qualifying lane miles, population, and other criteria in the formula. For instance, local government assistance constituted only 7 percent of Virginia’s transportation expenditures in 2012, amounting to \$380 million to be split among eighty-one cities and towns. These funds are critical for localities to maintain, operate, and improve their arterial and collector roads and local streets, for

instance to build new crosswalks and bike lanes. The main source of revenue for local governments is the property tax, which must support the police, school system, and wastewater system in addition to the transportation system. With limited state assistance for local road improvements, many cities do not make bicycle and pedestrian improvements a priority. Yet the bulk of daily travel, especially bicycle and pedestrian travel, takes place on local roads. The lack of funding for sustainable modes presents a significant challenge for local governments seeking to shift local trips by car to bicycle, pedestrian, and public transit.

In several states, including Virginia, populous urban areas have served as “donor regions” for highway building in more rural areas, contributing significantly more in gas tax receipts than they receive in allocations from the state highway fund or direct local transfers.<sup>35</sup> However, there may be a shift underway. Virginia did not use the traditional funding formula in 2012, and so even though it was still a small part of the budget, \$380 million for local road assistance represented an increase of \$15 million over FY2011.<sup>36</sup>

Some local governments benefit from local revenue sources, usually a local option sales tax earmarked for transportation, but this is usually committed to public transit. For instance, in Virginia, there is an additional 2 percent tax on gasoline sales within the Northern Virginia Transportation District. Local officials are often reluctant to increase sales taxes for transportation purposes, as they are not user fees, and regressive in terms of the burden on those who pay.

### Potential New Revenue Sources for Sustainable Modes

As discussed above, as traditional transportation sources have proven inadequate or politically impossible to change, there has been increased interest in debt, leveraging private source, and in increasing user fees such as tolls, gas taxes, and parking charges. Perhaps the greatest challenge in developing a financing plan at the regional level is the existence of multiple governmental jurisdictions at multiple levels, each with its own tax base, tax structure, and tax policy. Most new sources that have been implemented are at either the state or local level, because

the MPO is strictly a planning body, lacking the authority to levy taxes. Any effort to develop new revenue sources requires substantial agreement and cooperation among the many players in the region, as well as public support and political leadership at the state level. There are also technical challenges to introducing new methods of collecting fees, from selecting the new technological systems to setting a legal and administrative framework to manage them.

The Washington capital region's long range plan (CLRP) names several potential new revenue sources which could be implemented at the state or local level, or on a project basis. It points out that even if the state gas tax was increased, or indexed to inflation, increasing vehicle fuel efficiency would continue to erode revenues. Revenue sources linked to transportation system use, such as per-mile fees and congestion charging, were preferred. Potential new transportation revenue sources identified in the CLRP and beyond, some of which are already in use in the Washington capital region, are:

- A per-mile (VMT) fee for road use, which could be differentiated according to vehicle engine size and weight;
- Tolls, at a flat rate or differentiated according to time of day (congestion charging);
- Local option sales taxes;
- Beneficiary charges implemented through land taxes or special assessment districts: impact fees, value capture, tax increment financing (TIF), joint development; and
- Public-private partnerships and innovative financing.

These shall each be discussed in turn.

A per-mile, or VMT, fee system charges drivers on a per-mile basis for road use, giving them direct feedback about travel choices leading to higher VMT. Such a system is already in use in Germany, where commercial trucks are charged €0.12 per kilometer for use of the national highway system.<sup>37</sup> The Toll Collect system was supported by the German

trucking industry because it leveled the competitive playing field against trucks registered in neighboring countries with lower registration fees and fuel taxes, like Poland and Hungary. Since its implementation in 2005, “empty” haul trips have decreased by more than 20 percent.<sup>38</sup>

A comprehensive VMT fee system has been successfully piloted in Oregon, and was perceived by participants as fair and not a burden.<sup>39</sup> The fee could be varied by vehicle so that heavier vehicles like trucks pay more, reflecting the greater wear and tear they impose on roads. A disadvantage to this system is that it would require major investment in new technology to collect the fee. In the Oregon pilot, the fee was collected when vehicles were fueling at specially equipped gas stations. Each participating vehicle carried an on-board unit that could communicate wirelessly with the fuel pump to report vehicle miles travelled. Then the mileage fee charges were included together on the same bill with the charges for fuel and fuel tax, and the drivers paid all at once.

Tolls and congestion charging are fees that are usually imposed for use of a particular facility, like a road, bridge, or tunnel. When the fee is varied according to peak hours of travel, or to respond to levels of congestion monitored in real time, then it is a congestion charge. As congestion increases, so does the fee to use the tolled facility, encouraging users to delay their trip, find an alternate route, or use another mode. There are already three projects in the CLRP that are partly financed by tolls or congestion charges: the Intercounty Connector in Maryland, and express lanes on I-95 and I-495 in Virginia. The express lanes are known as HOT lanes, or High Occupancy/Toll lanes, because they are free for use by high occupancy vehicles (two or more passengers), while those driving alone must pay the toll. Tolls are paid using on-board units purchased by drivers and kept in their vehicles that are linked to payment accounts. Although these systems generate a reliable revenue stream, there are significant set-up costs, such as gantries over the highway to monitor traffic and to communicate the dynamically adjusted toll rate to drivers.

Beneficiary fees seek to capture some of the value created by a new transportation facility, such as a

road or transit station, to future users. Impact fees and special assessment districts are rooted in the idea that new development should pay its own way. They are mechanisms by which fees are applied to adjacent properties that benefit from transportation improvements, usually along a street or throughout a neighborhood. Usually only local government has the authority to implement them. For instance, Arlington County and Fairfax County both use impact fees on commercial land to finance transportation infrastructure needs. Commercial real estate pays a surcharge of \$0.125 per \$100 assessed value in Arlington, and \$0.11 per \$100 assessed value in Fairfax.<sup>40</sup>

Value capture and tax increment financing (TIF) are both mechanisms linked to the property tax rates. Value capture adjusts land tax rates according to the property value added by publicly funded transportation improvements. TIF is a mechanism that seeks to leverage future property values to finance projects in the present, by freezing property taxes at a set level and making property investment more profitable. These mechanisms have been in use in the Washington capital region for decades. For instance, Washington, DC used a value capture tax to finance expansion of the Metrorail system by charging property owners within 2,500 feet of a station a higher property tax rate.<sup>41</sup> It is likely that Fairfax County will adopt an impact fee to help finance transportation infrastructure around the Silver Line’s Tysons Corner station.<sup>42</sup>

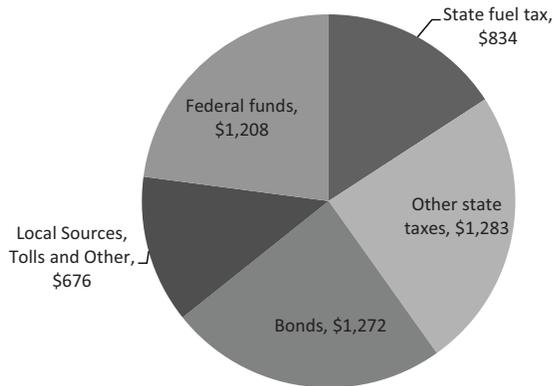
Washington Metrorail is the leading practitioner of joint development in the U.S. When a transit provider participates in the land development around a new transit station by retaining ownership of the surrounding land or selling air rights above the transit corridor, it is called joint development. The Dulles Silver Line includes several joint development projects where rents will help to finance transit services.

Local option taxes are special taxes designated for transportation purposes that can be applied to anything transportation or non-transportation related, such as fuel sales, general sales, property sales, or income. These taxes require two steps to be approved. First they must be specifically enabled by state legislation, and then they must be approved by voters on a ballot measure. Despite this high hurdle,

this has proven a popular way to secure stable financing for transit systems in many U.S. cities. General sales taxes tend to have the highest yield. In the Washington capital region, there is a 2 percent surcharge on fuel sales within the Northern Virginia Transportation District.

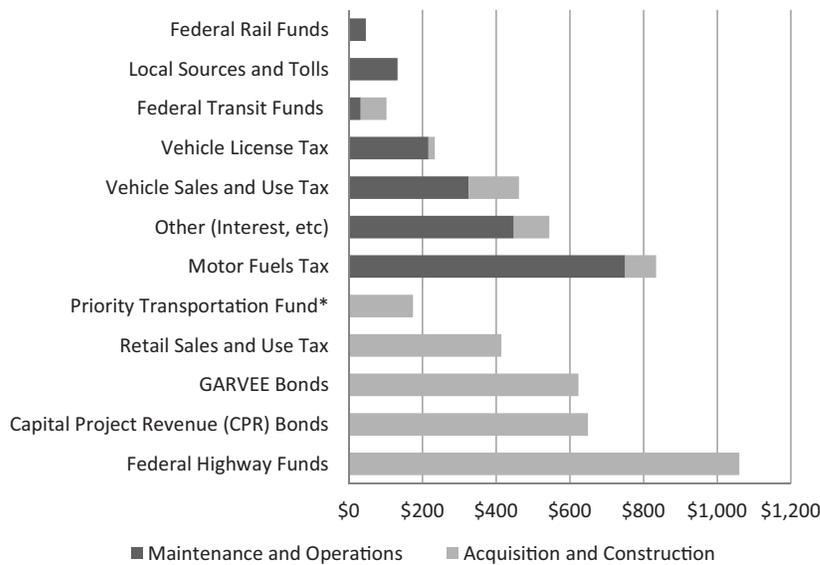
Although just a few have been discussed in detail in this Policy Report, there are many other potential transportation finance mechanisms being experimented with around the U.S., as most states and regions are facing similar challenges to the Washington, DC region. For more information, an exhaustive list of financing mechanisms that are being used by local governments was compiled by a non-profit organization that tracks such issues, the State Smart Transportation Initiative.<sup>43</sup>

Figure 1: VDOT 2012 Budget Revenue Sources (in millions) (\$5.2 billion)



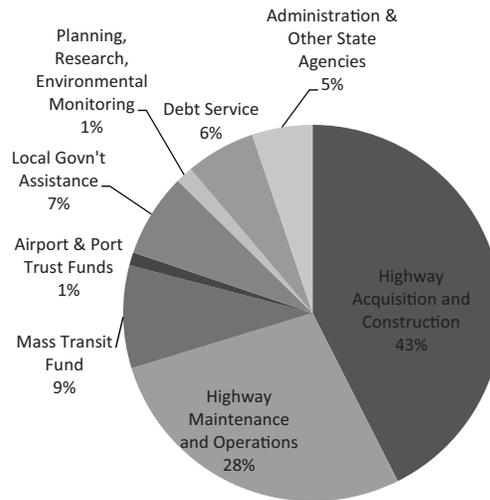
Source: VDOT, Commonwealth Transportation Fund Budget, Fiscal Year 2011-2012 (Richmond, VA: Virginia Department of Transportation, 2011).

Figure 2: Sources of Transportation Revenues and Eligible Uses, 2012 (\$5.2 billion)



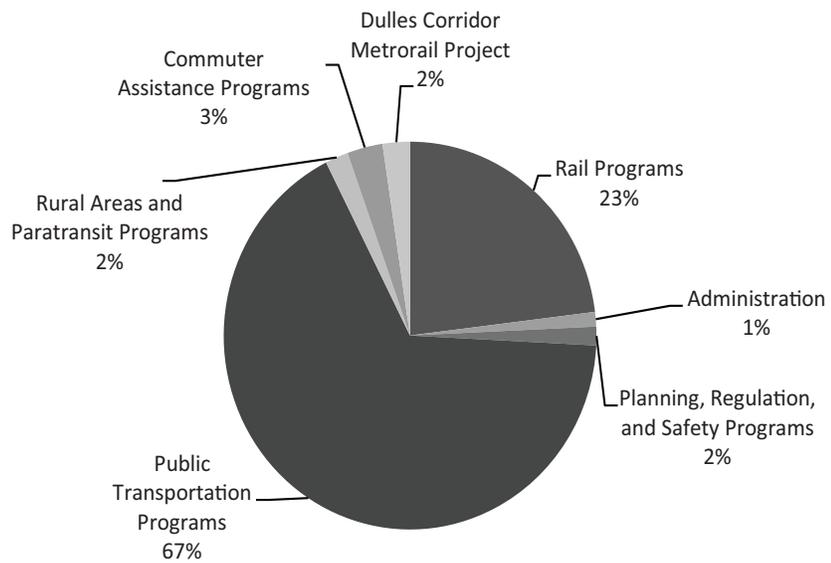
Source: VDOT, Commonwealth Transportation Fund Budget, Fiscal Year 2011-2012 (Richmond, VA: Virginia Department of Transportation, 2011).

Figure 3: VDOT 2012 Budget Expenditures (\$5.2 billion)



Source: VDOT, VDOT Annual Budget, Fiscal Year 2011-2012 (Richmond, VA: Virginia Department of Transportation, 2011).

Figure 4: Virginia DRPT Expenditures FY2012 (\$481 million)



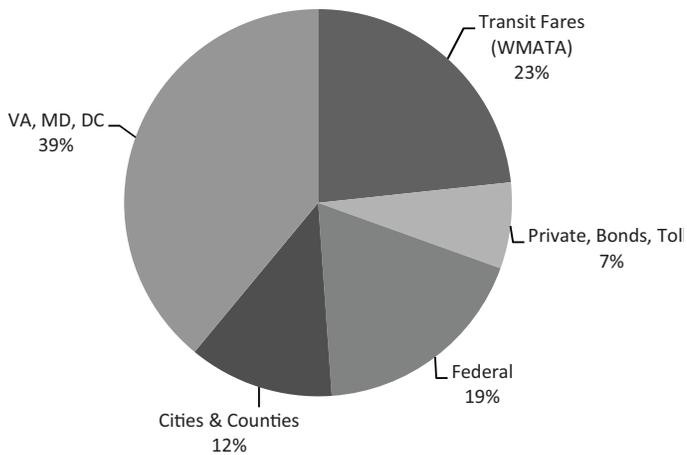
Source: DRPT, Annual Budget Fiscal Year 2012 (Richmond, VA: Department of Rail and Public Transportation, 2011).

Figure 5: Map of the National Capital Region



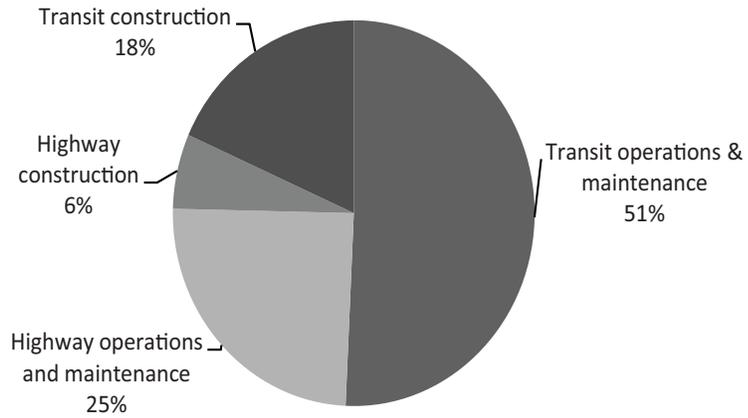
Source: TPB, The Financially Constrained Long-Range Transportation Plan for the National Capital Region (Washington, DC: Transportation Planning Board, 2010).

Figure 6: Regional Long Range Plan 2011-2040 Revenue Sources (\$233 billion)



Source: TPB, The Financially Constrained Long-Range Transportation Plan for the National Capital Region (Washington, DC: Transportation Planning Board, 2010).

Figure 7: Regional Long Range Plan 2011-2040 Expenditures (\$233 billion)



Source: TPB, The Financially Constrained Long-Range Transportation Plan for the National Capital Region (Washington, DC: Transportation Planning Board, 2010).

## FINANCING MECHANISMS IN GERMANY

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Local and regional public transportation services employ about 120,000 people in Germany and transport approximately 28 million passengers every day, i.e., about 10 billion passengers per year.<sup>44</sup> Local and regional public transportation or transit is considered any scheduled transport with less than 50km itinerary or less than one hour total travel time.

Transit funding in Germany takes place at the federal, state, and municipal level. Many funding instruments exist, some covering a single mode, others relating to various modes. The total funding of transit services was €28 billion in 2008.<sup>45</sup> Of this, approximately €9 billion or a little more than a third came from direct revenue, such as user fees, advertising, and rental revenues. Other sources of funding include:

- investment funding for road transit (state funding for investment)
- investment funding for rail transit (state funding for investment)
- tax breaks (no VAT on commissioned transit services, reduced VAT for all other)
- public reimbursements (regional fare transfers, special fares for students, disabled, and others)
- contractual revenue road (revenue for commissioned services)
- contractual revenue rail (revenue for commissioned services)

As can be seen on the one hand, user fees do not cover the full costs of public transportation. On the other hand, users paid approximately €10 per 100km

in public transportation in 2010, much higher than the average of €6.50 per 100km paid for fuel by car owners, not taking into consideration other costs related to car ownership.<sup>46</sup>

While fuel costs increased by 140 percent from 1991 to 2011, transit ticket prices (in regional transit associations, or Verkehrsverbunden) rose by 120 percent, both much higher than average living expenses (approximately 45 percent).<sup>47</sup> This implies that fees for using public transportation cannot be increased significantly in order to raise further revenue for infrastructure and operations. Other sources need to be explored.

The following sections describe in more detail the various existing funding instruments at the federal, state, and municipal level, applied to the Stuttgart region whenever possible.

### Federal Funding for Transit

Rail passenger transportation for urban and regional distances is co-funded by the federal government. The 1993 law on regionalization (*Regionalisierungsgesetz*, RegG) entered into force in 1996.<sup>48</sup> Under the statutes of the law, the federal government transfers funding to the German *Länder* (states), thus allowing them to order rail services from railway providers. The tax on liquid fuels for automobiles provides the revenues for these streams of funding. Hence, road users are co-funding regional rail.

The amount available under this law was set at €6.675 billion in 2008 and increases by 1.5 percent per year until 2015. The federal State of Baden-Württemberg has a share of 10.44 percent in this

funding, i.e., roughly €740 million in 2012.<sup>49</sup> Currently, funding for the period after 2015 is being negotiated.<sup>50</sup>

The German states can contract for the desired rail services through either direct procurement or an open tendering process.<sup>51</sup> The rail service operator then receives a set contract value, plus the fares paid by individual riders. The fee structure for fares is part of the contract between the commissioning state and the operator. The main contractor by far is DB Regio, a company that operates regional rail service throughout all of Germany

The second large pillar in federal transport infrastructure funding used to be the Law for the Financing of Municipal Transport Development (*Gesetz über Finanzhilfen des Bundes zur Verbesserung der Verkehrsverhältnisse der Gemeinden* or *Gemeindeverkehrsfinanzierungsgesetz*, GVFG), which was in effect until 2007. Due to the so-called first federalism reform in 2006, the law was changed into the Law to Decentralize Communal Responsibilities and Financial Aid (*Gesetz zur Entflechtung von Gemeinschaftsaufgaben und Finanzhilfen* or *Entflechtungsgesetz*, EntflechtG).<sup>52</sup> The change in name kept most instruments intact and did not affect the general purpose of the law: separating responsibilities of tasks, which were until then accomplished by the federal government and the states in cooperation. This implies annual transfers of €1.336 billion from the federal government to the states. Until 2013, this funding is earmarked for transportation investments only. After 2013, the earmarking is removed. The funding instrument is in place until 2019. Discussions about federal funding for state and municipal transportation financing are still ongoing.

The State of Baden-Württemberg has a right to 12.40 percent of federal funding, i.e., roughly €166 million.<sup>53</sup> This money is used mostly for rail infrastructure financing. Other sources of federal funding are much smaller in volume, but can be significant for the funding of specific investments or operations.

Funding for railway infrastructure investments can be supported through the federal railway extension law

(*Bundesschienenwegeausbaugesetz*, BSWAG 1993), of which a portion is made available for transit funding as well. For the years 2009 to 2013, a total of €973 million of federal railway funding was set aside for various new transit projects and improving existing transit rail systems.<sup>54</sup> Germany's total funding for rail infrastructure investments (including funding at state level) was €430 million in 2008.

Furthermore, the federal government transfers reimbursements to railway operators for transporting disabled passengers at a reduced fare (section 148 of the Social Security Bill, *Sozialgesetzbuch*). Overall transfers to compensate for lost revenue (including transfers by states) were €2.17 billion in 2008.<sup>55</sup> Another component of indirect federal funding is the application of a reduced Value Added Tax (i.e., 7 percent instead of 19 percent) for all regional and local transit fare sales.

Moreover, municipalities have the right to compensate losses in one municipally-owned service provider with surplus in others, such as compensating transit agency losses with gains from an energy provider. This summation across enterprises alleviates the potential tax burden of the municipally-owned companies and thus also represents an indirect federal funding. Total financing through this tax break mechanism in Germany amounted to €2.78 billion in 2008.<sup>56</sup>

### State of Baden-Württemberg Funding for Transit

In 2010, transit providers in Baden-Württemberg served 1.174 billion passengers, of which approximately 50 percent used the bus, 33 percent light rail, and 13 percent rail.<sup>57</sup> Rail transit in Baden-Württemberg is commissioned through two entities: Nahverkehrsgesellschaft Baden-Württemberg GmbH (NVBW) serving the entire state, and Verband Region Stuttgart serving the Stuttgart region. Overall, 309 transit providers transported passengers in the state.

The state of Baden-Württemberg's transportation system expenditures amounted to approximately 1.77 billion in the fiscal year 2011, corresponding to approximately 5 percent of total state spending.<sup>58</sup> Baden-Württemberg received approximately

€1.112 billion for transportation from the federal government, with the rest coming from non-transportation related state sources.<sup>59</sup>

Baden-Württemberg spent €1.181 billion<sup>60</sup> on public transit services, approximately 68 percent of all state transport spending. This total budget was comprised of several categories, including:

- €650.9 million transfers to operating costs of municipal and regional rail transit,
- €135 million infrastructure investments,
- €2.8 million rolling stock investments,
- €10 million transfers to investments and operating costs of bus transit,
- Approximately €48 million to support regional transit associations (Verkehrsverbunden),
- €36.8 million to compensate for free tickets for disabled, and
- €394 million to compensate for fare rebates to students.

The federal passenger transportation law (*Personenbeförderungsgesetz*, PBefG 1990) entitles transit providers to receive a 50 percent compensation paid by the states for foregone revenues due to reduced fares for students and apprentices. States have the right to decide legislation amending the procedure laid out in Section 45a of the PBefG.<sup>61</sup> In 2010, the State of Baden-Württemberg transferred €224 million to transit providers to compensate for lost revenue of secondary cycle education students and €170 million for school students.

Since school-busing is the exception in Germany, students riding public transit constitute a significant share of the ridership. A continuing decrease in the number of students, thus, has direct implication for the operation of transit in the peri-urban and rural regions.

The region of Stuttgart, on the other hand, is expected to grow in terms of population and economic activity

and hence will have an increasing potential ridership of transit.

A total of twenty-two regional transit associations exist in the State of Baden-Württemberg, each ensuring a uniform fare system within their area of operation. The Verkehrsverbund provides a harmonized transit schedule and a single ticket for all transit connections (rail and bus). Riders can access information about the individual Verkehrsverbund and their services including connections on the portal <http://www.3-loewen-takt.de/index.php>.

The Verkehrsverbund Stuttgart (VVS), created on 1 October 1978, covers the city of Stuttgart and the surrounding municipalities Böblingen, Esslingen, Ludwigsburg, and the Rems-Murr-Kreis.<sup>62</sup> This corresponds to an area of more than 3,000 square km covering 2.4 million citizens and over 330 million passengers in 2010.<sup>63</sup> In 2010, total operating costs of the VVS amounted to €627.1 million, while revenues from tickets, lease, and rentals equaled €363.2 million, resulting in a cost-recovery rate of 57.9 percent. The remaining 42.1 percent are covered by transfers from the state of Baden-Württemberg as well as the participating municipalities and transportation providers. Baden-Württemberg distributes €50 million annually to the twenty Verkehrsverbunden in the state through a performance-based system incentivizing measures that increase ridership or improve financial efficiency, where the best-performing regions receive a higher share of funds.<sup>64</sup>

### City of Stuttgart Funding for Transit

The city of Stuttgart is most populated entity within the VVS and as such bears a significant share of the financial burden. The fully city-owned Stuttgarter Straßenbahnen AG (SSB) is the largest owner within the VVS and holds 26 percent of shares (the city of Stuttgart holds another 7 percent).<sup>65</sup> SSB employed 3,000 people, serviced seventy-one bus and light rail lines, and provided 190 million passenger rides in 2010.<sup>66</sup> The city directly commissioned the transit services to the SSB through in-house commissioning.

SSB operating revenues were €281.7 million in 2010, while operating costs amounted to €300.2

million. The total remaining operating funding gap was €18.5 million. Daily use (36%), followed by commuting (33%) and student transit (27%). Senior citizen riders represent 4 percent of fare revenues. In 2010, SSB invested a gross amount of €106.5 million, but also received investment subsidies of €31.8 million. More than half of the investment went to rail maintenance and extension.

The city of Stuttgart supported transit in 2010 with transfers of €45.8 million, which includes transfers to SSB and other municipal transit operators.<sup>67</sup> On the other hand, the city received compensatory payments for transit services from the state and other municipalities in the same order. The city transferred €0.5 million to VVS. As reporting duties vary between the federal level, municipalities, Verkehrsverbunden, and transit providers, a fully transparent assessment of transfers and funding is difficult.

Stuttgart's spending on bicycle facilities was rather low compared to public transit. Investments and maintenance of bicycle lanes by the city was budgeted at €1.2 million in 2010.<sup>68</sup>

## Conclusion

Transit funding in Germany depends on many sources at various levels of governance. While fare revenues cannot cover the full costs of services, the legal framework ensures coverage of all regions.

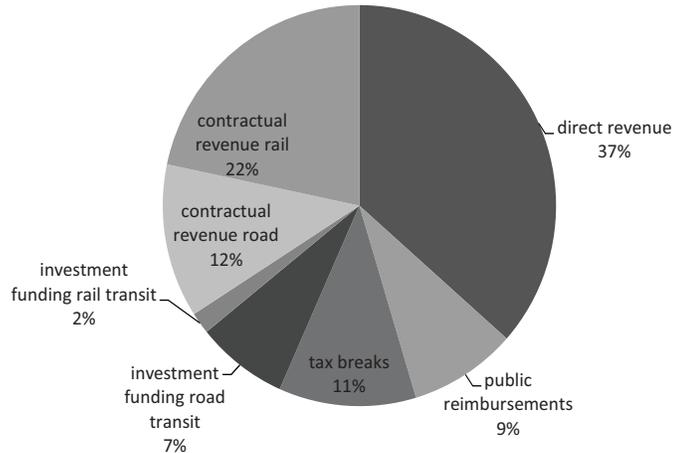
Wealthier and denser agglomerations fare better as the funding gap is relatively small and can be borne more easily by the state and municipality. As such, Stuttgart and its surrounding region are in a very favorable situation in terms of transit funding.

The multi-layered funding structure provides for multiple safety nets on the funding side: if the fare revenues decrease, then public entities can co-fund a higher share; if the municipality is short on cash, then state or federal government can jump in. The diverse funding instruments make it relatively difficult to measure the funding flows and assess the efficiency of the system. On the other hand, linking part of the funding to fuel taxation guarantees a stable funding source.

It has been argued that funding instruments need to be harmonized and simplified across the different levels of governance in order to foster transparency and efficiency of transit service provisioning.<sup>69</sup> While Verkehrsverbunden reduce competition among transit providers, markets are sufficiently regulated and quality regularly monitored to ensure high levels of cost-recovery and service quality in most cases. The coming decades will see changing frame conditions for public transit in Germany: an ageing population, tighter public funds, and shifts in regional economic power will challenge the quality and coverage in some regions. The Stuttgart region will be exposed to these developments as well, but to a much lesser degree than other areas in Germany.

Only the continuation and extension of federal funding for public transit can soften the regional disparity in available funding in Germany. Therefore, it is essential that core public transit services, both capital investments and operating costs, will be covered by federal funding instruments. Quality and effectiveness performance indicators may be suitable to allocate part of the funding and thus encourage innovative and cost-effective management practices.

Figure 8: Sources of Revenue for Transit Services in Germany  
(billion €, total €24.61 billion)



Source: René Bormann et al., Neuordnung der Finanzierung des Öffentlichen Personennahverkehrs (Bonn: Friedrich-Ebert-Stiftung, 2010).

## CASE STUDIES

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### Washington: Metro's Silver Line

#### BACKGROUND

The Washington Area Metro Authority (WMATA) is a government agency operating transit service in the Washington metropolitan area. The Washington metropolitan area includes three jurisdictions: the District of Columbia, (southern) Maryland, and (northern) Virginia. Within those three jurisdictions, WMATA provides rapid transit service under its Metrorail brand, fixed-route bus service under its Metrobus brand, and paratransit service under its MetroAccess brand. The planned "Silver Line" project is an extension of the rapid transit system (rail).

The Silver Line project will oversee the construction of eleven new stations and a twenty-three mile extension of the existing Metrorail system, operated by WMATA from East Falls Church to Washington Dulles International Airport west to Ashburn.<sup>70</sup> The extension will serve Tysons Corner, as well as the Reston and Herndon area, two of Virginia's largest employment centers. It will also provide a direct ride from Dulles International Airport to downtown Washington. All of the new stations built along Silver Line will be in the Virginia part of the Washington metro area, seen on upper left in Figure 9 (page 37).

Construction of the Silver Line project is broken up into two phases. Construction on Phase 1 has already begun, with a planned completion date of March 2013. Phase 1 will include the four stations in Tysons Corner, as well as the station at Wehle Avenue, located in Reston, Virginia (Fairfax County). Phase 2 will run from Wehle Avenue to Ashburn (seen as Route 772 on map), located in Loudoun County, Virginia. The construction and completion date has not yet been set for Phase 2.

The purpose of the Dulles Metrorail is to provide high-capacity transit service in the Dulles Corridor. New Metrorail service in the corridor will not only result in travel time savings for commuters between the Dulles Corridor and downtown DC, but additionally expand the reach of the existing regional rail system, offer a viable alternative to automobile travel, and support future transit development along the corridor. Furthermore, the connection from Downtown DC to Dulles Airport will connect more travelers into and out of DC who would otherwise have relied on Ronald Reagan Washington National Airport. At the moment, Dulles Airport is seen as inconvenient by travelers because there is no way to get there unless by car, taxi, or a long bus ride.

#### FINANCING

The cost of the project has varied widely since first proposed. The project's official website continues to list the cost at \$5.25 billion,<sup>71</sup> although the Metropolitan Washington Airports Authority (MWAA) just released a report estimating \$5.6 billion,<sup>72</sup> and the *Washington Post* and *Washington Examiner* reference the cost at \$6 billion.<sup>73</sup>

The entities providing funding to the project are: the federal government, the State of Virginia, Fairfax County, Loudoun County, and MWAA. The amount of funding that each entity was thought to be contributing to the project has fluctuated since inception—namely, how much the federal government and MWAA were going to provide—but the biggest contributor was always going to be MWAA by means of the Dulles toll road, which will account for more than half of the total funding. The report just released by the MWAA Joint Finance and Dulles Corridor Committee cites the following figures.

Contributions by entity, based on a projected total project cost of \$5.6 billion:

- Fairfax County will contribute \$900 million based upon a fixed percentage of 16.1 percent of the total cost of the project.
- Loudoun County will contribute \$269 million based upon a fixed percentage of 4.8 percent of the total cost.
- Aviation funds from MWA will contribute \$229 million based upon a fixed percentage of 4.1 percent.
- The federal government will contribute \$900 million (17.1 percent) based on a fixed amount from FTA grant for Phase 1 of \$900 million.
- The State of Virginia will contribute \$275 million (4.9 percent), based upon a fixed amount from non-toll road funding.
- The Dulles Toll Road (DTR) will contribute the remaining amount, \$3.02 billion (54 percent), which is neither a fixed amount, nor a fixed percentage.

Funding from the DTR has been a source of dissatisfaction among motorists because of the steep increases at toll roads planned for the next three years.<sup>74</sup> The cost of the toll roads, which is currently at \$2.25, would increase to \$2.75 in 2013, \$3.50 in 2014, and \$4.50 in 2015. Whether those rates will increase from thereon remains unseen, but in any case, the toll road will contribute the majority of funding to the project. Since the amount the DTR will contribute is neither fixed as a percentage nor as an amount, it is plausible that it will need to contribute even more if delays in construction occur.

The multi-pronged approach to funding the Silver Line project is interesting in virtue of how the DTR fits into the plan. Namely, the heaviest burden of the project's funding is being placed on the entity that is perhaps the least environmentally accommodating: motorists. Since one of the principal aims of the project is to encourage an alternative to automotive transportation, it is perhaps fitting that this would be the case. And, since public transportation is almost inherently more eco-friendly than a system of individuals

motorists, it is only logical that cities establish arrangements in which the biggest polluters are the class paying the biggest tax burdens, an idea that the EU is certainly no stranger to.

At the same time, the DTR's dependence on motorists for a majority of the project funding has clear risks. Continually rising tolls for the DTR and also the tolls of a nearby feed-in toll road (the Dulles Greenway) could result in fewer motorists using the DTR, partially reducing this source of funding and increasing traffic on secondary roads. However, with few public transportation alternatives for these motorists and with strong population and employment growth expected in the region, current trends indicate that the expected funding will likely materialize. This approach also raises some questions of fairness, which voters in Loudoun and Fairfax counties are likely to address in the coming years.

### San Francisco: Using Parking Fees for Public Transit

#### BACKGROUND

The San Francisco Municipal Transportation Agency (SFMTA) is responsible for the public transportation systems in the City and County of San Francisco. The SFMTA was created in 1999 by voter proposition (Proposition E), established as Article VIII A of the San Francisco Charter.<sup>75</sup> The citizens' intent through the proposition was to rationalize the local public transportation options of the City and County of San Francisco by creating one authority responsible for all the various transportation systems. In addition to operating the bus, light rail, and cable car systems, the SFMTA oversees San Francisco's Municipal Railway (MUNI). When SFMTA was established in 1999, it also assumed responsibility for the city's parking and street traffic systems—these are operated as a sub-department of SFMTA as the San Francisco Department of Parking and Traffic. The SFMTA's responsibilities were expanded further in 2009, when the city's Taxicab Commission was also subsumed under the SFMTA with the passage of Proposition A in that year.<sup>76</sup> The SFMTA also has authority over the bridges and roads leading into San Francisco; several of these are toll roads, the proceeds of which flow to the SFMTA. Beyond its

unique and comprehensive structure, the SFMTA system is quite large, boasting the country's third highest ridership on a per capita basis: each day, over 700,000 individual rides take place on the MUNI system and over 35,000 vehicles enter the City and County of San Francisco from outside their borders.<sup>77</sup>

Since 1973, MUNI, which operated many of the systems now under SFMTA itself, and subsequently the SFMTA have been tasked with a "transit-first policy" approach to transportation. This emphasis has meant that non-automobile-oriented options and planning take precedence as the SFMTA considers in which areas to make its capital investments and how high to set fees and charges for various items (including vehicle registration, car towing, parking meters, etc.). To this end, for example, Section 8A.105(e) of the ordinance that established SFMTA declares that revenue accruing from parking meters, parking garages, and traffic fines will accrue to the Municipal Transportation Fund.<sup>78</sup> This holds true for these other charges and fees as well. Among other responsibilities, the ordinance establishing the SFMTA gave control of city-owned parking garages, toll booths, etc. to SFMTA. With the addition of responsibility for taxis and the Taxi Commission, the SFMTA now has full authority to implement a comprehensive transportation vision for the City and County of San Francisco focusing on the transportation and movement of people, which includes but is neither limited to nor focused on the passenger vehicle. As the SFMTA is responsible for all street traffic as well, this means that the SFMTA considers bicycle infrastructure, biking, sidewalks, and walking in its planning, in addition to the various means of public transportation that it offers.

## FINANCING

As mentioned above, in addition to the fact that the SFMTA has responsibility for the operation of San Francisco's various transportation systems and infrastructures—including streets, street parking, bridges, tunnels, and public parking garages—the proceeds from various auto-related fees and charges accrue not directly to the city and county's general funds, but rather to the operating budget of the SFMTA. Therefore, in addition to the usage fees (farebox

revenue) paid by users of the SFMTA's transit options, tolls from car drivers entering the city, as well as street parking and parking garage fees, accrue to the SFMTA budget. Parking and other automobile-related fines, car towing fines, car registration fees, and other automotive charges (i.e., neighborhood parking permits) also provide portions of the SFMTA's operating revenue; in San Francisco, at least, the public has chosen to use these charges and fees from automobiles to fund and promote transit and non-automobile transportation options in San Francisco.

The most recently available financial audit of the SFMTA provides figures for the agency's operating budget and the contribution of farebox revenue, fees, and fines, as well as the contribution of street and garage parking to the revenue of the SFMTA system. The SFMTA's budget revenues are displayed in Table 2 (page 37).

When combining categories to assess proportional contributions to the operating budget, fines, parking fees, and vehicle towing made up 24.14 percent of the SFMTA's revenues in 2000-09 and 28.51 percent in 2009-10. This slightly exceeds the contribution from farebox revenues. The public contributions to SFMTA—in the form of general fund support and government grants and taxes—actually declined over this period from 44.36 percent to 33.54 percent of the SFMTA's operating budget. These sources are derived, in part, from income taxes, as well as state and local sales taxes. The decrease in general public support for SFMTA was offset by larger proportional contributions from parking fees, permits and fines, towing, and farebox revenues. Those categories together contributed \$414 million out of the SFMTA's \$769 million budget.

The transit-first policy orientation of the SFMTA has been merged with the financial support of automotive fines, charges, and fees, which enables the SFMTA to carry out part of its mission without relying exclusively on taxes and farebox revenue.

## Verkehrsverbund Stuttgart

### BACKGROUND

In many German cities and regions, adjoining commu-

nities had public transportation offerings and public transit systems and operators that did not cooperate directly with one another. Systems had different vehicles, offered different services, did not link routes and timing, and so on. This led to redundancies and inefficiencies. In order to streamline local public transportation service and to improve access to the service for riders, the Verkehrsverbund (VV) was created. A direct translation is “transport association,” because each Verkehrsverbund amalgamates the disparate local transportation providers under one company. They enable disparate local transit to share revenues across multiple transit operators within a region. For this reason, the Verkehrsverbund is often called a “fare union.” In some cases, the Verkehrsverbund is also a regional transit agency that serves as the operator of longer-distance services that span the region.

A Verkehrsverbund is a public entity, often organized in the legal form of the *Gesellschaft mit beschränkter Haftung* (GmbH), which roughly equates to limited liability companies in the U.S., with legal responsibility for organizing and delivering public transportation services to the citizens of a region. Hamburg established the first Verkehrsverbund in 1965. As a regional entity, a Verkehrsverbund is responsible for coordinating all aspects of transit operations and ticketing among the local transit operators in the region, from fare structures to route design and the timing of transfers.

The Verkehrsverbund Stuttgart (VVS), established in 1978, is one of twenty-two VVs in the state of Baden-Württemberg. It covers the Stuttgart region by organizing a uniform set of fares and tickets for usage of the bus, streetcar, and regional rail systems. The VVS also produces an overlapping and comprehensive operational schedule for the system’s offerings, provides information for riders about the various schedules and the projected frequency of each line, and also ensures that connections between lines and modes of transportation are rationalized in order to simplify transfers between them.

## FINANCING

In Germany, as in the United States, all of the capital costs and those operations and maintenance costs not covered through farebox recovery are provided

through public funding. The public funds for local public transportation come from some combination of the state (e.g., Baden-Württemberg), the region, and the localities served by the system. The federal government (*Bund*) also provides funding for public transportation.

Through the Verkehrsverbund, fares are pooled and redistributed among local operators to cover the operations and maintenance budget of the regional system as a whole. Since the VV is charged with providing reliable service to as many people in the region as possible, it serves to rationalize decision-making and maximize service options based on all available funds in the region. Research has shown that VVs have been more successful than individual local transit providers in attracting new riders, increasing revenue per passenger, and improving cost-effectiveness.<sup>79</sup> For instance, during the period 1990-2007, VVS increased the number of annual transit trips in the region by 40 percent, and farebox revenue per passenger increased by 30 percent.<sup>80</sup>

The rates of farebox recovery for local public transportation systems in Germany tend to be significantly higher than in the U.S. In 2007, German systems averaged a farebox recovery of 77 percent, while American systems averaged 33 percent.<sup>81</sup> For the operating years of 2010 and 2011, the VVS had the operating costs and farebox revenues as displayed in Table 3 (page 38). The farebox recovery rate is lower than the German average, but is on an upward trend, increasing slightly from 2010 to 2011, and nearing 60 percent.

## Stuttgart’s S1 S-Bahn Extension

### BACKGROUND

The S-Bahn in Stuttgart is a regional train network connecting the city of Stuttgart, the Stuttgart airport, and surrounding communities. The entire S-Bahn network in Stuttgart is 266km in length and has an annual average ridership of over 360,000 people per day.

In the past decade, the S-Bahn has completed two network extensions (to the S4 and S1 lines) and is in the process of creating a new line, the S60. Both of

the (nearly) completed projects and also the prospective extension to the S60 line have been financed solely with public funds. As with the funding necessary for the construction of the Silver Line in the Washington, DC area, acquiring the needed funds for the S-Bahn construction projects required the contributions of state and local governments, as well as the implementing authority.

#### FINANCING

The S4 line extension from Marbach to Backnang is 14 km and was completed in late 2012. This extension added five stops to the S4 line. The estimated capital investment costs of building the extension are €11 million (\$14 million),<sup>82</sup> which was split between the federal state of Baden-Württemberg (€6.5 million/\$8.3 million), the Verband Region Stuttgart (€3.10 million/\$3.95 million), which operates the S-Bahn system, and the communities of Ludwigsburg (€550,000/\$701,000) and Rems-Murr (€830,000/\$1.06 million), where the new stations are located.

The Verband Region Stuttgart also led the expansion of the S1 line. This extension was 13 km and extended the line from Plochingen to Kirchheim. The total planning and construction costs were €32.5 million (\$41.4 million). In addition to the line extension, these costs also included the construction of five overpasses. After a series of false starts and long negotiation (the first discussions of extending the line began over thirty years ago), a group of public partners were able to agree on the division of financial contributions in order to complete the project. In the final agreement, the S1 extension received financial support from local communities, the region, and Baden-Württemberg. The total cost of €32.5 million was divided up as follows: fifteen of the communities served by the line contributed €7.78 million (\$9.92 million); the Verband Region Stuttgart €12.29 million (\$15.67 million); and Baden-Württemberg €16.4 million (\$20.9 million). To finalize the agreement, the Verband Region Stuttgart also agreed to assume additional project risk (in the event of cost overruns, etc.).<sup>83</sup> The S1 extension was completed in 2009.

## car2go Car-Sharing

### BACKGROUND

In 2008, Daimler AG began a subsidiary in Europe and North America called car2go, launching its first fleet in Ulm, Germany. Car2go is a car-sharing program that enables paying members to rent cars on a per-minute basis. Car-sharing offers customers access to automobiles and other motor vehicles without having to own the car itself. While similar in some respects to renting a car, car-sharing attempts to provide mobility options to drivers in their neighborhood and throughout a city or region. Cities have embraced car-sharing programs as a way to expand the mobility options for citizens. Car-sharing augments the existing transit system by providing access to automotive transportation, while potentially reducing car ownership overall.

The first car-sharing programs, and still the most established, in Europe and the United States utilize a model where members can choose from a variety of cars that can be rented on a short-term (usually hourly or daily) basis. Rentals are all-inclusive with the usage fee, insurance, parking, gas, and maintenance included in one price based on the time of use. However, this model requires drivers to make a round-trip, as each vehicle “lives” in a particular parking spot, to which the driver must return it when the rental is over.

The car2go car sharing model is different in two respects: it offers only one type of car, the Smart Fortwo, and one-directional rental, where cars do not have to be returned to the point of rental. Cars may be parked throughout a city or region, and members locate them using a web-based, geo-positioning tool on the car2go website and also via smartphone application. They offer customers options of flexibility that position-based car-sharing systems do not have. Car2go aims its service primarily at those who are not planning trips well in advance—usually customers utilize the on-demand rental option by simply finding an available car and renting it on the spot.

Daimler followed up its initial pilot phase in Ulm with car-sharing programs throughout Europe and North America, including active fleets in both the

Washington, DC metro area and in Stuttgart. Berlin, Germany, boasts car2go's largest fleet with nearly 1,200 cars. The Stuttgart system began with 300 automobiles.

In Stuttgart, car2go launched an all-electric vehicle version of the car-sharing system at the end of November 2012.<sup>84</sup> The city is promoting electric vehicles in general; for instance, by the end of 2012, 190 of 250 planned charging stations were installed.<sup>85</sup> EnBW, the electric utility in Stuttgart, is installing the charging stations—eventually there will be 500 stations in and around Stuttgart, for use by car2go and privately owned electric vehicles.<sup>86</sup> One of the outstanding challenges is determining the fee structure for car2go and private electric vehicles for using the charging stations. Stuttgart has established an exemption from parking fees for electric vehicles parking in the city center. This exemption was made possible by a grant from the state of Baden-Württemberg, which provided the funding (€ 2.4 million) as part of its ongoing support for electric vehicles in the state.<sup>87</sup>

## FINANCING

### *Upfront Capital Costs*

To date, car2go has been financed and operated as a completely private venture (the first exception to this is actually the program in Stuttgart, where the electric vehicle infrastructure and the parking agreement have entailed explicit or implicit public support). Both in Washington, DC and in Stuttgart—and in all other cities where car2go operates—members pay a one-time membership fee. After that, the hourly and daily usage fees are designed to cover the costs of operation (gasoline, parking, maintenance, insurance, etc.). Without indicating when the company expects to break even on the car2go system, the company has stated that car2go was launched as a business venture and must eventually become profitable in order to continue to exist.<sup>88</sup> Moreover, with the launch of the first all-electric fleet in Stuttgart in November 2012, Daimler AG indicated that it has ambitions to offer the car2go service in over fifty cities by 2015.<sup>89</sup>

In the case of Washington, DC, car2go North America, LLC (the official name of the Daimler North

America Corporation subsidiary), the company provided the 300 Smart Fortwos. Based on the wholesale price of the Smart Fortwo Passion Coupe (\$13,661), the model used in the DC car2go system, adding in approximately \$1,000 per vehicle for shipping, insurance, and import duties, the authors arrive at the estimate of \$4.4 million for the capital investment of starting the program.<sup>90</sup> In addition to this capital outlay, car2go in Washington, DC had to agree to an arrangement with the city's government to enable customers to park the vehicles in any legal spot—excluding rush hour and street-cleaning restrictions—at any time without having to pay directly for parking. According to publicly available records, car2go go paid the DC Department of Transportation a total of \$793,300 in 2012 for parking rights on public streets, including parking tickets accrued by car2go vehicles in the course of the year.<sup>91</sup> This amount represents a cost of \$2,890 per vehicle. For the first year of operation in DC, 2012, assuming that user fees cover operating costs, including fuel, insurance, and maintenance, we estimate that car2go invested an estimated \$5.1 million in order to launch the system.

The European car2go subsidiary certainly entailed a higher per-vehicle expense to launch Stuttgart's new all-electric vehicle fleet; however there are other costs savings, as mentioned above. Stuttgart has partnered with the state of Baden-Württemberg, which is covering the costs of installing charging station infrastructure and waiving parking fees for electric vehicles in the city center; the exemption is slated to last through 2014.<sup>92</sup>

Daimler's continued plans for expansion of car2go over the next several years, despite the significant capital outlays to launch the program in each city, support the company's claim that Daimler views car2go as a viable business endeavor that is already or will soon contribute to its bottom line.

## Capital Bikeshare

### BACKGROUND

Capital Bikeshare is the name of a regional bike-sharing program in Washington, DC and several surrounding communities, including Arlington and

Alexandria, VA. The Capital Bikeshare system consists of over 175 stations where users can find and park system bicycles, and over 1,670 bicycles.<sup>93</sup> The bike stations and the bikes themselves are owned by the local governments that support the program, while the operation of the Capital Bikeshare system is contracted to an outside vendor in a public-private partnership. The operating company is Alta Bicycle Share, which operates bike-sharing systems in other cities including: Melbourne, Australia; Chattanooga, Tennessee; Boston, Massachusetts; and (recently announced) Portland, Oregon.<sup>94</sup>

Capital Bikeshare was started in September 2010 and replaced a previous bike-sharing system in Washington, DC called SmartBike DC. The Capital Bikeshare system is based on a docking station model akin to other bike-sharing programs in Paris, France, and Montreal, Canada. Users can pick up bikes from any docking station where a bike is available—the location and number of bikes available at each station can be found on the Capital Bikeshare website and smartphone application, which displays dynamic tracking of the number of bikes at each station on a GPS-based map.

Use of Capital Bikeshare bicycles requires joining the system as a member, with an account tied to a credit card. Membership options were designed for both tourists and residents of the area. Regardless of the membership option selected by a user, the first thirty minutes of each trip with a bicycle is included in the membership fee. Usage fees for each trip differ based on the length of use and the type of membership that the user has.

Capital Bikeshare memberships and ridership have increased steadily since its launch: Figures 10 and 11 (page 40) display the membership and ridership dynamics of the Capital Bikeshare system from October 2011 through September 2012. It can be seen that in just two years, membership jumped from 17,802 annual members and 99,442 distinct 24-hour memberships to 28,341 and 209,235 memberships, respectively.<sup>95</sup> Looking at ridership dynamics, in October 2011, there were 123,497 trips system-wide, and by September 2012, a peak of 218,843 trips.<sup>96</sup> Membership dynamics were similar: we report annual and 24-hour memberships over the same

three data points.

## FINANCING

### *Upfront Capital Costs*

The initial investment costs for starting the Capital Bikeshare system in each of the four jurisdictions where it is in operation were covered by a mix of federal and local public investment. The costs of the docking stations differ by size. Using the advertised cost of sponsoring a station in Alexandria as a baseline, the docking stations range in cost from \$40,209 for the installation and equipment for an 11-dock station with 6 bikes; a 27-dock station with 14 bikes costs \$72,687.<sup>97</sup> Total governmental funding for the capital costs of Capital Bikeshare, divided by jurisdiction is estimated to total, to date, \$10.3 million in Washington, DC; \$3.1 million in Montgomery County, Maryland; \$1.9 million in Arlington, Virginia; and \$600,000 in Alexandria, Virginia.<sup>98</sup> The estimated cost of each bicycle is approximately \$1,000; based on this figure, the cost of the system's bicycles is approximately \$1.6 million. Estimates for other capital expenditures are not available at present.

As the system has expanded, it is possible to report more specific capital cost figures for the program. The extension of bike-sharing into Montgomery County, Maryland, which borders Washington, DC to the north, with 350 bicycles and 50 docking stations is estimated to cost \$2.15 million.<sup>99</sup> A grant of \$1 million from the State of Maryland would cover 30 of the stations, which works out to an average cost of over \$33,000 per station. A transportation impact tax for new business development in Montgomery County would help offset some of the shortfall in capital costs.

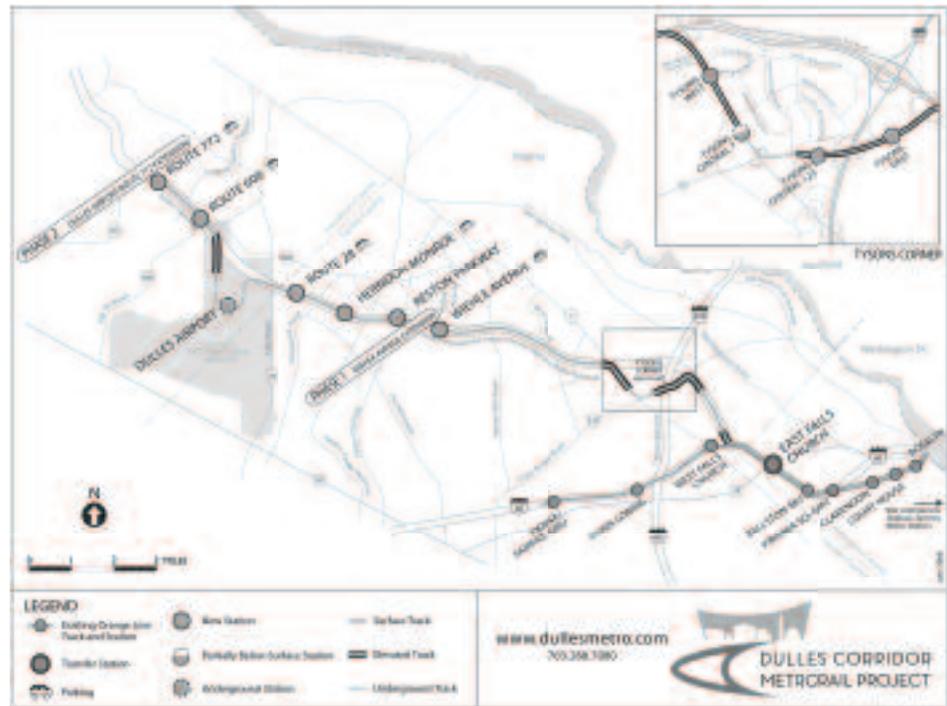
## OPERATION AND MAINTENANCE COSTS

The user fees, collected from short-term rentals and annual memberships, are the source of revenue designed to cover the costs of operation and maintenance (O&M). One method of assessing the financial sustainability of a transit offering is to assess "farebox recovery," which is the ratio of operating and maintenance costs versus direct income from user fees (for example, bus fares). An analysis of Capital

Bikeshare's initial farebox recovery revealed an exceptionally high degree of cost recovery. From the launch of the system in September 2010 through April 2012, Capital Bikeshare reported O&M costs of \$2.54 million, while income from user fees and other sources totaled \$2.47 million.<sup>100</sup> This works out to a farebox recovery ratio of 97 percent. Based on data made available by Capital Bikeshare, steadily increasing numbers of one-time and annual users imply that recovery rates should remain robust. A portion of the yearly revenues come from advertisements on the bike stations, which are paid for by businesses. These arrangements run from the "adoption" of an 11-bike station for \$10,000 a year up to the \$72,000 "sponsorship" for the cost of a 27-dock station, plus maintenance costs running up to \$3,450 per year. Sponsorship also nets the supporting company fifty free memberships.<sup>101</sup>

As the system expands to Montgomery County and Alexandria, operational costs could increase, partly due to increased costs of "re-balancing," or transporting bikes between stations in order to maintain similar levels of bike availability. High farebox recovery and relatively low capital costs have made Capital Bikeshare a low-cost option for increasing mobility options and improving access to bicycles in an urban area.

Figure 9: Dulles Corridor Metrorail Project



Source: Metropolitan Washington Airport Authority

Table 2: SFMTA Operating Budget and Sources of Revenue in Dollars

Revenue Categories	FY 2008-2009 Original Budget (% of total revenues)	FY 2009-2010 Amended Budget (% of total revenues)
Farebox Revenues	\$157,248,618 (20.05%)	\$195,163,421 (25.39%)
Permits, Fees, and Fines	\$112,133,142 (14.30%)	\$129,775,643 (16.88%)
Parking and Rents	\$70,238,800 (8.96%)	\$81,547,830 (10.61%)
General Fund Support	\$195,715,000 (24.96%)	\$178,300,000 (23.20%)
Recoveries, Fund Balance	\$89,777,476 (11.45%)	\$96,520,910 (12.56%)
Government Grants and Taxes	\$152,081,480 (19.40%)	\$79,467,287 (10.34%)
Vehicle Towing and Other	\$6,902,570 (0.88%)	\$7,817,111 (1.02%)
<b>Total Revenues</b>	<b>\$784,097,086</b>	<b>\$768,592,202</b>

Source: San Francisco Board of Supervisors, Limited Scope Performance Audit of the San Francisco Municipal Transportation Agency Part 1, 11 May 2010, <http://www.sfmta.com/cms/rauditresp/documents/FINALREPORTSFMTA051110opt.pdf>, and authors' calculations.

Table 3: Yearly Operating Costs, Revenue, and Farebox Recovery of the VVS (2010 and 2011)

	2010	2011
Operating costs (in million €)	630.2	638.9
Service revenue (in million €)	363.2	376.3
Farebox recovery rate	56.7%	58.9%

Source: VVS, Zahlen, Daten, Fakten: Begleitheft zum Verbundbericht (Stuttgart: Verkehr- und Tarifverbund Stuttgart, GmbH, 2011), <http://www.vvs.de/download/ZahlenDatenFaktenVB2011.pdf>

Table 4: car2go Rental Rates and Fee Structure in Washington, DC

Membership fee (one time)	\$35.00
Per minute charge during a rental	\$0.38
Per hour rental maximum charge	\$13.99
Per day maximum charge	\$72.99
Per mile charge after 150 miles per rental	\$0.45

Source: See car2go's website, <https://washingtondc.car2go.com/faq.php#answer5>. Each item is also assessed a 10% sales and use tax.

Table 5: car2go Rental Rates and Fee Structure in Stuttgart

Membership fee (one time)	€ 9.90
Per minute charge during a rental while driving the car	€ 0.29 (€ 0.09 per minute is charged, when the rental includes a duration where the driver has parked the car, retaining the rental)
Per hour rental maximum charge while driving the car	€ 12.90 (€ 5.40 per hour is charged, when the rental includes a duration where the driver has parked the car, retaining the rental)
Per day maximum charge	€ 39.00

Source: See car2go's Stuttgart website, <https://www.car2go.com/de/stuttgart/was-kostet-car2go>.

Table 6: Capital Bikeshare Membership Fees (as of November 2012)

Type of Membership	Membership Fee
One day (24 hours)	\$ 7.00
3 days	\$ 15.00
30 days	\$ 25.00
Annual membership	\$ 75.00
Annual membership with monthly installments	\$ 84.00 (twelve payments of \$ 7.00)

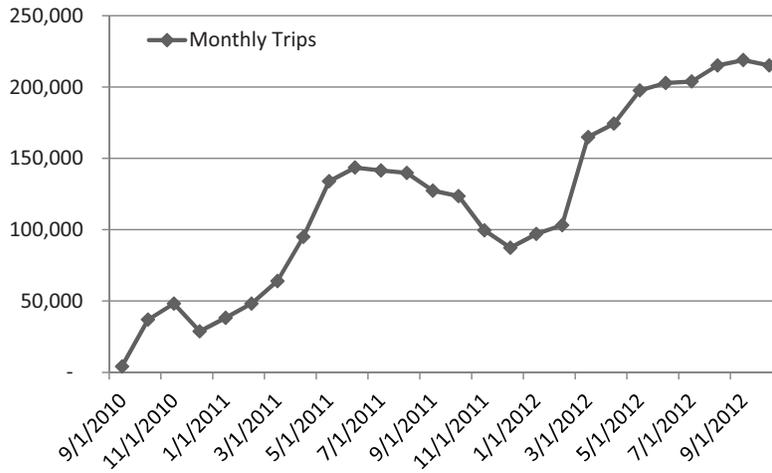
Source: See Capital Bikeshare's website, <http://www.capitalbikeshare.com/home>

Table 7: Capital Bikeshare Usage Fees

Duration of Trip (in minutes)	Total Hourly Fee for the Trip	
	One Day and Three Day Members	All Other Members
Under 30 (up to 29:59 minutes)	Included	Included
30:00 – 59:59	\$ 2.00	\$ 1.50
60:00 – 89:59	\$ 6.00	\$ 4.50
90:00 – 119:59	\$ 14.00	\$ 10.50
For all additional increments of 30 minutes	+\$ 8.00 per 30 minute increment	\$ 6.00 per 30 minute increment
Maximum daily charge	\$ 94.00	\$ 70.50

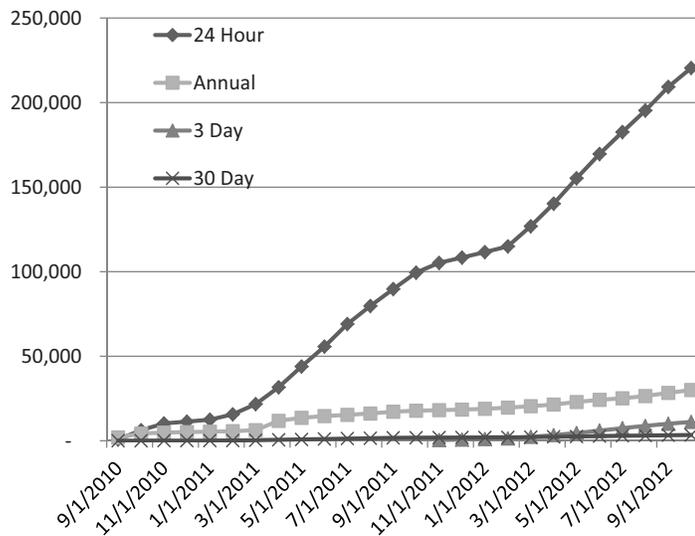
Source: See Capital Bikeshare's website, <http://www.capitalbikeshare.com/home>

Figure 10: Capital Bikeshare Membership Data



Source: See the Capital Bikeshare System Data Dashboard (2012), <http://cabidashboard.ddot.dc.gov/CaBiDashboard/>.

Figure 11: Capital Bikeshare Ridership Data



Source: See the Capital Bikeshare System Data Dashboard (2012), <http://cabidashboard.ddot.dc.gov/CaBiDashboard/>.

## CONCLUSION

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This comparison of public transportation funding in the U.S. and Germany revealed systemic differences that are rooted partly in historic developments, but partly also in more recent decisions.

A key historic difference is to be found in governance, i.e., in the different relations between the federal government, the states, and the municipalities. While both the U.S. and Germany are federal by design, the authority of the federal government reaches much further into the state level in Germany. The approach to federalism in the U.S. is to provide guidelines, but delegate most decision-making to state legislatures. Another historic difference is that Germany's regional governments are more empowered than those in the U.S. As a consequence, there is greater harmonization across German states and regions, both in the level of transportation services provided, and in the coordination of service quality.

In the U.S., a weak federal role encourages greater flexibility and subsidiarity, improving prospects for many competitive states, while in Germany, a higher level of federal influence is mirrored by a higher level of fiscal obligation of the federal government toward its states. The German system of redistributing taxes to fund public transportation also reflects the idea of the German *Sozialstaat* or welfare state system, where transfers reduce inequality and ensure a common standard of living. This inadvertently takes resources and flexibility from states (and municipalities) and discourages competition between regions. On the other hand, it ensures minimum service levels throughout the entire territory. By contrast, in the U.S. there is great variation in transit service at the local and regional level, depending upon the public resources and political will of each area. Arguably, the coverage and service quality of public transportation

are superior in most German municipalities compared to the U.S.

Another key historic difference between these two nations is the approach to land-use (spatial) planning. This topic was discussed at length in a companion report to this one that was published by AICGS in 2013, "Transportation and Land-Use Planning in Germany and the U.S.: Lessons from the Stuttgart and Washington, DC Regions." Germany's system of spatial planning helps to explain why its transit systems are able to operate much more efficiently than those in the U.S. In the German system, land-use decisions are carefully coordinated with transit investments, to ensure that the population density can support efficient levels of service. German regions have traditionally clustered development more closely together metropolitan regions in the U.S. From a financing perspective, while U.S. municipalities often compete for new development by offering corporate tax breaks, an issue known as "fiscal zoning," this issue has been addressed by the federal government in Germany, where municipalities are regulated as to the amount they can raise or lower their corporate taxes.

There are also strong differences between transportation institutions in the U.S. and Germany. In the U.S., while the main transportation funding source is federal, the majority of decision-making is at the state level. State transportation agencies control the vast majority of investment into the transportation system, tending to favor the highway system over public transit services. In Germany, transport investment decision-making is spread across all levels of government. A federal agency is responsible for planning, building, and maintaining the interstate highway system (*Autobahnen*). Municipalities and regions

have greater authority and far larger budgets for planning, building, and maintaining urban and regional transport systems, and tend to invest most heavily in public transit services.

Other differences are rooted in political decision-making, rather than historic and institutional context. The major share of funding for sustainable modes, particularly public transportation, comes from the municipal level in the U.S.; in Germany, it comes from the federal government. This difference in funding approaches implies different incentives to adopt novel and innovative funding instruments. While our case studies show a number of examples from both countries, only one example from Germany involves private funding (car2go in Stuttgart), while all other German examples are purely publicly financed. In the U.S., on the other hand, our examples show a trend toward a much greater degree of private funding.

The relevant findings of the case studies for policy-makers are:

- Germany offers a model of pure public financing that ensures a common level and quality of service throughout urbanized regions. An extension of Stuttgart's regional rail system (S-Bahn S1 line) was used to illustrate how pooling resources from the federal, state, regional, and local levels adjoining the line can be a fair and efficient means of providing funding for public transport infrastructure investments. This example reflects Germany's higher commitment to and prioritization of investments in transit. The state of Baden-Württemberg spent 37 percent of its transportation budget on public transit in FY2011, compared to 8 percent by the state of Virginia. In addition, Virginia is increasingly seeking to finance its highway-oriented transportation system with debt and sales taxes that shift the burden of highway building onto non-drivers, a policy which is both regressive and not environmentally sustainable.
- In the U.S., financing public transit investments more often involves the private sector. Most commonly, public investment is used to leverage private investment in the form of land development around stations. The Washington capital region's Silver Line was used as an example of two innovative financing mechanisms that are being used to finance the transit line extension: road tolls and value capture. Tolls paid by drivers using the Dulles Toll Road are financing a large portion of the Silver Line project cost, thus simultaneously serving as a disincentive to driving and a financing mechanism for transit. Local municipalities are financing their contributions to the Silver Line with value capture policies where businesses near the stations pay a higher tax rate.
- Parking and registration fees are another way in which revenues collected from drivers are increasingly being used to cross-subsidize public transit. In the Washington capital region, car2go DC has made lump-sum payments to local municipalities for parking rights. The example of San Francisco, California was used to illustrate the largest-scale example of this type, the Transit First policy by which all parking revenues are dedicated to the city's transit system.
- Germany's regional transportation associations, or Verkehrsverbunden, show how disparate local transit providers have formed organizations to enable sharing revenues across multiple transit operators within a region. For this reason, the Verkehrsverbund is often called a "fare union." In some cases, the Verkehrsverbund is also a regional transit agency, operating transit services that span the region. Allowing customers to switch between different services seamlessly with harmonized schedules and a single ticket can increase overall revenue and improve cost-recovery. Stuttgart's Verkehrsverbund (VVS) was discussed as an example of how the region's transit services have become more efficient, cost effective, and customer-service oriented since it was formed in 1978.
- Public private partnerships (PPPs) are an innovative financing model being used in both countries. PPPs generally take the form of a legal contract between the public and private entities that sets a framework specifying the roles, responsibilities, and financial contribution of each, but can also be a cooperation without a binding contract. The Washington capital region's Capital Bikeshare is a traditional PPP, where public funding has covered up-front capital costs to build the system, and it is operated by a private company on a break-even basis.

■ In Stuttgart, the car2go car-sharing service illustrates a less formal cooperation between the city and Daimler AG that is similar to a PPP. In this case, public funds have been used to support the launch of car2go as an all-electric vehicle fleet. Bike-sharing and car-sharing both function as complementary services to the public transit system.

These findings point the way forward to further research and policy action. A few additional ideas emerged during the discussion at the meeting in Stuttgart where this Policy Report was presented in draft form, which the authors did not develop in detail, but would like to mention. A significant difference between the U.S. and Germany lies in the approach to transporting students. While in the U.S., dedicated school busing for students became a de facto standard after desegregation busing in the 1970s and 1980s, German students rely on common public transportation options to reach their schools. School buses use scarce capital in an inefficient way as they idle most of the day and year, and as they can only be used for a sole purpose. In Germany, both federal and state governments heavily subsidize the transport of students with annual transit passes. Thus, transit providers can count on a stable base revenue source, which is especially vital in rural areas, where student ridership forms a higher share of transit use. If busing were discontinued, those funds could go into the local transit system and would thus benefit non-student riders as well. This leveraging could trigger additional transport services in terms of higher service frequencies or new lines, and so create a virtuous cycle where more riders are attracted, more revenues generated, and greater system efficiency achieved.

Our comparison thus closes with an outlook to further research and address the challenges faced in financing for public transportation in both countries. Improving the respective financing systems is crucial for supporting dynamic and efficient societies in the twenty-first century.

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