

THE INNOVATIVE DOT

Focus Area 2: Revenue Allocation and Project Selection

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Scarce transportation dollars need to be spent where they do the most good. But making changes to long-standing practices, some of which are ensconced in law, can be difficult and present a hurdle to state departments of transportation (DOTs) looking to get the best bang for their buck.

Pressing forward with revenue allocation and project selection reform represents a major way in which DOTs can deliver projects with greater impact more quickly. Many agencies are now reforming project selection and formula funding processes for sub-state units of government, often tying proposed spending to state, departmental, and/or local goals and objectives.

In this section:

- Establish Revenue and Funding Flexibility: Mode-Neutral Evaluation and Funding Distribution
- Incorporate Asset Management
- Develop a Performance- and Outcome-Focused Project Selection Process
- Remove Barriers to Off-System Investment
- Update Funding Formulas and Implement Competitive Fund Distribution for Smart Transportation

Pictured: Improvements to the Perimeter Center Parkway in Atlanta, GA were part of the work of the Atlanta Livable Centers Initiative. See *“Update Funding Formulas and Implement Competitive Fund Distribution for Smart Transportation”* to learn more.

FOCUS AREA 2: REVENUE ALLOCATION AND PROJECT SELECTION

Establish Revenue and Funding Flexibility: Mode-Neutral Evaluation and Funding Distribution

The Opportunity

State and federal transportation revenues are often funneled into mode-specific pools and then distributed to projects of the same type. A dollar taken in from an auto toll facility is typically a dollar credited to additional roadway projects, while a dollar in transit fare is a dollar of transit offset. In fact, half the states have a constitutional or statutory provision that limits the use of state gas tax revenues exclusively to highway and road purposes.¹

This siloed approach ignores the integrated nature of the transportation system and exacerbates the highway and road focus in transportation funding. Improvements to roadway surfaces benefit transit riders, for example, and more efficient and attractive transit options benefit those who drive. Options such as system management, transit investments, technology improvements, and demand management may be less costly and more effective solutions to transportation problems than capacity projects. Segregating funds by mode does not allow states to prioritize projects that best serve the system as a whole; rather, it creates budget biases and false choices.

What Is It?

State DOTs can allocate funds efficiently based on system-wide needs, priorities, and performance by pooling resources into a multimodal fund, and then distributing funds using mode-neutral criteria. Under this approach, a DOT conducts a consistent cost-benefit analysis or a return on investment (ROI) calculation for each project regardless of mode, and the option with the lowest cost-benefit ratio or the highest ROI receives funding. This means that no option—road building, transit, or system management—is ignored in the project selection process.

Under this approach, a state would:

- **Establish a dedicated transportation fund** as repository of pooled funds from transportation user fees;
- **Combine all revenues/resources into common pot** for redistribution to the most effective projects; and
- **Decide how to distribute funds through a comprehensive mode-neutral analysis** that evaluates proposed projects based on criteria tied to specific state goals that focus on economic development, job creation, health and safety, asset preservation, and other priorities.

Some states already allocate funds using this framework. In others, achieving it may be too great a political challenge, but in that case, the DOT can perform multimodal planning and work to find the funding to match the best plan.

One of the biggest challenges to establishing a mode-neutral approach to project evaluation is the mode-specific division of current federal transportation funding—highway funding, bridge funding, and

¹ National Conference of State Legislatures. (2011, June 1). *Transportation Governance and Finance: A 50-State Review of State Legislatures and Departments of Transportation*. Retrieved 9/12/2013 from <http://www.ncsl.org/default.aspx?tabid=19117>.

transit funding are divided into separate pots of money that have different requirements for use and are administered by separate agencies within the U.S. DOT. However, there is more flexibility in these programs than is commonly acknowledged. The new flexibility among highway funding programs provided by the federal transportation program MAP-21 may allow states to start to address some of these issues, although trying to use federal funding flexibly across modes will still present challenges.

Implementation

For states that do not currently have a mode-neutral fund in place, creating such a fund to pool transportation resources will likely require legislative action. This can vary on a spectrum between fully eliminating all mode-specific accounts and simply finding openings in existing language that allow a demonstration of the benefits of mode-neutral revenue collection and distribution. Appropriate strategies will depend on a state's political climate and budgetary constraints.

Eliminate mode-specific accounts. States can eliminate or amend restrictive earmarking provisions and replace them with new language that allows revenue to be deposited into a single transportation fund for use across all transportation modes. Statutory language is typically easier to modify than constitutional language. Several states have statutory language that can serve as a model for states looking to amend existing earmarking provisions. For example, Oregon's Multimodal Fund² is separate from the state's General Fund and supports air, marine, rail, and public transit projects.

Create a sub-fund that allows flexible allocation based on state priorities. Washington shifted \$114 million of its state road funds (generated through taxes, permits, etc.) to its Multimodal Account.³ The Washington State DOT (WSDOT) and state legislature collaboratively distribute this funding based on priorities rather than mode. Several states, including Maryland, Florida, North Carolina, and Wisconsin, have all modified state legislation to allocate a portion of transportation funding based on state priorities.

Review statutory disbursement formulas. Some states have mandatory disbursement formulas set by their legislatures that establish how much must be spent on roadway projects versus non-highway projects. In some cases, these statutes have some implicit flexibility that states can utilize. Rhode Island, for example, established a dedicated state transportation fund by statute §31-36-20 that requires that all gas tax revenues be deposited into the Intermodal Surface Transportation Fund (ISTF).⁴ While the legislation specifically allocated a portion of the fund to particular uses, the DOT has flexibility to allocate the majority of the fund to the most effective purposes.⁵

New York provides an alternative model for states that wish to retain some allocation formula. State Finance Laws §89-B⁶ and §89-C⁷ established the Dedicated Highway and Bridge Trust Fund and the

2 Oregon State Legislature. *Oregon Statute 367.080: Multitmodal Transportation Fund*. Retrieved 9/12/2013 from <http://www.oregonlaws.org/ors/367.080>.

3 Ennis, M. "WPC's Recommendations on the State's 2012 Transportation Tax Package, Part III." Washington Policy Center. Retrieved 9/12/2013 from <http://www.washingtonpolicy.org/publications/legislative/wpc-recommendations-2012-transportation-tax-package-part-iii>.

4 State of Rhode Island. Rhode Island State, Title 31: Motor and Other Vehicles. Chapter 31-6: Motor Fuel Tax. Retrieved 9/12/2013 from <http://www.rilin.state.ri.us/statutes/title31/31-36/31-36-20.HTM>.

5 State of Rhode Island FY 2013 Governor's Budget. Executive Summary. Chapter 8: "Transportation." Last updated January 31, 2012. Retrieved 8/1/12 from http://www.budget.ri.gov/Documents/CurrentFY/ExecutiveSummary/8_Transportation.pdf.

6 New York State Legislature. *Statute §89-B, State Finance*. Retrieved 8/23/12 from [http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=\\$\\$STF89-B\\$\\$@TXSTF089-B+&LIST=SEA32+&BROWSER=BR OWSER+&TOKEN=59091576+&TARGET=VIEW](http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=$$STF89-B$$@TXSTF089-B+&LIST=SEA32+&BROWSER=BR OWSER+&TOKEN=59091576+&TARGET=VIEW).

7 New York State Legislature. *Statute §89-C, State Finance*. Retrieved 8/23/12 from [http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=\\$\\$STF89-C\\$\\$@TXSTF089-C+&LIST=SEA33+&BROWSER=BR OWSER+&TOKEN=59091576+&TARGET=VIEW](http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=$$STF89-C$$@TXSTF089-C+&LIST=SEA33+&BROWSER=BR OWSER+&TOKEN=59091576+&TARGET=VIEW).

Dedicated Mass Transportation Trust Fund, respectively, in the New York State DOT as repositories of transportation-related revenues. Although marginally constrained by mode, the DOT has flexibility to apply the funds toward a broad array of projects for highways, airports, ports, rail, ferries, and transit.

Expand the definition of “roads and highways.” If changing earmarking language is not feasible, expanding the definition of “roads and highways” can allow states more flexibility with fund allocation. For example, as a result of state-level Complete Streets legislation, Wisconsin’s DOT provided guidance in Chapter Trans 75 that requires roads built with state and federal funds to have amenities for bike, pedestrian, and transit users.⁸ Communities now must consider all road users when building new roads, including motorized, non-motorized, and transit. This means that bike lanes, sidewalks, wide paved shoulders, and/or transit pull-outs may be included in the definition of a road, so separate funding is not necessary.

Identify openings in modal dedication language. If amending restrictive statutory or constitutional language is politically unfeasible, there are still opportunities for transportation revenue flexibility. Oregon has separated the tax paid on gas for non-road machines (such as lawn mowers, chainsaws, and leaf blowers) from the gas tax paid by motorists and sets aside this money, the “Lawnmower Fund,” specifically for non-road transportation projects. As defined in ORS 184.642, this fund consists of taxes on fuel for non-road vehicles and machines, and therefore is not subject to the constitutional restrictions that apply to the state’s highway fund.⁹ This nuance complies with state law, which mandates that revenues generated from roads must be used exclusively for road projects. While the amount collected in the Lawnmower Fund is relatively small—approximately \$5 million annually, as of 2009, compared to \$328 million in the Highway Fund—it still provides some funding that the DOT may use for transportation projects that go beyond roads and highways.¹⁰

Case Studies

Maryland

Maryland’s method of allocating funds for transportation allows complete flexibility across modes. Projects are selected based on the goals and objectives in Maryland’s 20-year transportation plan. The approach is bottom-up: local municipalities submit project lists to the Maryland DOT (MDOT), and the governor prioritizes projects based on the state’s goals and objectives, as well as the proposed project’s level of service, safety, maintenance issues, economic development potential, availability of funding, and input received from public and local officials.¹¹ The governor makes the final project selection, which is submitted to the General Assembly for approval. The General Assembly is able to reduce funding for projects but cannot add funding.¹²

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- 8 State of Wisconsin. (2010, December). Wisconsin Legislative Documents. Chapter Trans 75: Bikeways and Sidewalks in Highway Projects. Retrieved 9/12/2013 from https://docs.legis.wisconsin.gov/code/admin_code/trans/75.
- 9 Oregon State Legislature. ORS 184.642, Department of Transportation Operating Fund. Retrieved 8/23/12 from <http://www.oregonlaws.org/ors/184.642>.
- 10 Oregon State Legislature. *2009-2011 Oregon Legislatively Adopted Program Budget*. Retrieved 9/12/2013 from http://www.oregon.gov/ODOT/CS/FS/docs/budget/0911Lab_PrgBdgt.pdf?ga=t.
- 11 Cambridge Systematics, Inc., University of Maryland Center for Advanced Transportation Technology, and Resource Systems Group. (2010). “National Cooperative Highway Research Program Report 664: Measuring Transportation Network Performance.” Transportation Research Board of the National Academies. Retrieved 8/15/12 from http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_664.pdf.
- 12 National Conference of State Legislatures. (May, 2011). *Transportation Governance and Finance: A 50-State Review of State Legislatures and Departments of Transportation*. Retrieved 8/10/12 from <http://www.ncsl.org/documents/transportation/FULL-REPORT.pdf>.

This multimodal funding protocol, delineated in Chapter 725, was instituted in 2010 after a multi-year process and several amendments. The process was spurred by transportation advocacy organizations, which wanted more transparency in project selection. The advocacy coalition worked with MDOT and the state legislature to develop a bill that would better align state priorities with projects selected for funding. Chapter 725 requires MDOT to better define how the department evaluates and selects proposed major capital projects. Local jurisdictions must demonstrate the relationship between their prioritized projects and the long-term goals of the state transportation plan and local land use plans.¹³

While this legislation did not significantly change the process of allocating funds, it did create a more transparent process. Counties now have guidance on criteria, the timeframe for project submittal, and more information in order to build strong projects from the beginning.

Wisconsin

Wisconsin has a segregated transportation fund that takes in revenues from motor fuels taxes, vehicle registration, bonding, and other sources and supports all modes, including urban transit and a state-owned intercity freight rail network. Sometimes the “diversion” of revenues collected from one mode to support another—particularly transit—becomes a political issue. However, a Wisconsin DOT (WisDOT) study of the socioeconomic benefits of transit learned that public transit use saves the state’s riders and taxpayers an estimated \$730.2 million annually¹⁴, contributes to overall quality of life, reduces emissions, and benefits drivers by mitigating highway congestion.

To better understand the value of public transit investments, WisDOT conducted a thorough cost-benefit analysis over the life cycle of the investment (20 to 30 years in the case of transit capital investment projects). This research showed that investing in transit would produce a return of more than three dollars on each dollar spent at all the potential state funding levels that were evaluated.¹⁵ It furthermore documented benefits in greater detail, in terms of affordable mobility that transit provides (an especially crucial factor for households without ready access to an automobile, for whom transit is a key means of reducing household expenses allocated to transportation and thus allows household income to be invested in other sectors of the economy), congestion management, and economic development. Once all the benefits and costs had been estimated, investigators could calculate cost-benefit metrics such as net present value, cost-benefit ratio, and ROI under different levels of state funding. These types of metrics are useful to state decision-makers in assessing the economic worthiness of public transit.

Pennsylvania

The Pennsylvania DOT (PennDOT) developed a mode-neutral planning process as part of its Linking Planning and NEPA (LPN) initiative. This initiative was initially a response to changes in SAFETEA-LU legislation regarding the connection between the planning and NEPA (National Environmental Policy Act) phases of project delivery. The result of this initiative was the development of a series of screening tools that are to be used during the long-range transportation planning process that is conducted by metropolitan planning organizations (MPOs) and rural planning organizations (RPOs) throughout Pennsylvania.¹⁶ PennDOT worked with MPOs and RPOs to develop screening tools that require the

13 Maryland Transportation Code Ann. 2-103.1 (c)(5). Retrieved 8/1/12 from http://www.mdot.maryland.gov/Office%20of%20Planning%20and%20Capital%20Programming/County_Priority_Letters/Documents/Ch_725_hb1155.pdf.

14 Wisconsin Department of Transportation Research Program. (May, 2006). Wisconsin Project 0092-05-14, “The Socioeconomic Benefits of Transit in Wisconsin, Phase II: Benefit Cost Analysis.” Retrieved 9/12/2013 from <http://wisdotresearch.wi.gov/wp-content/uploads/05-14tranbenefits-f1.pdf>.

15 *Ibid.*, p. 6.

16 Pennsylvania Department of Transportation. Center for Program Development and Management. (2010, September). *Developing Regional Long Range Transportation Plans: Resource Guidance for Pennsylvania Planning Partners*. Retrieved 8/1/12 from: <ftp://ftp.dot.state.pa.us/public/Bureaus/Cpdm/FinalRTPGuide.pdf>.

assessment of all modes of travel for all problems and candidate projects. Although these tools have been in place for several years, they are just beginning to be tested in current rounds of long-range transportation plan development.

Oregon

In 2012, the Oregon DOT (ODOT) changed how the Statewide Transportation Improvement Program (STIP) is developed. The STIP will no longer be developed as a collection of programs tied to specific pools of funding dedicated to particular transportation modes or specialty programs. Instead, STIP funds will be divided into two broad categories, with 76% of funds going toward the preservation of existing statewide and regional assets such as pavement and bridges and the remaining funds reserved for “activities that enhance, expand, or improve the transportation system.”¹⁷

While the list of eligible enhancement projects reflects the consolidation of non-highway programs under MAP-21, it also represents a significant change in the way ODOT identifies, designs, and evaluates projects. Enhancement projects are selected and submitted primarily by MPOs and Area Commissions of Transportation (ACTs), then evaluated by the Oregon Transportation Commission (OTC), ODOT staff, and elected officials against ten benefit categories tied to stakeholder interests, the Oregon Transportation Plan, and other state priorities. Oregon uses a single standard application to allow mode neutral evaluation and comparison of competing projects. The ability to design and combine infrastructure projects and operational programs (such as transportation demand management) for multiple modes reflects ODOT’s commitment to its sustainability objectives.¹⁸

Minnesota

Minnesota DOT (MnDOT) recently built upon its highly regarded investment decision-making approach—used primarily during the planning, project development, and programming of its projects—to evaluate long-term investment strategies. Its decision-making framework currently incorporates benefit-cost analysis (BCA) and life-cycle cost analysis (LCCA), which account for environmental, social, and economic factors including safety, travel time, travel time reliability, emissions, health, and land impacts. However, recognizing that its aging infrastructure, changing travel demands, and limited funds will pose new challenges in the coming decades, the agency recently began testing a new approach for evaluating the implications of various investment strategies over the course of 20 years.

In 2012, the governor-appointed Minnesota Transportation Finance Advisory Committee (TFAC) released a report outlining recommended funding and investment strategies over the next 20 years. In that report, TFAC identified three investment scenarios: 1) maintaining current funding levels; 2) maintaining the current performance of the system at an estimated cost of \$5 billion above baseline spending; and 3) building an economically competitive system at an estimated cost of \$10-12 billion above baseline spending. TFAC recommended that the state pursue the third scenario.¹⁹ Given the range of investment strategies available for working toward this goal and the potential funding challenges, MnDOT conducted a comprehensive return-on-investment (ROI) analysis, with support from Smart Growth America, to estimate the expected benefits of pursuing each scenario and the relative benefits of different investment strategies.

17 Oregon Department of Transportation (2012, September) “Introduction to Enhance and Fix-It for the 2015-2018 STIP.” September 24, 2012. Retrieved 10/9/2013 from <http://www.oregon.gov/ODOT/TD/TP/STIP/Introduction%20To%20Enhance%20and%20Fix-It%20-%20September%2024%202012.pdf>.

18 Oregon Department of Transportation (2012, October). “2015-2018 STIP Enhance Application How-to Webinar” October 11, 2012. Retrieved 10/9/2013 from http://www.oregon.gov/ODOT/TD/TP/STIP/STIP_how_to.pdf.

19 Minnesota Transportation Finance Advisory Committee. (2012, November). “Summary Report and Recommendations.” Retrieved 11/18/13 from <http://www.dot.state.mn.us/tfac/docs/TFACSummaryReportNov30.pdf>.

MnDOT's ROI analysis builds upon its BCA analysis approach, meaning that it accounts for a broader range of costs and benefits than a typical private sector ROI analysis. In their study, the agency analyzed ROI over 20 years for 10 different investment categories. Benefits and costs were estimated from representative projects and from relevant literature. This work revealed considerable benefits of maintaining the system's current level of performance and somewhat less but still substantial benefits of pursuing a world-class system. Perhaps more importantly, the work revealed that specific strategies, such as active traffic management (ATM), congestion mitigation, safety spot improvements, and tolled express lanes offered the greatest potential ROI, compared to things like paving and bridge work. This work will help the agency identify a viable investment framework for allocating available funds to meet stakeholder needs. Moving forward, the ROI framework provides an important mode-neutral approach to project prioritization and investment decision-making.²⁰

Resources

American Planning Association (2010). Policy Guide on Surface Transportation. <http://www.planning.org/policy/guides/adopted/surfacetransportation.htm>.

This guide provides an overview of surface transportation funding challenges and outlines APA's policy approach.

Cambridge Systematics, Inc., University of Maryland Center for Advanced Transportation Technology and Resource Systems Group. (2010). National Cooperative Highway Research Program Report 664: Measuring Transportation Network Performance. Transportation Research Board of the National Academies: Washington, DC http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_664.pdf.

This guidebook outlines strategies for integrating existing performance measures from individual transportation modes and jurisdictions into systems for evaluating full network performance.

National Conference of State Legislatures. (2011, May). Transportation Governance and Finance: A 50-State Review of State Legislatures and Departments of Transportation. <http://www.ncsl.org/default.aspx?tabid=19117>.

This report provides a review of transportation governance and finance in each of the 50 states, including in-depth profiles for each state.

Pennsylvania DOT & New Jersey DOT. (2008, March). Smart Transportation Guidebook: Planning and Designing Highways and Streets to Support Livable and Sustainable Communities. <http://www.state.nj.us/transportation/community/mobility/pdf/smarttransportationguidebook2008.pdf>.

This joint effort of the Pennsylvania and New Jersey DOTs provides guidance to project managers for state transportation projects on the key components of local community context—land use plans and policies, street network connections, and development controls—that allow more sound state investment in a larger share of the transportation system.

Wisconsin DOT Research Program. Wisconsin Project 0092-05-14, "The Socioeconomic Benefits of Transit in Wisconsin, Phase II: Benefit Cost Analysis." <http://wisdotresearch.wi.gov/wp-content/uploads/05-14tranbenefits-f1.pdf>.

This report provides a model for performing a transit cost-benefit analysis.

20 Smart Growth America. (2013, November). "Assessing Return on Investment in Minnesota's State Highway Program." Retrieved 12/10/2013 from <http://www.dot.state.mn.us/minnesotago/pdf/2013/MnDOTFinalReport.pdf>.

FOCUS AREA 2: REVENUE ALLOCATION AND PROJECT SELECTION

Incorporate Asset Management

The Opportunity

From 2009 to 2011, 55 percent of state road funding went to expanding lane miles, but this work only represented 1 percent of total state-owned highway miles. That means the remaining 45 percent of funds went toward 99 percent of the road system.²¹ This average suggests that maintenance is often a lower priority, despite indications that existing roads are in desperate need of repair. The American Society of Civil Engineers gave U.S. roads a D and its bridges a C+ in its 2013 Report Card on America's Infrastructure.²² One-third of the county's roads rank in poor or mediocre condition. Postponing maintenance greatly increases its cost. The American Association of State Highway and Transportation Officials (AASHTO) estimates that every \$1 spent to keep roads in good condition today allows a state to avoid spending \$6-\$14 to fix a road once it has significantly deteriorated.²³

At the same time, public scrutiny and suspicion of wasteful or excessive spending has increased. Limited public funds must be used in the best way possible, and voters are holding their public officials accountable. According to a survey by the Rockefeller Foundation, 86 percent of respondents favor a "fix-it first" policy that maintains existing assets before building new ones.²⁴ Literally fixing every road before considering new capacity would be a crude form of asset management, but this poll shows an appreciation for the importance of system preservation.

Adopting an aggressive asset management program is an opportunity to optimize the use of scarce resources, encouraging more policy- and data-driven decisions when weighing big spending categories such as maintenance, construction, and operations, or when considering projects and design alternatives.

What Is It?

All states engage in some level of asset management with maintenance budgets; however, in recent years the term has expanded to include a targeted effort by states to keep infrastructure in good or better condition than at present, consider trade-offs in capital planning, and contain the costs of planning, construction, and operating new facilities.

According to the Federal Highway Administration (FHWA):

Asset Management capitalizes upon three key factors. **First**, pavements, bridges and maintenance appurtenances tend to degrade at predictable rates, so their future conditions can be predicted based upon asset condition history and known deterioration curves. **Second**, timely preservation, and preventive and rehabilitative treatments at the right point of the deterioration curve can be very economical because they prevent the rapid degradation of

21 Smart Growth America and Taxpayers for Common Sense. (2014, March). *Repair Priorities 2014: Transportation Spending Strategies to Save Taxpayer Dollars and Improve Roads*. Retrieved 9/30/2014 from <http://www.ssti.us/wp/wp-content/uploads/2014/03/SGA-repair-priorities-2014.pdf>.

22 American Society of Civil Engineers. (2013). *Report Card for America's Infrastructure*. Retrieved 11/26/13 from <http://www.infrastructurereportcard.org/>.

23 American Association of State Highway and Transportation Officials and the Road Information Project. (2009). "Rough Roads Ahead: Fix Them Now or Pay for It Later." Retrieved 9/12/2013 from <http://roughroads.transportation.org/>.

24 Rockefeller Foundation. (2011). *The Rockefeller Foundation Infrastructure Survey*. Retrieved 5/17/12 from <http://www.rockefellerfoundation.org/uploads/files/80e28432-0790-4d42-91ec-afb6d11febee.pdf>.

assets that occurs once they reach a deteriorated state. Restoring severely degraded assets is more costly than preserving them in a sound state. **Third**, assets have significantly different values; for example, high-volume pavements and bridges create more public value than do lightly traveled ones. By carefully assigning economic values to assets and by prioritizing the treatment of those which have the highest economic value and by setting appropriate treatment timings, transportation agencies can optimize scarce resources. This systematic optimization allows agencies to “get the biggest bang” for their scarce infrastructure resources and demonstrate that they are taking a rational and systematic approach to maximizing public resources.²⁵

Access to appropriate data and careful analysis are the keys to effective asset management:

Data. First, a DOT needs a solid accounting of the entire system and the condition of its assets. Some DOTs hire contractors to collect this data initially and then update the information internally. Florida’s Roadway Characteristics Inventory (RCI) is both a field handbook describing how to collect data and a staff handbook that reports on the data collected. For the Florida DOT (FDOT), the RCI also provides valuable information on safety issues and helps the department target budgets and reduce crashes.²⁶

Analysis. With data in hand, agencies can perform analyses to help guide investment. They can predict pavement performance to avoid disinvestment through deferred maintenance, prevent the need for simultaneous rebuilding of large fractions of the system, and smooth the rate of spending. Nebraska, for example, runs a pavement optimization program that tracks pavement deterioration and provides cost-benefit ratios that determine where dollars can have the biggest effect.

Life-cycle cost analysis (LCCA) is an important complementary tool that allows agencies to consider the future costs of proposed new facilities in their long-term asset management planning. LCCA considers both initial costs and discounted future costs, including maintenance, reconstruction, and user costs. Such accounting is especially critical in cases where non-DOT entities, such as local governments, have the power to capitalize capacity projects and then turn them over to the DOT for operation and maintenance.

Implementation

Legislative direction (optional). An asset management program can be initiated by legislation that calls for performance measures of the state’s transportation system. In Michigan, for example, former Governor Jennifer Granholm spoke about responsible transportation spending and asset management during her first campaign in 2002; after winning the election, she redirected \$400 million toward repairs.²⁷ Michigan’s 2002 Act 499 created a Transportation Asset Management Council and required all jurisdictions to submit an annual asset management report covering a multi-year program.²⁸

Washington’s asset management program began in 1994, when the state legislature passed 1993 replacing a formula-driven selection process with a more flexible model that emphasized preservation

25 Federal Highway Administration. (2012, June) “Executive Brief: Advancing a Transportation Asset Management Approach (FHWA-IF-12-034). Retrieved from 9/12/2013 from <http://www.fhwa.dot.gov/asset/pubs/if12034.pdf>.

26 Federal Highway Administration. (2012, August 17). “Highway Safety & Asset Management.” Retrieved 9/12/2013 from http://www.fhwa.dot.gov/asset/assetmgmt_safety.cfm.

27 The Governors’ Institute on Community Design (2007, April) “Adopt a Fix-it-First Policy.” *Policies that Work: A Governors’ Guide to Growth and Development*. Retrieved from <http://govinstitute.org/policyguide/pdfs/policyguide.pdf>

28 Sanada, B. “Asset Management and Act 51.” Presentation for Michigan Transportation Asset Management Council. Retrieved 9/12/2013 from http://www.michigan.gov/documents/mdot/MDOT_Act51_Asset_Management_Process_283478_7.pdf.

and improvement programs.²⁹

A DOT does not need legislation to start an asset management program; however, these examples show how a governor or legislature initiated the change and required the DOT to implement it.

Asset inventory. Asset management requires DOTs to make decisions based on data about road characteristics and conditions, so database updates must be integrated into the process for informed decision making. Washington began its asset inventory as a series of cross-referenced databases, but in recent years has embarked upon a geographic information system (GIS)-based dataset called Workbench.³⁰ States should also make asset inventories available to local jurisdictions to help them understand life cycles and road conditions. The Metropolitan Transportation Commission (MTC) in the Bay Area uses StreetSaver, a computer-based pavement management system that is available to MTC's cities and counties.³¹

Goals and policies. DOTs should start with a baseline so they can design high but achievable goals. For example, a DOT might aim to increase its state highway status ranked as good from 35 percent to 50 percent in five years. Prioritization of roads, scoring criteria, and performance measures should be created to help achieve these goals. The principles of asset management require that preservation or maintenance be considered on a level playing field with expansion projects, or even as a higher priority, given the importance of maintaining the system.

The North Carolina DOT (NCDOT) undertook a comprehensive Transportation Asset Management (TAM) program in 2003. The agency created a TAM office and divided roads into tiers by state, region, and subregion, as well as by level of need. Through legislation, a line item was added to the state budget for system preservation; highway funds are no longer restricted to paving projects but can now also include "improvement." As a result of its asset management program, NCDOT can now produce trade-off scenarios to evaluate the best use of funds across all projects.³²

Cultural shift. All DOTs engage in asset management at some level and in some departments, but too often these departments, such as highways, bridges, or mass transit, do not communicate with each other. Washington found that transparency of data within the agency helped staff understand that the DOT's success depended on the success of every department. In Michigan, leaders promoted the road and bridge network as a "corporate asset," rather than a resource that everyone fought over for their own particular projects.

Another cultural shift would be to think outside of agency silos. For example, many states do not take into account user costs when evaluating LCCA or other cost-benefit analyses. This may be due to the difficulty in estimating these costs, a state DOT's focus on its own agency costs, or the risk of user costs "swamping" the data due to its potential magnitude. But these reasons should not deter state DOTs from finding ways to take into account vehicle operating costs, effects on property values, crash costs, and more. Costs can be weighted according to a DOT's priorities, and cost calculations already exist for certain components of user costs. For example, research studies have quantified how much

29 Federal Highway Administration. (2007 April). "Comprehensive Transportation Asset Management: The Washington State Experience." Retrieved 9/12/2013 <http://www.fhwa.dot.gov/infrastructure/asstmgmt/cswa07.pdf>.

30 Environmental Geospatial Information for Transportation Peer Exchange. (2006, November) *Transportation Research Circulator Number E-C106: Environmental Geospatial Information for Transportation*. Retrieved 8/20/12 from <http://onlinepubs.trb.org/onlinepubs/circulars/ec106.pdf>.

31 California Metropolitan Transportation Commission. Retrieved 9/22/2013 from http://www.mtc.ca.gov/about_mtc/about.htm.

32 Federal Highway Administration. (2011). "Comprehensive Transportation Asset Management: The North Carolina Experience, Part II." Retrieved 9/12/2013 from <http://www.fhwa.dot.gov/asset/hif12006/hif12006.pdf>.

the international roughness index (IRI) of a pavement can impact vehicle operating costs.³³

Reporting and monitoring. Asset management can readily be tied into other initiatives in this handbook, such as system-wide [performance metrics and performance-based project prioritization](#). Transparent reporting, a theme running through several initiatives, reassures the public that their tax dollars are managed well. Reporting through dashboards or other web tools about the amount of money saved and future savings through system re-investment shows the public fiscal prudence.

Delivery. Once an agency has prioritized projects according to its asset management framework, it must take the necessary steps to deliver those projects in a timely manner. The Tennessee DOT recently postponed major new capacity projects (such as a long-planned new 65-mile stretch of Interstate 69), until it can meet its obligations to repair and replace old bridges and resurface existing roads.³⁴ In order to address its nearly 4,500 deficient bridges, the Pennsylvania DOT has launched a Rapid Bridge Replacement Project (RBRP) through which anywhere from 200 to 1,000 projects can be bundled together in a public private partnership for rapid delivery.³⁵

Case Studies

Florida

Hillsborough County makes extensive use of information systems in its asset management program. The county realized it needed better coordination of its activities,³⁶ so the engineering, construction, and road and street maintenance departments were combined into a new public works agency, with each department bringing its own database and management system. Staff realized the new agency needed a combined inventory of roadways, shoulders, curbs, and sidewalks. To undertake this effort, the county hired a contractor, which collected detailed data on condition, speed, and other metrics on 20,000 linear miles in a four-month period.³⁷ The data were integrated into the county's existing Hansen Infrastructure Management System Roadway Module and ultimately linked to a GIS base.

This integrated management information system, known as the Hillsborough County Asset Management System (HAMS), allows staff to see any county road's condition, maintenance history, and photos of the location, as well as update data. As the dataset evolved, cost and benefit data were added, along with a desire to use the data for economic analysis and smart investments. Prior to this, capital projects were typically selected *ad hoc*. Now that the county has adopted asset management into its project selection process, asset coordinators can query HAMS and find more than 38 road variables when evaluating projects.³⁸

At the state level, asset management has been integrated into the entire planning, programming, and monitoring processes. FDOT created policies for road maintenance based on specific outcomes. For

33 Barnes, G. & Langworthy, P. (2003, June). "The Per-mile Costs of Operating Automobiles and Trucks." State and Local Policy Program, Humphrey Institute of Public Affairs, University of Minnesota. Retrieved 8/20/12 from <http://www.cts.umn.edu/Publications/ResearchReports/reportdetail.html?id=670>.

34 State Smart Transportation Initiative. (2013, March 11). "Tennessee DOT Commissioner halts I-69 project." Retrieved 11/12/13 from <http://www.ssti.us/2013/03/tennessee-dot-commissioner-halts-i-69-project/>.

35 Finerty, John (2013 February 12) "Public-private partnership eyed to repair Pa. bridges quicker" The Shannon Herald. Retrieved 10/25/2013 at <http://sharonherald.com/local/x1633480163/Public-private-partnership-eyed-to-repair-Pa-bridges-quicker>.

36 Federal Highway Administration. (2005, May). *Economics in Asset Management: The Hillsborough County, Florida, Experience*. Retrieved 8/2/12 from <http://www.fhwa.dot.gov/infrastructure/asstgmt/difl.pdf>.

37 *Ibid.*

38 *Ibid.*

example, FDOT's resurfacing operating policy calls for resurfacing, on average, 5.6 percent of the state's highway system each year. Bridges declared deficient are replaced in nine years.³⁹

Florida, like Hillsborough County, makes extensive use of private contractors to inventory assets and perform routine maintenance. FDOT's asset management contracts have grown from \$484 million in 2004 to \$900 million in 2008.⁴⁰ Asset management is supported by the Roadway Characteristics Inventory, which includes roadway condition information as well as data needed for federal and state reporting requirements.⁴¹ The offices of planning, maintenance, and traffic operations administer the dataset.

FDOT's efforts have led to excellent results. Bridges and resurfacings exceed FDOT targets for good repair (90 percent and 80 percent, respectively).⁴² FDOT also communicates regularly with the public and administers surveys to determine expectations. Asset management has been adopted as part of the culture at FDOT; it is not a special function, but rather has become business as usual.

Pennsylvania's Life Cycle Cost Analysis

PennDOT wanted to choose pavement types based not only on initial cost and institutional opinion, but also on a consideration of life cycle costs. LCCA allows DOTs to compare the merits of competing pavement designs, and the policy was adopted by PennDOT in 1980. PennDOT requires this analysis for all projects that cost more than \$10 million and for all interstate highway projects over \$1 million.⁴³ Before adopting an LCCA policy, paving choice was left up to the project engineer. As a result, PennDOT had a long list of different paving types with various maintenance needs and life spans to maintain and rehabilitate. Road rehabilitation required construction zones or closures, which then affected vehicle flow. PennDOT wants paving designs that will last for at least 20 years, and it expects rehabilitation to add another 20 years to the life cycle. Engineers submit their costs for construction and maintenance over a 40-year period, and PennDOT evaluates pavement proposals based on current and future costs.⁴⁴ Because PennDOT's contracting system already contained a significant amount of data on previous bids and projects, LCCA did not require a huge amount of new data collection. The LCCA process was created by a special task force at PennDOT and became institutionalized in the PennDOT Highway Geometric Design Manual and its Pavement Policy Manual. As a result of LCCA's rigorous nature, PennDOT now has better pavement design.⁴⁵

Michigan's Annual Reporting System

Michigan DOT was a pioneer in research into pavement management. Years of work beginning in the 1980s culminated in a requirement in 2002 by the legislature for MDOT and local road agencies to implement an asset management approach for all road mileage eligible for federal aid. Local units employ the simple Pavement Surface Evaluation and Rating (PASER) system to survey 40,000 route-miles every two years and tabulate pavement condition. The health of the system is reported annually in terms of remaining service life. Procedures for the process are developed by an Asset Management Council, on which local units, regional planning agencies, and MDOT are represented, assisted by academic institutions. Six of the annual reports have been issued so far, confirming a steady

39 American Association of State Highway and Transportation Officials. (2007). "US Domestic Scan Program: Best Practices in Transportation Asset Management." Retrieved 9/12/2013 from http://onlinepubs.trb.org/onlinepubs/trbnet/acl/nchrp2068_domestic_scan_tam_final_report.pdf.

40 *Ibid.*

41 *Ibid.*

42 *Ibid.*

43 Federal Highway Administration. (2011, April 7). "PennDOT's LCCA Program." Retrieved 8/20/12 from <http://www.fhwa.dot.gov/infrastructure/asstmgt/dipa206.cfm>.

44 *Ibid.*

45 *Ibid.*

deterioration of system conditions through disinvestment due to underfunding.⁴⁶

Minnesota's Cap and Swap

In some states, an inherent conflict of interest exists where capital funds come from local sources, often dependent on selling projects to the public, and maintenance costs are borne by a separate entity. One remedy is to simply cap the number of lane miles of roadway that the state agrees to maintain. If a new facility were added to the system, an equal number of miles would be swapped with local authorities that would agree to perpetual ownership and maintenance.

One state that has such a cap, which has prompted swaps of roadway back to local governments, is Minnesota. "The trunk highway system may not exceed 12,200 miles in extent, except the legislature may add trunk highways in excess of the mileage limitation as necessary or expedient to take advantage of any federal aid made available by the United States to the state of Minnesota."⁴⁷

Such a cap imposes a form of LCCA considerations on local decision-making. Any new lane miles added to the state system are offset by devolving state lane miles to the locals, who take over owner-operator responsibility.

Resources

General

The American Association of State Highway and Transportation Officials & The Road Information Project. (2009). *Rough Roads Ahead: Fix Them Now or Pay for It Later*. <http://www.ttap.mtu.edu/library/RoughRoadsAhead.pdf>.

This report describes the preservation needs of the nation's highways and examines some of the solutions that can be applied, ranging from fix-it-first to multimodal freight strategy.

Federal Highway Administration (2013). *Asset Management* web page. Current as of 11/21/2013. <http://www.fhwa.dot.gov/asset/index.cfm>.

FHWA maintains a web site devoted to asset management, with numerous resources and case studies.

Federal Highway Administration. (2007). *Asset Management Overview*. http://www.fhwa.dot.gov/asset/if08008/assetmgmt_overview.pdf.

This report discusses next steps, challenges, and strategies for implementing an asset management program, and includes best practices learned since the 1999 FHWA Asset Management Primer was published.

Federal Highway Administration. (2011, April 7). *Improving Transportation Decision Investment Decisions Through Life-Cycle Cost Analysis* web page. U.S. <http://www.fhwa.dot.gov/infrastructure/asstmgmt/lccafact.cfm>.

This is a short online primer on LCCA, describing its rationale, how it works, basic methodological process, and relevant FHWA technical outreach programs.

Smart Growth America & Taxpayers for Common Sense. (2011, June). *Repair Priorities: Transportation*

46 Contributed by Aarne Frobom, Planning Specialist, Michigan DOT. (2012, August).

47 State of Minnesota. *Constitution of the State of Minnesota, Article XIV: Public Highway System*. Justial.com website. Retrieved 11/12/2013 at <http://law.justia.com/constitution/minnesota/Article14.html>.

spending strategies to save taxpayer dollars and improve roads. <http://www.smartgrowthamerica.org/documents/repair-priorities.pdf>.

This report lays out the benefits of adopting a fix-it-first transportation policy and provides strategic advice to both state and federal policymakers.

Washington State DOT. (2012, April). Transportation Asset Management (TAM) Plans Including Best Practices: Synthesis. <http://www.wsdot.wa.gov/NR/rdonlyres/D5CBDD16-361C-4D7A-9F28-94850C5E3E62/0/SynthesisofStateTransportationAssetManagementPlansMorinP2012kl1D.pdf>.

This report provides a thorough discussion of how other states handle asset management, with links to further resources, organized in a bibliographical format.

The Hamilton Project. (2011, February). Fix it First, Expand it Second, Reward it Third: A New Strategy for America's Highways. http://www.brookings.edu/~media/research/files/papers/2011/2/highway%20infrastructure%20kahn%20levinson/02_highway_infrastructure_kahn_levinson_paper.pdf.

This paper proposes reordering national highway infrastructure priorities, with a focus on fix-it-first policies. The paper also discusses the creation of a Federal Highway Bank.

Case Studies

The Federal Highway Administration. (2011, April 7). Life-Cycle Cost Analysis: The Pennsylvania Experience. <http://www.fhwa.dot.gov/infrastructure/asstmgt/dipa2toc.cfm>.

This case study summarizes how the Pennsylvania DOT implemented its LCCA policy. Topics discussed include a historical perspective, LCCA methodology, data requirements, implementation, and benefits.

The Federal Highway Administration. (2005). Economics in Asset Management: The Hillsborough County, Florida, Experience. <http://www.fhwa.dot.gov/infrastructure/asstmgt/difl.pdf>.

This case study reviews HAMS, with a discussion of how the county operated before HAMS, how the Hillsborough County's Public Works Department implemented HAMS, and the benefits it has received since then.

FOCUS AREA 2: REVENUE ALLOCATION AND PROJECT SELECTION

Develop a Performance- and Outcome-Focused Project Selection Process

The Opportunity

Setting measures of success is not unique. Most transportation project selection processes consider the success of alternatives in addressing narrowly defined, project-specific transportation needs. However, in these cases, the transportation project is perceived as the “end,” not the “means,” to achieving broader objectives.

In order to achieve greater gains with limited dollars, some DOTs have begun selecting projects using criteria that consider the full spectrum of the state’s strategic goals, such as safety, economic development, transportation choice, community character, and resource conservation. This approach to evaluating performance ensures that states get more than successful individual projects—they get a transportation system that supports the economy and helps to address other state priorities. The approach also demonstrates the results of transportation investments to stakeholders and constituents, which can ultimately play a critical role in building public support for transportation funding increases.

What Is It?

Performance-based project selection is a data-driven process that gives transportation agencies the ability to evaluate the impact of projects using standard criteria and prioritize those that will produce the best results. Through this approach, agencies develop performance measures for the transportation system, collect data over time to assess progress, and allocate resources based on the results. It is most effective when agencies set specific, time-bound performance targets and prioritize investments based on progress toward achieving those targets.

Traditionally, transportation agencies evaluate performance with mobility-based measures, such as volume/capacity ratio or travel time between points, or system condition measures, such as pavement quality or bridge condition. Expanding the approach by evaluating project and system performance based on a more comprehensive set of indicators can help manage increasingly complex transportation systems with competing priorities.

Implementation

Establishing a comprehensive performance-based project selection approach will typically involve the following steps:

Articulate clear goals for the transportation system

Performance measures and indicators should be tied to the state’s goals for its transportation network. These goals will vary by agency, but a comprehensive set of desired outcomes will generally include the following:

- Economic growth and development
- Effective flow of goods for commerce
- Job creation
- Health and safety

- Accessibility
- Transportation choices for travelers
- Coordination with local land use policies
- Life cycle costs of assets including roads, bridges, and transit
- Energy savings and emissions reduction

Enable reform

Linking project selection to performance metrics can come from elected officials or from within a DOT. In Oregon and North Carolina, legislators mandated an overhaul of the project selection process. Oregon reform came from a broader state program aimed at enhancing economic growth⁴⁸, while in North Carolina, elected officials wanted to remove politics from the decision-making process.⁴⁹

While the support of elected officials can provide valuable political backing and resources, a DOT can demonstrate leadership in this area by creating a cross-agency task force to brainstorm new programming processes and examine current methods to pinpoint any deficiencies.

Develop partnerships with other state and local agencies

Efforts at the DOT level to integrate performance measures into planning and project selection frequently dovetail with broader state-wide initiatives and can open the door for collaboration with other agencies. Creating a methodology and structure for system-wide performance metrics may not be viable if they focus solely on DOT-funded projects. Branding the initiative as a way to get better results from the transportation system with greater transparency in the decision-making process can help to bring a broad range of partners on board. Support from MPOs and other regional and local agencies can smooth the adoption of a new performance measurement system.

Identify sources of data

New trends in “big data” usage can help agencies decide if projects meet their transportation needs. “Big data”—defined as extremely large data sets that may be analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions— can be used to improve planning, operations, design, customer service, and other functions. Big data sources include the following:

- Bike/ped counts
- Bluetooth
- Camera sensors
- Cellular telephone signals
- Custom smartphone apps
- GPS devices
- Loop detectors
- Mapping smartphone apps
- Smart parking meters
- Social media
- Taxi logs
- Tolls
- Transit fares/smart cards
- Truck logs

Several companies are leading the way in collecting and analyzing big data for transportation projects in various parts of the country:

- **AirSage**

The Moore County Transportation Committee, working with the North Carolina DOT, significantly increased the accuracy of its data collection for its long-range transportation plan by using cutting edge technology of aggregated cell phone data provided by AirSage.⁵⁰ Nearly 11.6 million trips were recorded from more than 3 million unique mobile

48 Interview with staff from the Long Range Planning Office of the Oregon DOT. (2012, April).

49 Interview with staff from the Strategic Planning Office at the North Carolina DOT. (2012, April).

50 State Smart Transportation Initiative. (2013, October 27). “Cellphone data is helping to improve travel demand modeling.” Retrieved 11/7/14 from <http://www.ssti.us/2013/10/cellphone-data-is-helping-to-improve-travel-demand-modeling/>.

devices between September 20 and October 18, 2012 to provide the most accurate portrait of people's movement throughout the county with a particular focus on the U.S. 1 corridor. This data revealed that very little traffic traveled the entire corridor, meaning that a proposed bypass would not be worth the investment.

AirSage generates billions of anonymous location data points and aggregates them to show clusters of people and their movements. Transportation planners can use this data to identify the sources of congestion on specific roadways. In contrast to traditional Household Transportation Surveys, which use small sample sizes that can represent as few as one out of every 100 households and rely on people's memory of each trip, the data used by AirSage represented approximately one in six Moore County residents captured by their cell phone signals.

- **StreetLight Insight™**

StreetLight Insight™ is another company that uses anonymous location data to measure mobility patterns. By organizing spatial data into contextual metrics, transportation planners can understand movements of populations around cities and regions. StreetLight creates metrics by interpreting location data from cellular towers and GPS devices such as smartphone navigation applications, in-car navigation systems, navigation hardware devices, and vehicle management devices. The San Diego Association of Governments (SANDAG) used StreetLight data in 2012 to understand the impact of a toll reduction on the South Bay Expressway, which was meant to divert traffic away from interstate I-805. StreetLight's metrics showed a shift in drivers' behavior both spatially and temporally as a result of the toll reduction and helped SANDAG best assess the results of their tolling decisions.

- **Urban Engines**

Publicly launched in May 2014, Urban Engines uses spatial analytics and behavioral economics theory to improve city planning and operations. Urban Engines uses the concept of "crowd sensing," a method of understanding where people congregate and how they move. For example, card swipes in a subway system provide basic information on rider location and total travel time. Using algorithms and supplemental data, such as real-time transit schedules, Urban Engines can deduce what is happening at any subway station or on any train at a given time. Transportation planners can use this information to more successfully meet peak-hour demands and offer incentives for commuters to travel at different times.

Create performance measures (system-wide and project-level)

Performance measures and indicators will vary by state and context, but successful measures have common characteristics. System-wide performance metrics must be applicable across all projects. Agency staff and stakeholders will typically assign a common metric, such as monetary value, to each measure and indicator. The most robust decision-making tools use both quantitative and qualitative measures. In terms of quantitative measures, several desktop and web-based applications are available today that are capable of running sophisticated mathematical analysis and budget optimization for project selection.

Limiting the number of measures helps ensure that data collection isn't overly burdensome for the agency; generally, broader measures are needed for policy and planning purposes, as they guide larger overarching goals, whereas more specific measures are needed for programming and resource allocation in order to provide clear bench marks.

A recent study by the Pew Center on the States and the Rockefeller Foundation shows that 13 states have created holistic transportation performance measures, including job creation, commerce, environment, and neighborhood preservation, but the state of the practice remains fledgling.⁵¹ For example, the measures may call for a project to energize the economy, but actually measuring the project's economic impact remains difficult.

Develop a framework for integrating performance measures into the decision-making process

State DOTs can apply performance measures to different parts of the planning and project selection process. Oregon's least-cost planning tool, known as Mosaic, involves a rigorous and time-intensive data collection and evaluation process that informs the development of the Long-Range State Plan, which is updated every ten years. Staff of ODOT's Long Range Planning office explained that Mosaic evaluates "bundles of actions"—a series of strategies for a region—rather than individual projects.⁵² By contrast, North Carolina's Prioritization 3.0 process applies to the State Transportation Improvement Program (STIP) development process.⁵³

The Tennessee DOT restructured its project prioritization and selection process to provide greater transparency; it now selects projects based on a data-driven evaluation. Tennessee's Project Evaluation System builds upon policies in its Long-Range Transportation Plan and includes both quantitative and qualitative evaluation. The system has two evaluation tiers: Tier 1 analysis uses technical measures to address mobility, economic development, goods and freight movements, safety, and security, and Tier 2 uses mode-neutral, more qualitative measures such as public support, livable communities, and funding.⁵⁴ More recently, TDOT chose Decision Lens – a collaborative decision-making tool – for evaluating and prioritizing projects and setting performance criteria. DOTs in Maryland, Mississippi, New Hampshire, and Pennsylvania also use the software.⁵⁵

To make performance metrics applicable across the full transportation system, data collection methods should be integrated into all levels of the DOT. They must align vertically (from top management to technical staff) and horizontally (across functional units).

Build in flexibility

Performance measures should grow and evolve over time to incorporate new practices and state priorities.

Communicate results with dashboards and other performance measurement tools

Several DOTs use report cards, graphics, and online dashboards to communicate progress to elected

51 Pew Center on the States and the Rockefeller Foundation. (2011, May). *Measuring Transportation Investments: The Road to Results*. Retrieved 8/20/12 from <http://www.rockefellerfoundation.org/blog/measuring-transportation-investments>.

52 Interview with Transportation Programs and Economic Analysis Unit Manager at Oregon DOT. (2012, April). North Carolina Department of Transportation. "Strategic Prioritization Process." Retrieved 9/22/2013 from <http://www.ncdot.gov/performance/reform/prioritization/>.

53 North Carolina Department of Transportation. "Strategic Prioritization Process." Retrieved 9/22/2013 from <http://www.ncdot.gov/performance/reform/prioritization/>.

54 Tennessee Department of Transportation. (2005). *Final Report Tennessee Long-Range Transportation Plan Project Evaluation System*. p vi. Retrieved 8/1/12 from <http://www.tdot.state.tn.us/plango/pdfs/plan/ProjEvalSys.pdf>.

55 Decision Lens, Inc. (2013, January 16). "Decision Lens Selected by Mississippi Department of Transportation for Capital Plan." Retrieved 11/12/13 from http://www.decisionlens.com/news/decision_lens_selected_by_mississippi_dot_capital_planning.

officials and taxpayers. Innovative dashboards can include measures of factors beyond congestion and level of service, such as quality of life and economic development.

The Michigan DOT integrated its performance measures into the state-wide dashboard so residents can easily and clearly see how the state's progress with its transportation system connects to other state goals. The dashboard tracks economic growth, safety, accountability, mobility, and road conditions.⁵⁶

Case Studies

North Carolina: DOT's Project Prioritizations Framework

NCDOT's new project prioritization framework is designed to integrate state policy goals into the project selection process through the development of several transportation plans. NCDOT's long-range 2040 Plan, branded "Policy to Projects," was the first building block of the reform effort.⁵⁷ The 30-year plan lays out the agency's overarching goals and policies. A second ten-year Program and Resource Plan, created through a data-driven prioritization process, lists revenue projections and allocations for all modes. This ten-year plan then feeds into the STIP.⁵⁸

In 2009, as part of the process for developing the ten-year Program and Resource Plan, NCDOT asked its MPOs to describe their transportation needs. In response, the DOT received a list of \$54 billion in desired capital projects. However, the agency had only \$10.5 billion to allocate for 2015-2020 (\$9 billion for highway and \$1.5 for non-highway).⁵⁹ To allocate these funds, NCDOT staff ranked each project by mode into the three main goals of safety, mobility, and infrastructure health, and cross-categorized by geography. The ten-year Program and Resource Plan laid out current allocations for each mode, amounts requested by the MPO, and recommendations from three stakeholder summits.⁶⁰ Projects then went through the scoring and prioritization process: Prioritization 1.0.⁶¹ Project scoring differs between highway and non-highway projects; NCDOT currently envisions incorporating a more data-driven method into the non-highway projects. Examples of scoring measures include:

- Does the project include HOV/HOT/LRT/BRT in the highway right of way?
- Does the project provide a direct connection to a transportation terminal (airport, seaport, ferry, intermodal, or train)?
- Does the project increase economic competitiveness as calculated by the Transportation Economic Development Impact System (TREDIS) model?

Highway projects received scores based on a combined quantitative score (pavement conditions data), qualitative score (local input), and multimodal score (bonus points for inclusion of HOT/HOV lanes, connection to transit terminal, etc.).⁶² For non-highway projects, scoring varies by division. For rail

56 American Association of State Highway and Transportation Officials. (2012, January 27). "Michigan DOT Puts Transportation Dashboard on the Web." *AASHTO Journal*. Retrieved 8/13/12 from <http://www.aashtojournal.org/Pages/012712michigan.aspx>.

57 North Carolina Department of Transportation. (2011, July 6) *From Policy to Projects*. Retrieved 8/13/12, from <http://www.ncdot.gov/performance/reform/default.html>.

58 *Ibid.*

59 North Carolina Department of Transportation. (2011, July 6) *From Policy to Projects*. Retrieved 8/13/12 from <http://www.ncdot.gov/performance/reform/default.html>.

60 *Ibid.*

61 Kissel, C. (2012, July 13). *Project Prioritization: Case Study: North Carolina Develops Statewide Performance-based Prioritization Process*. National Association of Development Organizations. Retrieved 8/14/12 from <http://www.nado.org/project-prioritization-case-study-north-carolina-develops-statewide-performance-based-prioritization-process/>.

62 *Ibid.*

projects, criteria include service type (heavy rail, light rail, etc.), service frequency, and connections to existing services, while for pedestrian and bicycle projects, scores are based on local priority, cost, and inclusion in the local pedestrian and bicycle plan, among other criteria. The scoring of non-highway projects is not standardized, which makes it difficult to rank different modes (such as rail and public transportation) against each other. The priorities of the MPOs and RPOs make up 30 percent of the total score.⁶³

The strategic prioritization process has successfully met all of its goals: it engaged stakeholders and now reflects local priorities. NCDOT now provides a public online database with project information and scoring data. Strategic planning staff concluded that the implementation of the strategic prioritization process has led to increased credibility and better use of data to score and evaluate projects. This framework enabled NCDOT to work with the legislature and governor to successfully enact a new Mobility Fund in 2010 to help relieve congestion and enhance mobility across the state.⁶⁴ Prioritization 2.0 allowed NCDOT to complete the next round of prioritization for its 2018-2022 projects. Changes included:⁶⁵

- New economic impact measures (TREDIS)
- An economic competitiveness component to determine the value added of each highway investment within a community
- A data-driven process for evaluating bicycle and pedestrian projects. Bicycle and pedestrian projects are evaluated on a 100-point scale that includes local input, inclusion of the project in a local adopted plan, safety impacts (number of vehicle-pedestrian-cyclist crashes), population density, and whether the project provides a direct connection to a land use such as a school or transit station.
- A data-driven process for evaluating urban public transportation projects. Public transportation projects get ranked on elements such as whether the project reduces vehicle fleet age, provides new connections to other modes or services, increases lifespan of facilities, and accepts local input.
- A new web portal that allows MPOs, RPOs, and division staff to submit new priority projects, rank projects, and access information about project information and rankings for the entire state.
- More flexibility for MPOs and RPOs, which can now work together to transfer points between areas in order to prioritize larger projects with greater regional significance.

Prioritization 3.0 is the initial implementation of the Strategic Transportation Investments (STI) Act signed by Governor Patrick McCrory on June 26, 2013. This law requires all modes (non-highway and highway) to compete for the same capital funds from the North Carolina Highway Trust Fund and non-highway spending is limited to 10 percent of the total. STI created the Strategic Mobility Formula, which is a new way of allocating available revenues based on data-driven scoring and local input.⁶⁶ NCDOT can now create its STIP using the scores for division and regional projects based on criteria contained in the Strategic Mobility Formula.

63 North Carolina Department of Transportation. *Strategic Prioritization Process Highway Scoring Matrix*. Retrieved 8/13/12 from <https://connect.ncdot.gov/projects/planning/Planning%20Document%20Library/Prioritization%201.0%20Highway%20Scoring%20Matrix.pdf>.

64 Based on an interview with staff from the Strategic Planning Office of Transportation at the North Carolina Department of Transportation (2012, March).

65 North Carolina Department of Transportation. "Strategic Prioritization Process." Retrieved 8/14/12 from <http://www.ncdot.gov/performance/reform/prioritization/>.

66 North Carolina Department of Transportation. "Strategic Transportation Investments." Retrieved 11/4/2014 from <http://www.ncdot.gov/strategictransportationinvestments/>.

Implementation of the STI requires a 30-day comment period, which includes at least one public meeting. Public input is methodically collected and local input points are assigned. These local input points are combined with quantitative scores to determine the final score for each regional and division project. The final determination of projects on the STIP is based on the Strategic Mobility Formula scores along with environmental and engineering plans and corridor spending caps. NCDOT is still considering the normalization process for distributing funds among modes. This process as well as the minimum thresholds for funding to highway and non-highway projects will be implemented in the upcoming Prioritization 4.0.

The Strategic Mobility Formula funds three categories of projects:

- Division Needs - 30%
- Regional Impact - 30%
- Statewide Mobility - 40%.

Within these categories Prioritization 3.0 created scoring criteria, measures, and weights for all modes and guidance for assigning local input points provided to each MPO/RPO and NCDOT Division.

In a time when transportation revenues are decreasing, STI allows for more efficient and effective use of resources so that projects to enhance mobility and revitalize communities can move forward. This process encourages NCDOT to think from a statewide and regional perspective and provide the flexibility to address local needs.

While Prioritization 1.0 represented a major shift for NCDOT, the process became increasingly robust in the second round of long-range planning. Prioritization 3.0 has allowed NCDOT to schedule projects based on many considerations including Strategic Mobility Formula scores, completion of environmental and engineering plans, and funding constraints. NCDOT anticipates that the Board of Transportation will adopt the new STIP in June 2015 after it receives public comment. The drive to change the programming process can start from within or be mandated at the legislative level. Other state STIP programs can adapt the process used by NCDOT and modify performance measures as needed to incorporate the state's unique needs.⁶⁷

San Francisco Bay Area: Plan Bay Area

In California, the majority of the state's transportation funds are allocated directly to regional transportation planning agencies (RTPAs) and MPOs. Consequently, regional entities have a significant role in project prioritization. The MTC, the Bay Area's MPO, initially resisted developing performance measures despite pressure from stakeholders to do so. A state-level mandate drove the MTC to overhaul its programming approach in 2002, when Senate Bill 1492 (now State Government Code Sec. 66535) required the MTC to establish performance measurement criteria on both a project and corridor level to evaluate and prioritize all new investments for consideration in the 25-year Regional Transportation Plan (RTP).⁶⁸

Since then MTC has helped to develop a set of regional policy goals, with performance targets, to evaluate both planning scenarios and individual transportation projects to be included in Plan Bay Area, a long-range integrated transportation and land-use/housing strategy through 2040 for the San Francisco Bay Area. The performance targets addressed a broad range of issues including climate protection, adequate housing, healthy and safe communities, open space and agricultural

⁶⁷ Based on an interview with staff from the Strategic Planning Office of Transportation at the North Carolina DOT. (2012, March).

⁶⁸ *Ibid.*

preservation, equitable access, economic vitality, and transportation effectiveness.⁶⁹

MTC used project-level assessments to understand how potential investments address performance targets for each of the policies. This approach determined which of the over 1,000 uncommitted projects would be approved as part of the Preferred Transportation Investment Strategy. This was completed using a two-part assessment:

1. Qualitative assessment to reflect the somewhat broader considerations embodied in goals, and
2. Quantitative assessment to measure cost effectiveness with respect to performance targets

The qualitative assessment addressed approximately 230 individual projects based on their level of support for the adopted targets. Projects were rated on a scale from +10 (strongly supporting all targets) to -10 (strongly adversely impacting all targets).

All major capacity increasing transportation projects in the Bay Area (those with costs above \$50 million or with regional impacts) were evaluated using a quantitative, model-based methodology to determine each project's benefit-cost ratio. These 90 projects make up the majority of the discretionary investments in Plan Bay Area. The quantitative assessment went beyond the adopted performance targets to consider as many quantifiable benefits as possible in determining which projects were most cost-effective at providing benefits to users and society.

Finally, since it was impractical to perform individual assessments on the remaining 700 smaller projects, these were grouped into nine categories based on mode, project purpose, and functional class (expansion, operations, safety, etc.). Each category was evaluated against the performance targets.

The project performance assessment performed by MTC generated significant differences between projects of different modal types. For example, road efficiency projects, such as ramp metering and new HOV/auxiliary lanes, were found to be highly cost-effective and exhibited moderate support for performance targets. On the other hand, road expansion projects were somewhat cost-effective but demonstrated adverse impacts on key performance targets (e.g., emissions reduction). Transit projects were only marginally cost-effective but performed the strongest in terms of supporting the plan's performance targets.

The results of this project performance assessment were used for two primary purposes:

High performing projects (which performed well on both the targets assessment and the benefit-cost assessment) were prioritized for regional funding in Plan Bay Area. Low-performing projects (which exhibited poor performance on either the targets assessment or the benefit-cost assessment) were subjected to additional scrutiny requiring project sponsors to present a compelling case to policymakers for inclusion in the plan.

Being such a large state with regionally diverse needs, California entrusts its regions with the task of determining which projects are most needed. Elements of this approach could be adopted by smaller states for statewide planning and programming purposes or by similar regional organizations such as MPOs or congestion management associations that have considerable power over planning and programming.

⁶⁹ Association of Bay Area Governments and Metropolitan Transportation Commission, Plan Bay Area Final Performance Assessment Report, accessed January 9, 2014, http://onebayarea.org/pdf/final_supplemental_reports/FINAL_PBA_Performance_Assessment_Report.pdf.

California: Smart Mobility Framework

In 2010, the California DOT (Caltrans) launched the Smart Mobility Framework (SMF) initiative to develop a comprehensive and consistent framework for evaluating, prioritizing, and designing transportation projects at the state and regional level. The framework is intended to inform the State Transportation Improvement Program (STIP) and revisions to state and local design standards. The SMF rests on six principles: location efficiency, reliable mobility, health and safety, environmental stewardship, social equity, and robust economy. The framework emphasizes mode-neutral performance measures such as safety and health considerations, travel time, reliability, and service quality. Caltrans is also developing scorecards and design standards appropriate to different local contexts (urban centers, rural areas, etc.) with supplementary performance measures for each context as needed.⁷⁰

In 2013, Caltrans initiated two SMF implementation pilot studies. The Pilot Area 1 study will test and evaluate SMF performance measures and outcomes as they were applied to the I-680 corridor within Contra Costa County (Caltrans District 4). The goal is to use lessons learned from the project to create guidance for future Caltrans' system planning and development processes. The Pilot Area 2 study will apply SMF principles and performance measures to assess future projects for a sub-regional long range transportation plan in the South Bay Cities Council of Governments Region. The goal is to develop a suite of easy-to-use processes and tools to apply the framework and best practices to inform infrastructure decision making.⁷¹

Oregon: Mosaic

Oregon DOT included seven wide-ranging goals in its 2006 state transportation plan and recently developed Mosaic, a least-cost planning tool which used the Oregon Transportation Goals as a framework for the development of performance categories and performance indicators. Mosaic produces monetary assessments of potential investments along with value-oriented assessments based on a flexible, weighted scoring system. Mosaic is designed to compare specific bundles of investments, such as highway capacity improvements, transit enhancements, active transportation projects, and a variety of transportation demand management programs that are considered during a typical planning process. The tool shows how each bundle compares to others in terms of total investment costs, benefit/cost ratio, monetized benefits, and non-monetary benefits as identified and given weight by stakeholders involved in a particular planning process.

The tool can also separate the associated costs and benefits of each bundle, such as those related to emissions, crashes, and travel-time savings, or break each bundle down into general system performance categories such as mobility, accessibility, or quality of life. It is up to stakeholders and users of the tool to identify specific bundles and weight the various indicators in advance. The Excel-based tool—which is meant to be used throughout the planning process—relies on existing demographic, land use, transportation facility, environmental, economic, and cultural resource data from GIS. It also depends on outputs from fairly robust travel models and forecasts, though it can be run using more basic assumptions about travel patterns.

70 Caltrans (2010, February) *Smart Mobility 2010: A Call to Action for the New Decade*. Retrieved on 10/15/2013 from http://www.dot.ca.gov/hq/tpp/offices/ocp/smf_files/SMF_handbook_062210.pdf

71 Caltrans (2013, April) "Smart Mobility Framework" Factsheet. Retrieved 10/25/2013 from http://www.dot.ca.gov/hq/tpp/offices/ocp/smf_files/SMF_Pilot_Study_Fact_Sheet_041613.pdf.

Resources

The American Association of State Highway and Transportation Officials. (2008, January). A Primer on Performance-Based Highway Program Management: Examples from Select States.

This primer provides an overview of the history of highway performance measures and state practices.

The Federal Highway Administration. (2011, March). Key Performance Indicators in Public-Private Partnership: A State of the Practice Report. Retrieved 3/23/12 from <http://international.fhwa.dot.gov/pubs/pl10029/pl10029.pdf>.

This report provides a national scan of performance measures used to measure success in public-private partnerships.

The Federal Highway Administration, Office Of Planning, Environment and Realty. (2011, September 15). Performance Based Planning and Programing. http://www.fhwa.dot.gov/planning/performance_based_planning/.

This website on performance-based planning provides resources for further information and case studies, including a case study on the San Francisco Bay Area's MTC.

The Federal Highway Administration. (2013, December) A Performance-Based Approach to Addressing Greenhouse Gas Emissions through Transportation Planning. http://www.fhwa.dot.gov/environment/climate_change/mitigation/publications_and_tools/ghg_planning/ghg_planning.pdf

This handbook serves as a resource for State DOTs and MPOs interested in addressing GHG emissions through performance-based planning and programming.

National Cooperative Highway Research Program. (2006). Report 551: Performance Measures and Targets for Transportation Asset Management. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_551.pdf.

This three-volume report on the use of performance measures and targets for transportation asset management reviews the national state of the practice, provides criteria and guidelines for selecting appropriate performance measures and targets, and describes an overall framework states can use to develop performance measures.

Pew Center on the States. (2011, May). Measuring Transportation Investments: The Road to Results. <http://www.rockefellerfoundation.org/media/download/1e2c3184-28d1-4052-9a17-adc9eb73f3c9>.

This report evaluates how well all 50 state transportation agencies are using comprehensive goals, performance measures, and data related to economic growth, job creation, mobility, access, and other policy outcomes to inform transportation decision-making.

WSDOT. (2004, November). Emerging Performance Measurement Responses to Changing Political Pressures at State DOTs: A Practitioner's Perspective. http://www.wsdot.wa.gov/NR/rdonlyres/139F581F-0CED-40E6-B3DB-E89581B016DF/0/Practitioners_Perspective.pdf.

This report discusses how performance measures have changed over time, from a very data-intensive process to one that embraces the qualitative side as well, and includes metrics on the economy and the environment.

Case Studies

General Assembly of North Carolina. (2007). House Bill 2436, <http://www.ncga.state.nc.us/sessions/2007/bills/house/pdf/h2436v9.pdf>.

This website provides the text of North Carolina's legislative mandate for the reform of transportation project programming.

The Federal Highway Administration, Office of Planning, Environment, and Realty. (2011, September 15). Performance Based Planning Case Studies: Metropolitan Transportation Commission. http://www.fhwa.dot.gov/planning/performance_based_planning/case_studies/san_francisco/.

This case study describes the performance measures used by the MTC, how they fit into the programming process and lessons learned from MTC staff.

Innes, J. & Gruber, J. Bay Areas Transportation Decision Making in the Wake of ISTEA. <http://www.uctc.net/papers/514.pdf>.

Starting on page 339, this report details how performance measures were initially opposed, then adopted, by the MTC.

Metropolitan Transportation Commission. (2003). Transportation 2030 Project Performance Evaluation Report. Attachment 1: Legislative Requirement: Text of Senate Bill 1492, enacted in 2002 as California State Government Code Section 66535. http://www.mtc.ca.gov/planning/2030_plan/downloads/PPER/1-Legislation.pdf.

This provides the text from Senate Bill 1492 requiring the MTC to adopt performance measures

Tennessee Department of Transportation and Smart Growth America. (2012, August 20). Transportation Process Alternatives for Tennessee: Removing Barriers to Smarter Transportation Investments, Final Report. <http://www.smartgrowthamerica.org/documents/removing-barriers-in-tennessee.pdf>.

This report, developed through a partnership between TDOT and Smart Growth America, analyzes TDOT's current approach to project identification and development and identifies strategies TDOT can use to enable and encourage flexible, lower-cost ways to increase capacity on the state's transportation system.

Tennessee Department of Transportation. (2005, December). Tennessee Long-Range Transportation Plan: Project Evaluation System. www.tdot.state.tn.us/plango/pdfs/plan/ProjEvalSys.pdf.

This report lays out Tennessee's revised project selection and scoring process.

FOCUS AREA 2: REVENUE ALLOCATION AND PROJECT SELECTION

Remove Barriers to Off-System Investment

The Opportunity

Rebuilding our economy and creating new jobs is the most important issue of our generation. Thriving local economies need access to workers, materials, and markets. Transportation investment is key to economic recovery and prosperity, yet old ways of doing business often unnecessarily limit DOT investment options to facilities “owned” by the department.

DOTs can enable and encourage flexible, lower-cost ways to improve the capacity of the state’s entire transportation system (regardless of ownership) to expedite job creation and economic development. While obvious on its face, this approach is unusual due to policies and practices that limit the ability to spend federal and/or state transportation dollars on transportation facilities that are not designated as federal or state facilities. Removing barriers to off-system investments is an opportunity for the DOT and the state’s political leadership to demonstrate that they are leading efforts to reform the way government works, and to ensure that taxpayer money is buying the most cost-effective solutions.

Several states have successfully spent federal and/or state dollars on a project-by-project basis on facilities that were not on the federal or state highway system. When off-system investment is the most cost-effective solution, it should be considered as a matter of policy.

What Is It?

Typically, federal and state dollars are spent on national and state transportation facilities. Directing some of these funds to improve local facilities can be a more cost-effective way to improve the transportation system overall.

State leaders do not need to be bound by the roads under state ownership to direct their investments. Partnerships with FHWA can enable federal dollars to be spent on the local transportation system, but shifting funds to the local transportation system also requires education about the benefits and cost savings that can result from this transfer.

For example, the New Jersey DOT (NJDOT) planned a routine bypass to address congestion on NJ Route 31 where it runs through Raritan Township and the Borough of Flemington. However, further analysis showed that a different plan focused on local roads would more effectively address the congestion, better support local economic development, and cost a great deal less (see case study below). The key was the state DOT’s willingness to work for the most cost-effective improvements, regardless of who owned which pieces of the network.

Implementation

States have had varied success in spending federal and state dollars on local transportation networks, and most pursue this option as an exception or special case rather than a systematic way of maximizing the value of the existing transportation network. Key steps to implementing an approach that allows for off-system investment include:

1. Determining if there are legal or policy limitations to spending state monies on local facilities. If none exist, explore whether this has been done in the past and what the obstacles have been.

2. If legal barriers exist, exploring the practicality of modifying legislation and gathering support from legislators. This is likely to require education and examples of benefits.
3. Documenting value-to-price ratios or cost-benefit analyses to demonstrate the advantages of allowing investment on an entire network, regardless of ownership, versus restricting investment to state-owned facilities. This may require the development of an analytical tool or model to demonstrate how the system would function overall.
4. Engaging the local decision-makers who have jurisdiction over the transportation system targeted for improvement early in the process, and prior to having a broad public discussion.
5. Working with the federal funding partner (i.e., FHWA) at the local, regional, and federal levels and providing it with analytical information that demonstrates the value of investing in local facilities compared to the value of investing in the state or federal facility.
6. Developing a systematic approach to identifying the conditions that should exist in order to invest in the local transportation system.
7. Modifying the programming mechanisms to allow for this investment.

Case Studies

New Jersey

Over the past several years, NJDOT has been working with counties, municipalities, and other stakeholders to reinvest in established communities through a state program known as New Jersey Futures in Transportation (NJFIT). NJDOT established this effort in 2005 in partnership with the Office of Smart Growth (now the Office for Planning Advocacy) and other state agencies.

As one of NJFIT's pilot projects, NJDOT reevaluated a planned bypass on Route 31 in Raritan Township and Flemington Borough intended to relieve congestion on a stretch of the route running through the heart of Flemington's commercial district. The bypass had languished in the DOT's project pipeline for decades due to a lack of funds.⁷² NJDOT re-examined whether the proposed bypass solution—which was projected at great cost and which the Flemington community believed would reinforce Route 31's role as a high-speed highway out of step with local desires for community character—was truly the best way forward.⁷³ NJDOT conducted an extensive analysis that emphasized both stakeholder involvement and a technical analysis of different roadway design alternatives, and ultimately decided to replace the planned bypass with a two-lane parkway that would provide additional access to Route 31 while preserving the region's open spaces and community character.

One of the most important components of this project was an emphasis on developing a better-connected network of local streets in the community, including amenities to support bicycling and walking, to minimize pressure on Route 31. New development will add to this street network over

72 New Jersey Department of Transportation. (2010, October). "NJFIT: Future in Transportation: Route 31 project Hunterdon County." Retrieved 8/1/12 from <http://www.state.nj.us/transportation/works/njfit/route31.shtm>.

73 ICF International (2008, November). "NJ Route 31 Integrated Land Use and Transportation Plan." Retrieved 8/1/12 from http://www.transportationforcommunities.com/shrpc01/case_study/11/corridor. NJDOT had estimated the cost of the freeway bypass at between \$125 and \$150 million. For reference purposes, New Jersey DOT's fiscal year 2005 capital budget was approximately \$1.4 billion, according to NJDOT records accessed at <http://www.state.nj.us/transportation/about/press/2004/040604.shtm>, at the high end of its cost estimates, the Route 31 bypass project would have used over 10 percent of this budget.

time, providing additional routing options for local traffic. NJDOT developed a transportation model to evaluate the effectiveness of the additional local street network on the functionality of Route 31. Analyses indicated that investing in local networks effectively relieved congestion on Route 31 at a much lower cost than building new roads or expanding the state network.⁷⁴

Oregon

The Oregon DOT (ODOT) is using least-cost planning to define more cost-effective ways to improve Oregon's transportation system, including the local network. Least-cost planning is "a process of comparing direct and indirect costs of demand and supply options to meet transportation goals, policies, or both, and the intent of the process is to identify the most cost-effective mix of options."⁷⁵ This initiative was defined by the 2009 Oregon Legislature in the Jobs and Transportation Act (House Bill 2001) and complements ODOT's practical design initiative, required by the same law.⁷⁶ Practical design stresses the value of making strategic decisions based on what most benefit the overall system and directs available dollars toward activities and projects that optimize the system as a whole. Since 2009, ODOT estimates that practical design has saved the agency "tens of millions of dollars."⁷⁷

Resources

Pennsylvania DOT and New Jersey DOT. (2008, March). Smart Transportation Guidebook: Planning and Designing Highways and Streets to Support Livable and Sustainable Communities. <http://www.state.nj.us/transportation/community/mobility/pdf/smarttransportationguidebook2008.pdf>.

This joint effort of the Pennsylvania and New Jersey DOTs provides guidance to project managers for state transportation projects on the key components of local community context—land use plans and policies, street network connections, and development controls—that allow more sound state investment in a larger share of the transportation system.

Oregon DOT Highway Division. (2010, March). Oregon Practical Design Strategy. http://www.oregon.gov/ODOT/HWY/TECHSERV/docs/Practical_Design_Guideline.pdf?ga=t.

This is a guidebook for Practical Design, as it has been used by ODOT. Practical design has been used by ODOT as a way to enhance its transportation system. Even with scarce resources, ODOT has been able to improve its transportation system because it has established project scopes that deliver specific results, and it offers flexible parameters for design teams.

Tennessee DOT and Smart Growth America. (2012, August 20). Transportation Process Alternatives for Tennessee: Removing Barriers to Smarter Transportation Investments, Final Report. <http://www.smartgrowthamerica.org/documents/removing-barriers-in-tennessee.pdf>.

This report, developed through a partnership between TDOT and Smart Growth America, analyzes TDOT's current approach to project identification and development and identifies strategies TDOT can use to enable and encourage flexible, lower-cost ways to increase capacity on the state's transportation system.

Wisconsin DOT Research Program. Project 0092-05-14, "The Socioeconomic Benefits of Transit in Wisconsin, Phase II: Benefit Cost Analysis." <http://wisdotresearch.wi.gov/wp-content/uploads/05-14tranbenefits-f1.pdf>.

This report provides an example of how to perform a cost-benefit analysis of transit in a state, and gives a cost-benefit analysis model that can be used to quantify transit benefits dependent upon the type of funding.

74 *Ibid.*

75 Oregon Revised Statutes 184.653 §6.

76 *Ibid.*, §19.

77 Oregon Department of Transportation. (2012, July 17). "Practical Design Stretches Resources Further." Retrieved 8/2/12 from <http://cms.oregon.gov/ODOT/GOVREL/Pages/news/071712a.aspx>.

FOCUS AREA 2: REVENUE ALLOCATION AND PROJECT SELECTION

Update Funding Formulas and Implement Competitive Fund Distribution for Smart Transportation

The Opportunity

States provide half of all surface transportation funding.⁷⁸ Thus, state funding distribution processes weigh heavily on the development of a transportation system that supports a state's economy and prosperity.

For many states, decisions about how this money is distributed are based on traditional formulas that don't directly reflect the current needs of the state or its transportation system. These formulas often have little to do with which transportation investments actually provide the greatest return by helping to grow the economy and maintain a healthy transportation system. For example, Caltrans relies on a static formula to apportion 75 percent of the STIP funding to the Regional Transportation Improvement Program; 40 percent goes to northern counties and 60 percent to southern counties, with allocation at the county level based on population (weighted 75%) and state highway lane miles (weighted 25%).⁷⁹

What if Caltrans used a distribution formula that considered future demographic changes and shifting transportation demand variables? More useful, comprehensive funding distribution processes could reflect a broad range of transportation issues such as roadway safety, future needs from population growth, and preservation of current system assets. Revised funding distribution processes that take these variables into account would enable states to distribute money based on a holistic view of current assets and future needs within the transportation system. It would result in funding going to regions, projects, and modes that contribute to a smarter transportation system. Likewise, at least for a portion of fund distribution, relying on competitive funding programs could increase the transparency and efficiency of the funding process.

Changing outdated distribution formulas to a competitive, results-driven process is an opportunity for a state's DOT and governor to show the public that the state is serious about getting the most from taxpayer dollars, serious about getting the state's fiscal house in order, and serious about addressing the current economic crisis. Transparent funding distribution aligned with statewide goals will drive innovation at the local level that is in line with the needs of the larger region, strengthening the competitiveness of the state as a whole.

What Is It?

Methods for adopting more comprehensive funding distribution approaches include:

1. **Matching criteria and performance metrics against statewide goals.** Retool current formulas in order to channel funding to projects that are aligned with statewide goals. These changes will increase government transparency and allow a state to articulate its goals and performance outcomes when it plans transportation improvements. Fund allocation criteria should also be tied to measurable performance metrics. This will allow the DOT to track the

78 Intergovernmental Forum on Transportation Finance. (2008, January). *Financing Transportation in the 21st Century: An Intergovernmental Perspective*. Retrieved 8/20/12 from <http://www.napawash.org/wp-content/uploads/2008/08-16.pdf>.

79 Metropolitan Transportation Commission (2003, March). "Overview of Transportation Funding." Retrieved 9/12/2013 from <http://www.mtc.ca.gov/meetings/presentations/>.

impact of its funding investments in order to report on progress and maximize the program's effectiveness. Reporting on progress with regards to metrics also supports the DOT in its efforts to more clearly communicate the criteria on which it bases its funding decisions. In the case of the Minnesota DOT's (MnDOT) Target Formula Re-evaluation, performance metrics were weighted according to the statewide goals of improving safety, system preservation, and mobility (see case study below).

- 2. Creating competitive transportation grant programs.** A competitive grant program can maximize the investment of limited transportation funds and leverage private sector contributions. While a competitive grant program may represent a small portion of funding relative to a state's formula-based funding, it can spark innovative solutions to transportation problems that can result in cost savings and better outcomes. Beyond the projects that are ultimately funded, the funding programs themselves provide an orientation toward innovative and lower cost transportation that extends their reach. Other communities can see the success of these transportation projects, even if they are on a small scale, and applying for the funds forces applicants to think about smarter transportation possibilities.

On a regional level, the Atlanta Regional Commission's (ARC) Livable Centers Initiative transportation grant program links land use and transportation funding and has supported 100 transportation projects in the past ten years using only one percent of the Atlanta Regional Transportation Plan's funding.⁸⁰ The competitive Livable Centers Initiative grants are given to localities based on the community's land use and zoning policies that meet broader regional goals to create centralized areas of activity that promote walking, cycling, transit use, and greater roadway connectivity. The Livable Centers Initiative Implementation Report 2011 details ARC's funding process and how it spurred the adaptation of local comprehensive plans to line up with regional goals.⁸¹

At the state level, Washington State DOT has also instituted a competitive grant program, through which it has provided \$143.5 million since 2006 to support local mobility projects; the DOT is currently soliciting applications for the 2013-2015 biennium.⁸² This Regional Mobility Grant Program supports local efforts to improve transit mobility and reduce congestion on the most heavily traveled roadways. WSDOT is undertaking studies to develop methods of evaluating the cost-effectiveness of each project.

- 3. Prioritizing transportation project funding.** Explicit and substantiated prioritization can improve the fund distribution process by giving precedence to projects that are particularly cost-effective or do a particularly strong job of meeting certain goals. In addition to the competitive grant program mentioned above, WSDOT has implemented a project prioritization process to ensure that taxpayers get the most value for the dollars spent.⁸³ This prioritization program, spelled out in RCW 47.05⁸⁴, ranks projects based on their costs and benefits within six project areas—safety, preservation, mobility, economic, environmental retrofit, and other

80 Atlanta Regional Commission. (2009). *Livable Centers Initiative Indicators and Benefits Study*, 3-4. Retrieved 8/9/12 from http://www.atlantaregional.com/File%20Library/Land%20Use/lu_lci09_indicatorsbenefits_1009.pdf.

81 Atlanta Regional Commission. (2011). *Livable Centers Initiative Implementation Report*. Retrieved 8/20/12 from http://www.atlantaregional.com/File%20Library/Land%20Use/LCI/lu_2011_lci_implementation_report_06-2011.pdf.

82 Washington Department of Transportation. (2012). "Regional Mobility." Retrieved 8/1/12 from <http://www.wsdot.wa.gov/Transit/Grants/mobility.htm>.

83 Washington Department of Transportation. (2012). Highway Construction Program – Project Prioritization. Retrieved 8/20/12 from <http://www.wsdot.wa.gov/projects/prioritization/default.htm>.

84 Washington State Legislature. Revised Code of Washington - RCW Title 47 Public Highways And Transportation - Section 47.05.030 Ten-year programs -- Investments, improvements, preservation. Retrieved 9/12/2013 from <http://law.onecle.com/washington/public-highways-and-transportation/47.05.030.html>.

facilities— and the goal of the process is to provide the biggest benefit for the least cost.⁸⁵ While Washington’s prioritization process is limited to highway construction processes, a similar process could be expanded to include all transportation projects within region or state as is done at the Metropolitan Transportation Commission in the Bay Area of California.

Implementation

1. **Conduct an internal evaluation.** State DOTs wield relatively significant control over how funds are allocated for transportation projects. The funding reform process begins with an internal evaluation process within the capital programs or finance departments and broadens to include the county and local DOTs. Frequently, this process is championed by department officials and takes place within the department in conjunction with county and municipal officials and stakeholders. According to staff of MnDOT’s Office of Capital Programs and Performance Measures, that agency led the most recent revision to the federal and state target funding formulas in 2006, integrating statewide goals and performance objectives. In the case of North Carolina’s Transportation Reform, Governor Bev Perdue pushed for departmental reform with an executive order.⁸⁶
2. **Develop partnerships with local and state agencies.** Funding formula reform will be most effective if the state DOT works in conjunction with regional MPOs to accommodate a greater variety of transportation projects. Partnerships with local governments and regional organizations will also help to overcome the common misperception that funding changes will reduce local control of projects. This strategy proved effective in Atlanta, where the ARC’s competitive funding distribution provided communities with financial support to develop their own transportation plans, resulting in greater local control.

Recalibration of allocations must be also done in concert with other state agencies, such as planning, natural resources, and economic development, to advance and address not only transportation system concerns and performance, but economic and environmental deliverables as well.

3. **Start small and set aside funding.** Baby steps are often necessary to test out new fund distribution processes. A small demonstration program fund is a good place to start as a test run and may not require legislative authorization, making it an easier way to demonstrate smart transportation principles. Finding the money is likely the most challenging part of establishing a competitive fund for smart transportation projects. Gas tax funds are often limited by statute or state constitution. Pennsylvania was able to address this problem by setting aside federal funds.

Timeframe and expectations. Revising funding procedures can take time; the processes described in the case studies below took two to three years of extensive meetings with stakeholders at the state, local, and community levels. If performance measures are already in place, the process will likely proceed more quickly.

States have the best opportunities to revise funding formulas when state and local long-term transportation plans and objectives are in alignment. State-wide goals can also foster local planning by

85 Washington Department of Transportation. (2012). Highway Construction Program—Project Prioritization. Retrieved 9/12/2013 from <http://www.wsdot.wa.gov/projects/prioritization/default.htm>.

86 North Carolina Department of Transportation. (2009). Transportation Reform. Retrieved 8/9/12 from <http://www.ncdot.gov/performance/reform/>.

awarding funding to projects that address regional development goals. This has occurred with ARC's Livable Centers Initiative: currently, 88 percent of the communities involved in the project have modified their comprehensive plans to create economic activity corridors and community improvement districts according to their own Livable Centers Initiative studies.⁸⁷

Special considerations outside of the funding formula must be made for major infrastructure emergencies or large infrastructure projects in communities with unique maintenance issues. In these situations, state level transportation funding reserves can be maintained and granted through a separate allocation process.

While agencies and stakeholders may be wary of changes to existing funding formulas, there is an opportunity to integrate existing funding levels with statewide goals on performance measures to improve safety, preserve and maintain roads and bridges, reduce congestion, and prepare for future population growth. As explained in further detail below, MnDOT successfully revised its funding formulas to maintain roughly the same allocations to the state's transportation districts while still incorporating more performance measures.

Case Studies

Pennsylvania

The State of Pennsylvania started the Pennsylvania Community Transportation Initiative (PCTI)⁸⁸ to competitively distribute funding for smart local transportation initiatives in late 2008.⁸⁹ In response to its first announcement, PennDOT received more than 400 applications from cities, boroughs, townships, MPOs, and RPOs requesting more than \$600 million. PennDOT staff evaluated the proposals based on their focus on town-building rather than sprawl, their capacity to leverage other funding, their consistency with regional plans, and their innovation and suitability to teach or demonstrate the positive application of smart transportation principles. Ultimately, \$59.2 million was distributed to 50 projects throughout the state that link transportation investments to local land use planning and decision-making. In 2010, PennDOT administered a second round of funding, distributing \$24.7 million to 41 projects.⁹⁰

Pennsylvania funded this program by setting aside federal funding. Though the program faced initial resistance from MPOs and RPOs and some PennDOT staff concerned about the use of funds, it aligned closely with the smart transportation framework developed by the DOT during a massive spending overhaul in 2004, so it was ultimately approved as a demonstration laboratory to launch projects embodying smart transportation principles.

Lancaster County Transportation Coordinating Committee (TCC)

Inspired by the Pennsylvania PCTI, described above, Lancaster County launched its own smart growth transportation program in 2011. The TCC, a multiagency committee, dedicated \$2 million from the state allocation of transportation funds to the county to a competitive smart transportation project fund.

87 Atlanta Regional Commission. (2011). *Livable Centers Initiative 2011 Implementation Report*. p. 4. Retrieved 8/9/12 from http://www.atlantaregional.com/File%20Library/Land%20Use/LCI/lu_2011_lci_implementation_report_06-2011.pdf.

88 Pennsylvania Department of Transportation. Pennsylvania Community Transportation Initiative. Retrieved 9/12/2013 from <http://www.smart-transportation.com/pcti.html>.

89 *Ibid.*

90 *Ibid.*

The program is intended to encourage smaller projects that will increase mobility and connectivity⁹¹ at the municipal level. Thirteen projects were submitted in the first round of funding and five were chosen to receive a total of \$1.5 million⁹², including a pedestrian path expansion and sidewalks near a bus stop and a school. If the funds were not used for smart growth projects, the money would have gone to roadway or bridge projects in the county.

Minnesota: Target Formula Re-Evaluation

In response to the Intermodal Surface Transportation Efficiency Act regional planning requirements, MnDOT created Area Transportation Partnership (ATP) Districts to allocate federal funds in the early 1990s. The first funding formula was based on discussions with ATP stakeholders and ensured that the transportation fund distribution didn't change drastically from existing levels. MnDOT allocated funding according to target formulas weighting system size at 40 percent and system usage at 60 percent; it determined system size based on existing lane miles and system usage based on both current and future vehicle miles traveled (VMT).⁹³ Subsequent revisions in 2003 and 2006 allowed the funding formula to evolve to incorporate statewide goals addressing safety concerns, roadway and bridge maintenance, and transit needs. Target funding formulas for both federal and state fund allocations are now weighted to include:⁹⁴

- 60 percent preservation, determined by average bridge needs, heavy commercial VMT, and average pavement needs;
- 10 percent safety, determined by three-year average traffic fatalities; and
- 30 percent mobility, determined by congested daily VMT for trunk highways, transit needs, and future VMT based on population predictions.

The staff of MnDOT's Office of Capital Programs and Performance Measures spearheaded the most recent revision to the federal and state target funding formulas, integrating statewide goals from the Minnesota State-wide Multimodal Transportation Plan. These statewide goals are operationalized through clearly stated performance targets. Some of the performance metrics employed by MnDOT include:⁹⁵

- Targets:
 - To reduce traffic fatalities to 400 annual fatalities by 2010. MnDOT successfully met this goal.
 - Create 100 percent ADA accessible pedestrian signals by 2030.
 - Increase bus service hours to 1.6 million by 2015.
- Maintenance of system:
 - 84 percent of the state's bridges in a state of good or satisfactory repair.
 - Good pavement quality: 70 percent of principal arterials in good quality, 65 percent of non-principal arterials in good quality.

91 Lancaster County Transportation Coordinating Committee. (2011, July 28). "Lancaster County Smart Growth Transportation Program." Retrieved 8/1/12 from http://www.co.lancaster.pa.us/planning/lib/planning/projects_and_programs/sgt_program_guidelines_as_adopied_6-27-11-final.pdf.

92 Harris, B. (2012, July 4). "Funding OK'd for smart growth projects." *Lancaster Online*. Retrieved 8/1/12 from http://lancasteronline.com/article/local/682716_Funding-OK-d-for-smart-growth-projects.html.

93 Minnesota Department of Transportation. (2001). *State Transportation Improvement Program Guidance*. Appendix C, pg. C1-2. Retrieved 8/9/12 from <http://www.dot.state.mn.us/planning/program/pdf/STIPGMar01.pdf>.

94 Minnesota Department of Transportation. (2006). "Approved Federal and State Target Funding Formulas," Retrieved 9/12/2013 from <http://www.dot.state.mn.us/planning/program/targetformula.html>.

95 Minnesota Department of Transportation. (2010). *Transportation Results Scorecard*. Retrieved 8/10/12 from <http://www.dot.state.mn.us/measures/pdf/2010%20SCORECARD.pdf>.

- Congestion reduced to ensure travel can maintain target speed (55-60 miles per hour) along 95 percent of interregional corridors.
- 100 percent on-time bridge inspections.
- Customer satisfaction of highway maintenance at 7.0 on a scale of 10.0 or better.

ATP districts prioritize their transportation needs first; then those needs are incorporated into state-level transportation priorities and weighted against state performance measures. The ATP districts are given the allotted transportation funding according to the target funding formulas. The districts have significant local control over the projects they choose to produce in order to meet statewide goals of safety, mobility, and preservation.

As transportation funding formulas have been revised, MnDOT has aligned its state goals with performance based funding. Other state transportation improvement program fund allocations can adopt the revision process used by MnDOT to create federal and state funding formulas that meet statewide goals and help to guide regional transportation project prioritization.

Atlanta Livable Centers Initiative

In 1999, the ARC and the Georgia DOT (GDOT) saw an opportunity to link land use policy and transportation funding to improve air quality and created the Livable Centers Initiative. As part of the LCI, \$18 million in transportation planning study funds will be awarded between 2000-2017 to support transit use, walking, and bicycling. Transportation projects resulting from LCI studies are eligible through a competitive grant process for a portion of \$500 million in priority funds dedicated to the program (individual award amounts range from \$80,00 to \$120,000).⁹⁶ In the past ten years, the LCI has spurred almost 100 transportation projects using only one percent of the Atlanta Regional Transportation Plan's funding, maximizing limited investments.⁹⁷

Prior to the LCI program, all transportation funding was allocated based on the projects outlined in the Regional Transportation Plan, which is developed and guided by the MPO's planning staff, the Transportation Coordinating Committee, and the Transportation Air Quality Committee.

The LCI encouraged greater support of counties, cities, and towns to plan transportation projects based on their own needs while also coordinating with larger regional development goals. ARC staff explain that the LCI is popular with local officials and citizens because they can link it to their own local plans to improve economic growth by balancing jobs and housing needs.⁹⁸ At the same time, the region benefits by taking advantage of the infrastructure and private investments committed in the local community to achieve more balanced regional development, reduce VMT, and improve the regional air quality.⁹⁹

Because Surface Transportation Program (STP) projects with federal funding must go through GDOT's planned development process, there is extensive review time. ARC's LCI staff have worked with GDOT to streamline the process and cut the amount of time in half.¹⁰⁰

96 Atlanta Regional Commission. Livable Centers Initiative. Retrieved 9/12/2013 from <http://www.atlantaregional.com/land-use/livable-centers-initiative/>.

97 Atlanta Regional Commission. (2009). *Livable Centers Initiative Indicators and Benefits Study*, pp. 3-4. Retrieved 8/10/12 from http://www.atlantaregional.com/File%20Library/Land%20Use/lu_lci09_indicatorsbenefits_1009.pdf.

98 Interview with ARC Project Manager, (2012, May).

99 Atlanta Regional Commission. (2009) *Livable Centers Initiative Indicators and Benefits Study*, pp. 3-4. Retrieved 8/10/12 from http://www.atlantaregional.com/File%20Library/Land%20Use/lu_lci09_indicatorsbenefits_1009.pdf.

100 Interview with ARC Project Manager, (2012, May).

Resources

Atlanta Regional Commission. (2011). 2011 Livable Centers Initiative Implementation Report. http://www.atlantaregional.com/File%20Library/Land%20Use/LCI/lu_2011_lci_implementation_report_06-2011.pdf.

This report provides the results of a three-tiered survey conducted biennially by the ARC to measure the success of the LCI program. The survey quantifies changes in development, measures changes in land use policy, and assesses attitudes toward improvement and livability resulting from implementation of LCI studies.

Atlanta Regional Commission. (2012). LCI Transportation Program Implementation Progress Report, July 2011-December 2011. http://www.atlantaregional.com/File%20Library/Land%20Use/LCI/lu_lci_breaking_ground_12_2011_final.pdf.

This report examines the LCI program's history and outlines the types of projects funded in the most recent round of grants, the project status, and committed funds.

Minnesota DOT. (2006). Federal Target Formula. <http://www.dot.state.mn.us/planning/program/pdf/targetformula/Approved%20Federal%20Formula%20January%202006.pdf>.

This website gives the final approved federal funding formula.

Minnesota DOT, Office of Investment Management. (2001). Guidance for the Development of the State Transportation Improvement Program. <http://www.dot.state.mn.us/planning/program/pdf/STIPGMar01.pdf>.

This provides an overall framework of the ATIP/STIP process in Minnesota.

Minnesota DOT, Office of Investment Management. (2006). Talking Points for Funding Formula Re-evaluation. <http://www.dot.state.mn.us/planning/program/pdf/targetformula/Talking%20Points%20for%20Web%202-22-06.pdf>.

This lists discussion points detailing how and why the funding formula was revised in 2006.

Pennsylvania DOT. (2012). Pennsylvania Community Transportation Initiative (PCTI) 2010 Program Guide. http://www.ppta.net/todtoolkit/assets/downloads/FundingMethods_Link_PCTI-2010_ProgramGuide.pdf.

This guide outlines the themes and funding selection process for PCTI grant applicants.