Economic Considerations:

Statewide Transportation Strategy (STS)
Short-Term Implementation Plan

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Economic Considerations of the STS

Overview

This paper evaluates how the programs identified in the *Statewide Transportation Strategy (STS) Short-Term Implementation Plan* may individually and cumulatively impact the state's economy. In addition to these individual evaluations, this paper outlines some potential economic benefits of the STS and describes some basic economic concepts that apply to understanding all of the potential economic impacts from STS implementation. Furthermore, it outlines how ODOT may conduct more rigorous economic impact analyses if or when specific STS programs with the potential for significant economic impacts are closer to implementation.

This paper does not consider the costs and benefits of reduced greenhouse gas (GHG) emissions on climate change, sea level rise, and other impacts from decreased GHG outputs as a result of implementing these STS programs. These are excluded for two reasons: first, the state of Oregon and the transportation sector cannot address a global issue like climate change without the support of other states, economic sectors, and nations. Second, the economic benefits from the slowing of climate change would accrue beyond the 20 to 30 year horizon applied to most economic impact analyses.

The exemption of climate change benefits does not diminish the potential for significant economic benefits produced for the state by the STS programs. These "co-benefits" (i.e., benefits in addition to the primary benefit of reducing GHG emissions) occur because the actions within each program may improve the efficiency of Oregon's households and productivity of its businesses. The following example of linked outcomes provides an example of how a specific STS action produces economic benefits independent of the long-term benefits of climate change abatement:

1. An action such as the expansion of ODOT's traffic incident management program will reduce congestion on the roadways where it is deployed;

2. Reduced congestion will in turn reduce commute time for workers;

3. Reduced commute time in turn increases the number of workers available to employers within a certain commute shed;

4. This larger pool of labor improves the likelihood that employers can match worker skills to jobs;

5. Better worker matching increases the productivity of businesses;

6. Higher productivity makes a business more competitive relative to its rivals outside the region and thus increases that business's market share;

7. A larger market share stimulates that business's hiring and output (i.e., direct effects);

8. Increased output leads this business to purchase more inputs, both raw materials and services, which increase employment and output for this business's suppliers (i.e., indirect effects); and,

9. This cumulative expansion increases workers wages, who spend these additional wages and stimulate additional economic activity (i.e., induced effects).

Conversely, there is also the potential for significant economic cost for the state and for individuals or businesses associated with ongoing implementation of the STS programs. Thus, the net impact of these co-benefits depends on their timing, the cost of an STS action, and how this cost is paid. The timing matters because a dollar of benefit that is realized ten years in the future is worth less than a dollar of cost incurred now. The cost matters because the cost of implementing a particular program or strategy may exceed the value of the benefit.

Finally, the source of funding matters because general taxes impose burdens across all households and businesses regardless of whether they receive any benefit from the strategy. User fees, on the other hand, may be designed and implemented to impose the cost directly on those who benefit. Using the above example of the STS action to expand ODOT's traffic incident management program (TIMP), if the TIMP is paid for with tolls on the roadway segment where the TIMP is deployed, the commuter who benefits pays directly for the TIMP. This direct link between the value of each STS action and the price charged to the beneficiaries creates a marketplace, where the STS actions that confer the most value on users can be most easily funded by "capturing" that value and charging the beneficiaries through user fees.

Determining the net economic benefits of the STS programs will ultimately require a quantitative economic impact analysis. A robust analysis of each program entails first calculating the direct impacts of each action in each program, which will require knowing much more about the specific locations where each action is deployed and its particular characteristics or technical specifications. These direct impacts, together with the costs of implementing and maintaining each action, and the sources of revenue for paying these costs, are then input into an economic model that determines how firms will change their production of goods and services and how households change their work and consumption. The aggregation of all these changes across Oregon's population provides a quantified estimate of the change in the state's economic performance compared to if the STS actions were not implemented.

The *STS Short-Term Implementation Plan* does not include the level of detail required for a quantitative economic impact analysis of the type described above. Nevertheless, the actions in each program provide sufficient information to conduct a qualitative assessment of how individual actions or a program as a whole will likely cause direct impacts to household and businesses, and how these in turn will cause economic impacts.

Discussion of Economic Concepts

Before delving into the potential economic impacts of the individual STS programs, this overview describes three simple economic concepts that may apply across all of the STS programs and explain how they may impact the state's economic performance.

Market failures and regulation: Mainstream economics embrace the concept that free markets produce more efficient outcomes and more economic growth than highly regulated markets. Nevertheless, most free markets suffer from imperfections which diminish their efficiency. The market for auto travel, for example, suffers significant lost efficiency because of congestion. Congestion occurs when individual drivers are not deterred from entering a freeway when it has reached its carrying capacity. The lack of sufficiently strong deterrents to those last few drivers that bring an almost saturated roadway to a state of gridlock would be what economists would call a "market failure." Ramp metering or peak period tolling are examples of regulations that can remedy this failure. The challenge for regulators, and the most common reason businesses contend that many regulations harm a market rather than help it, involve poorly designed regulations. These either do not remedy the real imperfections, are applied too weakly or aggressively, or both.

Market formation and barriers to entry: Another closely held belief of efficient markets is that the private sector will provide the appropriate type and amount of goods and services when there is sufficient demand. The flip side of this belief reasons that public investments intended to create a market are likely to merely use taxpayer money to create a market that is either not viable or, if viable, would have been created without public investment. Well-functioning economies, however, exhibit many examples of viable and important private sector industries that would not have been created without significant public investment. Air travel, for example, would not exist as we know it without heavy public investment in airports, air traffic control systems, safety oversight, security, etc. While private industry can now provide some of these public sector investments, the formation and dramatic growth of the air travel market depended heavily on these public sector investments in very large capital infrastructure projects.

Related but somewhat different is the effect that initial impediments or "barriers to entry" have on formation of markets that could be profitable to business and provide a valuable service or good to the consumer. One current example is the role of the public sector in creating a larger network of charging stations for electric vehicles (EV). The private sector has heretofore generally avoided making large investments in electric charging stations because they perceive too much uncertainty in the EV market and therefore too much risk to warrant the capital investment. Public sector investment (whether direct or in the form of an industry subsidy) is required to create an economic environment in which the various players will step forward and make the investment decisions that eventually lead to a functioning market that does not require ongoing subsidy. In this example, with publicly-funded expansion of the electric charging network, consumers have one fewer reason to avoid purchasing an EV (i.e., limited range because there are not enough places to recharge along the highway) so EV sales increase. Auto manufacturers see less risk in

producing a larger volume of EVs, and eventually there becomes enough EV ownership that sufficient demand for charging stations emerges to support a for-profit industry.

Short versus long term impacts: Among the concerns businesses and residents may hold about the potential adverse economic impacts of STS strategies, many may be best understood by separating these impacts into short-term versus long-term, and small versus large businesses. Many STS strategies would likely result in immediate or short-term changes in business practices or personal consumption that may be disruptive or expensive, and that may reduce the competitiveness of some in-state businesses. As businesses and households adapt to the STS programs, these short-term impacts will give way to long-term impacts that may often be smaller, larger, or work in the opposite direction. Small businesses are less able to weather short-term costs and disruptions than larger and multi-state firms. Understanding the differences and magnitudes of short versus long-term impacts provides policymakers with the opportunity to adjust the speed and scale of implementing STS actions such that these short-term adverse impacts may be mitigated for the most vulnerable households and businesses.

Evaluation of STS Short-Term Implementation Plan Programs

In the following evaluations of the STS programs[1], the general economic concepts presented above are applied to each program's likely economic impacts. These program summaries provide qualitative descriptions of the likely economic impacts, and include the following three parts:

- **Program Actions and Their Intended Economic Remedies:** This part provides a list of the program's specific actions and summarizes their attributes which have direct relevance to understanding their potential impacts to the State's economy.

- **Direct and Potential Costs:** Direct costs are defined here as the amount of funding needed to launch and sustain an action. The potential costs are monetary and non-monetary burdens that may cause economic harm to Oregon businesses or households.

- **Potential Economic Co-benefits:** Co-benefits are benefits in addition to the primary benefit of reducing GHG emissions.

Our summaries of each program's economic impact avoids speculating whether a "net present value" analysis would determine if the aggregate benefits over time will exceed the aggregate costs. Such quantitative findings require analytical rigor well beyond the scope of this overview. As already noted above, such analysis would also require more detailed specification of the STS actions and costs. Nevertheless, efforts were made to determine the timeframe for potential benefits and costs.

[1] For more information on these programs, please refer to the STS Short-Term Implementation Plan.

Program 1: Electric Vehicles and Low Emission Fuels

Program Actions and Their Intended Economic Remedies

Overall, this program's actions attempt to remedy *market formation and barriers to entry* and *short versus long term impacts*. Many state and metropolitan regions have determined that electric vehicles (EV) sales are impeded most significantly by the lack of an extensive network of electrical charging stations akin to the abundance of gas stations. Industry experts and academic analysis have identified the significant risks and large upfront investment costs of developing the recharging network as the major obstacle. Nevertheless, Oregon has roughly 500 charging stations at the present time and will add more. Other obstacles include the higher cost of EV (i.e., a barrier to entry to the consumer), uncertainty in the volatile price trends for gasoline, natural gas, and electricity (i.e., short versus long term impacts), and to a much lesser degree the lack of standards for recharging equipment and technology (an investment risk factor that impedes market formation.) The ten actions intended to address these challenges involve the following:

1. Develop communication materials that highlight the benefits of alternative fuel vehicles, including EV, and create maps and other resources that identify the state's existing EV charging network.

2. Expand communication efforts that promote EV tourism activities in Oregon.

3. Through the Transportation and Growth Management (TGM) Program, collaborate with the Oregon Department of Land Conservation and Development (DLCD) and explore ways to incorporate EV charging stations, natural gas, biogas, and other alternative fueling facilities, as primary and/or accessory land uses, in model code modules.

4. Explore funding opportunities for implementing a pilot program focused on wireless EV charging stations.

5. Partner with the members of the Energize Oregon Coalition and pursue funding for innovative projects, such as studying the feasibility of implementing smart grid initiatives, which allow for the two-way communication between providers and consumers of electricity.

6. Continue to participate in the West Coast Green Highway Initiative.

7. Administer $4,000,000 in federal Congestion Mitigation Air Quality funds, approved by the Oregon Transportation Commission in September 2013, to encourage the use of natural gas as a transportation fuel by supporting the installation of natural gas fueling stations.

8. Provide data, technical information, and assistance to the Oregon Department of Energy (ODOE) to study the feasibility of incentivizing the purchase of cleaner, more fuel-efficient vehicles, such as electric, CNG, propane, and hybrid vehicles.

9. Participate and provide expertise to the Oregon Department of Environmental Quality's (ODEQ) efforts to promote Clean Fuels as a member of the Interagency Low Carbon Fuel Committee.

10. Provide technical assistance to the Legislative Revenue Office in the preparation of reports on the feasibility of a statewide fee or tax on GHG emissions, required per SB 306 (2013).

Direct and Potential Costs

Assuming that funds will not need to be increased to cover the implementation and/or the maintenance and operation costs, the *economic* cost of launching and sustaining the three communication actions may be described as either: 1) the *opportunity* cost of not spending these funds on the next best alternatives or 2) the repeal of these funding sources and returning them to the taxpayers. A quantitative economic impact analysis would create two alternatives, a *next-best* scenario and a *no-project* scenario, and then compare the outcomes of all three to estimate the differences, with all other conditions held constant.

There are two potential economic costs expected of this program. The first involves the potential impact on transportation funding. Unless the State amends its fuel tax statutes or replaces them with a mileage-based fee, the substitution of gasoline with lower-taxed alternative fuels will accelerate the current decline in fuel tax revenue. The further loss of transportation funding will exacerbate the state-of-good-repair for Oregon's roadways and defund some economically positive investments. In addition, there is the potential that either the loss of transportation revenue or redirecting existing expenditures will reduce funding for other programs that assist low income households, thus having an adverse impact on equity. While equity impacts (i.e., the potential redistributive effects of an action) are not economic impacts *per se*, the possibility that STS actions might adversely impact some groups more than others, and particularly those groups protected by law, was a frequently-heard concern in the STS outreach efforts.

The second potential economic cost, i.e., foregone opportunity to repeal and rebate existing taxes, seems small and unlikely. The economic harm would be caused in the same way only in the reverse of the benefit described in the Overview with the example involving expansion of ODOT's traffic incident management program. In that example, the STS action reduces congestion.

While not an economic impact, another potential impact of any strategy that accelerates conversion to electric-powered vehicles is the prospect of further environmental impact (including GHG emissions) from generation of electricity from fossil fuels. This economic assessment, like the STS itself, assumes that the power generation industry will also be motivated or required to achieve significant reductions in GHG emission. Thus, the increase in future electricity demand for transportation will not result in an offsetting increase in GHG emissions from the power sector.

Potential Economic Co-Benefits

The most obvious positive economic impacts of this program will involve the benefits to Oregon's electric power generation industry. Benefits will also accrue to those industries that produce and distribute alternative fuels, but only to the degree that the alternative fuel industries are not the same ones that produce and distribute gasoline and diesel transportation fuels. The magnitude of this economic benefit depends on the amount of in-state industry activity that is linked to electric power and alternative fuels, compared to the petroleum production and distribution and the manufacturing and repair of gasoline versus electric and alternative-fueled vehicles. Given that Oregon's electric power industry produces surplus power but the state has no domestic oil or gas production, this program may stimulate significant economic benefits for the state. Finally, households that own an EV may have lower lifecycle vehicle costs depending on the costs of fossil fuel and the premium paid for electric and alternative fueled vehicles.

Program 2: Eco-Driving

Program Actions and Their Intended Economic Remedies

From an economic perspective, this program is intended to address specific inefficient driving habits that result in more fuel consumed than is necessary. This program seeks to change these habits with four actions which focus on education. ODOT is currently developing and distributing educational materials and collaborating on research with academic institutions to measure the effectiveness of current education. The STS includes the following four actions which will expand on the existing educational programs:

1. Launch deployment of ODOT eco-driving educational efforts, leveraging partnerships and funding where possible.

2. Explore developing an eco-driving certification program for transit operators, commercial fleets, and freight carriers.

3. Identify opportunities for strategic partnerships and for working with the private sector to promote technologies that support eco-driving, such as in-car displays regarding fuel efficiency.

Two of these three actions involve state government or local agencies appealing to the driver directly. Action 3 proposes to partner with private industry. The evidence supporting all of these actions indicates that the demand for additional education is insufficient to entice the private market to provide these expanded services.

Direct and Potential Costs

Only one potential economic cost of this program is expected. As would be the case for Program 1, Program 2's deliberate intent to reduce fuel consumption, unintentionally

reduces transportation funding. Unless these funds are replaced, the further loss of transportation funding will exacerbate underinvestment in maintenance and repair of the state's existing transportation infrastructure, and/or curtail cost-effective capital projects. These deficiencies retard economic growth by raising operating costs for motorists and/or allowing congestion to increase.

Unlike Program 1, which stimulates replacement of petroleum fuels with electric and alternative fuels, this program will simply reduce fuel consumption per mile, and possibly in total. In order to understand all sides of the potential economic impact from decreased petroleum fuel consumption, consideration needs to be given to the impacts on the state's petroleum businesses and workers. Each year, Oregonians spend more than $3 billion for petroleum products. Oregon has no primary oil refineries in the state, but the state's industry includes petroleum distributors in addition to businesses that are not impacted by less motor fuel consumption (e.g., lubricating oils, asphalt production, and asphalt roofing products). The state has over 140 businesses that distribute petroleum products throughout Oregon and about 1,800 fueling stations (in 2010) which employ more than 9,800 full- and part-time workers. If the STS eco-driving program is effective at reducing the amount of gasoline and diesel that households and trucking companies purchase, these jobs should be reduced proportionately, all other conditions held constant. As described below, however, new jobs should be created when household and business savings are reinvested into the state economy.

Potential Economic Co-Benefits

The potential economic benefits of this program are likely to be modest and involve both households and businesses. To the degree that significant numbers of household adopt aggressive eco-driving practices, these households will save on motor fuel expenditures and have additional disposable income. From an economic perspective, this substitution of fuel expenditures with other forms of household consumption has some likelihood of benefiting the state's economy. The amount of benefit depends on the local content (i.e., the amount of in-state value added) of the household's alternative consumption. If a family spends the money they save by eco-driving on Oregon-produced Pinot Noir, the state's economy grows. If they buy a tablet computer produced in China, then Oregon's economy does not benefit as much.

Trucking companies and transit operators that save fuel because their drivers are trained (and certified) will see their operating costs decrease. For private trucking, this cost savings will improve the competitiveness of these businesses and the truck-intensive businesses they serve, which in turn enables these businesses collectively to capture larger market share compared to their out-of-state rivals, and to increase their output, hiring, and wages. The cost savings for transit operators will reduce their operating costs, which provides opportunities to expand service, invest in new equipment, raise wages, reduce the current operating subsidy, or lower passenger fares. Any of these outcomes stimulate the state's economy.

Program 3: Road User Charge Economic Analysis

The action of this Program is to conduct a rigorous economic analysis of the benefits and costs of a road user charge or vehicle miles traveled fee. This analysis will consider implementation costs, as well as social costs such as air pollution and greenhouse gas emissions. Because the proposed action is itself an economic analysis, no further assessment is provided here.

Program 4: Strategic Assessments and Scenario Planning

Program Actions and Their Intended Economic Remedies

The Program will direct ODOT's Transportation Development Division to work with metropolitan planning organizations (MPOs) and associated jurisdictions on Strategic Assessments and scenario planning efforts, providing technical assistance and negotiating financial support. ODOT will collaborate with the Department of Land Conservation and Development (DLCD) to provide this technical and financial assistance to regional and local agencies and engage with stakeholders. This program, under the requirements of HB 2001, will improve the integration of land use and transportation planning processes to achieve statewide GHG emission targets and will support voluntary efforts that help to advance the STS vision.

Strategic Assessments are designed to assess the potential outcomes in a metropolitan area assuming current trends continue and adopted plans are implemented. These assessments, together with the technical and financial support provided by ODOT and DLCD, help the MPO identify potential actions (investments, programs, etc.) that best meet identified community goals; they represent the first step in a scenario planning process. The amount of support for individual assessments is generally low, but the uncertainty of Strategic Assessments that focus on STS outcomes, and the potential for stakeholder concerns, present potential complexities that could challenge MPOs in ways that require more than ODOT and DLCD can provide given current funding levels and staff resources.

Direct and Potential Costs and Benefits

The technical and financial support provided by Program 4 are very unlikely to cause significant economic benefits or costs. One purpose of the Strategic Assessments themselves is to determine potential regional impacts (i.e., benefits and costs) of actions that include GHG reduction efforts. The likely economic impacts from STS program implementation depends on each regional economy's unique industry mix, land use, fiscal health and other market and socioeconomic conditions. Although the integration of STS policies into Strategic Assessments and regional scenario planning efforts will likely produce economic costs and benefits, the specific net economic impacts on households and businesses for any given region cannot be identified in advance of the scenario planning activities themselves.

Program 5: Intelligent Transportation Systems (ITS)

Program Actions and Their Intended Economic Remedies

This program supports ODOT's numerous, ongoing ITS initiatives. ITS applies technology and software to improve roadway operations and management, which in turn reduces congestion and GHG emissions, and improves safety. Most if not all states and many metropolitan regions are increasing their deployment of ITS investments as a cost-effective alternative to major capital expansion of the roadway system. Nevertheless, there are valid arguments that the pace of ITS investment and the deployment of promising emerging technologies lags behind the economic case for more rapid and comprehensive strategies for reducing congestion and improving travel reliability, which are both directly linked to economic growth. The seven actions intended to address these challenges involve the following:

1. Plan for the expansion of variable speed projects across the state by identifying opportunities, assessing feasibility, and determining priorities.

2. Develop communication materials that educate drivers on the benefits of variable speed limits.

3. Plan for the expansion of adaptive signal control technologies by identifying opportunities, assessing feasibility, and determining priorities across the state.

4. Develop a TripCheck smart phone application to provide improved access to traveler information while traveling.

5. Work with the Governor's Office, Oregon Solutions, and Traffic Incident Management stakeholder groups to strengthen interagency coordination related to highway incident management.

6. Work with the Oregon State Police to expand the Oregon Interoperability Server use, which allows for the electronic exchange of data among the ODOT, Oregon State Police, and 911 dispatch systems.

7. Improve awareness of Oregon's "move it" law which requires drivers of vehicles involved in a crash to remove their vehicle from the travel lane if it is operable.

Direct and Potential Costs

As a general rule, ITS actions that improve the operational efficiency of an existing roadway or interchange/intersection are some of the most cost-effective investments for improving travel time reliability and reducing recurrent congestion, and often represent a more cost-effective approach to achieving more capacity than physical system expansion.

Potential Economic Co-Benefits

The potential economic benefits of this program could be substantial depending on how well the ITS actions reduce crashes and recurrent congestion, and improve travel time reliability. Of the three direct benefits, the improvement to travel time reliability (through reduction of non-recurrent delay) would likely generate the most substantial economic benefits because of the disparities in the value between different trip purposes. In terms of economic impact, "on-the-clock" travel has much more impact on industry productivity than the other trip purposes such as commute, shop, school, social, or tourism. The majority of on-the-clock travel involves goods movement, and the benefits of reliable travel time for this trip purpose have grown exponentially as just-in-time inventory (JIT) control has spread from manufacturing and warehousing to most major retail operations. Unexpected delays caused by accidents, road or interchange closures, and inclement weather can inflict major disruptions on business operations. Shippers frequently are forced to buffer their schedules with significant additional travel time to ensure on-time deliveries, resulting in lost efficiency. In addition, more reliable travel times allow local distributors to serve the same demand with fewer routes and trucks and their customers can manage their inventories more efficiently.

The potential for ITS actions to reduce daily congestion (i.e., recurrent delay) would provide substantial economic benefits to Oregon employers, especially those reliant on knowledge workers. Less congestion for commuters creates a larger pool for labor which employers can recruit from within a given commute shed (e.g., a maximum of 40 minutes). This larger and often more diverse access to labor increases the quality of employment-worker matches. As the pool of accessible labor grows, odds increase that firms will find a good fit for their specialized skill needs. Good matches lead to higher productivity because they are more efficient and productivity drives economic expansion.

Program 6: Transportation Planning and Project Selection

Program Actions and Their Intended Economic Remedies

This program's actions attempt to ensure implementation of numerous STS strategies over time by influencing the direction of statewide policy and guidance documents. The Program's proposed actions are:

1. Consider the STS and work to move in the direction of the STS vision in all relevant statewide plans, plan updates, guidance documents, and policy documents such as, but not limited to:

    - Statewide Bicycle and Pedestrian Plan Update

    - Statewide Transportation Options Plan, including the development of an internal Transportation Options Program that focuses on agency operations and staff opportunities

- Statewide Rail Plan Update
- Statewide Public Transportation Plan Update
- Transportation System Plan Guidelines
- Least cost planning / Mosaic

2. Amend the Oregon Transportation Plan (OTP) to consider the STS, which is required in order to fulfill the STS legislative requirements of SB 1059 (2010). The amendment is likely to be minor, focused on the introductory language of Goal 4: Sustainability.

3. Consider the STS vision in the development of the 2017-2020 Statewide Transportation Improvement Program (STIP) through collaboration with the STIP Stakeholder Committee.

There are no direct economic impacts – i.e., neither significant benefits nor costs – associated with the long range planning activities this program would implement. However, these policy plans and documents should incorporate the STS vision within the overall future vision of the Oregon transportation system. The plans influence transportation funding decisions, which lead the state incrementally towards achievement of that vision. This program will embed STS strategies into the plans, policy documents, and guidelines so that statewide planning activities support STS strategies in general and will influence resource allocation decisions, project prioritization, and development approvals. While the integration of STS policies into the State's transportation plans will likely produce economic costs and benefits over time, the specific economic impacts on households and businesses cannot be identified in advance of the planning activities themselves.

Direct and Potential Costs and Benefits

The specific activity of incorporating STS provisions into policy, planning and guidance documents generates only small increments to the already-programmed costs of the various plan updates, and thus will not generate a meaningful economic cost. The potential downstream costs and benefits of actual plan implementation could be significant, but are impossible to determine quantitatively or even qualitatively until specific actions are selected for implementation within system plans or planning guidelines.

The potential for significant future economic costs depends on the aggressiveness with which ODOT, local jurisdictions, and other partners approach implementation. Typically, state and local plans and policies lay out guiding principles that result in criteria for prioritizing the expenditure of public funds. Local jurisdiction's transportation system plans can encourage specific patterns of development through project selection. The net impacts will likely depend on how well applications of Program 6 strategies remedy a market failure or help create new markets. For example:

- STS Strategy 8 targets improvements in intercity transit. Suppose the integration of the STS vision and goals into the Statewide Rail Plan and the Statewide Public Transportation Plan Updates leads to new intercity rail and transit service. The amount of benefit depends on how well this new or improved intercity mode provides a more effective option compared to the modes previously used by its new passengers, as well as how many new riders the service attracts. Additional benefits include the business generated for suppliers of transit vehicles, or commercial and retail service establishments that might locate around intermodal transit hubs served by the intercity modes. Potential costs include the loss of business to industries currently serving the intercity travel demand that has been diverted to this new mode. Passenger air travel in short-haul markets, for example, might be impacted by a diversion to intercity express bus or rail. Highway-oriented businesses such as restaurants, auto services, and lodgings might see a change in demand if any significant volume of long-distance auto travel was diverted to bus or rail. The net economic impact would be the value of the benefits minus the costs.

- Strategy 13 involves compact, mixed-use development. The integration of the STS vision provides more impetus and momentum for this strategy if the STS principles are articulated in both state and local bicycle and pedestrian plans and public transportation plans. To the extent that state policy favors higher-density residential and employment development, in conjunction with a complete streets approach to transportation infrastructure, there could be both economic benefits and costs to multiple parties. Short-term congestion costs might increase for those who continue to use private autos in dense locations, while accessibility benefits would increase for those who are able to take advantage of faster (in some cases) and lower cost modes such as cycling and transit. Over the longer term, the higher density of housing and its closer proximity to jobs (compared to a more sprawling residential land use pattern) will promote what economists call the economies of agglomeration. This effect involves placing a larger and potentially more diverse pool of labor nearer employers. These employers, all other conditions held constant, will enjoy higher productivity than their competition because they are more likely to find employees with the right skills (i.e., employee matching effects). Additionally, local jurisdictions could find that their cost per capita of building public infrastructure and delivering municipal services declines over the long-term as a result of higher density and closer proximity.

- Strategy 15 supports more efficient industrial land uses. Local transportation system plans and land use plans aligned with the STS recommendations might result in the creation of freight consolidation centers or eco-industrial parks, where shippers and producers enjoy close proximity to consumers, economies of agglomeration, and related benefits (STS elements 15.1 and 15.2.) Creation of more efficient freight distribution networks and corridors serving these centers (element 15.3) could prioritize freight movement over personal transportation in certain locations. These strategies could produce economic benefits such as faster and/or more reliable delivery times for shippers, but also higher congestion costs or reduced accessibility to operators of passenger vehicles. Determining the net economic impacts (i.e., benefits minus costs) requires quantitative analysis of specific investments and regulations that might be necessary to bring about the change in investment and system utilization.

These examples show how Program #6, by promoting the integration of the STS vision and goals into the State's planning activities, could accelerate or catalyze economic benefits and costs. To the extent the STS strategies help to achieve core OTP goals, such as improved accessibility, mobility, and operational efficiency, then Program #6 should ultimately contribute to reduced transportation costs (per capita or per unit of economic output) and overall improvement in the State's economic position.

Program 7: Stakeholder Coordination

This program directs ODOT to monitor and provide information about initiatives that align with the STS, and to pursue external and internal coordination to ensure efficiencies, remove redundancies, and identify leveraging opportunities where appropriate. Neither the proposed actions of this program nor the intended outcome of those actions (i.e., improved efficiency and leverage of time and money invested) are expected to generate economic costs or benefits.

Conclusion

Over the course of developing the STS and the *STS Short-Term Implementation Plan* some stakeholders expressed concerns regarding the potential economic impacts of implementing the STS vision. This paper aims to address some of those concerns. Furthermore, as ODOT moves forward with STS implementation, including the implementation of short-term actions and the development of future implementation plans, ODOT it is committed to a transparent process and ongoing stakeholder engagement, and will consider opportunities for more in-depth economic analysis.