Sustainable Transportation: An ITE Technical Brief

Sustainable Practices in Transportation Defined

Sustainable transportation as an organizing principle considers the ability to provide for society’s current needs without compromising the interests of future generations. The ideas of sustainability are not necessarily new but are gaining more traction in recent years due to social, economic, and political climates. In fact, basic ideas surrounding sustainable practices had been formally expressed back in the 1980s. In recent years, “sustainability” has become a buzzword across multiple industries. In a general sense, sustainability refers to a system’s ability to continue without failing, and in practice usually refers to the “triple bottom line” of sustainable economies, equitable societies, and ecological systems. Sustainability emphasizes the integrated nature of human activities and therefore the need for coordinated planning among different sectors, groups, and jurisdictions. It expands the objectives, impacts, and options considered in a planning process. This helps insure that individual, short-term decisions are consistent with strategic, long-term goals.

This technical brief seeks to explain how the transportation profession can incorporate sustainable practices into all aspects of transportation policy, planning, implementation, operations, and maintenance. Transportation is essential to sustainability and sustainability is applicable to communities of all sizes. The only difference between large and small communities are specific areas of focus. Planning for a sustainable society — including specifically sustainable transportation — has secondary benefits for the quality of life for all. Supporting cycling and walking promotes healthy, active, and engaged communities through programs including walking school buses and Safe Routes, which is focused on young students and their parents. In the long term, this also will reduce pressures on other functions such as our health care systems. Where the practice of designing Complete Streets seeks to design a safer, inclusive space for all users; the practice of sustainability takes it a step further by considering the broader implications of our transportation choices.

A SUSTAINABLE TRANSPORTATION SYSTEM IS:

- **Equitable** through ensuring affordability and availability to all ages, races, and sexual orientations throughout the entire Greater Philadelphia region.
- **Safe** by striving toward goals outlined under Vision Zero (which aims to achieve a transportation network with no fatalities).
- **Innovative** by incorporating recent technological advancements in all modes of the transportation network, as well as allowing for new modes to emerge.
- **Efficient** through improving operations of existing transportation facilities, as well as increasing capacity allowing more users.
- **Green** by incorporating alternative fuel sources such as electricity into transit, and reducing the direct impacts of automobile emissions on air and water quality.
- **Accessible** by promoting compact development patterns that are conducive to increased transit service, as well as higher levels of active transportation such as cycling and walking.
- **Competitive** through strategic investments that save both time and money.
- **Resilient** by better preparing infrastructure to deal with the impacts of severe weather.
- **Multimodal** through creating an integrated network for all modes of travel.

Figure 1: Sustainable Transportation System Goals for Delaware Valley Regional Planning Commission (DVRPC) Sustainable Transportation Actions – How We Can Apply Sustainability to our Transportation Network to include complex elements in a variety of areas from resiliency to safety. Source: DVRPC.
further by considering long-term impacts and interests. Sustainable economies, equitable societies, and ecological systems are cyclical and which mode(s) and transportation options a person chooses has an impact on the triple bottom line.

What Does Sustainability Mean to the Transportation Profession?

The transportation industry is rapidly changing in our world in response to economic pressures, environmental challenges, societal changes, and evolving technologies. Governments and agencies face fundamental questions that are difficult to resolve and may involve seemingly conflicting objectives. Just as the safety, health, and welfare of the public remains at the forefront in terms of importance, so too should sustainability and resiliency, to reflect current and future public policy concerns. The New Zealand Transport Agency committed to a pilot program in 2012 to implement the Greenroads International Rating System for seven projects. This pilot process provided insight to the agency’s current performance and demonstrated the value of explicitly considering sustainability metrics. As a result, the New Zealand Transport Agency now requires that projects costing more than $15 million be developed considering sustainability rating metrics.

Agencies in low-growth areas are faced with road systems that were built for economic boom times when bigger networks of wider highways were seen as the yellow brick road to prosperity. Now they are tasked with maintaining networks in the face of a shrinking tax base. Growing cities have different challenges. Increasing travel demands often exceed road network capacity, and transit solutions take time to fund and construct. Depending on agency, jurisdiction, or organization, the metrics for sustainable success can be looked at from either a Top-Down or Bottom-Up approach. Top-Down approaches recognize that data is not readily available to measure existing/future year conditions, or their sensitivity to countermeasures, and seeks to define outcomes first followed by supportive objectives\(^1\). This practice can be seen in organizations including the following: the European Commission’s Sustainable Mobility Policy Measures and Assessment program and the Sustainability – National Road Authorities Project. One key concern with the Top-Down approach is whether we are limiting ourselves to existing concepts of measurement and thus stifle creativity or does this keep us grounded to the harsh reality?

Bottom-Up approaches utilize existing data available provided by the increasing link between sustainability and funding, as the need to measure and certify sustainable practices is a high priority. This practice can be seen in organizations such as Leadership in Energy and Environmental Design, Institute of Sustainable Infrastructure Envision, Civil Engineering Environmental Quality Assessment and Award Scheme, and FHWA’s INVEST (Infrastructure Voluntary Evaluation Sustainability Tool). One key concern with the Bottom-Up approach is whether we are focused on checking off boxes for the sake of credibility and funding while compromising an appreciation for local context and thus stifling creativity in an effort to promote standardized triple bottom line business practices.

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\(^1\) Sustainable Transportation: State of the Practice Review, Institute of Transportation Engineers, 2013.
A blend of Top-down and Bottom-up has been published by Transportation Research Board (TRB) and includes metrics reflective of the triple bottom line such as mobility, mode-split, quality, universal design, energy consumption, emissions, affordability, renewable fuels, habitat preservation, and others. In addition, the U.S. National Cooperative Highway Research Program has published the following reports:

- Report 708 – *A Guidebook for Sustainability Performance Measurement for Transportation Agencies*
- Report 750 – *Strategic Issues Facing Transportation, Volume 4: Sustainability as an Organizing Principle for Transportation Agencies*

In addition to the multiple federal and State metrics created, there are also regional, municipal, and organizational metrics which have been created. An encouraging sign is that many agencies are already doing the minimum requirements prescribed across the different Sustainable checklists even without direct reference. However, having multiple sources for sustainable performance measures could result in inconsistent results across the profession depending on your background, agency, etc. It is also worth noting that achieving the bare minimum in a rating system should not be considered high praise, as doing more to improve our communities, this should always be the goal.

It is not just transportation professionals that are looking at creating sustainable transportation. The healthcare community—including health workers and insurance providers—are partnering to create transportation goals and are already involved in creating their own metrics for how sustainable practices can be measured. Providing sustainable transportation options often leads to a healthier community, and many organizations are making the connection between health and sustainability. For example, the World Health Organization has published “The Roadmap to implement the 2030 Agenda for Sustainable Development, building on Health 2020, the European policy for health and well-being,” and the United Nations has published 17 Sustainable Development Goals under the 2030 Agenda for Sustainable Development, shown below, that include sustainable and health transportation. ITE has a focus on transportation and health that focuses on promoting the linkage between transportation options and healthier communities. The Transportation and Health Standing Committee develops resources for transportation professionals to incorporate health considerations into the transportation planning and programming process.

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2 TRB Sustainable Transport Indicators Subcommittee Recommended Metrics, TRB 2010.
How Does Sustainability Affect the Transportation Professional?

ITE’s Canons of Ethics serve as a cornerstone of member responsibility to uphold and advance the honor and dignity of the profession with respect to the public, employers, clients, and other professionals. ITE and its members are committed to sustainability and resiliency, acting as stewards of the natural environment and built world. ITE incorporated the following sections in “Relations with the Public” in 2017:

Sec. 3. The member will strive to improve the public’s quality of life through an economically, socially, and environmentally sound transportation system that supports a sustainable society.

Sec. 4. The member will consider the need for resilience in the design and operations of the transportation system, as a means of enhancing society’s ability to respond and recover from economic, technological, or physical interruption of varying durations.

These recent changes challenge each of our members to promote, advocate, and practice these principles as part of daily activities and encourage clients and other professionals to do the same. As we consider our impact on society, the economy, and overall environmental footprint, this is a charge to our members to serve as an example for others.

ITE’s membership is highly diverse and consists of members who work at consulting agencies who wonder “what’s in it for us?” as concerns about transition begin. Will the push for sustainable projects require a financial benefit to their projects, a burden to their business bottom line, or is this just a marketing tool at this point? It is one thing to have a general understanding of Sustainability as a buzzword but quite another to have a level of commitment in practice to make a difference. Until sustainable practice becomes second nature, it will be necessary for advocates to play an active role in the culture change.

There are many small steps toward sustainability that ITE members can take in their daily lives outside of the professional realm. A commitment to these initiatives as part of daily life can jumpstart the culture change towards a more sustainable world. Examples include considering alternate modes of transportation when available (walk, cycle, transit, etc.), combining trips and sharing rides, and leveraging technology. Transportation—if we like it or not—is a critical part of the triple bottom line essential to our daily life; so, it’s important to consider as we seek to reduce, reuse, and recycle in means and methods of travel.

Figure 4: E-bicycle and e-scooter charging station in Providence, Rhode Island, USA. Source: Holly Stowell, ITE.
What Does Sustainable Transportation Practice Currently Look Like?

Transportation plays a key role in a sustainable society by providing mobility for people and goods, in ways that minimize impacts on the natural environment, and create social and economic benefits. A transportation system that promotes a sustainable society\(^3\) is one that does the following:

- Allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations. A policy aimed at protecting the environment would not be truly sustainable if it were grossly unfair, unhealthy, or led to economic collapse.

- Is affordable, operates efficiently and safely, offers choice of transport mode, and supports a vibrant economy. Economic sustainability requires that funding sources are adequate to build, maintain, and operate vital transportation facilities and systems.

- Limits emissions and waste within the planet’s ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land/water and the production of noise.

This focus on people, planet, and prosperity offers a framework for healthy, prosperous, and connected communities. Sustainability in transportation can take many forms and be showcased in a variety of ways.

Mobility hubs are an examples of adapting to sustainable transportation and serve a critical function in the regional transportation system as origin / destination and transfer points. They are places of connectivity, switch points, and sometimes charging of electric shared modes. Mobility hubs encourage sustainable transportation and complete trips, where various modes of transportation — walking, cycling, riding transit, car-share service and others — come together with mixed-use activities like working, living, shopping, and playing, and where electric modes can be charged.

Another example lies in jurisdictions that have established vehicle miles traveled (often called VMT) reduction targets in an effort to reduce greenhouse gas emissions, reflecting concerns that motor vehicle traffic is economically, socially, and environmentally excessive, and so should be reduced. For example, [Washington State law](https://example.com) established legal targets to reduce per capita vehicle miles traveled from the 2008 baseline, by 18 percent by 2020, 30 percent by 2035, and 50 percent by 2050. The law imposes the

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\(^3\) Centre for Sustainable Transport, 2005.
responsibility for achieving these targets on the Washington State Department of Transportation. One approach State and federal agencies are using is to shift from evaluating urban transportation system performance based on level-of-service, which assumes that it is desirable to maximize motor vehicle traffic volumes and speeds, to VMT, which assumes that it is desirable to reduce total motor vehicle travel. This can be considered a paradigm shift that supports more resource-efficient and diverse, and therefore more sustainable, transportation systems.

What’s Next For the Profession?
Sustainable practices will undoubtedly change over the coming years as more data becomes available and technology advances. With these changes, it is important to reflect and ask ourselves the following:

- Do we focus on narrower aspects of transportation projects or all conceivable aspects of the industry?
- Whose viewpoints should the performance measures reflect? How should it weigh transportation agency providers, consultants, customers, and other advocates for societal change?
- How can we best integrate sustainability and resiliency (such as in adopted climate protection plans)? How do we go further?
- Do we need to accept that there will be extreme weather events that needs to be considered?
- Do we need to be more aggressive with our targets for a sustainable society? How to avoid becoming too rigid and slow to adapt?
- How quickly must processes change to promote successful adaptation?
- How big an industry collaborative effect with this be (e.g., healthcare, energy, etc.)?

ITE recognizes that there is still much to be discovered about sustainable practices/policies and that our responsibilities as a leader in the transportation industry will continue to fill in the gaps in our knowledge. ITE provides the following charges for our continued work:

- Standardize Definitions for Sustainability
- Effectiveness of Sustainable Strategies
- Address Barriers to Sustainable Strategies
- Establish Practical and Effective Planning Processes
- Identify Best Practices