

SUSTAINING TRANSPORTATION

The challenge of making transportation infrastructure eco-friendly as well as economical, is difficult but not impossible

New-age infrastructure is all about sustaining productivity and supporting a good quality of life. In this context, transportation infrastructure plays a vital role in augmenting the civic lifestyle in a city and, if done properly, can help to preserve non-renewable resources and produce results that are consistent with health.

What is Sustainable Transportation?

The widely accepted definition of sustainable transportation was put forth by ministers of transport from 15 European Union countries. It states that the sustainable transportation is affordable, operates efficiently, offers a choice of mode of transport and supports a competitive economy as well as balanced regional development. In doing so, it also limits emissions and waste, uses nonrenewable resources at or below the rates of development of renewable substitutes while minimising the impact on the use of land and the generation of noise.

The vision for a sustainable society is slowly being realised through the adoption of best

practices in sustainable design, the application of green technologies and participation in collaborative approaches to transportation system planning and development. Although progress is being made, there is much more to be done.

At the regional level, transportation systems are being optimised to support the economy through efficient operations in business districts, travel demand management in congested areas and expansion in economic development corridors. Instead of building new facilities to meet increasing demand, policymakers are looking to use the existing capacity more effectively. For example, rather than resizing roads to accommodate more trucks, there may be incentives given for shipping by rail or water.

"We're finding that we don't have infinite resources, which includes fuel and there is an increased awareness of the fragility of our ecosystems," explains Prof Sarah Slaughter, senior lecturer at the MIT Sloan School of Management and coordinator of the Sloan Sustainability Initiative. Reflecting on lessons learned from Hurricane Katrina, Prof

Slaughter says, “We need to think about not just normal operating conditions, but also conditions in extreme events—storms, hurricanes, blizzards and look at the role of critical transportation services. You have to think about how you evacuate all the people from the affected area in a safe way.”

As vice chair of NRC’s workshop committee, Prof. Slaughter has helped to identify issues surrounding how to design and build sustainable infrastructures that meet today’s economic, social, and environmental needs while enhancing the ability of future generations to meet their economic, social, and environmental needs.

At the project level, planners are now thinking about the intersection between infrastructure and the environment in a more holistic way. Context-sensitive design, multimodal solutions, and equitable land use policies are becoming popular. For example, a green highway can pass through a natural habitat and cause minimal contamination by deploying swales to catch runoff that is treated locally. In an urban area, using more permeable surfaces for sidewalks and pavement can decrease runoff and increase groundwater recharge.

The Green Highways Partnership (GHP), a voluntary, public/private initiative seeks to make sustainability the driving force behind

Dealing with Traffic Congestion

The most powerful country in the world, the United States, faces two-thirds of the traffic congestion during peak hours, resulting in 2.9 billion gallons of wasted fuel and 4.2 billion hours of lost time. The Federal Highway Administration estimates that 5 per cent of this congestion is due to poorly timed traffic signals. Improved signal timing alone could save up to 145 million gallons of fuel each year.

Applying the principle of congestion pricing, the City of London charges vehicles £8 to enter the central city between 7 am and 6 pm, Monday-Friday. The charge has reduced congestion by 40 per cent and round-trip times by 13 per cent. Other cities have followed this example with comparable results.

infrastructure development. GHP promotes the use of green technology, which encompasses an expanding group of methods and materials for achieving sustainability goals. These include best practices such as integrated planning and lifecycle analysis; tools such as building information modeling and smart technology; and materials such as porous pavement and recycled hot mix asphalt. There are now technologies available to monitor infrastructure condition and performance, new



materials for construction and repair, and systems that are self-diagnosing and self-repairing—all leading to fewer service disruptions, lower lifecycle costs, and greater resiliency. Intelligent highway systems also help, for example, aid in demand management initiatives that charge a premium to access facilities during peak hours.

Transportation Projects That Promote Sustainability

Greg Bentley, CEO, Bentley, reflected on the vital role that infrastructure plays in sustaining society and the environment. He says, “Every infrastructure asset has an intended design capacity and design lifetime, and we’ve too often exceeded both. As we reinvest to replace obsolete physical infrastructure, we have the opportunity to create more intelligent infrastructure assets.”

The Bentley user community applies the firm’s software solutions to infrastructure projects that support sustainable economic growth and environmental stewardship around the world. Below are just some of the innovative projects undertaken by construction companies with the help of Bentley software:

India Bridge Between Districts: A new bridge over the River Rupnarayan will connect the West Midnapore and Hooghly districts in India, impacting the lives of 15 million people. (Development Consultants)

Nepal Paved Roads: Upgrading 17 unpaved roads in a 27,500 square-km area of the Terai region will improve mobility, decrease the cost of commerce, reduce energy consumption, and

Did you know?

China invests up to 12 per cent of its gross domestic product (GDP) on infrastructure, Japan invests 10 per cent, and India and the European Union each spend 5 per cent, whereas the United States spends 2.6 per cent .

The transportation sector generates 10 per cent of GDP worldwide but causes a disproportionate amount of environmental damage.

Transportation is responsible for 22 per cent of global energy consumption, 25 per cent of fossil fuel burning, and 30 per cent of air pollution and greenhouse gas emission. (American Association of State Highway and Transportation Officials- AAAHTO)



raise the standard of living for 1.7 million inhabitants. (RITES)

China Cable-Stayed Bridge: The one km-long Stonecutters Bridge will provide service to and from Hong Kong’s International Airport, alleviate congestion on arterial roads, and enhance transportation to container terminals. (Arup)

California Transportation Corridor: SR75/282 will improve safety and relieve congestion between the San Diego Coronado Bridge and Naval Air Station North Island, part of the largest aerospace-industrial complex in the US Navy. (Parsons Brinckerhoff)

Florida Bridge Restoration: Rehabilitating the Bridge of Lions in St. Augustine, Florida, will preserve a 1927 landmark listed in the National Register of Historic Places and conserve resources that would have been consumed by a replacement structure. (Reynolds, Smith and Hills)

European High-Speed Rail: A 621 km link of



the Trans-European Transport Network between Spain and France will cut Madrid-Barcelona travel time by 50 per cent and reduce reliance on air and automobile travel in the European Union. (Sacyr)

Algeria High-Speed Rail: The 640 km line located on a 1,000 metre high plateau in the Atlas Mountains of North Africa will be critical to economic development in the lightly populated region. (Bernard Ingenieure)

South Africa Airport Terminal: Integrating the existing international and domestic terminals at OR Tambo International Airport in Gauteng, South Africa, will accommodate a 26 per cent increase in passenger throughput. (Bentel Associates International)

Washington Multimodal Bridges: Context-sensitive design for the Aurora Multimodal and Interurban Bridges project will improve safety for vehicles and pedestrians traveling a three mile corridor in Shoreline, Wash. (CH2M HILL)

Sustainable Transportation Indicators

The Center for Environmental Excellence by AASHTO advises transportation professionals to use indicators that reflect their goals for sustainable transportation. An effective performance measure passes the Four-R test: relevant, robust, repeatable, and responsive. These indicators quantify:

- ▶ Economic outcomes: Ease of access, operation costs, productivity, efficiency, cost-benefit, transport diversity, smart growth.
- ▶ Social outcomes: Accessibility, affordability, safety, security, health and

fitness, community livability, equity, working conditions.

- ▶ Environmental outcomes: Resource conservation, ecological intrusion, emissions to air, soil, and water, habitat protection, land use impact.

Using indicators such as average commuter travel time, per-capita crash fatalities, and per-capita climate change emissions, transportation officials are more effectively measuring and improving the performance of transportation infrastructure throughout the lifecycle.

Paving the Path to Sustainability

Organisations that wish to grow profitably in the future must focus their efforts towards saving environment, along with benefiting shareholders and society. Population and economic growth are putting pressure on critical infrastructure worldwide. It is imperative to change the way these systems are planned, built, operated, and maintained so they meet the needs of current and future generations. A focus on sustainability provides the best means to implement this strategy simultaneously, enabling organisations to innovate, differentiate themselves and succeed. ➡

Courtesy: Bentley

Source: 1. The Centre for Sustainable Transportation
2. The Centre for Sustainable Transportation and International Journal of Global Environmental Issues