

# Transportation Sustainability

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## ABSTRACT

The transportation industry has a great potential for sustainability and participation in the green building field. There is a direct participation for the stations construction and indirect participation at the rail tracks and maintenance away buildings/shops/yards. The real estate (site selection), carbon foot print for the building, green surroundings, energy savings by using efficient lighting fixtures, ventilation equipment with variable frequency drives, renewable energy source for electrical power to the trains tracks – third rail/ catenaries, efficient rolling stocks (rail vehicles), effective drainage systems, low potable water use, native plants requiring low water consumption for landscaping, utility rebate, recyclable materials use, secured bicycle storage at the station and space on the rail cars, local material supply to the site, use of sensors and controls for saving energy, monitoring and maintaining good air quality etc, are some of the areas of contribution towards the sustainability. In this paper the author will cover the following:

1. Sustainability in real estate, green surroundings and decrease in carbon foot print.
2. Extra right of way along the tracks devoted to the act as a buffer to the neighborhood.
3. Effective storm water management near the track alignment.
4. Construction material reuse, local and regional material use for new construction.
5. Energy efficient HVAC systems, stations envelope, and maintenance shop design.

6. Sensors use, low wattage and high intensity lighting fixtures, air quality improvement and day lighting.
7. Rolling stock effectiveness – new modern efficient design.
8. Bicycle storage at the stations and space on the rail cars.
9. Renewable energy use – wind and solar power to operate the rail trains through third rail/ catenaries.
10. Utility rebate to the transit agency from revenue collection for efficient equipment and systems.

The author strongly feels that U.S. Green Building council (USGBC) in collaboration with the Federal Transit Administrator (FTA) should focus on the transportation industry and develop useful high performance LEED credit standards. An incentive grant should be provided for the enforcement of high performance Green building standards. This will make significant improvement in the environment, and save energy.

## GENERAL:

The rail industry is a major contributor to sustainability, especially in the area of reducing carbon footprint of passengers traveling. At the same time, it is still important for rail industry to be sustainability vigilant for their facilities, as a gesture of good stewardship to the community, they serve. The transportation industry includes underground and above ground rail stations and tracks, bus routes, bus/ rail shelters, control centers, yard/shop facility, maintenance of way, storage tracks, parking

structures and parking lots, administrative buildings, etc.

**SUSTAINABILITY IN REAL ESTATE, GREEN SURROUNDINGS AND DECREASE IN CARBON FOOTPRINT:**

The rail and bus transportation systems require a large real estate and right of way. The real estate is required for the infrastructure, stations, tracks, right of way, surroundings, buffer zone around the tracks (minimum of 25 feet on each side of the track) for the public safety, signals, vehicles storage yards, maintenance shops buildings, shelters, control tower, administrative support buildings etc. Storage of vehicles (rolling stocks, buses and support vehicle) also requires a huge real estate.

The track alignment and stations location is chosen, keeping in mind the availability of basic services for human needs, away from the 100 years flood zone, away from seismic zone, impacts on the neighbors such as noise & vibration, availability of cleaner environment to the neighbors, public safety, etc.

**INFRASTRUCTURE DEVELOPMENT/ NEW CONSTRUCTION:**

During the development of the system and construction of the infrastructure proper planning, design and implementation is important, keeping sustainability in mind. For the planning selection of site and alignment, longevity of the system, impact on the neighbors, boosting the local economy by use of regional materials should be considered. Joint development by merging several basic services in the transportation infrastructure is another option which should be considered.

Many cities planning require use of the train stops as a part of city green. Cities should incorporate green features such as solar panel, educational elements, native trees, draught tolerant landscaping, bio swale to reduce the storm drainage, rain water collection tanks, water reclaim system, pervious paving material, drip irrigation, use of Forrest stewardship council (FSD) material, salvage and reuse of material, provision for bicycle racks, etc. Many rail companies convert abandoned rail and right of way into landscaping area, to become part of the

storm water management to alleviate the water runoff.

For the design, the features such as energy efficient heating, ventilation & air conditioning (HVAC) systems, MERV 13 air filters for operating facility, time clock, lighting controls, automatic light sensors, energy efficient, low wattage, high intensity lighting fixture like LED, T8, T5 lamps, photovoltaic system on substations and station roof, power outlets for emergency vehicles and hybrid energy efficient vehicles charging, low flush, less water consumption type plumbing fixtures, secured location for bicycle racks, can be included to achieve sustainability. The storm drainage at the track area should be designed with the flow away from the tracks. The area surrounding the track should be properly landscaped.

Some of the sustainable standards can be incorporated in the design and merged esthetically as part of permanent feature of the infrastructure. Using the sustainable material and incorporating various sustainability factors are helpful to the environment. Actual carbon footprint has to be minimized.

These elements will make the stations dressed with welcome features, to the riders. This transit station becomes a tourist attraction, thus increasing ridership.

**OPERATION AND MAINTENANCE:**

The equipment used and the system should be inspected and maintained at a pre-determined schedule and as per the manufacturer's recommendations, to extend the life of the system. In order to support and maintain the system, low volatile Organic compounds (VOC) chemicals must be used for cleaning and servicing. They must comply with the low emitting materials standards. The chemicals used for the car wash, chassis wash should also be in compliance with low emitting materials standards. The paints should be Green Seal approved. The filters should be changed at the prescribed interval, humidity and temperature control should be provided for the thermal comfort of the occupants.

The fuel used for the train control operation should be an efficient and clean fuel.

This could be produced by installing solar system, wind energy system, and such. The use of the renewable energy is another choice which should be considered. The energy used in running the trains on third rail or catenaries or quite large and should be served with a clean fuel. The drainage system along and around rail track should be constantly maintained to avoid flooding. Providing monitoring devices for the energy use help tracking high use areas. Necessary correction actions can be taken.

**INCENTIVES:**

The currently available incentives are from the utility companies. They are for the use of energy efficient HVAC equipment, rolling stock (vehicles), lighting fixtures, sensing devices, water conservation methods etc, which conserves energy and save potable water. There are many other sustainable items, effective utilization of which can save capital and operating costs.

**CONCLUSION AND RECOMMENDATION**

There are many elements of sustainability which can be incorporated in the planning, design and operation of the transportation systems. There is a need for the development of high performance standards for the transportation industry. FTA and other transportation funding agencies should fund the development of these standards. They should provide additional grants for the implementation of those high performance standards. This will help in promoting cleaner environment and providing better quality of life, thus savings capital and operating costs by sustainable system use.