

Envisioning the Future of Rail in North Carolina: Electrification



The electrification of North Carolina's railroads presents an unprecedented opportunity to modernize transportation, integrate renewable energy, and enhance economic mobility across the state. Transitioning from fossil fuel-powered rail to electric locomotives powered by renewable energy aligns with the state's goals of reducing greenhouse gas emissions and preparing for high-speed rail connectivity.

Vision for Electrification

The Mid-Atlantic High-Speed Corridor, connecting North Carolina with Virginia, South Carolina, Georgia, and the Northeast Corridor at Washington, D.C., could serve as a model of sustainable, multi-modal transportation. By placing electric transmission lines above railway rights-of-way and incorporating renewable energy sources like solar, wind, hydro, and biogas, this initiative establishes a self-sufficient, green energy-powered network capable of supporting passenger and freight traffic.

Light Rail and Commuter Trains

In addition to high-speed rail, **light rail and commuter trains** could be built alongside the main rail lines, leveraging existing infrastructure for both power and transportation. Expanding the network with light rail spurs into neighborhoods opens new opportunities for working- and middle-class commuters to leave their cars at home. These spurs provide affordable, efficient

transit options, reduce traffic congestion, and improve air quality. By connecting neighborhoods to employment centers, schools, and essential services, this system expands access to job opportunities and strengthens regional economic ties.

Connecting to Electric Transit and Community Infrastructure

Strategic **nodes at rail intersections** can serve as hubs that link other electric transportation modes, such as buses, trams, electric bike-share programs, and autonomous electric shuttles. These hubs facilitate seamless transitions for passengers traveling across various types of transit, reducing reliance on personal vehicles and increasing the efficiency of local and regional mobility.

The electrification of rail corridors also supports the transformation of **community service vehicles** such as garbage trucks, emergency response vehicles, police cars, and public transit buses to electric models. The widespread presence of electric infrastructure along rail lines makes charging these vehicles accessible and affordable. Municipalities can transition to zero-emission fleets more easily, reducing operational costs and improving air quality.

Benefits to North Carolina

1. Economic Growth and Connectivity:

- High-speed rail, light rail, and electric transit create an interconnected transportation system linking urban hubs, smaller towns, and suburban areas.
- Commuter rail spurs and electric transit nodes attract businesses by improving workforce mobility and reducing transportation costs.

2. Increased Mobility and Equity:

- Affordable light rail and electric transit options benefit residents by reducing commuting costs and travel time.
- Integrated electric transit systems improve accessibility for underserved populations, fostering greater inclusion and opportunity.

3. Environmental Benefits:

- Electrified railways and transit nodes significantly reduce greenhouse gas emissions, while supporting electric vehicle adoption for personal and public use.
- Renewable energy integration along rail corridors enhances the state's clean energy portfolio and overall sustainability.

4. Community Revitalization:

- Restoring abandoned rail corridors for commuter and electric transit can rejuvenate underserved communities and reduce urban sprawl.

- Transit hubs and electric fleet upgrades encourage mixed-use developments, fostering vibrant, sustainable neighborhoods.

5. Infrastructure and Energy Innovation:

- Sharing electric infrastructure among rail, transit, and municipal fleets optimizes costs and minimizes land use.
- Renewable energy installations along railways support not only trains but also public electric vehicle charging, boosting grid resilience and local energy independence.

Strategic Considerations

1. Regional and Local Planning:

- Collaborating with local governments to design transit-oriented developments near nodes ensures communities benefit from new infrastructure.
- Integrating municipal fleet electrification into long-term transportation plans enhances efficiency and sustainability.

2. Investment in Multi-Modal and Electric Transit:

- Leveraging federal funding and public-private partnerships can support the development of interconnected electric transit systems and municipal fleet conversions.
- Equitable planning ensures all communities, including rural and underserved areas, gain access to electric transit options.

3. Scalability and Flexibility:

- Nodes must be designed with future growth in mind, allowing for easy expansion of electric transit systems and integration with emerging technologies like autonomous vehicles.

Looking Ahead

The Mid-Atlantic High-Speed Corridor, with complementary light rail, commuter trains, and electric transit nodes, offers a transformative vision for North Carolina. By integrating renewable energy and electric vehicle infrastructure, the state can reduce emissions, improve mobility, and create a foundation for long-term economic growth. This holistic approach addresses population growth, enhances quality of life, and demonstrates how infrastructure investments can empower communities to embrace a sustainable and connected future.

