

# Chapter 2

## Planning Context and Considerations

Successful planning cannot occur in a vacuum. Planning must take into consideration past accomplishments, current conditions and anticipated trends. For the Virginia Statewide Rail Plan, several demographic and societal trends impacting its rail system are noteworthy:



*Richmond's newly renovated Main Street Station brings together the best of today's rail travel for passengers in and around Virginia.*

- By 2030, the population of the United States is expected to grow by 5 percent. In that same period, Virginia's population is expected to increase 30 percent, from the current 7.5 million to 9.8 million.
- Much of that growth will take place in Virginia's major metropolitan areas, which are growing faster than the rest of the state. Two of every three Virginians now live in Northern Virginia, Richmond or the Hampton Roads metropolitan areas.
- Virginia's transportation system, responsible for moving people and goods into, out of, within and through the state via roadways, air, water and rail, is over-crowded. Its major transportation corridors – already experiencing congestion-related travel delays – will see even more demand. This could jeopardize the Commonwealth's ability to maintain a business environment that has earned it the title of best state in the country for business.
- The Port of Virginia's growth in containerized cargo is expected to increase by 350 percent between 2005 and 2035. By 2011 it will be at full capacity of existing terminal infrastructure.
- Cargo in the nation is expected to double from 15 billion tons in 2005 to approximately 30 billion tons in 2035. Although this prediction shows the vast majority of freight being handled by trucks, highway congestion and the increasing cost of fuel make an increase in the percentage of cargo carried by rail a necessity. Virginia's statewide long-range multimodal plan (VTrans2025) has recommended moving more cargo by alternatives other than trucks.
- There is global competition for finite resources of oil and coal, causing the price of a barrel of oil to nearly double in the last year alone. The pressure is on to find ways to become more energy efficient and reduce greenhouse gases.

- ⚡ Railroads are typically three or more times more fuel efficient than trucks. Every ton-mile of freight that moves by rail instead of truck reduces greenhouse emission by 67 percent or more.
- ⚡ After a period of relatively low coal exports, increased global demand for coal has caused a rapid growth in coal exports. In the first quarter of 2008, for example, there was a 62 percent increase over the same period in 2007. Coal is the largest freight commodity in Virginia, comprising 59 percent of tonnage. All coal from the Appalachian coalfields to the Ports of Hampton Roads is carried by trains (none by long haul trucks).
- ⚡ Various DRPT and Commonwealth transportation corridor studies have identified the need for improved and increased passenger rail services in Virginia (both by VRE and by Amtrak) to meet the increased demands that population growth will put on the transportation infrastructure of Virginia's metropolitan areas.
- ⚡ Capacity is a significant concern for both passenger and freight rail. The U.S. Department of Transportation is predicting that freight railroad demand will increase by 88 percent between 2002 and 2035. VRE ridership is expected to double in the next 20 years.

These trends have been factored into the development of the Statewide Rail Plan. They are described in more detail in this chapter.

## Past Accomplishments

In the past six years, Virginia has worked to incorporate rail planning and improvements into an integrated multimodal transportation corridor network. Significant legislative accomplishments include the creation of the Rail Enhancement Fund (REF) and Rail Advisory Board in 2005 and the addition of general funds added to the REF program to address critical needs in Virginia's I-95 and I-81 transportation corridors.

Virginia has been one of the leading states in implementing rail improvements to support rail access for businesses and assuring shortline railroad viability. Investments to alleviate congestion, increase on-dock rail movements from the Ports of Hampton Roads and to advance higher-speed rail in the Commonwealth top the list of rail priorities. To make headway in these crucial areas, the Commonwealth has:



*Freight rail helps connect domestic and international goods shipped to and from the Port of Virginia to markets nationwide.*

- ⚡ Developed the first dedicated source of funding for passenger and freight rail improvements in Virginia's history. Initiated in 2005, the REF supports improvements for passenger and freight rail transportation that deliver public benefit through public private partnerships, such as:
  - Improving the movement of freight from the Ports of Hampton Roads through a public private effort involving Norfolk Southern and several states to construct a double-stack container train corridor between the Ports of Hampton Roads and Columbus, OH. In Virginia, the project includes raising tunnels to accommodate the taller trains and constructing new intermodal terminal facilities in the Roanoke region.
  - Improving the movement of double-stack freight to/from the Ports of Hampton Roads through public private partnership efforts with CSX to remove vertical obstructions on the CSX National Gateway system which extends from Atlanta, GA to the Northeast.
  - Doubling the on-dock rail yard to transfer containers to/from rail at the new Maersk APM Terminal marine facility at the Ports of Hampton Roads, a project utilizing shared public private funding.
  - Relocating approximately 4.5 miles of existing rail lines owned by the Commonwealth Railway shortline from urban neighborhoods in Portsmouth and Chesapeake to the rail-ready highway medians of Route 164 and I-664, a project due to be completed by late

2009. This corridor will be used to serve both the planned Craney Island Marine Terminal and the recently completed Maersk APM Terminal.

- Strengthened the shortline railroad industry in Virginia through the Rail Preservation Fund. Major projects recently completed include improvements on portions of the Buckingham Branch railroad that handles Amtrak intercity passengers trains and improvements on the Commonwealth Railway to provide Norfolk Southern and CSX access to major intermodal facilities at the new Maersk APM Terminal and the future Craney Island Marine Terminal.
- Supported Commonwealth economic development through the Rail Industrial Access Fund since 1986, providing rail access to businesses in Virginia that generated 25,000 new jobs and approximately 181,000 railcars — the equivalent of taking 634,000 trucks per year off of the highway system.
- Provided essential rail congestion relief including building the new railroad bridge over Quantico Creek on I-95 to remove the last single-track section of the Washington, D.C. to Richmond corridor.

### Population and Growth Trends

Transportation, including passenger rail and freight, is driven by a number of key factors. The primary factors are population density and growth trends for the future. The U.S. population, currently approximately 300 million, is expected to grow by

21 percent to 378 million by 2035. For Virginia, the projections are even greater. According to the Virginia Employment Commission, between 2007 and 2030, Virginia’s current population of 7.5 million will increase to approximately 9.8 million – a 30 percent increase (*Figure 2-1*). The Commonwealth’s population growth rates far exceeds the 5 percent rate of the U.S. as a whole.

Most of the growth is due to people relocating to the Commonwealth. They are drawn to Virginia’s economic opportunities in its urban areas. As a result, Virginia’s major metropolitan areas are growing faster than the rest of the state. Two of every three Virginians now live in Northern Virginia, Richmond or the Hampton Roads metropolitan areas. And one of every three lives in the Northern Virginia area. For the rest of the state, 70 percent of

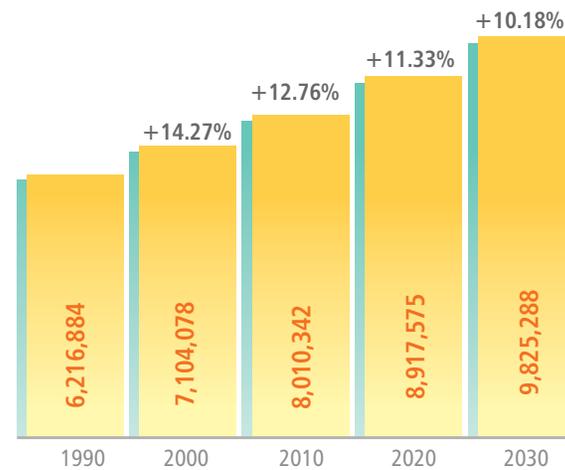
all localities have gained population while only 20 percent have lost population.

### Economic Development and Port-Rail Modal Interface

Almost 11,000 high-tech companies and 30 Fortune 1,000 firms are located in the state, contributing to Virginia’s economy. Rail transportation improvements provide direct economic benefits by reducing the costs of transportation; expanding the accessibility of businesses to suppliers, labor and consumer markets; and attracting new entrepreneurial opportunities to a community or region. An efficient transportation network with rail access to major shipping and travel destinations in Virginia and nationwide is a powerful combination for potential economic development. The Virginia Port Authority estimates that over 60 million square feet of additional distribution center space will be needed over the next 25 years to keep pace with containerized exports and imports in Virginia. The Commonwealth’s rail and highway transportation system allows companies to locate these distribution centers throughout the state – often in rural areas where land costs are less expensive and an available workforce is nearby.

Business climate is influenced by a number of factors, including the cost of labor, transportation and energy; tax and regulatory burdens placed on businesses; and quality of life. Centrally located on the U.S. East Coast, Virginia’s integrated transportation system of highways, railroads, airports and seaports ensures that businesses can reach all global markets and get shipments from

*Figure 2-1*  
**POPULATION CHANGE PROJECTIONS FOR VIRGINIA**



Source: Virginia Employment Commission

suppliers more efficiently. Highlights of Virginia's transportation system include:

- ❑ Twelve freight railroads and two passenger railroads operate on more than 3,400 miles of railway in Virginia, of which more than 3,200 miles are Class I railroads (the largest railroads in the U.S.). Two of the nation's largest railroads operate in Virginia: CSX Corporation and Norfolk Southern Corporation, which is headquartered in Norfolk.
- ❑ Fourteen commercial airports serve Virginia, including two of the nation's busiest: Washington Dulles International and Ronald Reagan Washington National.
- ❑ The Port of Virginia offers world-class shipping facilities and a schedule of approximately 3,000 sailings annually to over 250 ports in 100 foreign countries. The Port, offering one of the largest intermodal networks on the East Coast, handled 2.12 million 20-foot equivalent units (TEUs) in 2007 and moved more than 28 percent of its total business by rail. The new Maersk APM Terminal, the first private terminal in the U.S., at Portsmouth opened in 2007 and will be a major container terminal on the East Coast.
- ❑ The Virginia Inland Port in Front Royal serves as a regional intermodal facility and acts as a collection point for containers from West Virginia, Ohio, Pennsylvania, Northern Virginia and elsewhere (*Figure 2-2*).

**Figure 2-2**  
**ECONOMIC DEVELOPMENT NEAR THE VIRGINIA INLAND PORT**



Source: Virginia Port Authority

- ❑ The Port of Richmond is a multimodal freight and distribution center located on the James River, adjacent to I-95, offering service to northern Europe, the United Kingdom, Iceland, the Mediterranean, Canada, South America, Mexico and the Caribbean.

- ❑ Virginia’s highway system features more than 70,000 miles of interstate, primary and secondary roads, including eight major interstate routes: I-95, I-85, I-81, I-77, I-66, I-64, I-495 and I-395.

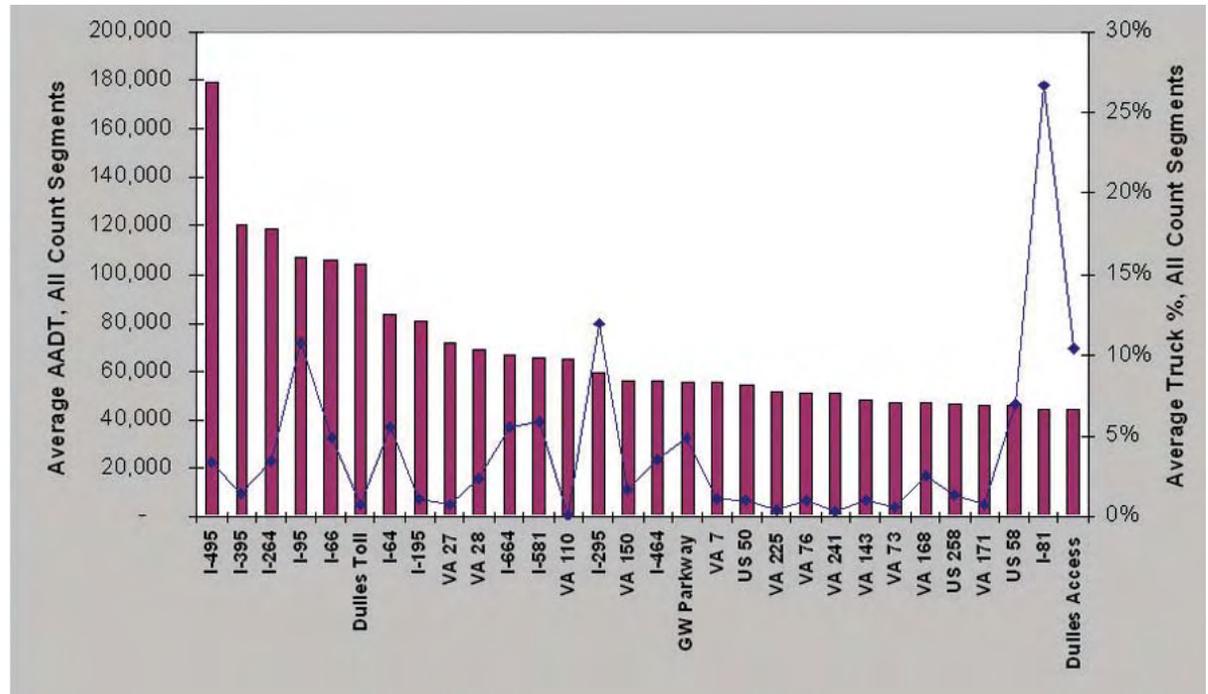
Virginia offers six foreign trade zones designed to encourage businesses to participate in international trade by effectively eliminating or reducing customs duties. Numerous subzones are also provided and additional ones can be designated to enhance the trade capabilities of specific companies.

Virginia’s economic future depends on its ability to attract jobs, people and businesses. The state must compete to draw top companies, grow the job market and offer an exceptional quality of life that makes people want to call Virginia home. That is why the Commonwealth has identified strategies across all transportation modes to ensure people and goods can move freely throughout the state and continue to feed the economy.

### Transportation System Considerations

Virginia’s freight and passenger rail networks are part of a statewide transportation system that moves people and goods into, out of, within and through the state via highways, water, air and rail. Planning for rail cannot be divorced from consideration of these other modes.

**Figure 2-3**  
**AVERAGE TOTAL AADT AND TRUCK PERCENTAGES ALL COUNT SEGMENTS —**  
**TOP 30 ROUTES (2005)**



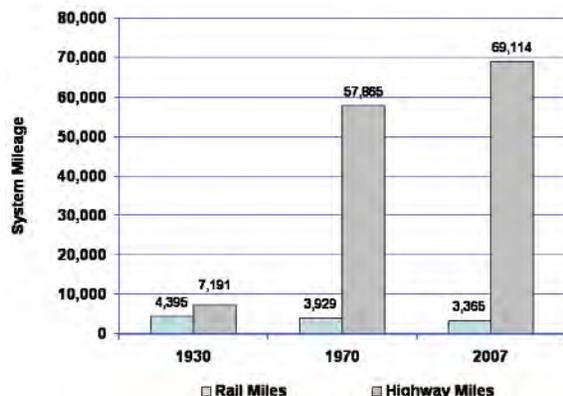
**Highways.** Virginia’s major highway transportation corridors are heavily used by passengers and freight, both for local and long distance travel. *Figure 2-3* shows the average annual daily trips and percentage of truck traffic on Virginia’s major routes. The single occupant vehicle is the predominant mode of choice for daily commuting (76 percent), followed by carpool (13 percent), public transportation (four percent, including bus and rail) and other (seven percent). This leaves the Northern Virginia, Richmond and Hampton Roads regions struggling with traffic congestion that creates headaches for

commuters and negatively impacts the delivery of goods and services. The vast majority of freight (74.2 percent) is moved by truck, followed by rail (19.9 percent), with air and water cargo making up the rest.

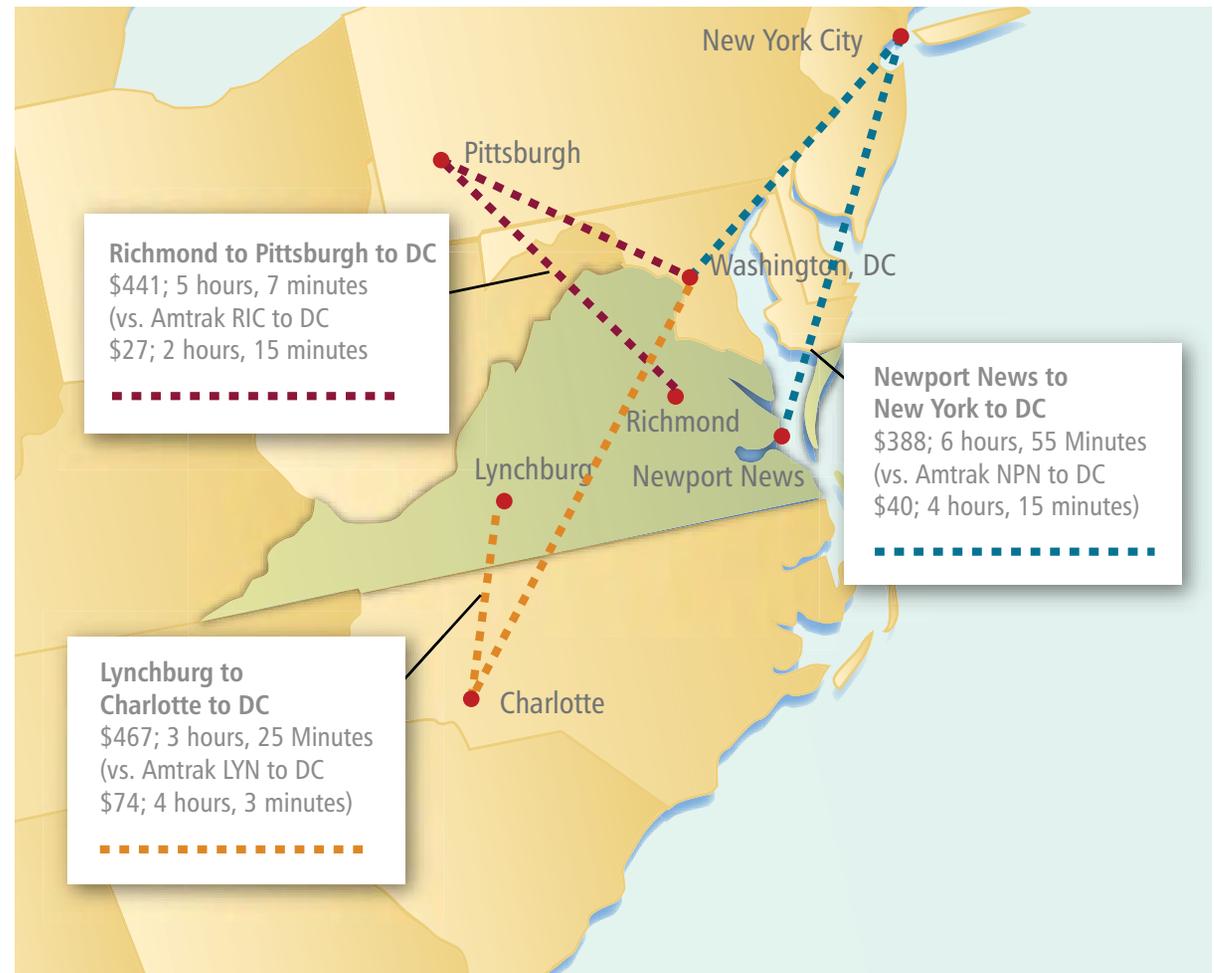
- ❑ I-95, the major north-south interstate serving the east coast, slices through Virginia from Washington, D.C. to the North Carolina border. Today the highway is significantly congested in the segment between Washington, DC and the Richmond area.

- ❑ The I-81 corridor, in the western half of the state, runs through the mountains from West Virginia, south to Tennessee. Regularly listed as one of the eight top trucking routes in the U.S., I-81 carries tourists, through travelers, a growing number of commuters and more than a third of all college and university students in Virginia. The entire corridor will be experiencing significant increases in congestion over the next 20 years.
- ❑ I-64 traverses the state from east to west, linking Hampton Roads to the western part of the state and on to West Virginia. It is significantly congested today in the segment between Richmond and Hampton Roads.
- ❑ Route 460 parallels I-64 and serves more of the local communities. However, to avoid the congestion on I-64, more vehicles are using Route 460, especially to access areas of the state south of Richmond.

**Figure 2-4**  
**VIRGINIA HIGHWAY AND RAIL MILES**



**Figure 2-5**  
**SAMPLE TIME AND COSTS FOR AIRLINE TRIPS TO WASHINGTON, DC AND RICHMOND FROM SELECTED VIRGINIA CITIES (JUNE 2008)**



- ❑ The I-66 corridor runs from Northern Virginia west to I-81, allowing access to suburban and rural areas west of Washington, DC. Most of this corridor is significantly congested.

*Figure 2-4* shows the significant increase in highway miles in Virginia over 77 years while rail miles have actually decreased in that same period.

**Aviation.** The aviation industry as it relates to passenger travel in the United States is struggling and there is no doubt that fundamental changes are underway that will impact future travel in all modes. In addition to the negative impact that the events of September 11, 2001 had on the airlines, competition and significantly rising fuel costs are forcing them to look for new revenue sources (adding baggage handling charges, for example) in order to keep up with costs. Historically, fuel represented approximately 25 percent of the airline industry costs; today it represents 30-50 percent. Since 2007, the cost of a gallon of airline fuel has increased by approximately 73 percent. In the last two years, 10 airlines have filed for bankruptcy and seven have gone out of business.

Given these issues, it is clear that there will be reduced frequencies of service, increased travel times and increased fares; in some instances air service in certain markets will be eliminated. Enhanced passenger rail service for short- to medium-distance trips of 100 to 500 miles may prove advantageous to air travel moving forward. Amtrak's intercity services — particularly in large markets for trips between major destinations such as Los Angeles to San Diego, Washington, DC to Philadelphia and New York to Philadelphia — already enjoy an air-rail market share greater than 90 percent. Selected corridors within the Commonwealth may prove to be viable markets for air-to-rail diversions, assuming investments are made to improve travel time and reliability. *Figure 2-5* shows some of the aviation routes along with their travel time and cost versus the same trip via Amtrak passenger rail service.

Other than some selected cities, there are few direct flights, so airline travelers must first fly to a hub airport in another state and then return to Virginia by connecting flight.

**Ports.** The Port of Virginia is the second largest port on the East Coast. The Port has three general cargo marine terminals: Norfolk International Terminal, Portsmouth Marine Terminal and Newport News Marine Terminal. In 2007, the Port handled 2.1 million (five percent) of the nation's 45 million 20-foot equivalent units (TEUs), the standard measure of container terminal capacity.

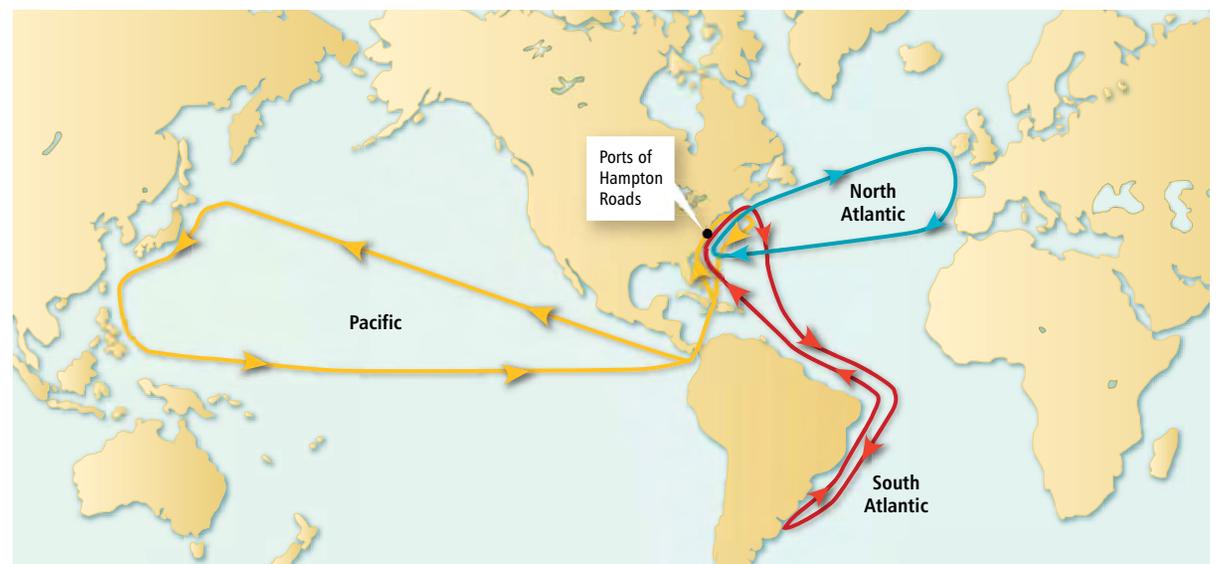
Since its introduction in 1956, loading cargo into standardized boxes — known as containerized cargo

— has revolutionized global shipping and economic development by reducing the cost of transportation between countries of the world. The evolution of transporting containerized cargo into larger and larger specialty containerships has brought economies of scale and the ability of “just-in-time” shipment of goods to companies in the U.S. and around the world.

The new generation of container ships can carry 8,000 to 10,000 TEUs per vessel but are so large that they can only be accommodated by port facilities with deepwater (50-55 foot deep channels) and large specialized container cranes to rapidly load and unload the vessel. Virginia is fortunate with its easy access to the Atlantic sea lanes, deepwater

*Figure 2-6*

**GLOBAL SHIPPING ROUTES WITH THE PORTS OF HAMPTON ROADS**



Source: Virginia Port Authority

channels and world class terminals at Norfolk International Terminals operated by the Virginia Port Authority and the recently opened private Maersk APM Terminal in Hampton Roads. Global trade routes for the Ports of Hampton are shown in *Figure 2-6*.

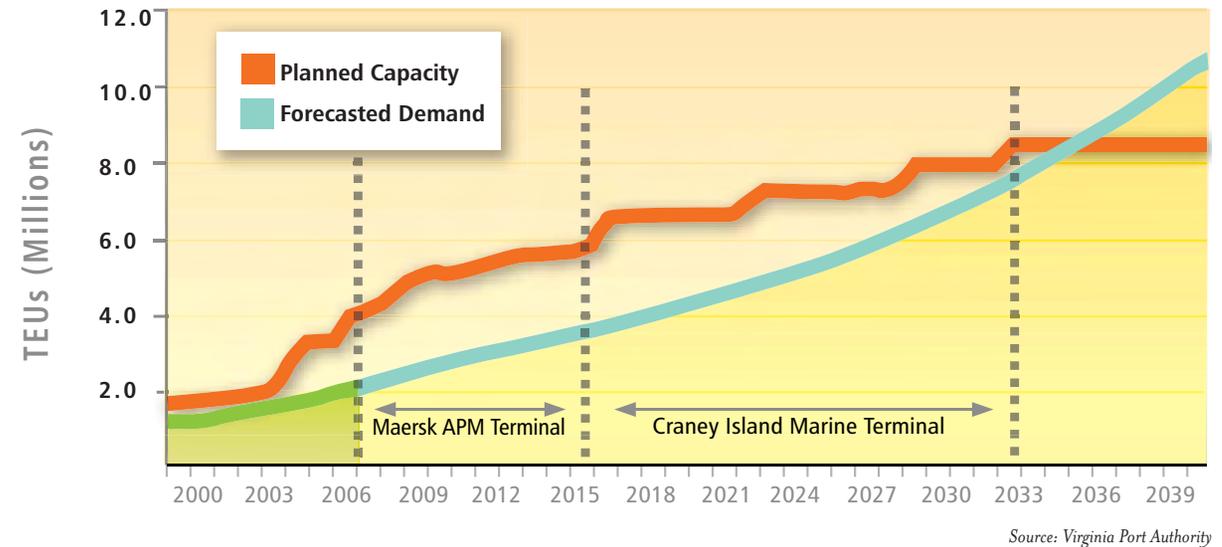
According to the Virginia Port Authority, TEU growth in containerized cargo is expected to increase by 350 percent between 2005 and 2035 (*Figure 2-7*). During the last 10 years (1998-2007), the total volume of container traffic through the Port of Virginia marine terminals has increased at an average annual rate of 5.74 percent. With the scheduled opening of the Heartland Corridor in early 2010, the recent clearance of the CSX double-stack (standardized cargo container boxes stacked two high on rail cars) rail route to Atlanta, GA and the planned addition of a third series of locks in the Panama Canal by 2015, growth is expected to continue.

The use of rail is a significant part of the Port of Virginia’s plan to enhance the efficiency and cost effectiveness of shipping. In fact, the Port already moves a higher percentage of containers by rail than any other East Coast port. Rail volume in 2007 increased 20 percent and remains the fastest growing sector of the Port’s growth.

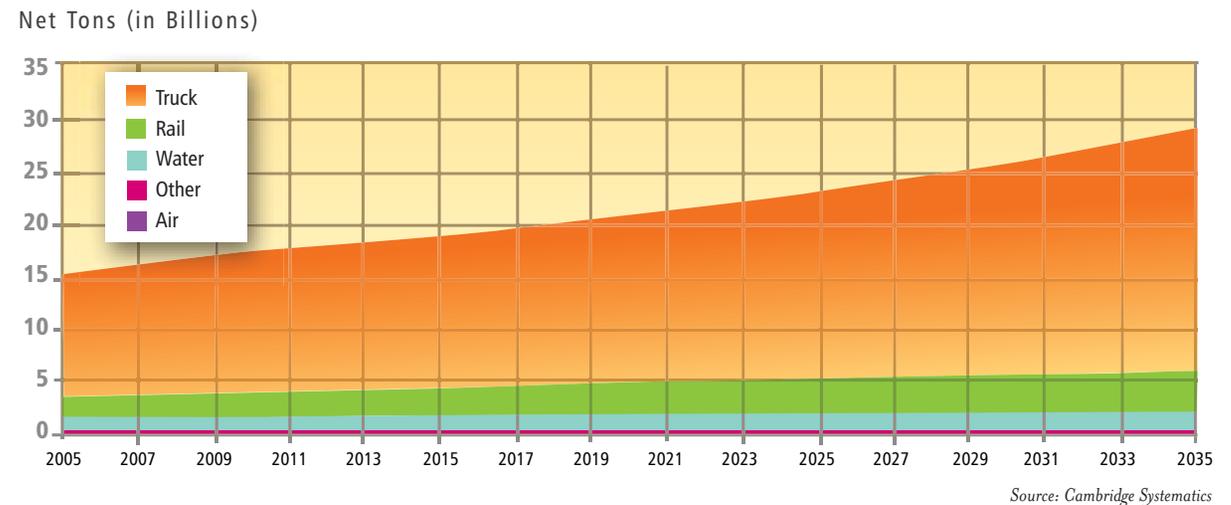
### Freight

Freight transportation has grown dramatically, fueled by the growth and spread of population and economic activity within the U.S. and the increasing interdependence of economies across the globe brought about by foreign trade. A significant impact

*Figure 2-7*  
**INCREASE OF CONTAINERIZED CARGO (TEUS) AT VIRGINIA PORTS**



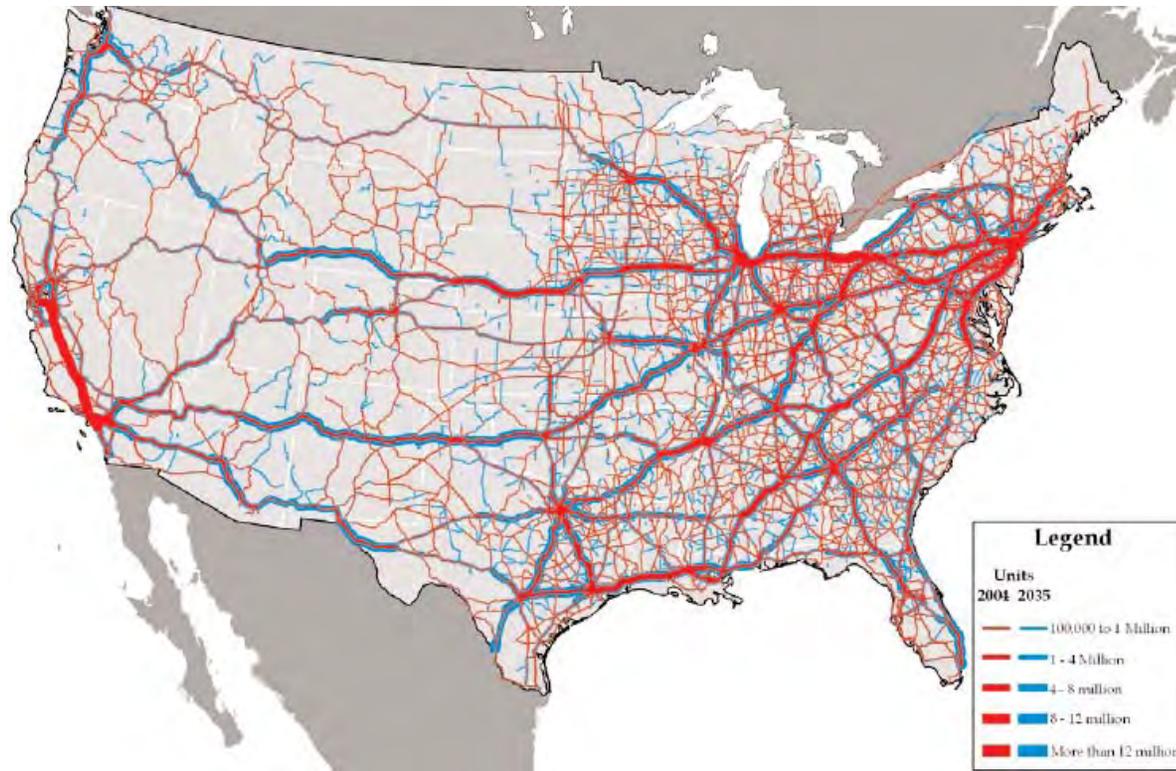
*Figure 2-8*  
**U.S. FREIGHT TONNAGE BY MODE 2005 – 2035**





*Intermodal trains have specially designed railcars that enable containers to be loaded directly from ship to rail.*

**Figure 2-9**  
**U.S. TRUCK FREIGHT FLOWS 2005 – 2035**



Source: Cambridge Systematics

on transportation patterns and economic development has been brought about by the global use of containerized cargo for the shipment of goods by trucks, rail and large specialty container ships calling at major ports. **Figure 2-8** shows the projected growth in cargo by transport modes.

Cargo in the nation is expected to double from 15 billion tons in 2005 to approximately 30 billion tons

in 2035. Although the prediction shows the vast majority of freight being handled by trucks, highway congestion and the increasing cost of fuel make an increase in the percentage of modal shift between the truck and rail a necessity. **Figure 2-9** indicates the projected growth patterns in truck flows between 2005 and 2035 and **Figure 2-10** indicates the projected growth patterns in rail flows in the same period. As seen in **Figure 2-9**, the I-95, I-81

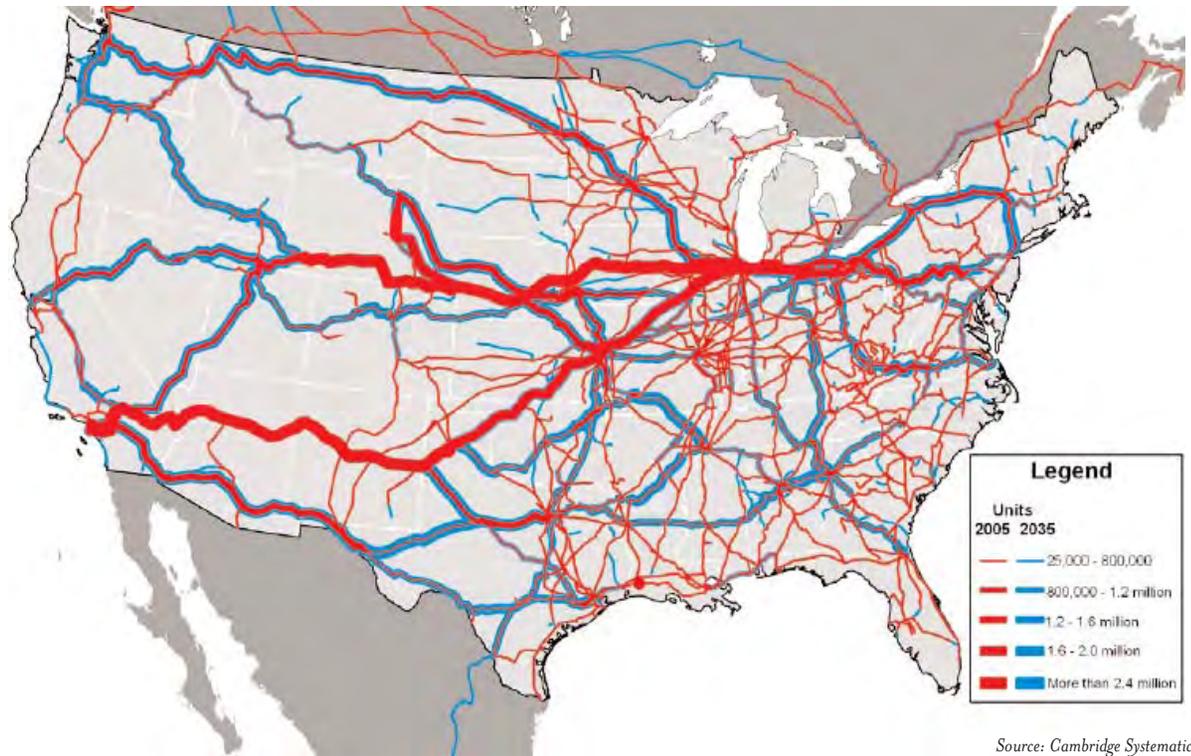
and I-64 highways between Richmond and Hampton Roads will carry an increasing number of trucks in future years.

**Figures 2-11** and **2-12** show the current and projected 2035 rail volumes compared to current rail capacity. Note that the statewide multimodal freight study indicated that the I-95 corridor is expected to be significantly impacted. Therefore, the CSX National Gateway project incorporated in the statewide rail plan projects a greater modal shift from highway to rail, reflecting the goals of this rail plan.

A detailed evaluation of freight movements in Virginia was recently completed as part of the VTrans2035 plan currently being developed. According to this study, the movement of freight – raw materials, intermediate products and finished goods – currently supports over \$350 billion of Virginia’s Gross State Product annually. To accommodate the movement of freight, Virginia hosts one of the nation’s leading seaports, two national freight railroads, numerous local and regional railroads, four major cargo airports and some of the nation’s most heavily used truck corridors.

Over the next two decades, the forecast is for significant growth in the demand for freight movement into, out of, within and through Virginia. Some of the Commonwealth’s freight infrastructure is well positioned to accommodate this growth. But much of its infrastructure will be challenged – from normal wear and tear; from growth in the amount,

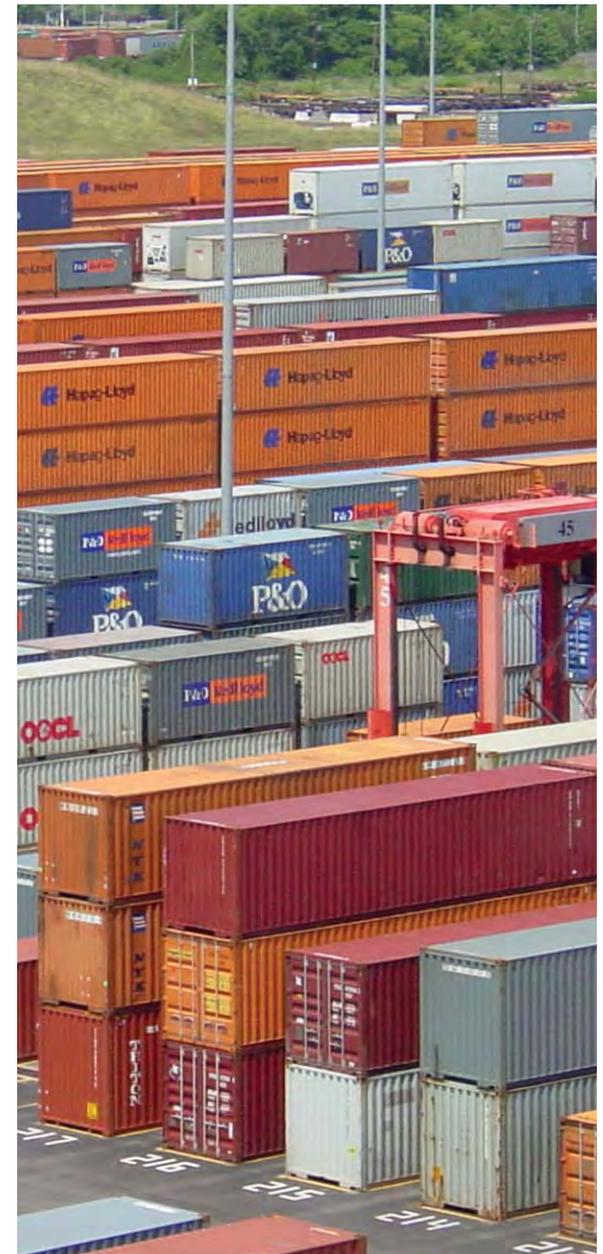
Figure 2-10  
U.S. RAIL FREIGHT FLOWS 2005 – 2035



Source: Cambridge Systematics

type and location of freight movement; from increased passenger traffic over shared highway and rail corridors; and from environmental pressures associated with higher freight volumes and/or denser settlement patterns in and around major freight facilities and corridors. Almost 80 percent of Virginia’s freight tonnage has an origin or a destination in another state – including 40 percent which is simply passing through Virginia on its way to and from other states – so growth and freight improvements in other states, or the lack thereof,

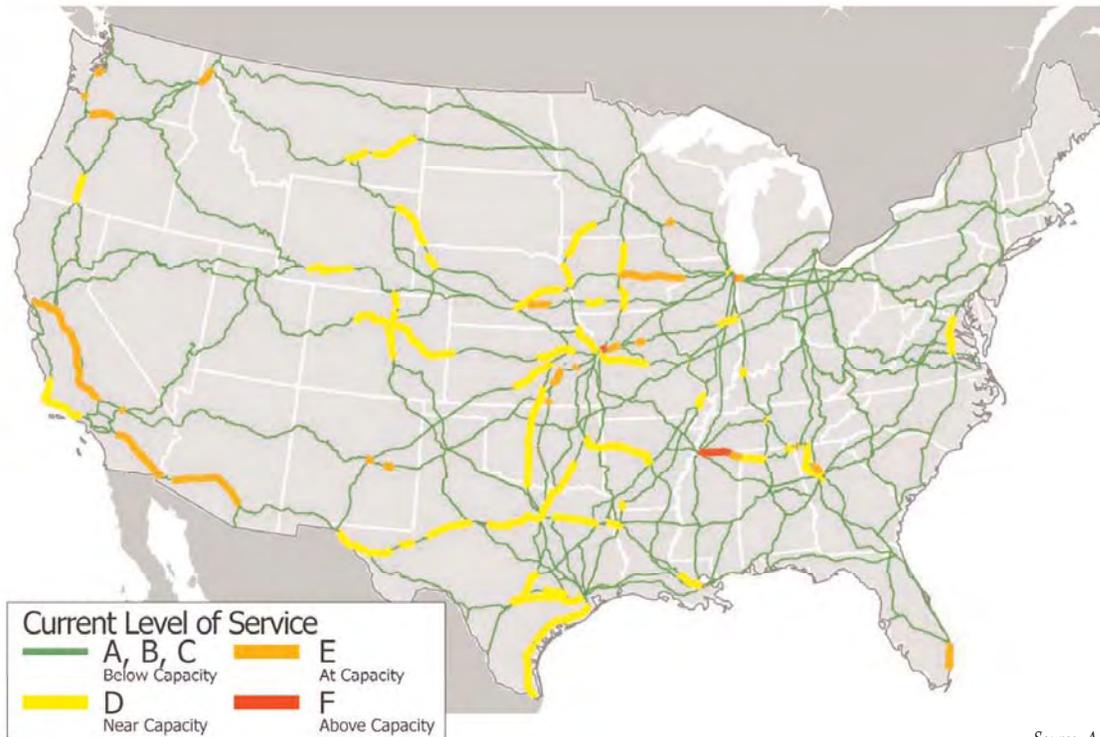
could significantly affect conditions in Virginia. Today, approximately 50 percent of Virginia’s total output, 28 percent of its gross state product and 34 percent of its employment are from freight-related industries that depend heavily on the movement of raw materials, intermediate goods and/or finished products. The movement of existing freight tonnage by mode and direction is shown in *Figure 2-13*. A projection of the increase in tonnage associated with each mode to 2035 is shown in *Figure 2-14*.



Containers at the Port of Virginia are sorted and classified for shipment.

Figure 2-11

## RAIL CURRENT VOLUMES COMPARED TO CURRENT CAPACITY



Source: AASHTO

## Passenger Rail

For nearly two centuries, railroads have been part of this country's heritage and history. Trains enabled the development of our major inland cities, the settlement of our rural areas and the opening of the West for expansion. However, trains are not just part of our past, they are a significant part of our present and a critical part of our future for effective passenger and freight rail movements, particularly as energy costs and fuel prices continue to rise.

- On a local level, passenger rail is a proven engine of economic development and growth. Studies show that when passenger rail service is introduced into a community, retail establishments flourish, commercial and residential property values increase and people enjoy the transportation choices they are able to make in their daily lives.
- On a regional level, passenger trains can provide cost-effective and convenient intermodal connections between communities and other modal choices, such as bus, trolley, light rail, bicycle, airport and park-and-ride facilities and expand economic development opportunities.
- On a national level, passenger trains provide an economic means of expanding capacity, transportation options and connectivity, mobility for underserved populations, congestion mitigation, local air quality attainment improvements and jobs — not just in the railroad industry but also in secondary support industries — which enable and stimulate economic development activity.

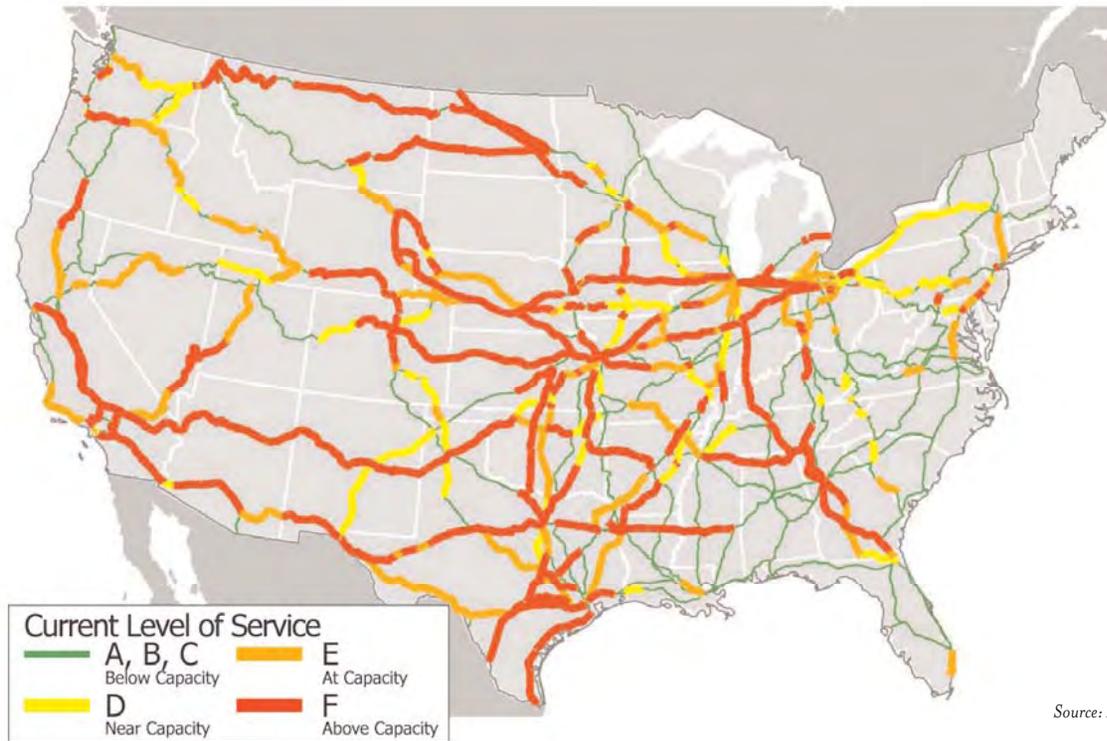
## Coal

Rail is the major mode of transportation for the movement of coal from mines to domestic industries or for export. After a period of relatively low coal exports, recent years have seen a rapid growth in coal exports due to increased global demand for coal for electricity generation, spurred by soaring petroleum costs. Historical coal movements through Hampton Roads terminals are shown in *Figure 2-15*. The first quarter of 2008 saw a 62 percent increase over the same period in 2007. This increased demand requires

a corresponding increase in the number of freight trains needed to transfer the cargo.

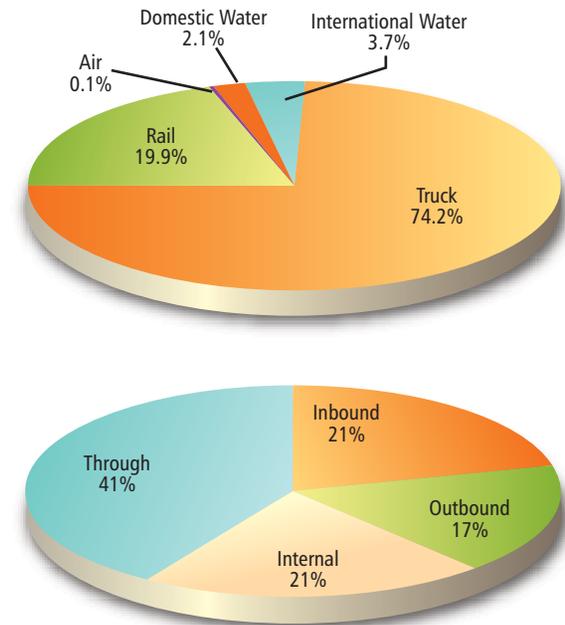
According to the most recent data from the Association of American Railroads (2005), the largest commodity carried by tonnage was coal (59 percent). A significant portion of the freight tonnage impacting the state rail system is coal from the Appalachian coalfields in Southwest Virginia to Norfolk Southern and CSX marine terminals in Hampton Roads for export.

Figure 2-12  
RAIL FUTURE VOLUMES IN 2035 COMPARED TO UNIMPROVED CAPACITY



Source: AASHTO

Figure 2-13  
VIRGINIA FREIGHT TONNAGE BY MODE AND DIRECTION



Source: Cambridge Systematics

On a global level, passenger rail conserves energy, helps reduce greenhouse gas emissions, reduces airborne particulate and toxic emissions and provides an environmentally benign land use alternative to the impermeable asphalt surfaces that contribute to the pollution of our waterways.

There are currently two passenger railroads operating in Virginia on approximately 616 miles of track owned primarily by Norfolk Southern and CSX.

Collectively, these two passenger railroads, Amtrak and VRE, carried nearly 5.4 million passengers in and through Virginia during 2007. Since 2003, there has been a steady increase in Amtrak Virginia ridership, averaging about five percent per year. VRE (Figure 2-16), which provides service to Washington, DC from the Northern Virginia suburbs, has experienced explosive growth. Ridership increases have averaged 16 percent per year and are expected to double in the next 20 years. Both VRE and Amtrak have been and

will be challenged by capacity constraints as a result of increased freight rail operations and other capital needs related to equipment and station facilities.

Metrorail and light rail are not considered to be part of the rail system since they rarely operate in railroad right-of-way and these modes are under the jurisdiction of the Federal Transit Administration.

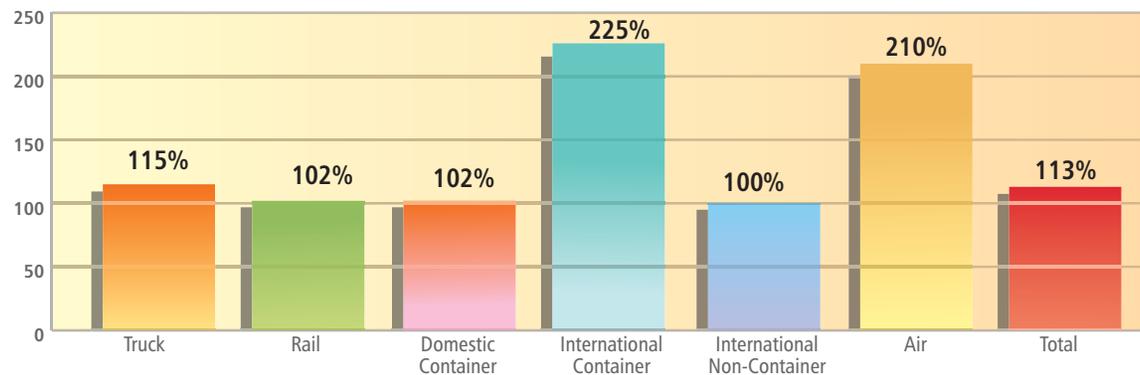
## Land Use, Natural Resources and Environmental Influences

The nation is in the early stages of a major change in transportation, the economy and, ultimately, quality of life. There is global competition for finite resources of oil and coal. Crude oil prices averaged \$72.00 per barrel in 2007. In late June 2008, the price for crude oil rose to approximately \$135.00 per barrel – an increase of 88 percent. China and India are making significant investments in infrastructure and are emerging as strong competitors in the global economy. India’s middle class population alone is equal to the total population of the United States. It has become imperative to become a more energy efficient nation and reduce greenhouse gases.

According to the Association of American Railroads, greater use of freight and passenger rail offers a

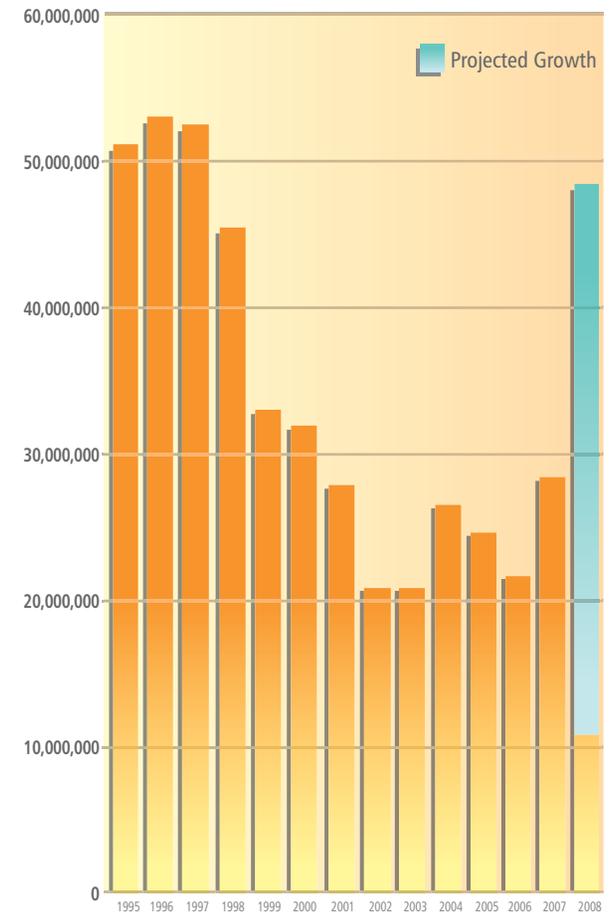
simple and relatively immediate way to reduce greenhouse gas emissions without adverse impacts on the economy. As *Figure 2-17* shows, the fuel efficiency of commuter rail is 27 percent greater than the automobile for passenger travel and Class I railroads are 90 percent more efficient than truck for freight movement. Railroads are typically three or more times more fuel efficient than trucks and railroads have a smaller carbon footprint. Every ton-mile of freight that moves by rail instead of truck reduces greenhouse emissions by at least 67 percent. Based on Federal Environmental Protection Agency (EPA) data, freight railroads account for 2.6 percent of the nation’s greenhouse gas emissions from transportation sources and just 0.7 percent from all sources. Based on data from the American Association of State Highway and Transportation Officials (AASHTO), diverting to rail just one percent of long-haul freight that currently moves by truck

*Figure 2-14*  
**VIRGINIA FREIGHT PROJECTIONS BY MODE (2035)**



Source: Cambridge Systematics

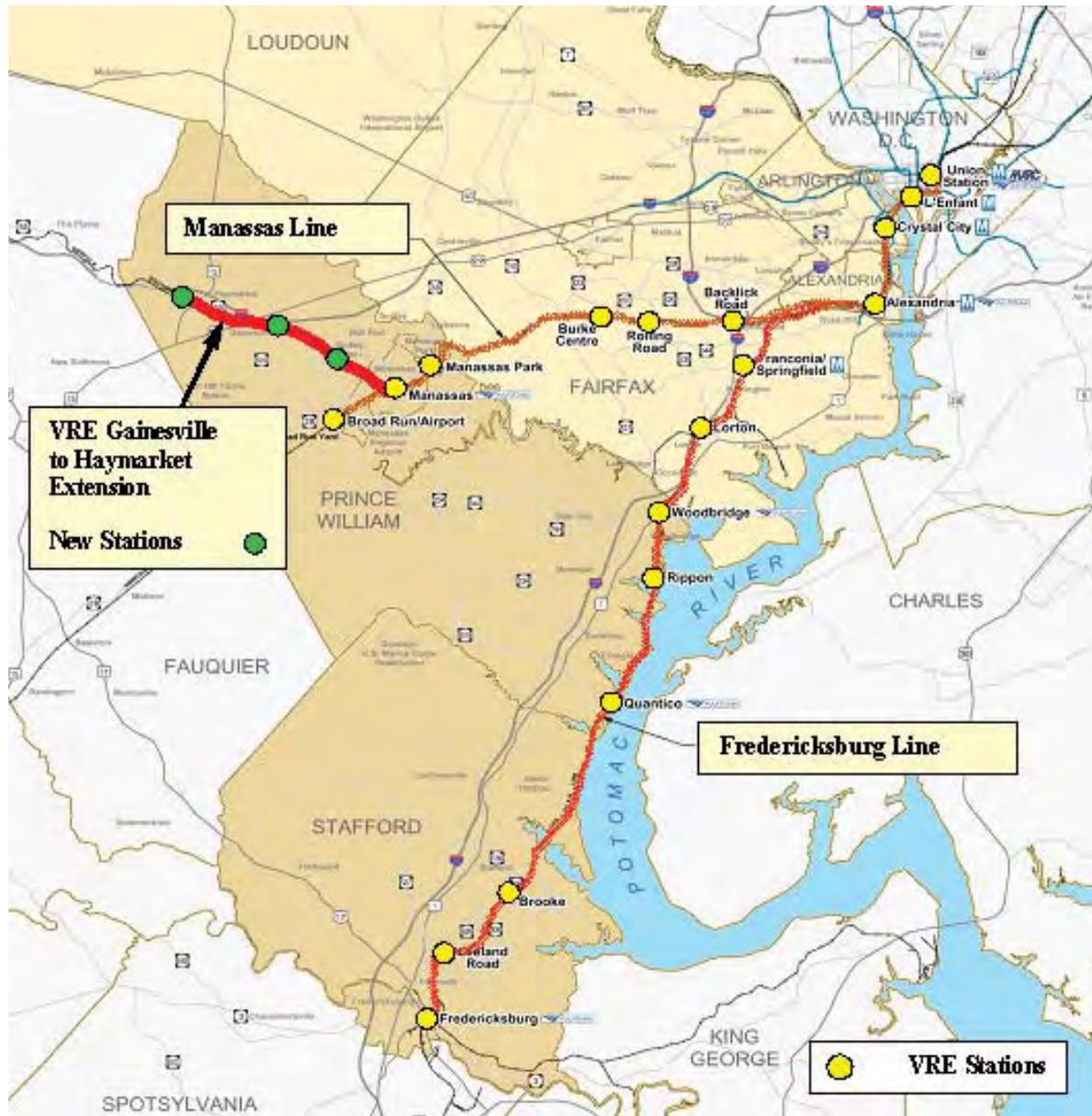
*Figure 2-15*  
**COAL SHIPMENTS 1995 - 2008**



Source: Virginia Maritime Association

would result in annual fuel savings of 110 million gallons and annual greenhouse gas emissions would fall by approximately 1.2 million tons.

Figure 2-16  
VRE SYSTEM MAP



Source: VRE



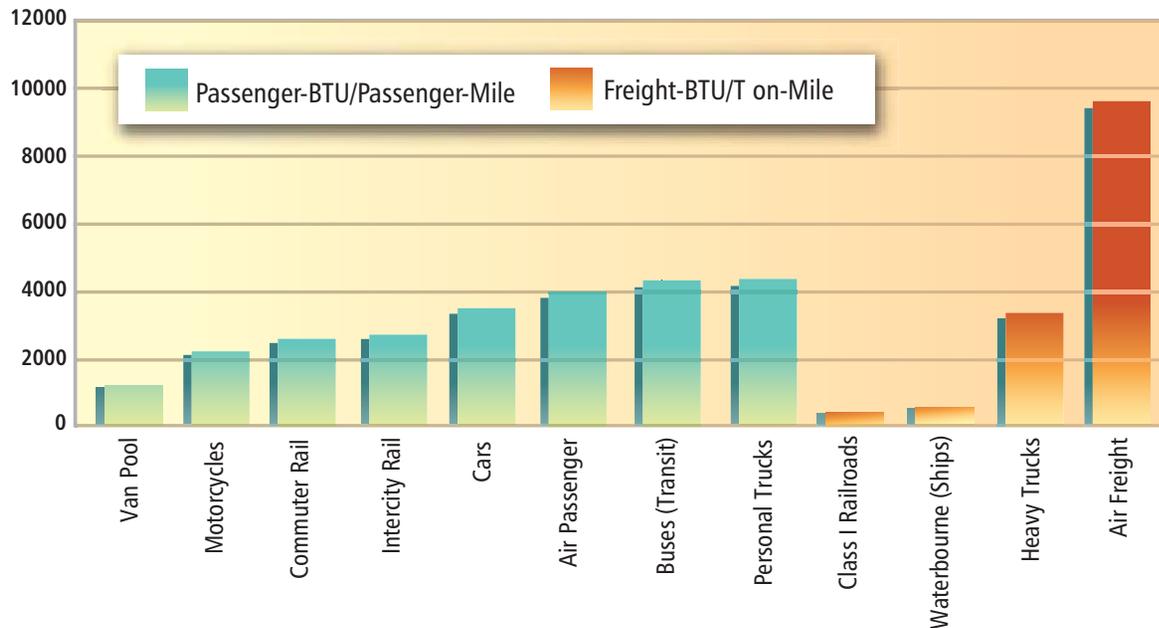
*Train travel is 17 percent more energy efficient than domestic airline travel and 21 percent more efficient than traveling by car.*

Railroads are the most fuel efficient mode of ground transportation. In 2007, freight railroads moved a ton of cargo an average of 436 miles per gallon of fuel. According to the Association of American Railroads, railroad fuel efficiency has risen 85 percent between 1980 and 2007, due to new locomotive technologies, advanced research and development innovative operating practices, employee training and diligence in complying with environmental laws and regulations. In 2007, Class I railroads used 3.5 billion fewer gallons of fuel and emitted 39 million fewer tons of carbon dioxide than they would have if their fuel efficiency and operating procedures had remained at 1980 levels.

Along with the environmental impact, transportation planning must consider land use and natural resources. While the purpose of Virginia's transportation system is to link regions and service communities by moving people and goods

Figure 2-17

**FUEL EFFICIENCY IN TRANSPORTATION**



Source: U.S. Department of Energy

throughout the state, infrastructure construction must not come at the expense of Virginia’s vast natural and cultural resources. Virginians have communicated that they do not want to sacrifice the environment or quality of life for transportation improvements. Virginia’s transportation agencies are dedicated to designing and operating a system that seamlessly integrates into communities while protecting the assets of every community throughout the Commonwealth. Passenger rail stations and freight rail intermodal facilities serve as anchors for more dense development which supports more efficient travel and reduced land use.

Improvements in the rail system offer many benefits:

- The diversion of auto and truck traffic to rail could improve public safety and air quality by reducing congestion and greenhouse emissions, which affect climate change and health.
- The diversion of air travel passengers to passenger rail could reduce congestion occurring in the nation’s airport system and provide a cost-effective and timely alternative for intercity travelers.

- Improved passenger and freight rail service could help reduce the negative impacts to individuals and the economy of short or prolonged energy supply disruptions and/or energy price increases.
- Land use and travel pattern changes for both passenger and freight movements could improve air quality, water quality and aesthetic appeal.
- Rail improvements could provide mobility and economic development opportunities to smaller communities and rural areas with limited access to passenger or freight transportation.
- The availability of an improved rail system could ensure a redundant transportation mode for use in emergency situations involving natural disasters, terrorist attacks and military response and readiness for war time situations.
- Passenger rail could provide a mobility option for individuals who cannot or choose not to drive or fly.
- Freight rail could provide an option to companies who cannot or choose not to use trucks and the highway system for the transport of cargo.