# A 10% Reduction in America's Oil Use in Ten to Twelve Years

# An Overlooked, Practical, and Affordable Approach Using Mature Existing Technology

Commentary by Alan S. Drake
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NOTE: This is the third commentary in our series Electrification 101 – a discussion aimed at informing transportation professionals, decisionmakers, and the public at large of the value and advantages of electrifying transportation operations, and the electrification of public transport systems in particular. The following essay is a slightly edited version of a summary position paper disseminated by the author at a recent Peak Oil conference in Washington, DC. Alan S. Drake, a former accountant, is an engineer, and professional researcher based in New Orleans.

### Step One – Electrify US Freight Rail Lines and Shift Freight to Rail

The Russians finished electrifying the Trans-Siberian Railroad, from Moscow to the Pacific, in 2002 and electrified to the Arctic Ocean port of Murmansk several months ago. Almost all of Japan and the continental European Union (EU) have already electrified their railroads – so there are no technical limitations. Electric railroads are cheaper to operate and can carry more freight because they accelerate and brake faster (and can generate electricity while braking, saving energy) and have no delays for refueling.

The United States used 19.8 million barrels of oil per day in 2002 with two-thirds for transportation. (Today, consumption is about 20.7 million barrels per day.) Railroads carried 27.8% of total US ton-miles with 220,000 barrels per day whilst trucks carried 32.1% of total ton-miles with 2,070,000 barrels per day (2002 data). Clearly, railroads are 8 times more energy efficient than heavy trucks and also are more labor-efficient.

In the era of cheap oil and the ascendancy of interstate highways, US railroads cut back capacity and ceded much cargo to trucking. Today, intermodal shipments (local trucking and long distance rail via containers or roll on/roll off) are growing rapidly, but this trend must be accelerated! Electrifying railroads and transferring half of the ton-miles of trucks to rail should save 6.3% of US oil consumption.

electric locos


*The Virginian Railway was one of a number of US railroads that electrified their mainline operations – both freight and passenger – beginning in the early 20th century.*

*Cheap and seemingly abundant oil was a major factor persuading railroads to de-electrify in favor of diesel propulsion.*

*[Photo: Norfolk & Western Historical Society]*

US railroads have pointed to property taxes as a major reason that they did not electrify (no taxes on their diesel, property taxes on electrification). Simply exempting any rail line that electrifies from property taxes under the Interstate Commerce clause will help to rapidly electrify many rail lines. Expanding capacity (adding tracks) and adding more intermodal transfer points will be more economically attractive without the burden of property taxes.

Removing property taxes on railroads would take the “thumb off the scale” in the economic competition between rail and trucks. Local jurisdictions that lose more than a certain percentage in tax revenue might have the excess compensated by the Federal government for 25 years, each year decreasing by 4%.

*Electric freight railroading in the USA: Four powerful modern electric locomotives haul a coal train on Arizona’s 78-mile Black Mesa & Lake Powell Railroad, which links a coal mining operation with a major regional power generating facility.*

*[Photo: Wes Carr]*

## Step Two – Increase Urban Rail Federal Funding

In 1970, 4% of Washington, DC commuters used city buses to get to work. Today about 40% use public transit. The difference is the 106 miles of Washington Metro. Washington Metro saves a half-billion gallons of gasoline per year directly, with at least as much more from changes in urban and suburban development patterns.

Miami has passed a new half-cent sales tax to build a 103-mile system of elevated “Subway in the Sky” over 25 years. The author has been told that 90% of the population will be within 3 miles of a station and over half within 2 miles. A reasonable number will be within walking and easy bicycling distance. An online map can be seen as follows (note that dark brown lines represent 2016+ plans):

http://www.miamidade.gov/trafficrelief/RailMap.htm [Appended]

*Miami metro Miami MetroRail train races into elevated Coconut Grove station in June 2004.*

*[Photo: L. Henry]*

Why will it take 25 years to build a system that will transform Miami as Washington and San Francisco have been transformed, saving billions of gallons of gasoline?

Federal Transit Administration (FTA) funding has declined from 80% for “New Start” rail projects to 50%, thereby dramatically slowing this energy-saving project and many others. Restoring that funding ratio to 80% (or better yet, 85% or 90% for the best projects and 75% for marginal projects, thus providing two funding paths for cities to chose from) will speed existing plans in Miami, Denver, Dallas, St. Louis, Salt Lake City, San Francisco-Bay Area of California, Washington, DC, Portland, New Orleans, New York City, Los Angeles, Charlotte, Sacramento, Houston, Phoenix, San Diego, Atlanta, and many other metropolitan areas.

An explosion in urban rail, from streetcars in small cities to larger light rail transit (LRT) in larger cities and rail rapid transit in the largest cities with regional passenger rail (“commuter rail”) everywhere is very likely with better federal funding. Today, there is a growing pent-up demand for the very limited federal matching funds now available. This pent-up demand can be tapped to build massive, permanent oil savings quickly.

An explosion in urban rail, from streetcars in small cities to larger light rail transit (LRT) in larger Budget space could come from reductions in federal highway funding and reallocations of those revenues, or as a supplement for the Strategic Petroleum Reserve (SPR), funded by growing federal oil lease royalities. New urban rail of all types, built in cities large and small, could add up to the fuel-saving equivalent of a dozen Washington Metros. This would save 4% of US oil use (6% of transportation oil use). New electric mass transit will benefit the US much more than new highways.

## Step Three – Promote Electric Trolley Buses

Electric trolley buses are cheaper and lighter, they last much longer, they are pollution-free, and are quiet, smooth (much less jerky) and more attractive to passengers than fossil-fuel buses. They obviously require overhead wires and electrical infrastructure. Four US cities currently operate electric trolley buses and a fifth will soon.

Hybrid buses, with minor engineering changes, can operate part-time as electric trolley buses and off-wire for part of their routes. This mixed use would significantly reduce their diesel fuel consumption.

The FTA currently funds 80% of bus replacement costs on a twelve-year cycle. Many experts feel that 15 years would be more appropriate. Perhaps FTA could fund fossil-fuel replacement buses on a 13.5 year cycle at 75% and trolley buses (with their electrical infrastructure) at 90%. Again, re-allocation of federal highway aid, or a fraction of increased federal oil royalities, could easily pay for this.


*Seattle is one of a number of North American cities operating electric trolley buses.*
*[Photo: King County Metro]*

## Step Four – Promote More Transportation Bicycling

Simple steps, such as more bike racks in city downtowns, would make bicycle commuting easier. Streets with excess capacity could have one traffic lane converted to two bike lanes. This is a city-by-city effort, with differences in every locale. So a national program is less effective, other than making it patriotic to bicycle to work, school and shopping and promoting bike racks at urban rail stops or allowing bicycles to be carried on transit vehicles.

## Step Five – Create a Strategic Railcar Reserve to Supplement and Extend the Strategic Petroleum Reserve

Suppose, as one of several possible future scenarios, that an Islamic Republic of Arabia replaces Saudi Arabia and the new Islamic Republic exports only enough oil (at elevated prices) to buy food and other essentials (no longer having to support 6,000 princes in luxury). The United States would face a severe and prolonged oil supply interruption.

It is likely that the US government would immediately institute a variety of oil conservation measures; these could include a 50-mph speed limit, 4-day work week, limited sports events, restricted air travel, etc. The nation would also immediately start draining the SPR. Demand for electrified urban rail would swamp the capacity of every system in the country. Freight railroads and Amtrak would also likely be overwhelmed. Once the SPR is half-drained, perhaps in two or three months, even more severe oil demand restrictions would be required, such as rationing.

Every urban rail system, and almost every line, could handle more passengers if they had more rolling stock. Their capacity is limited in other ways as well (platform length, park & ride lots, bicycle racks, etc.), but rolling stock is almost always the first limiting factor. Likewise, certain types of rail cars would be the first limiting factor on our freight railroads. So a Strategic Railcar Reserve (SRR) would allow existing urban rail lines to carry more passengers, and more railcars would allow more freight to be shifted from trucks, thus reducing US oil demand in another dimension and allowing the SPR to last a few days longer. Once the SPR is exhausted, the SRR (and all the steps above) would still be benefiting the nation.

Buying more railcars would be cheaper and better than buying more oil for the SPR. Rail cars are made in the USA, their benefit will last much longer than extra barrels of oil, they can be used and not disappear in even minor oil supply interruptions, and they are cheaper, per barrel saved, than $75 oil.

Every US urban rail system should estimate its likely demand in the case of an oil supply interruption and what would be required to handle this demand at 60% of crush load. In some cases, soon-to-be-retired cars could be mothballed, but new cars will be required for the SRR in most cases. They could be mothballed or added to the operational reserve.

## Conclusions

Transportation use of electricity (all subways, light rail, Amtrak's NEC) in 2004 was 0.19% of all electricity used in the USA. As previously noted, new urban rail of all types, built in cities large and small, could add up to the fuel-saving equivalent of a dozen Washington Metros, and would save 4% of US oil use (6% of transportation oil use). The higher efficiency of rail vs. rubber tires (8:1) and electric motors vs. diesel engines (3:1) means that the freight electrification goals of Step 1 will take slightly more than 1% of US electricity. Ten years is more than adequate time to build new power plants if any are needed. New wind turbine generation will exceed new transportation demand in future years.

These proposals and overlooked steps will complement the more widely discussed steps of more fuel-efficient cars, ethanol substitution, and other measures. They are complementary and not mutually exclusive. And the steps outlined above can be started immediately with plans already in process; they require no new technology, and will have a significant impact in the medium term.

Taking these steps will positively affect US oil supplies faster than drilling in the Alaskan National Wildlife Ref uge (ANWR), produce at least twice as much oil savings as ANWR will produce at its peak, and never deplete (Prudhoe Bay, Alaska is producing at approximately 20% of its peak, Washington Metro hits a new peak in oil saved every year). So, if one supports drilling in ANWR, these steps are even better. It is simply not logical to support drilling and not support these steps. And if one opposes drilling in ANWR, then these steps are a larger, faster, longer-lasting, and environmentally positive substitute.

It is worth noting that four American cities – Washington DC, New Orleans, Oakland and East St. Louis – could benefit from more urban rail, mainly streetcars and larger light rail, but cannot afford even 10% matching funds. Two of these cities, Washington DC and New Orleans, are of particularly prominent national significance and international stature.

Washington, DC's Department of Transportation (DOT) has a plan for 40 miles of streetcars in the District, while the author helped develop a 35-mile plan for streetcars in New Orleans. It would benefit the nation as a whole (in reduced gasoline use and international exposure, and as a learning tool for other cities) to fully fund streetcar systems in these cities. One goal of such a program should be reducing the cost of building streetcar lines.


*Portland MAX LRT and streetcar Portland, Oregon: Streetcar (right) passes MAX interurban-type LRT train (left) at one of the points where both systems intersect. [Photo: Peter Ehrlich]*

The author has also written a supplement to the Department of Energy Hirsch Report on Planning for Peak Oil that covers a vital point that the original report overlooked. It is available at:

http://www.lightrailnow.org/features/f_lrt_2005-02.htm

Sometimes good public policy is good politics. Reducing US oil consumption, reducing greenhouse gases, improving the US economy, reducing congestion, providing transportation alternatives, and reducing the number of 18-wheel trucks on the highways should be both good public policy and good politics!

# Rapid Transit Expansion Projects