Urban Light Rail Fail

By WARREN MEYER

Over the last year, light rail boosters around the nation have declared Phoenix light rail to be an unqualified success. The New York Times observed that the 2-year-old system "has been a greater success than its proponents thought it would be." Portraying light rail opponents like the Goldwater Institute as being "sheepish" in the face of light rail's success, the Times crowed that the system "has given the city a distinctly modern feel," an odd statement about a transportation technology that dates back nearly 200 years. These near universal accolades from mass transit boosters for Phoenix light rail make it a terrific test case to evaluate the basic viability of light rail projects.

A train on the new Phoenix light rail system. Image by Phil Sexton via Flickr

A key question is how should we define "success." If we define it, as many light rail boosters seem to, as having riders who like the trains, then I suppose Phoenix light rail is a success. If we define success as giving our local elected officials added prestige, a sort of modern triumphal arch to enshrine the greatness of our leaders, I suppose it is a success as well — certainly the Times seems to think that light rail has raised Phoenix's prestige.

The praise for Phoenix light rail reminds me of a home I visited recently that had a $50,000 super-size 100-inch flat screen TV. That TV was gorgeous. Everyone who saw it immediately fell in love with it. It worked flawlessly, and everyone at the party wanted one. In fact, it was probably the greatest, most sensible and successful purchase of all time … as long as one never considered the cost. This is exactly how light rail seems to get evaluated.

In 2006, years before the Phoenix light rail system was completed, I made a prediction — what I called my "light rail bet." I predicted that:

1. I could take all the money spent on the construction of the system and easily buy a Prius for every single daily rider, with money to spare
2. I could take the annual operating deficits for light rail and buy each of these new Prius owners enough gas to drive 10,000 miles per year and still have money left over.

I crafted this bet after studying the numbers for urban rail systems in Los Angeles, Albuquerque, and Northern Virginia. Now the numbers are in for Phoenix, and I am winning my bet by a landslide.

Over the last year, Phoenix light rail ridership has increased to an average of about 40,000 trips per day during the week. Since most of those riders have two trips per day (one each direction) we can think of this as 20,000 people making a round trip each business day.

Considering the initial $1. 4 billion capital cost of the system, Phoenix has therefore spent over $70,000 per daily rider just to build the system. This is an astonishing number — no wonder the riders of the system love it! The taxpayers of Arizona bought rail riders a commuting vehicle that costs nearly three times the $23,800 list price of a Prius III hybrid. The city could have, rather than build the system, bought every regular daily rider a new car and still had nearly a billion dollars left over — and those who got the car would have had a transportation option that went anywhere in the city, not just to 28 stops along a single 20-mile line. (To give one a sense of scale in this large, low-density city, I live and work well within the boundaries of the City of Phoenix and at no point does the light rail line come within a 10 mile drive of my home or office).

As for operating deficits, fiscal year 2010 financials have not been released, but we can get a good idea of what to expect from the most recent budget revisions. In that budget, the light rail system projects total annual operations costs of $34 million (excluding interest and all capital-related charges) of which only about $9 million are covered by fares and advertising sales. This means that the taxpayers must chip in $25 million of general revenue to subsidize operations, or $1,250 per daily rider per year. To test the second half of my bet, this same amount at $3 a gallon for fuel would allow one to travel just about 20,000 miles a year in a 48mpg Prius.

So thus my bet is won — the City of Phoenix could have (instead of building this system) given a new Prius to every regular daily rider and provided him or her with enough gas to drive 10,000 miles a year, and we still would have saved two-thirds of the capital cost and half the annual operating subsidy of the system.

What about the soft costs?

It is at this point that the typical light rail supporter will proudly proclaim the non-financial benefits of light rail, particularly in reduced congestion and energy savings. Lets consider each of these in turn.

In building Phoenix light rail, the city removed two lanes of existing roadway on busy commute routes (one lane in each direction) to make way for the tracks. At 40,000 trips per day, light rail carries about 2200 passengers (1100 in each direction) per hour through its 18-hour operating day. Sure, the train carries more than 2,200 in some peak periods, but few passengers ride the entire length so the typical traffic over any one particular segment is likely less.

Now consider the lane of roadway the tracks displaced. A typical lane of road has a capacity of 2000 cars per hour, so light rail removed 4,000 cars per hour of road capacity (2,000 each way). Its unclear how many riders this equates to, but the average car in the city has 1.5 passengers, so we will call this a lost road capacity of 6,000 trips per hour.

In other words, we have replaced roads that can carry 6,000 trips per hour with train tracks carrying perhaps 2,200 trips per hour, not to mention adding further congestion to remaining roads when cars have to yield the right-of-way to trains.

In terms of energy use, the best source of data for analyzing light rail efficiency is annual data turned into the Department of Transportation; unfortunately, no full-year energy use data has been submitted yet for Phoenix. But we can look to other similar systems to make an educated guess. Randal O'Toole of the Cato Institute looked at energy use in a number of light rail systems, and he found the average energy use in BTU's per passenger mile for all light rail systems to actually be above that for driving passenger cars.. While trains are far more efficient than cars when full, most of the time trains do not run full, and even at rush hour half the trains (those running against the typical commute direction) are using a lot more energy to move steel than passengers.

The middle class toy

Light rail is a classic example of a dynamic we see with many government services: A program originally aimed at the poor is co-opted by the middle class. When I grew up, transit's main goal in most cities was to provide affordable transportation to the working poor. These needs were mainly served by buses, which were flexible in their routes, much cheaper to deploy than rail, and fit well with the more dispersed transit routes of their customers.

But some time in the last 30 years, transit was discovered by the middle class. Wanting the government to pay for their commute, but loathe to ride a bus, middle class professional commuters pushed for shiny light rail systems. These systems tended to connect airports, universities, sports stadiums and central business districts with middle class neighborhoods. With their huge cost, these rail systems have tended to crowd out buses, reducing service to the original target group of the working poor and instead giving middle class college students and professional sports fans access to enormously subsidized transportation.

I have always found it ironic that light rail is typically hailed by its supporters as a "sustainable" technology. In Phoenix, money is continuously drained from the entire 4.3 million people who live here to pay for the transportation of 20,000 people by rail. How is this sustainable?