

## Auto energy use is less than that of modern rail lines

Our city government would like you to believe that the proposed Honolulu train will be very energy-efficient, but this is almost certainly not true. The average modern urban rail line in America is less energy-efficient than the average automobile, as the following analysis will explain. Automobile efficiency is increasing significantly while rail is not. In addition, the rising use of electric autos will make auto use far greener than rail. Here's why:

The following comments relate to an attached [five-page excerpt](#) from the annual [Transportation Energy Data Book, Edition 30](#), Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, June 2011.

The comparisons made here conclude that Honolulu's buses are more energy efficient than either automobiles or rail transit, and that automobiles are more energy efficient than the Honolulu Rail project would be.

Highlighted on the first page of this excerpt in Table 2.12, note that nationally automobiles use 3,538 Btus (British Thermal Units) per passenger mile (PPM), personal trucks and SUVs use 3,663 Btus PPM, and transit buses 4,242 Btus PPM, while rail transit only uses 2,812 Btus PPM. From this City officials transit industry would have you believe that rail transit is more energy efficient than autos.

However, as always, the devil is in the details.

On the next page, Table 2.13, is the timeline of energy use for autos and buses. Note that cars are more efficient than buses these days though they were not in 1970. The change has been dramatic. Since 1970 energy use per passenger mile for autos has declined by 27 percent while bus energy usage has increased by 72 percent. However, in Honolulu we have a very energy efficient bus system that, at 2,020 Btus per passenger mile, uses less than half the Btus per passenger mile of the national average for buses.

Automobiles have become far more energy efficient because of stiffer CAFE standards for automobile gas mileage combined with higher gas prices. On the other hand buses nationally have become less energy efficient because of the increased use of air conditioning in buses and the trend to far fewer passengers per bus. In Honolulu, for example, we have the same number of bus passengers that we had 20 years ago, 73 million annually, yet we have had a one-third increase in the number of buses and many of these are larger articulated buses. While we are presently highly efficient compared to the national average, there are bus systems that are close to experiencing energy usage of 1,000 Btus per passenger mile; it gives some indication that there are energy savings yet to be made for TheBus.

Further on in the excerpt is Figure 2.2, which shows that these days a majority of the nation's light rail lines use more energy per passenger mile than automobiles; only the twelve most efficient from Charlotte, North Carolina, to San Diego, California, perform better than the auto.

The next page, Figure 2.3 shows the energy usage for heavy rail systems, such as the Honolulu rail project.<sup>1</sup> This chart shows that two-thirds of these lines use more energy than automobiles. Note that New York's rail transit, which has a great deal of two-way traffic, uses less than 2,000 Btu PPM. Note that the two lines most like the Honolulu's project, in that they are mostly elevated, are Miami and San Juan, both of which are energy hogs.

The obvious question now is how do these light and heavy rail examples shown square with the average rail transit usage of 2,516 Btu PPM shown in Table 2.12?

The 2,516 Btu PPM number is a *weighted* average and includes the New York rail systems which are not only very energy efficient but also constitute two-thirds of the nation's rail transit passenger miles.<sup>ii</sup> Thus, using a *weighted* average and including New York leads us astray if we are looking for evidence of the likely energy efficiency of Honolulu's projected rail transit line. We have to look at modern rail lines *excluding* New York if we are to review energy use that is more likely to be like ours.

We have little reason to believe that Honolulu's rail line would be more energy efficient than automobiles since we would carry highly directional rail passenger traffic. The highest use would be one-way into town in the morning, then returning almost empty, with the reverse pattern in the late afternoon. There would be light use during the middle of the day and in the evenings.

On the other hand, the big city heavy rail lines, especially New York City, carry a great deal of traffic in both directions and are still quite busy in the non-rush hours.

While the Final EIS makes blanket statements about rail being energy efficient and even gives energy usage data, it contains no evidence that it has done anything other than pull numbers out of the air. The only reference is to the [Air Quality and Energy Use Technical Memorandum](#) but that is no better in providing sources.

If the City had proof that its rail line would be more energy efficient than automobiles, their arguments would be well documented; they are not. Environmental law requires that the FTA provide,

*Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements.*<sup>iii</sup>

The Final EIS has not justified any reason why the Honolulu rail project should be any more energy efficient than others in its reference class while intuitively, given the route's projected operations, one should expect less energy efficiency.

In the 1970s, there were almost no light rail lines since most cities had abandoned them in favor of buses.<sup>iv</sup> The only heavy rail lines in existence were the energy efficient ones in the densely populated cities like New York, Boston, Philadelphia and New Jersey. One would be right at that time in believing that rail transit was more energy efficient than automobiles.

Again, in the 1970s, it was drummed into people that buses were more energy efficient than cars nationally. At that time they were, but over the years, for the reasons given earlier, buses are now significantly less energy efficient than cars per passenger mile as actually used and operated. That is not the case in Honolulu where buses are significantly more energy efficient than autos if the national average for automobiles holds true here.

Our problem with thinking that rail transit is energy efficient is legacy thinking; we have not changed our thinking with the times and transit officials have not encouraged it.

The relative inefficiency between rail transit and automobiles will widen in the future. Today's transit energy use shows no sign of declining while automobile CAFE standards are to be increased by 65 percent by 2025.<sup>v</sup>

The growing use of electric cars will change matters because they can recharge their batteries at times when daily energy use is at its nadir. By 2030, the horizon year for the rail project, it seems fairly certain that automobiles being charged between midnight and 5:00 AM will do so in Hawai'i through the use of wind power and ocean wave generated energy.<sup>vi</sup> Rail transit, however, sees nothing significant that will reduce its energy use in the future or its reliance, for the most part, on fossil fuels.

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**Endnotes:**

- i The City keeps trying to use the term “light metro” rather “heavy rail.” However, light metro is descriptive rather than definitive. FTA has no definition for “light metro” only “heavy rail,” which is also described as “rapid transit” by FTA. The City defines the Project in the Final EIS as “rapid transit.” While it is a smaller heavy rail, it is still heavy rail.
- ii “It is useful to note that although our sample includes twenty five systems, trips on New York City’s system account for roughly two-thirds of the nation’s rail transit passenger miles.” Clifford Winston & Vikram Maheshri. *On the social desirability of urban rail transit systems*. Journal of Urban Economics. 2006. p. 7 of 21
- iii [http://edocket.access.gpo.gov/cfr\\_2008/julqtr/pdf/40cfr1502.24.pdf](http://edocket.access.gpo.gov/cfr_2008/julqtr/pdf/40cfr1502.24.pdf)
- iv Slater, Cliff. *General Motors and the Demise of Streetcars*. Transportation Quarterly, Summer 1997 (45-66)
- v [http://en.wikipedia.org/wiki/Corporate\\_Average\\_Fuel\\_Economy#Standards\\_by\\_model\\_year.2C\\_1978-2011](http://en.wikipedia.org/wiki/Corporate_Average_Fuel_Economy#Standards_by_model_year.2C_1978-2011)
- vi [http://www.hawaiisenergyfuture.com/articles/Ocean\\_Energy.html](http://www.hawaiisenergyfuture.com/articles/Ocean_Energy.html)  
[http://peswiki.com/index.php/Directory:Ocean\\_Wave\\_Energy](http://peswiki.com/index.php/Directory:Ocean_Wave_Energy)