Auto energy use is less than modern rail lines

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

Highlighted on the first page of this excerpt in Table 2.12, note that automobiles use 3,538 Btus (British Thermal Units) per passenger mile (PPM), 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.

Highlighted on the next page, Table 2.13, is the energy use for autos and buses. Note that cars are more efficient than buses these days though they were not in 1970. The trends have 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.

Automobiles have become far more energy efficient as can be seen in the endnote graph.[i] On the other hand buses 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 these are larger buses.

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

The next page, showing heavy rail systems in Figure 2.3, shows that only the five most energy efficient are shown to be more efficient than autos. Note that New York City's rail transit use, which has a great deal of two-way traffic, is less than 2,000 Btu PPM. Note that the two lines most like 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 over 50 percent of the nation's rail transit passengers. 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 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.

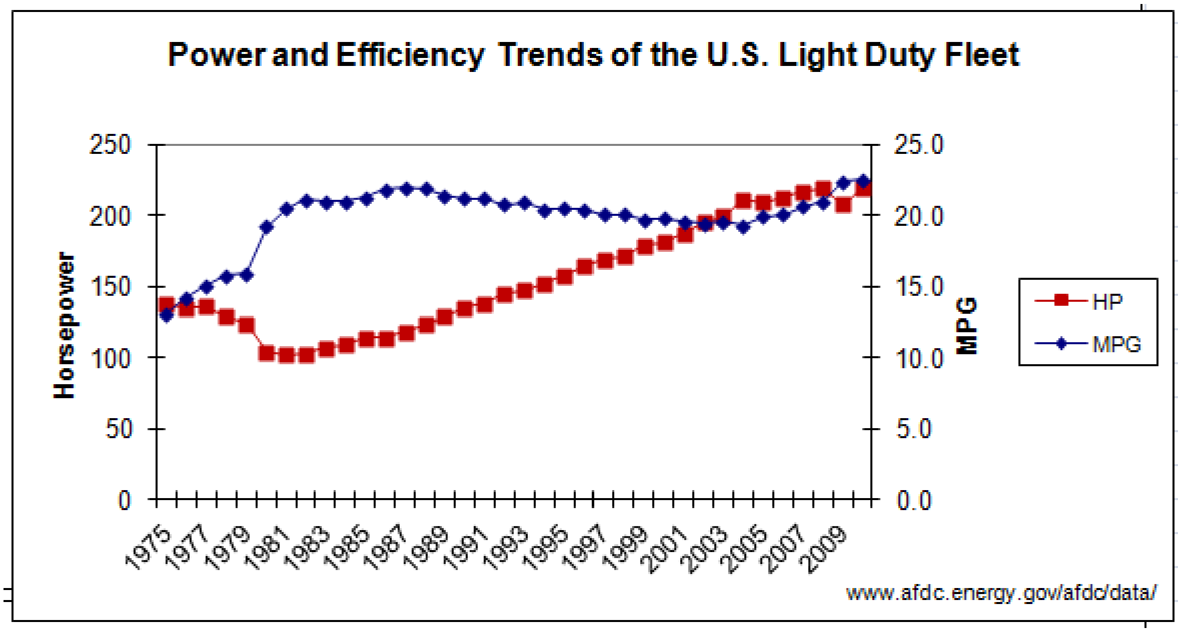
While the Final EIS makes blanket statements about rail being energy efficient and even gives energy usage data, it contains no evidence that it has done anything other than pull numbers out of the air. The only reference is to the Air Quality and Energy Use Technical Memorandum but that is no better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

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

> *Methodology and scientific accuracy. Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements.* http://edocket.access.gpo.gov/cfr_2008/julqtr/pdf/40cfr1502.24.pdf

Rev'd. 2.5.2012

Endnotes.



Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences among the transportation modes in the nature of services, routes available, and many additional factors, it is not possible to obtain truly comparable national energy intensities among modes. These values are averages, and there is a great deal of variability even within a mode.

Table 2.12
Passenger Travel and Energy Use, 2009

	Number of vehicles (thousands)	Vehicle-miles (millions)	Passenger-miles (millions)	Load factor (persons/ vehicle)	Energy intensities (Btu per vehicle-mile)	Energy intensities (Btu per passenger-mile)	Energy use (trillion Btu)
Cars	**134,880.0**	**1,606,815**	**2,490,564**	**1.55**	**5,484**	**3,538**	**8,811.0**
Personal trucks	**88,683.4**	**934,631**	**1,719,722**	**1.84**	**6,740**	**3,663**	**6,299.4**
Motorcycles	**7,929.7**	**20,800**	**24,128**	**1.16**	**2,854**	**2,460**	**59.4**
Demand response[a]	**68.9**	**1,529**	**1,477**	**1.0**	**15,111**	**15,645**	**23.1**
Buses	b	b	b	b	b	b	**200.0**
Transit	65.4	2,345	21,645	9.2	39,160	4,242	91.8
Intercity[c]	b	b	b	b	b	b	31.4
School[c]	683.7	b	b	b	b	b	76.9
Air	b	b	b	b	b	b	**1,751.4**
Certificated route[d]	b	5,453	541,646	99.3	280,734	2,826	1,530.8
General aviation	223.9	b	b	b	b	b	220.6
Recreational boats	**13,290.7**	b	b	b	b	b	**245.7**
Rail	**20.7**	**1,402**	**36,150**	**25.8**	**66,916**	**2,594**	**93.8**
Intercity (Amtrak)	0.3	283	5,914	20.9	50,924	2,435	14.4
Transit	13.5	775	19,004	24.5	61,663	2,516	47.8
Commuter	6.9	344	11,232	32.7	91,936	2,812	31.6

Source:
See Appendix A for Passenger Travel and Energy Use.

[a] Includes passenger cars, vans, and small buses operating in response to calls from passengers to the transit operator who dispatches the vehicles.

[b] Data are not available.

[c] Energy use is estimated.

[d] Only domestic service and domestic energy use are shown on this table. (Previous editions included half of international energy.) These energy intensities may be inflated because all energy use is attributed to passengers–cargo energy use is not taken into account.

Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences among the transportation modes in the nature of services, routes available, and many additional factors, it is not possible to obtain truly comparable national energy intensities among modes. These values are averages, and there is a great deal of variability even within a mode.

Table 2.13
Energy Intensities of Highway Passenger Modes, 1970–2009

	Automobiles		Light truck[a]	Transit Buses[b]	
Year	(Btu per vehicle-mile)	(Btu per passenger-mile)	(Btu per vehicle-mile)	(Btu per vehicle-mile)	(Btu per passenger-mile)
1970	9,250	4,868	12,480	31,796	2,472
1975	8,993	4,733	11,879	33,748	2,814
1976	9,113	4,796	11,524	34,598	2,896
1977	8,950	4,710	11,160	35,120	2,889
1978	8,839	4,693	10,807	36,603	2,883
1979	8,647	4,632	10,468	36,597	2,795
1980	7,916	4,279	10,224	36,553	2,813
1981	7,670	4,184	9,997	37,745	3,027
1982	7,465	4,109	9,268	38,766	3,237
1983	7,365	4,092	9,124	37,962	3,177
1984	7,202	4,066	8,931	38,705	3,307
1985	7,164	4,110	8,730	38,876	3,423
1986	7,194	4,197	8,560	37,889	3,545
1987	6,959	4,128	8,359	36,247	3,594
1988	6,683	4,033	8,119	36,673	3,706
1989	6,589	4,046	7,746	36,754	3,732
1990	6,169	3,856	7,746	37,374	3,794
1991	5,912	3,695	7,351	37,732	3,877
1992	5,956	3,723	7,239	40,243	4,310
1993	6,087	3,804	7,182	39,043	4,262
1994	6,024	3,765	7,212	37,259	4,262
1995	5,902	3,689	7,208	37,251	4,307
1996	5,874	3,683	7,247	37,452	4,340
1997	5,797	3,646	7,251	38,861	4,434
1998	5,767	3,638	7,260	41,296	4,399
1999	5,821	3,684	7,327	40,578	4,344
2000	5,687	3,611	7,158	41,695	4,531
2001	5,626	3,583	7,080	38,535	4,146
2002	5,662	3,607	7,125	37,548	4,133
2003	5,535	3,525	7,673	37,096	4,213
2004	5,489	3,496	7,653	37,855	4,364
2005	5,607	3,571	7,009	37,430	4,250
2006	5,511	3,510	6,974	39,568	4,316
2007	5,513	3,512	6,904	39,931	4,372
2008	5,465	3,526	6,830	39,906	4,348
2009	5,484	3,538	6,862	39,160	4,242
		Average annual percentage change			
1970–2009	-1.3%	-0.8%	-1.5%	0.5%	1.4%
1999–2009	-0.6%	-0.4%	-0.7%	-0.4%	-0.2%

Source:
See Appendix A for Highway Passenger Mode Energy Intensities.

[a] All two-axle, four-tire trucks.
[b] Series not continuous between 1983 and 1984 because of a change in data source by the American Public Transportation Association (APTA).

Great care should be taken when comparing modal energy intensity data among modes. Because of the inherent differences between the transportation modes in the nature of services, routes available, and many additional factors, it is not possible to obtain truly comparable national energy intensities among modes.

Table 2.14
Energy Intensities of Nonhighway Passenger Modes, 1970–2009

	Air	Rail		
Year	Certificated air carriers[a] (Btu per passenger-mile)	Intercity Amtrak (Btu per passenger-mile)	Rail transit (Btu per passenger-mile)	Commuter rail (Btu per passenger-mile)
1970	10,115	[b]	2,157	[b]
1975	7,625	3,548	2,625	[b]
1976	7,282	3,278	2,633	[b]
1977	6,990	3,443	2,364	[b]
1978	6,144	3,554	2,144	[b]
1979	5,607	3,351	2,290	[b]
1980	5,561	3,065	2,312	[b]
1981	5,774	2,883	2,592	[b]
1982	5,412	3,052	2,699	[b]
1983	5,133	2,875	2,820	[b]
1984	5,298	2,923	3,037	2,804
1985	5,053	2,703	2,809	2,826
1986	5,011	2,481	3,042	2,926
1987	4,827	2,450	3,039	2,801
1988	4,861	2,379	3,072	2,872
1989	4,844	2,614	2,909	2,864
1990	4,875	2,505	3,024	2,822
1991	4,662	2,417	3,254	2,770
1992	4,516	2,534	3,155	2,629
1993	4,490	2,565	3,373	2,976
1994	4,397	2,282	3,338	2,682
1995	4,349	2,501	3,340	2,632
1996	4,172	2,690	3,017	2,582
1997	4,166	2,811	2,856	2,724
1998	4,146	2,788	2,823	2,646
1999	4,061	2,943	2,785	2,714
2000	3,952	3,235	2,797	2,551
2001	3,968	3,257	2,803	2,515
2002	3,703	3,212	2,872	2,514
2003	3,587	2,800	2,837	2,545
2004	3,339	2,760	2,750	2,569
2005	3,264	2,709	2,783	2,743
2006	3,250	2,650	2,707	2,527
2007	3,153	2,516	2,577	2,638
2008	3,051	2,398	2,521	2,656
2009	2,901	2,435	2,516	2,812
		Average annual percentage change[c]		
1970–2009	-3.2%	-1.1%	0.5%	0.0%
1999–2009	-3.3%	-1.9%	-1.0%	0.4%

Source:
See Appendix A for Nonhighway Passenger Mode Energy Intensities.

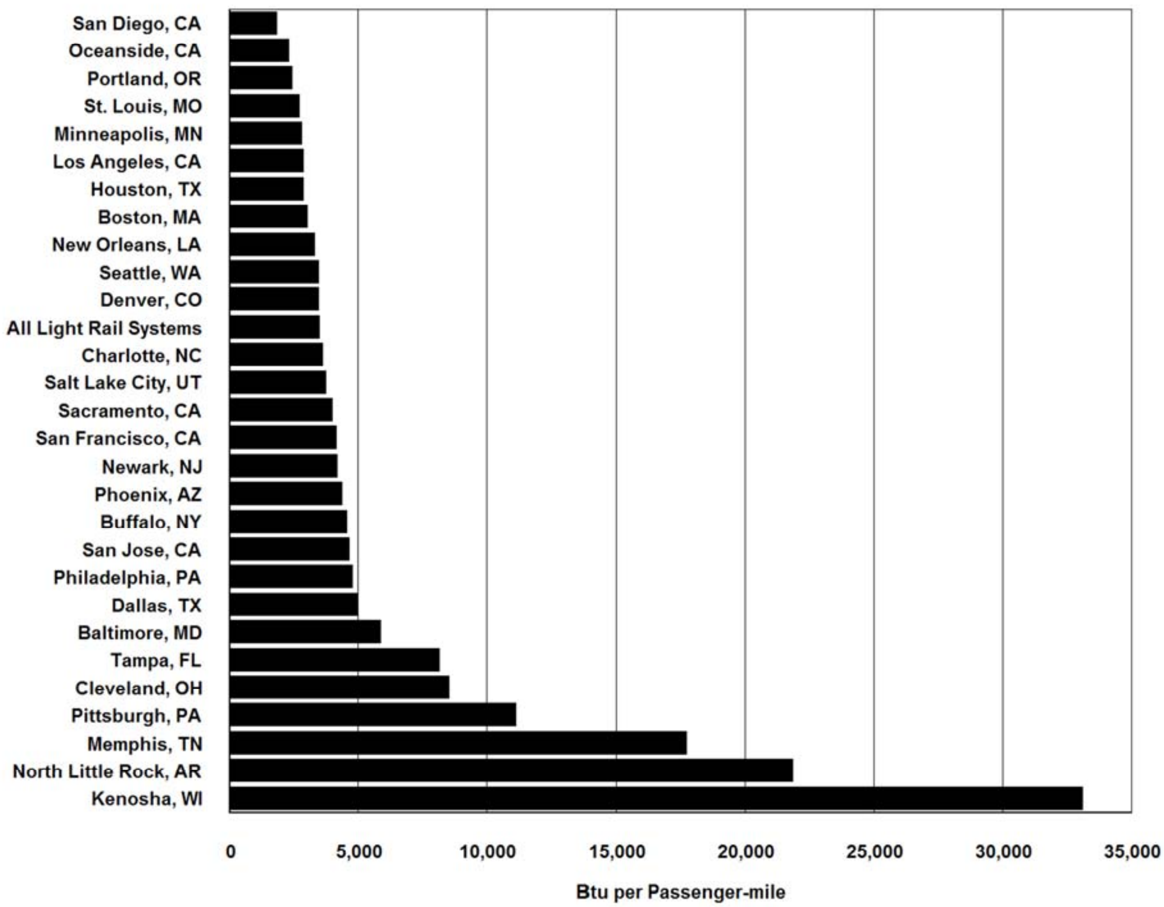
[a] These data differ from the data on Table 2.12 because they include half of international services. These energy intensities may be inflated because all energy use is attributed to passengers–cargo energy use is not taken into account.

[b] Data are not available.

[c] Average annual percentage calculated to earliest year possible.

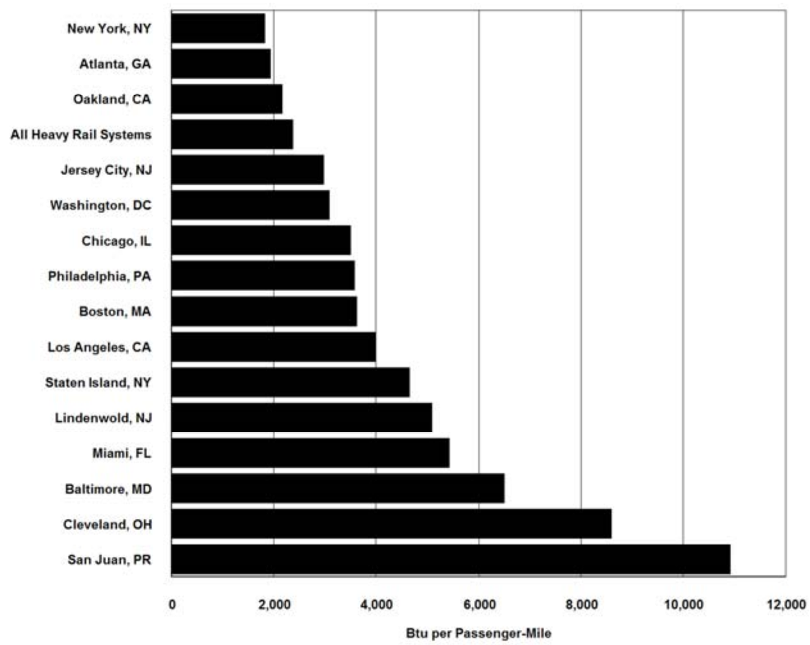
The energy intensity of light rail systems, measured in btu per passenger-mile varies greatly. The weighted average of all light rail systems in 2009 is 3,526 btu/passenger-mile.

Figure 2.2. Energy Intensity of Light Rail Transit Systems, 2009



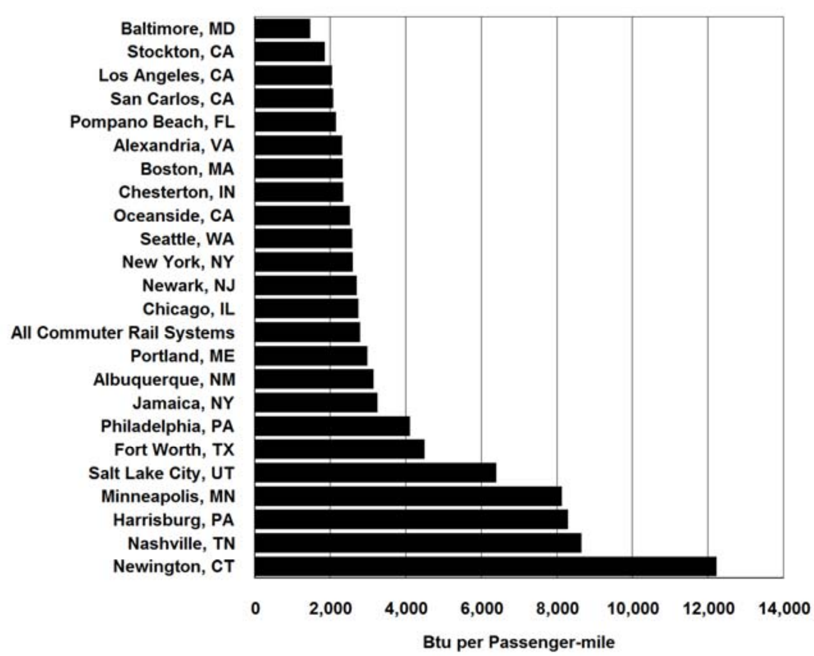
Source:
U.S. Department of Transportation, *National Transit Database*, May 2011. (Additional resources: http://204.68.195.57/ntdprogram/data.htm)

Figure 2.3. Energy Intensity of Heavy Rail Systems, 2009



Source:
U.S. Department of Transportation, *National Transit Database*, May 2011. (Additional resources: www.ntdprogram.gov)

Figure 2.4. Energy Intensity of Commuter Rail Systems, 2009



Source:
U.S. Department of Transportation, *National Transit Database*, May 2011. (Additional resources: www.ntdprogram.gov)