

Appendix F-1
Bus Price Analysis

Note: This document was originally released on February 2, 2017 and posted at <https://arb.ca.gov/msprog/ict/meeting/mt170626/170626buspricesanalysis.pdf>. This appendix contains minor changes from the original posting.

Bus capital cost is part of the total cost of ownership analysis. It represents a large share of the total cost. Each transit agency has its own requirement regarding bus specification. Depending on the specification, bus prices varies within the same bus type, fuel type and propulsion system. This appendix explains the bus prices staff used in the cost analysis. In addition, the future bus price projections (see Appendix F-2) in the cost analysis are based on the bus prices discussed in this appendix.

Staff summarized the bus prices from two relatively recent bus purchase contracts for 40-foot standard buses with the goal of making an apples-to-apples comparison (similarly equipped buses) to accurately reflect differences in incremental costs for different propulsion systems. Bus contracts often include different options and specify different equipment for what is referred to as the “base” bus. Even with the same component specification, the material or the model of those components varies. We reviewed the bus specifications from a consortium 2013 bus purchase bid from the Central Contra Costa Transit Authority (CCCTA) and a bus purchase bid for different propulsion technologies from the Washington State Department of Enterprise in 2015.

We confirmed with Proterra and BYD that the current prices for battery electric buses used in the CARB analysis are pre-tax prices that include ADA and standard equipment but do not include fare boxes, nor other bus options like cameras. The bus prices are \$770,000 for the BYD bus with a 12-year battery warranty, and the Proterra bus price is \$749,000 for their extended range bus (330kWh battery) and on-route charging bus.

The CCCTA bus consortium procurement included 22 California transit agencies¹ and lists the base components and costs of different options.² In this contract, the base bus price included both surveillance camera and intelligent vehicle systems. We deducted the prices for both of these components to represent a bus without optional bus equipment. This results in a pre-tax diesel bus price to \$417,000 in 2013. We then escalated the prices from 2013 to 2016 by using the Producer Price Index (PPI)³ which brings the price to around \$437,000 in 2016 (Table 1). For a given conventional propulsion system there are also different component options, such as alternator types, fuel tank sizes, and other propulsion related options, that simply do not exist in zero emission buses. We did not try to modify these values since they are representative of actual costs incurred by California fleets for conventional buses. The contract identifies the incremental for different propulsion systems as options as shown in Table 2.

¹ Central Contra Costa Transit Authority (CCCTA 2012). Request for Proposals 2012-MA-02 for Purchase and Delivery of Heavy-duty Buses. Date of Issuance: December 26, 2012.

² Gillig's Cost Proposal for Purchase and Delivery of Heavy Duty Buses. RFP 2012-MA-02. May 23, 2013.

³ Bureau of Labor Statistics (2018). Producer Price Index (PPI). Series ID: WPU1413. (PPI 2013 annual average is 226.6. PPI 2015 annual average is 235.3. PPI 2016 annual average is 237.5.) Data extracted on July 23, 2018. Available: <https://data.bls.gov/cgi-bin/srgate>.

Table 1. CCCTA 40' low floor diesel bus price

Line	Item Description	Price
A1.	Base offer per bus	\$414,722
A2.	Delete Video Surveillance	(\$6,165)
A3.	Delete Intelligent Vehicle System - Delete CCCTA Specified Clever Devices System	(\$16,899)
A4.	Base offer per bus after deleting video surveillance and intelligent vehicle system	\$391,658
B.	California Sales Tax @8.75%	\$34,270
C.	Non-taxable ADA equipment	\$24,954
D.	Delivery cost per bus (to the CCCTA location only)	\$196
E.	Total base offer per bus (without video surveillance and intelligent vehicle system) (including tax and delivery) (line A4+B+C+D)	\$451,078
F.	Base bus price in 2013 (without video surveillance and intelligent vehicle system) (excluding tax and delivery) (line A4+C)	\$416,612
G.	Base bus price in 2016 (without video surveillance and intelligent vehicle system) (excluding tax and delivery) (line F * 1.0481)	\$436,652

Source: Staff's calculation based on CCCTA contract and PPI.

Table 2. Incremental costs over diesel bus in the CCCTA contract for different propulsion systems

Year	CNG	Diesel Hybrid (BAE)	Diesel Hybrid (Allison)
2013 (CCCTA contract price)	\$48,414	\$194,501	\$217,518
2016 (Staff's calculation)	\$50,743	\$203,857	\$227,981

Source: Staff's calculation based on CCCTA contract and PPI.

Washington State established a statewide master bus purchase contract, which can be used by Washington state agencies and other authorized parties for future heavy-duty transit vehicle purchases of a wide range of propulsion systems including electric buses.⁴ The document from Washington State provides some insights on bus specifications across different bus propulsion systems with the same bus specifications.⁵ Table 3 summarizes the prices for different propulsion systems and the incremental costs over diesel bus.

⁴ Washington State Department of Enterprise Services (2014). Solicitation 09214. Heavy-duty public transit vehicles. Posting date: November 3, 2014. Available: <https://fortress.wa.gov/ga/apps/contracting/09214b.doc>.

⁵ Washington State Department of Enterprise Services. Heavy-duty Mass Transit Vehicles. Contract# 09214. Contract Award Date: July 24, 2015. Available: <https://fortress.wa.gov/ga/apps/ContractSearch/ContractSummary.aspx?c=09214>. Pricing and Ordering: <https://fortress.wa.gov/es/apps/contracting/09214p.xlsx>.

Table 3. Washington state 40' low floor base bus price (excluding tax and delivery)

2015 (Washington State contract price)	Diesel	CNG	Diesel Hybrid (BAE)	Diesel Hybrid (Allison)
Gillig	\$413,581	\$469,605	\$603,627	\$641,072
New Flyer	\$433,361	\$461,598	\$572,927	\$628,195
Schetky	\$429,859	\$476,945	N/A	\$639,859
2016 (Staff's calculation)	Diesel	CNG	Hybrid (BAE)	Hybrid (Allison)
Gillig	\$417,448	\$473,996	\$609,271	\$647,066
New Flyer	\$437,413	\$465,914	\$578,284	\$634,069
Schetky	\$433,878	\$481,404	N/A	\$645,842
Incremental cost over diesel				
Gillig		\$56,548	\$191,823	\$229,618
New Flyer		\$28,501	\$140,871	\$196,656
Schetky		\$47,526		\$211,963

Source: Staff's calculation based on Washington State contract and PPI.

We converted the 2015 pre-tax diesel bus price to a 2016 price. The 2016 diesel bus prices from three different bus manufacturers were around \$417,000, \$437,000, and \$434,000. The incremental costs in the Washington contract for other propulsion technologies vary by manufacturer. The battery electric bus prices in the 2015 in the contract were not used because the prices had already declined in 2016.

The 2016 bus prices in the CCCTA and Washington contracts are similar, but are not identical. For diesel buses the CCCTA contract price is about \$435,000 and matches two of the three diesel bus prices in the Washington contract. For CNG bus prices the CCCTA contract has an incremental cost of about \$50,000 for the exact same bus specification. The incremental cost for a CNG bus would be \$485,000 which is slightly higher than the Washington price. For diesel hybrid buses the CCCTA contract incremental costs ranges from about \$204,000 to \$228,000 for the same bus specification as the diesel bus. The Washington contract incremental costs for hybrid buses vary from \$141,000 to \$230,000 from three manufacturers. We propose to use the following 2016 pre-tax bus prices as shown in Table 4.

Table 4. Proposed 2016 pre-tax bus price for a basic bus without optional bus equipment

Diesel bus	CNG bus	Diesel hybrid bus	Battery electric bus (depot charge)	Battery electric bus (on-route charge)
\$435,000	\$485,000	\$640,000	\$770,000	\$750,000

The CNG bus prices also compare favorably to a recent San Diego Metropolitan Transit System (SDMTS)'s⁶ contract as shown in Table 5.

Table 5. San Diego MTS 40' low floor CNG bus price

Item Description	2016 Price
Bus price (taxable)	\$463,240
Sales Tax @ 8%	\$37,059
Non-taxable items	\$22,766
Bus price (including tax and FOB San Diego)	\$523,065
Bus price (excluding tax and FOB San Diego)	\$486,006

Source: Staff's calculation based on San Diego MTS's contract.

⁶ San Diego Metropolitan Transit System (SDMTS) (2012). SDMTS Board Meeting on 12/13/2012. Agenda item 33A. Available: https://www.sdmts.com/sites/default/files/2012-12-13boardpkg_001.pdf.

Reference List F-1

The following documents are the technical, theoretical, or empirical studies, reports, or similar documents relied upon in proposing these regulatory amendments, identified as required by Government Code, section 11346.2, subdivision (b)(3). Additionally, each appendix references the documents upon which it relies, as required by Government Code, section 11346.2, subdivision (b)(3).

Note: Each “Explanatory Footnote” is a footnote containing explanatory discussion rather than referencing specific documents relied upon.

1. Central Contra Costa Transit Authority (CCCTA 2012). Request for Proposals 2012-MA-02 for Purchase and Delivery of Heavy-duty Buses. Date of Issuance: December 26, 2012.
2. Gillig’s Cost Proposal for Purchase and Delivery of Heavy Duty Buses. RFP 2012-MA-02. May 23, 2013.
3. Bureau of Labor Statistics (2018). Producer Price Index (PPI). Series ID: WPU1413. (PPI 2013 annual average is 226.6. PPI 2015 annual average is 235.3. PPI 2016 annual average is 237.5.) Data extracted on July 23, 2018. Available: <https://data.bls.gov/cgi-bin/srgate>.
4. Washington State Department of Enterprise Services (2014). Solicitation 09214. Heavy-duty public transit vehicles. Posting date: November 3, 2014. Available: <https://fortress.wa.gov/ga/apps/contracting/09214b.doc>.
5. Washington State Department of Enterprise Services. Heavy-duty Mass Transit Vehicles. Contract# 09214. Contract Award Date: July 24, 2015. Available: <https://fortress.wa.gov/ga/apps/ContractSearch/ContractSummary.aspx?c=09214>. Pricing and Ordering: <https://fortress.wa.gov/es/apps/contracting/09214p.xlsx>.
6. San Diego Metropolitan Transit System (SDMTS) (2012). SDMTS Board Meeting on 12/13/2012. Agenda item 33A. Available: https://www.sdmts.com/sites/default/files/2012-12-13boardpkg_001.pdf.