

## **Useful Service Life of a Bus**

In research on industry standards for service life of a bus, various sources suggest the lifespan can range between 12 to 16 years.

### **Nova Bus Manufacturing**

Information received in September 2022 from Nova Bus, a major bus manufacturer in North America, provides the following relative to their Zero Emissions Vehicles:

The estimated lifecycle for each of our platforms is in the 12-to-16-year range (800,000 kms) and beyond. These numbers depend on the end users operating environment, duty cycle and ability to execute scheduled maintenance and inspection directives published within our maintenance manual.

The Low Floor Series (LFS) structure is made of stainless steel and has been designed following the Volvo design guidelines to operate for 16 years or 999,000 kms (whichever occurs first) and has been validated in accordance with the Element (formerly Exova) Design Life Validation Test (800,000 kms in New York City conditions), and the Altoona Test of 12 years - 800,000 kms. Nova Bus' structural frame will therefore operate with minimum maintenance throughout a minimum 12 years under the Design Operating Profile.

Additional Information received directly from the Nova Bus Regional Sales Office specific to the chassis indicates a lifespan of 15 years on the chassis itself.

### **New Flyer Bus Manufacturing**

Information received in September 2022 from New Flyer, a major bus manufacturer in North America, provides the following relative to their battery electric buses:

New Flyer claims the Xcelsior CHARGE NG battery-electric buses deliver up to 525kWh of power and 250 miles of range on a single charge and, over a 12-year lifespan, offer up to \$125,000 in maintenance savings and up to \$400,000 in fuel savings.

### **U.S. Department of Transportation Federal Transit Authority**

The most recent government agency research on the useful life of buses that could be found is a report published by the United States Department of Transportation Federal Transit Authority titled "Useful Life of Buses and Vans" dated April 2007 (Report). Key findings of the Report are summarized as follows.

The Federal Transit Administration's (FTA's) service-life policy for transit buses and vans establishes the minimum number of years (or miles) that transit vehicles

purchased with federal funds must be in service before they can be retired without financial penalty. The clear goal of this policy is to ensure that vehicles procured using federal funds remain in service for a substantial portion of their service life, thus ensuring that federal taxpayers obtain an adequate return on their investment. As shown in Table ES-1 from the Report, the minimum FTA service life policy for a Heavy-Duty Large Bus is 12 years or 500,000 miles (800,000 kms).

**Table ES-1**  
**Minimum Service-life categories for Buses and Vans**

Category	Typical Characteristics				Minimum Life	
	Length	Approx. GWV	Seats	Average Cost	(Whichever comes first)	
					Years	Miles
Heavy-Duty Large Bus	35 to 48 ft and 60 ft artic.	33,000 to 40,000	27 to 40	\$325,000 to over \$600,000	12	500,000

Average Cost in US Dollars

Findings of consultations with U.S. transit agencies completed for the Report is that the decisions for fleet replacement are constrained by capital funding availability. Table ES-2 from the Report shows the average retirement age for a 12-Year Bus is 15.1 years with 19% being one or more years past the FTA minimum retirement age of 12 years and 9% being three or more years (15 or more years of age) beyond the 12-year minimum retirement age.

**Table ES-2**  
**Minimum versus Average Retirement Age by Vehicle Category**

Vehicle Category/ Minimum Retirement Age	Average Retirement Age (Years)	Share of Active Vehicles That Are:	
		One or more years past the retirement minimum	Three or more years past the retirement minimum
12-Year Bus	15.1	19%	9%

Another consideration in establishing the useful service life of a bus is the minimum life-cycle cost replacement ages and mileages. In 2021, Saskatoon Transit had an average of 54,395 kms (34,000 miles) travelled/year/bus, which is higher than Calgary (43,675 kms), Winnipeg (43,129 kms), Edmonton (40,444 kms) and Regina (41,026 kms). Based on Table ES-3 from the Report, for a Heavy-Duty Large Bus the minimum life cycle cost age is 14 years, and the minimum cost mileage is 490,000 miles (784,000 kms). At an average of 54,395 kms/year/bus and minimum cost mileage of 784,000 kms, that works out to an age of 14.4 years.

**Table ES-3  
Minimum Life-Cycle Cost Replacement Ages and Mileages by Service-Life Category**

Vehicle Type / Category	Annual Vehicle Mileage	Minimum Cost Age	Minimum Cost Mileage
Heavy-Duty Large Bus:	25,000	17	425,000
12-Years / 500,000 Miles	35,000	14	490,000
	45,000	12	540,000

Finally, the Report makes the distinction between four different concepts of useful-life including optimal useful life, expected (or planned) useful life, minimum useful life, and the current average retirement ages for U.S. transit buses. Table 1-3 from the Report presents these concepts and their definitions. From reviewing information in the Report on actual service life and minimum life cycle replacement ages and mileages, most vehicles still have useful and cost-effective service beyond the minimum FTA’s 12-year minimum service life, but most of the asset’s value has been consumed.

**Table 1-3  
Vehicle Useful Life Concepts**

Useful Life Concept	Definition	Example Based on “12-Year” Bus
<b>Expected or Planned Useful Life</b> <i>The age at which agencies “expect” or “plan” to retire their vehicles</i>	The age at which transit operators plan to retire their transit vehicles under the assumption that these assets will be completely worn	For many agencies, this point is driven by policy and/ or funding availability and occurs at age 12 to 15
<b>Average Useful Life</b> <i>The age at which agencies “do” retire their vehicles</i>	The average age at which U.S. transit operators “actually” retire their transit vehicles	Based on analysis of NTD data presented below, the average retirement age is 15.1 years.
<b>Optimal Useful Life</b> <i>The age at which agencies “should” retire their vehicles</i>	The financially optimal point for vehicle retirement (i.e., the point at which life-cycle costs are minimized)	Based on the analysis in Chapter 7, this occurs between 12 to 14 years depending on annual mileage and other factors
<b>Minimum Useful Life</b> <i>The minimum age at which agencies are “allowed” to retire their federally funded vehicles without penalty</i>	The <i>minimum</i> age/mileage to retire a vehicle. This point assumes that most vehicles still have additional years of useful and cost-effective service but that most of the asset’s value has been consumed	Currently set at 12 years

Source: [https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/Useful\\_Life\\_of\\_Buses\\_Final\\_Report\\_4-26-07\\_rv1.pdf](https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/Useful_Life_of_Buses_Final_Report_4-26-07_rv1.pdf)

Statistics Canada, in conjunction with Infrastructure Canada released statistics on the average useful of public transit vehicles in the Canada provinces. The data shows that for Saskatchewan the average useful life of diesel buses is 10 years which is about three years lower than the national average. The results are shown in table SC1. According to the data, Bio-diesel buses have the longest expected average useful life at 18 years, which are all used in Alberta. Electric buses, used in predominantly in Quebec, Ontario, and Alberta, have an average useful life of 15 years.

**Table SC1: Average Expected Useful Life of Publicly owned Transit Assets (2020)**

Source: Statistics Canada Table 34-10-0254-01

Public transit assets, average expected useful life	Diesel Buses	Bio-diesel buses	Electric buses	Hybrid buses (includes diesel, biodiesel and natural gas)
Canada	13	18	15	14
Newfoundland and Labrador	22	N/A	N/A	N/A
Prince Edward Island	10	N/A	N/A	N/A
Nova Scotia	8	N/A	N/A	N/A
New Brunswick	N/A	N/A	N/A	N/A
Quebec	16	N/A	16	16
Ontario	12	N/A	13	12
Manitoba	18	N/A	N/A	N/A
<b>Saskatchewan</b>	<b>10</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Alberta	14	18	16	7
British Columbia	13	N/A	N/A	N/A
Yukon	12	N/A	N/A	N/A

In summary, based on this research, 12 to 15 years is the industry standard for the useful life of a bus. With a uniformly distributed fleet, this results in an average age of 6 to 7.5 years.