

# Special Purpose Vehicles

## 1 Introduction

According to data compiled by the Japan Automobile Dealers Association (JADA), the number of truck registrations increased slightly in 2013. For example, the number of large truck registrations increased by 105.4% from 2012 to 72,937 units and the number of small truck registrations increased by 103.8% to 235,883 units. Although the Great East Japan Earthquake greatly affected the number of large truck registrations, sales have increased for four consecutive years from the nadir of 2009 caused by the global financial crisis and adverse business conditions for special purpose vehicle manufacturers created by the new government's emphasis of people over infrastructure.

Key points related to the production and sale of special purpose vehicle sales in 2013 include increases for construction vehicles such as concrete pumping trucks, concrete mixing transport trucks, aerial work platforms, and dump trucks. In contrast, sales of sanitation vehicles (i.e., garbage trucks and cesspool emptiers) and trailers were flat, and sales of detachable container trucks decreased. Sales figures for these categories compared unfavorably to the increases in large truck sales.

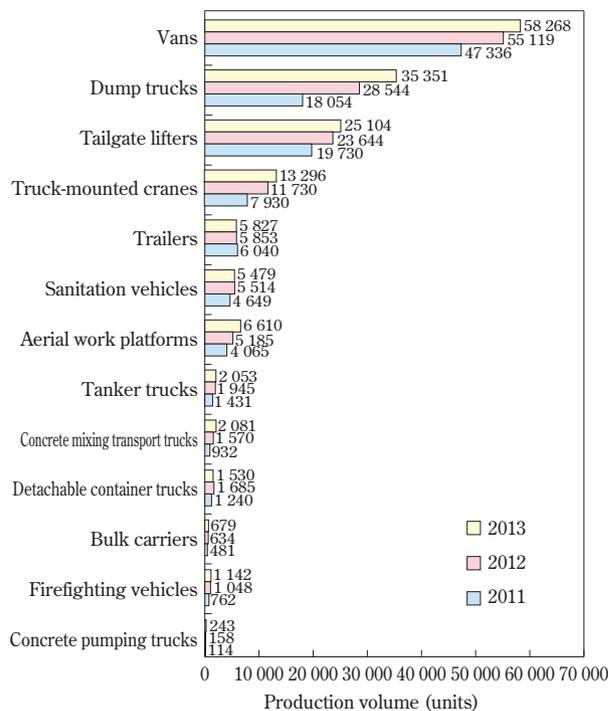
This article describes the main special vehicle trends based on data compiled by the Japan Auto-Body Industries Association (JABIA), the Japan Construction Equipment Manufacturers Association (CEMA), and the Automobile Inspection and Registration Information Association (AIRIA).

## 2 Market Trends

Production of special purpose vehicles increased for four consecutive years from 2009 to 2013, despite a slight blip in 2011 due to the earthquake. Compared to 2012, the number of large truck registrations increased by 105.4% in 2013. In particular, the three largest increases were registered by construction vehicles required to

build infrastructure for disaster reconstruction, such as concrete pumping trucks, concrete mixing transport trucks, and aerial work platforms.

Figure 1 shows the 2013 production results of special purpose vehicles per vehicle type. Compared to 2012, van production increased by 3,149 units to 58,268 units. Although this corresponded to an increase of 105.7%, this growth was lower than for other vehicle types. For example, the overall dump truck category increased by 6,807 units to 25,351 units. This was less than the growth achieved in 2012, but still corresponded to an increase of 123.8%. The production of every type of dump truck rose: large dump trucks by 152.6% to 7,194 units, medium dump trucks by 117.3% to 14,317 units, small dump trucks by 114.4% to 12,098 units, and mini-vehicle dump trucks by 165.0% to 1,739 units. As mentioned



Source: JABIA

Fig. 1 Production results of special purpose vehicles per product type.

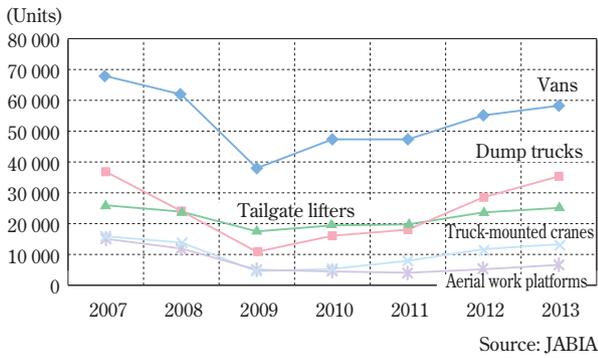


Fig. 2 Production trends of five typical special purpose product types.

above, the largest growth in production was achieved by concrete pumping trucks (up by 153.8% to 243 units), followed by concrete mixing transport trucks (up by 132.5% to 2,081 units), and aerial work platforms (up by 127.5% to 6,610 units). The production of dump trucks, truck-mounted cranes, and construction vehicles all increased. The production of tailgate lifters increased by 106.2% to 25,104, virtually the same rate of increase as large trucks and a similar trend to vans. However, the figures for other vehicle types show a slight decrease in trailer production compared to 2012, the second successive year-on-year drop. Overall, production of the thirteen types of vehicles shown in Fig. 1 increased for the fourth consecutive year by 110.5% to 157,663 units.

Figure 2 shows the production trends for five typical products (vans, dump trucks, tailgate lifters, truck-mounted cranes, and aerial work platforms) with annual production in 2013 of more than 10,000 units over the past seven years. Excluding aerial work platforms, production of these five vehicle types hit bottom in 2009 before recovering. In particular, from 2009 to 2013, van production increased by 153.4%, dump truck production increased by 325.7%, truck-mounted crane increased by 291.3%, and tailgate lifter production increased by 143.6%. Production of dump trucks (96.0%) and tailgate lifters (96.7%) has recovered almost to the levels in 2007, before the global financial crisis. However, overall production of these five vehicle types was still only 85.8% of the 2007 levels.

Figure 3 shows the trends for the average number of years in service from initial registration. This graph was prepared from registration data provided by AIRIA. The original registration data includes the number of registered vehicles at the end of March 2013 for each

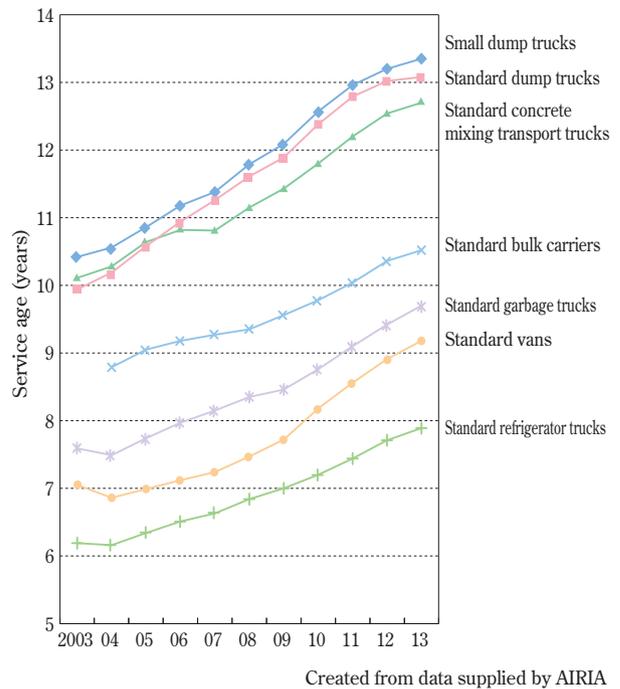
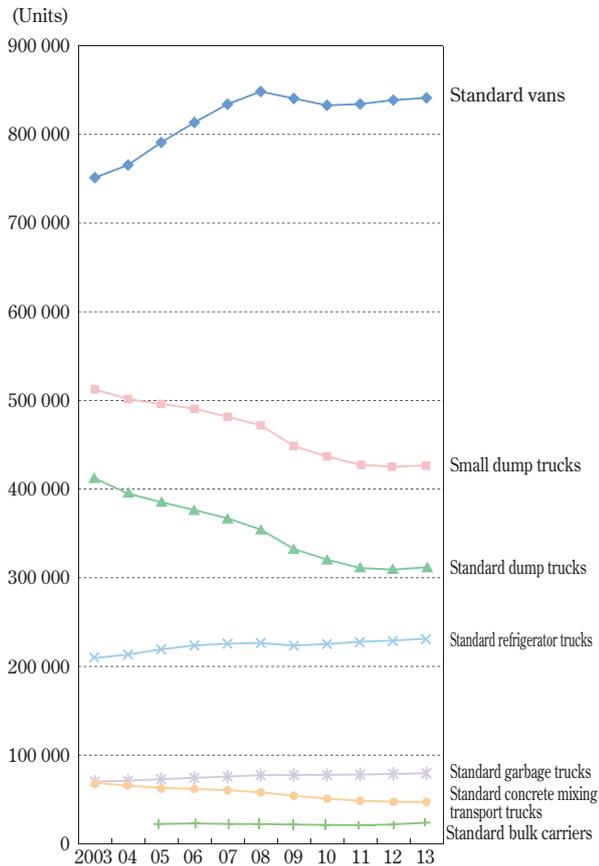


Fig. 3 Average service age from initial registration.

registration year between 1995 and 2012, and as collected data prior to 1994 (i.e., vehicles in service for more than 20 years). The average service age was extrapolated from these figures. According to the graph, the service age of each of these seven vehicle types is increasing. In particular, in the ten years between 2003 and 2013, the service age of standard dump trucks increased by the largest amount (3.14 years), followed by small dump trucks (2.93 years), and standard concrete mixing transport trucks (2.59 years). It is likely that the clearly separated dual trend between construction vehicles and other logistics-related vehicles will continue in the future.

However, the difference in service age of standard dump trucks between 2012 and 2013 was virtually flat at only 0.06 years and the rate of increase in service age for small dump trucks and standard concrete mixing transport trucks has plateaued for the past two years. The industry hopes that the service age of construction vehicles has now peaked.

Figure 4 shows the overall number of each of these vehicle types in Japan at the end of March each year. Although the number of standard vans increased from 751,262 in 2003 to 848,358 in 2008, it has hardly increased since then. However, the number has increased slightly from 832,809 in 2010 to 841,251 in 2013. Small dump trucks decreased by 17.0% from 512,548 in 2003 to



Created from data supplied by AIRIA

Fig. 4 Trends for overall number of special purpose vehicles in Japan.

425,169, equivalent to an annual rate of -1.9%. However, the number in 2013 was virtually unchanged at 426,675. Standard dump trucks decreased by 24.8% from 412,037 in 2003 to 309,184 in 2012, equivalent to an annual rate of -2.8%. However, the number of small dump trucks and standard dump trucks actually increased from 2012 to 2013, even if that increase was less than 1%. This indicates that the long-term decline for these trucks may have bottomed out. Standard refrigerator trucks increased by 10.5% from 209,411 in 2003 to 231,353, equivalent to an annual rate of 1%. Standard garbage trucks increased by 13.4% from 70,042 in 2003 to 79,450 in 2013, equivalent to an annual rate of 1.3%. Standard concrete mixing transport trucks decreased by 31.3% from 68,897 in 2003 to 47,354 in 2012, equivalent to an annual rate of -3.5%. However, this figure only fell by 0.5% in 2013 to 47,104, indicating that the declining trend is coming to an end. Standard bulk carriers also decreased by 7.9% from 19,218 in 2005 to 17,703 in 2012, equivalent to an annual

Table 1 Production proportions of non-earth and sand dump trucks, and dump trucks with SUS or aluminum bodies.

Vehicle type	Non-earth and sand	SUS	Aluminum
2-ton trucks	1.3%	0.2%	0%
4-ton trucks (GVW: less than 8 tons)	4.1%	0.6%	0%
GVW: 8 tons to less than 16 tons	13.8%	5.1%	0.3%
GVW: 20 tons	3.0%	5.4%	0%
GVW: 22 tons	19.9%	32.8%	0.7%
GVW: 25 tons	78.9%	77.4%	5.3%

Source: JABIA

rate of -1.3%. Again, however, this figure only fell by 0.4% in 2013 to 17,639. Although these figures show that the numbers of construction vehicles such as dump trucks and concrete mixing transport trucks decreased greatly up to 2011, the rate of decline bottomed out in 2012 and 2013. This is probably due to the effects of recovery work from the earthquake, Abenomics, the decision to host the 2020 Summer Olympics and Paralympics in Tokyo, and greater construction-related demand. However, the number of these vehicles on the road in Japan is unlikely to rise substantially in the long term, and the flat or very slight growth trends that are forecast for the next few years will require close monitoring.

### 3 Special Purpose Construction Vehicles

#### 3.1. Dump trucks

Dump truck production in 2013 increased by 123.8% from 2011 to 35,351 units. According to vehicle class, large dump trucks increased by 2,481 units to 7,194 units (152.6%), medium dump trucks increased by 2,115 units to 14,317 units (117.3%), and small dump trucks increased by 1,523 units to 12,098 units (114.4%). Although the production of large, medium, and small dump trucks all increased, the rates of increase were lower than in 2012 (171.8%, 160.0%, and 155.3%, respectively).

Table 1 shows the proportions of dump trucks produced in 2013 for transporting material other than earth or sand (i.e., non-earth and sand dump trucks). The overall proportion of this category of trucks fell in 2013 compared to 2012. For example, the proportion of 4-ton vehicles was 4.1% in 2013, down from 5.3% in 2012, the proportion of trucks with a gross vehicle weight (GVW) of 20 tons fell to 3.0% in 2013 from 7.4% in 2012, and the proportion of trucks with a GVW of 22 tons fell to 19.9% in 2013 from 35.3% in 2012. These figures indicate that the proportion of dump trucks produced for transporting earth or sand increased since these trucks are used

to build infrastructure as part of earthquake recovery work. Stainless steel (SUS) is used as a long-life corrosion-resistant body material for dump trucks. In the SUS body category, the proportions of each GVW category other than trucks with a GVW of 25 tons hardly changed from 2012 (GVW of 20 tons: 5.4%, GVW of 22 tons: 32.8%). However, the proportion of SUS-bodied trucks with a GVW of 25 tons increased dramatically to 77.4% in 2013 compared to 35.9% in 2012. In addition, the proportion of non-earth and sand dump trucks with a CVW of 25 tons increased to 78.9% in 2013 from 68.9% in 2012. This shows that, unlike other large trucks, 2013 was a standout year for the production of SUS-bodied and non-earth and sand dump trucks, resulting in clear increases in these categories. This was probably because as the overall production of dump trucks increased, the only individual category that decreased dramatically was the production of trucks with a GVW of 25 tons (60.3% of 2012). Due to the effects of the increase in production of trucks with a GVW of 20 tons, only the bare minimum number of these trucks was produced.

According to fuel, most dump trucks were equipped with diesel engines. Only 2 compressed natural gas (CNG) or liquefied petroleum gas (LPG) powered 2-ton dump trucks were produced. Four gasoline-powered dump trucks and 9 hybrid dump trucks were also produced in the same GVW category. However, there was no production in the 4-ton category.

### 3.2. Concrete mixing transport trucks

Production of concrete mixing transport trucks in 2013 increased by 132.7% from 2012 to 2,083 units. However, this contrasted with the results for the previous two years that saw increases in excess of 150%. According to class, large concrete mixing transport trucks increased by 138.1% to 1,761 units, medium concrete mixing transport trucks increased by 115.4% to 255 units, and small concrete mixing transport trucks fell to 87.8% of 2012 to 65 units. The trend for large concrete mixing transport trucks is particularly noticeable, increasing 435.2% since 2010. The average service age since initial registration of concrete mixing transport trucks has increased by 2.69 years from 10.11 years in 2003 to 12.70 years in 2012. The overall number of concrete mixing transport trucks has also declined by 31.6% from 68,897 in 2003 to 47,104 in 2012. However, both the increase in service age and the rate of decline in the number of these trucks has dropped in recent years.

## 4 Fixed Capacity Special Purpose Vehicles

### 4.1. Tanker trucks

Production of tanker trucks in 2013 increased by 105.6% from 2012 to 2,053 units. According to class, production of large tanker trucks decreased to 87.0% of the level in 2012 to 443 units, but medium tanker trucks increased by 110.9% to 1,354 units, and small tanker trucks increased by 116.1% to 245 units. Although the production of tanker trucks increased greatly in 2012, increases in medium and small tanker truck production in 2012 were large enough to offset a decrease in large tanker truck production, resulting in another slight overall increase. However, these figures indicate that the continued increases in production since 2009 have now come to an end. Large (21.6%) and medium (66.0%) tanker trucks accounted for roughly 90% of production, a proportion that did not change from 2012.

A detailed analysis shows that oil tanker trucks increased by 22 units from 2012 to 1,238 units, an increase of 101.8%. The number of large oil tanker trucks decreased by 49 units to 311 units (86.4% of 2012) and the number of medium oil tanker trucks increased by 50 units to 821 units, an increase of 106.5%. The number of water spraying or water supply trucks increased by 112 units to 719 units, an increase of 114.5%, which also contributed to the increase in tanker truck production.

According to use, the proportion of oil tanker trucks increased from 60.0% in 2011 to 62.5% in 2012, but fell back to 60.3% in 2013.

### 4.2. Bulk carriers

Production of bulk carriers in 2013 increased by 107.1% from 2012 to 679 units. According to class, large bulk carriers accounted for approximately 95% of this total, a proportion that remained unchanged. The proportion of bulk cement carriers increased from 41.4% in 2011 to 53.2% in 2012, and 60.5% in 2013. In contrast, the proportion of bulk foodstuff carriers decreased from 41.6% in 2011 to 36.8% in 2012, and 31.7% in 2013. This was because bulk cement carrier production increased by 122.0% from 2012, whereas bulk feedstuff carrier production fell to 92.3% of 2012. As with concrete mixing transport trucks, these results underlined the signs of recovery in concrete demand.

Although the overall number of standard bulk carriers fell by 9.5% from 19,218 units in 2005 to 17,393 units in 2011, the number of standard bulk carriers increased by

101.8% to 17,703 units in 2012 compared to 2011. In 2013, production was virtually unchanged at 17,639 units (99.6% of 2012), showing that the decreasing trend has stopped.

### 4.3. Vans

Van production in 2012 increased by 116.4% from 2011 to 55,119 units. Although production in 2013 only increased by 105.7% from 2012 to 58,268, this rate of increase is virtually the same as that for large trucks. According to class, production of large vans decreased to 97.3% of the level in 2012 to 13,225 units, but medium vans increased by 102.7% to 18,326, small vans increased by 112.7% to 25,327 units, and mini-vehicle vans increased by 115.4% to 1,390 units. As was the case in 2012, the rate of increase was larger as the size of the van decreased. According to use, production of ordinary goods vans increased by 113.4% from 2012 to 15,386 units, side-opening vans decreased to 98.0% of the level in 2012 to 18,794 units, and refrigerator and freezer vans increased by 105.4% to 20,278 units. According to proportion of type, ordinary goods vans accounted for 26.4% of production, compared to 32.3% for side-opening vans and 34.8% for refrigerator and freezer vans. According to body material, steel accounted for 1,197 units (2.1%), aluminum for 51,161 units (87.8%), and fiber reinforced plastic (FRP) for 5,910 units (10.1%). There were no major changes in these proportions.

The overall number of standard vans increased from 751,262 units in 2003 to 848,358 units in 2008. This number then fell to a low of 832,809 units in 2010, before increasing slightly to 841,251 units in 2013.

## 5 Other Special Purpose Vehicles

### 5.1. Sanitation vehicles

The category of sanitation vehicles includes garbage trucks, large capacity garbage dump trucks, cesspool emptiers (also known as vacuum trucks), as well as cleaning trucks and road sweepers (i.e., dewatering trucks and trucks that clean by spraying water or using suction). Production of these vehicles in 2013 was 5,479 units, 99.4% of the level in 2012. According to proportion of type, production of garbage trucks increased by 103.7% from 2012 to 3,827 units and accounted for 69.8% of sanitation vehicle production. Cesspool emptiers also increased by 102.5% to 982 units and accounted for 17.9% of sanitation vehicle production.

The overall number of standard garbage trucks increased by 9,408 units from 70,042 units in 2003 to 79,450

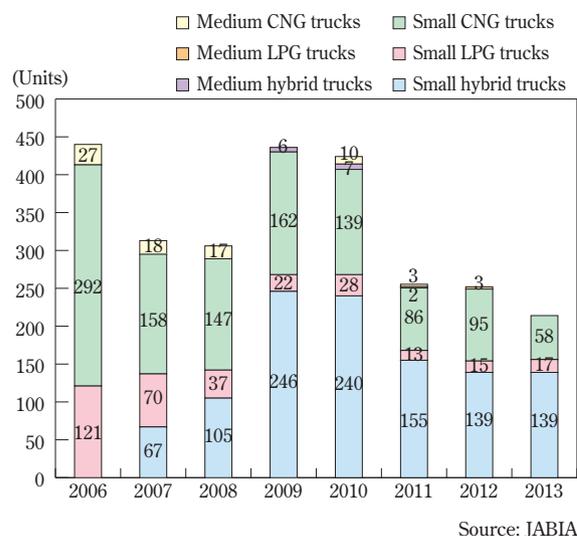


Fig. 5 Production volumes of CNG and LPG garbage trucks.

units in 2013. The average service age from initial registration increased by 2.11 years from 7.59 years in 2003 to 9.70 years in 2013.

Figure 5 shows the production status of CNG and LPG garbage trucks, which have grown in popularity as environmental awareness has increased. Annual production of small CNG and LPG-powered garbage trucks decreased greatly to 75 units, 68.2% of the level in 2012. Furthermore, production of small hybrid garbage trucks designed to reduce both fuel consumption and emissions was 139 units, maintaining the substantially lower production levels of 2012. Overall production of low-polluting environmentally friendly hybrid, CNG, and LPG garbage trucks fell from 440 units in 2006 to 214 units in 2013. This production trend will require close monitoring in the future.

### 5.2. Detachable container trucks

Production of detachable container trucks in 2013 decreased to 1,530 units, 90.8% of the level in 2012. According to class, large detachable container trucks decreased to 440 units (77.2% of 2012), medium detachable container trucks decreased to 850 units (97.5%), and small detachable container trucks decreased to 233 units (97.5%). However, compared to 2009, when production of these trucks fell due to the economic downturn, production of large, medium, and small detachable container trucks has increased by 167.3%, 227.9%, and 213.8%, respectively. The growth in medium detachable container truck production is particularly noticeable. According to the proportion of each class, large detachable container trucks accounted for 37.8% of the total, medium detachable con-

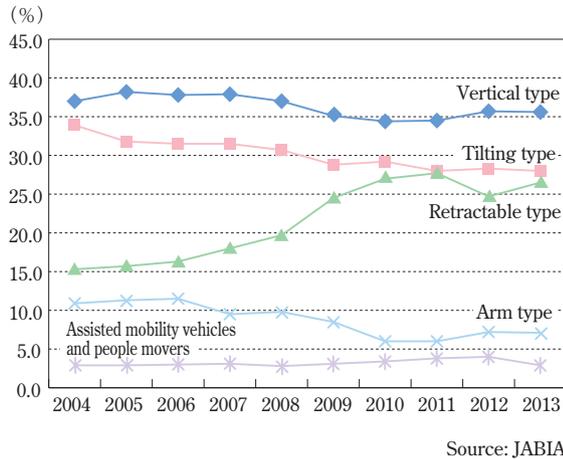


Fig. 6 Production proportion of tailgate lifters per type and use.

tainer trucks accounted for 51.8%, and small detachable container trucks accounted for 14.2%. There were no major changes in these proportions.

### 5. 3. Aerial work platforms

The production of aerial work platforms in 2013 was 5,044 units, which was 42.3% of the level in 2009. Production fell to 4,065 units in 2011, but recovered to 5,185 units in 2012 (an increase of 127.6% from 2011) and 6,610 units in 2013 (an increase of 127.5% from 2012). However, as shown in Fig. 2, this figure is still substantially lower than in 2007 and 2008. Categories of aerial work platforms include truck-mounted and self-propelled types. Truck-mounted aerial work platforms are mainly used for electrical and communication system engineering work, whereas self-propelled aerial work platforms tend to be found on construction sites, inside buildings and so on.

### 5. 4. Truck-mounted cranes

This category of vehicle mostly comprises a crane mounted behind the cab of a flat-bed truck and is used for construction or building work, or for handling cargo. Production of truck-mounted cranes, which reached 13,964 units in 2008, fell to 4,565 units in 2009 (32.9% of the previous year). However, as shown in Fig. 2, the production of truck-mounted cranes has increased for four consecutive years, reaching 13,296 units in 2013. This was 118.2% higher than in 2012, 291.3% higher than in 2009, and up to 95.9% of the level in 2008. Production has finally recovered to close to the level before the global financial crisis.

### 5. 5. Tailgate lifters

Tailgate lifters are mounted to the back of flat-



Fig. 7 Mobile crusher.



Fig. 8 Large mobile decontamination vehicle.

bed trucks or vans as a typical labor-saving device for handling cargo. Production of tailgate lifters in 2013 increased by 106.2% from 2012 to 25,104 units. According to type and use, vertical tailgate lifters increased by 105.9% to 8,940 units, tilting tailgate lifters increased by 104.9% to 7,024 units, retractable tailgate lifters increased by 113.8% to 6,646 units, and arm-type tailgate lifters increased by 103.7% to 1,776 units. However, tailgate lifters for assisted mobility vehicles and people movers decreased to 718 units, 75.6% of the level in 2012.

Figure 6 shows the production proportion of tailgate lifters per type and use. Vertical lifters accounted for the largest proportion (35.6%), followed by tilting, and retractable types. Over the last few years, the proportion of retractable tailgate lifters has been increasing and shows signs of overtaking the proportion of tilting tailgate lifters.

### 5. 6. Trailers

Trailers are used to transport large volumes or heavy items. In 2013, production decreased slightly to 5,827 units, 99.6% of the level in 2012. According to type, production of low-bed trailers increased to 270 units (182.4% of 2012), flat-bed trailers increased to 1,355 units (109.1%), van-type trailers decreased to 1,480 units (96.5%), trailers for containers decreased to 1,662 units (96.4%), tanker trailers decreased to 486 units (75.3%), dump trailers increased to 183 units (133.6%), vehicle carriers increased to 239 units (123.2%), and full trailers decreased to 129 units (64.5%). The increase in dump trailers reflects the trends of the equivalent standalone dump vehicles and is quite noticeable.

Three years has passed since the Great East Japan

Earthquake. Dump trucks and other types of special purpose vehicles are being used to assist the recovery of the affected areas. Furthermore, 2013 and 2014 saw the development of two new special types of trailer. The mobile crusher (Fig. 7) is a trailer that carries a conventionally fixed type of crushing device. This machine is capable of processing earthquake rubble on site without

the need for transportation. The large mobile decontamination vehicle (Fig. 8) is a tractor-trailer that sprays road surfaces with high-pressure water and sucks up the contaminated water through the floor. It is hoped that these two vehicles will help speed the recovery of the areas affected by the earthquake.