

# Using Automated EV buses at Fukushima Daiichi Nuclear Power Station

(Initiatives to put automated EV buses into practical use for the first time in Japan)

April 6, 2018



Tokyo Electric Power Company Holdings, Inc.

- Employing automated EV buses at the Fukushima Daiichi Nuclear Power Station will enable site infrastructure creation and decommissioning to proceed even smoother. The buses are planned to be put into use on April 18.
- At the Fukushima Daiichi Nuclear Power Station we have repeatedly tested automated buses and are proactively sharing that know-how with the local governments in the hopes that we can contribute to the recovery of transportation services in the Hamadori region.

## 1. The significance and objectives of employing automated buses

~Making the decommissioning process even smoother~

1

### **Making on-site transportation more efficient and convenient**

**By leveraging technology we will gradually create an environment in which workers on site can "go where they want, when they want."**

2

### **Improving vehicle management**

**By gradually replacing on-site transportation with EV buses, it will be possible to manage transportation in a unified manner and also eliminate problems associated with oil leaks.**

3

### **Making workers proud**

**Conveying to the world that we are making improvements to the work environment by leveraging cutting-edge technology will make site workers proud**

4

### **Reducing the exposure of bus drivers**

**Environmental improvements are moving forward but we still want to reduce exposure as much as possible ⇒ Exposure per bus driver: 1~2mSv/Year(FY2016)**

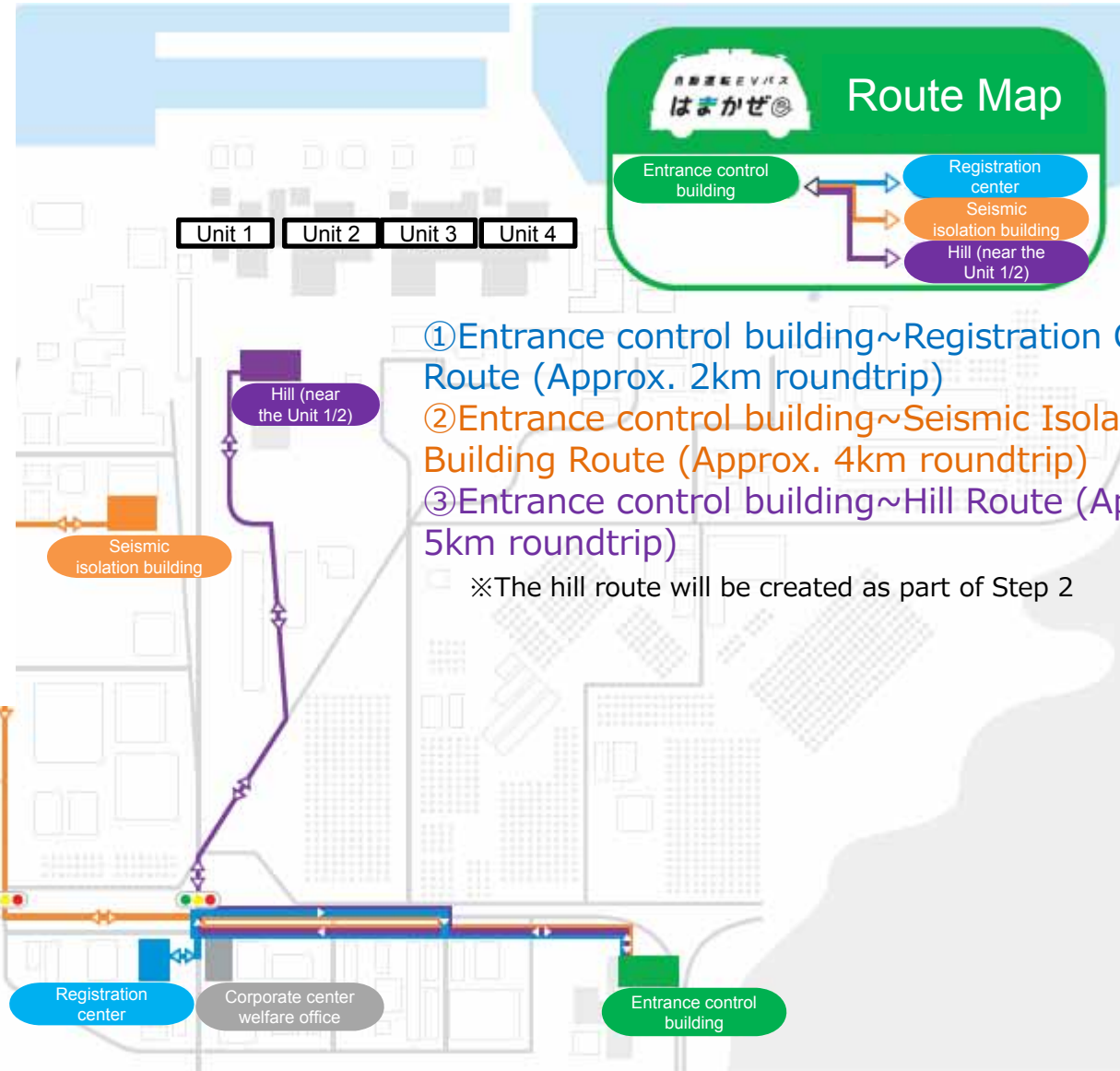
## 2. Bus routes

- Three "ARMA" EV buses manufactured by NAVYA in France will be put into use on April 18.

### 【Basic Specifications】



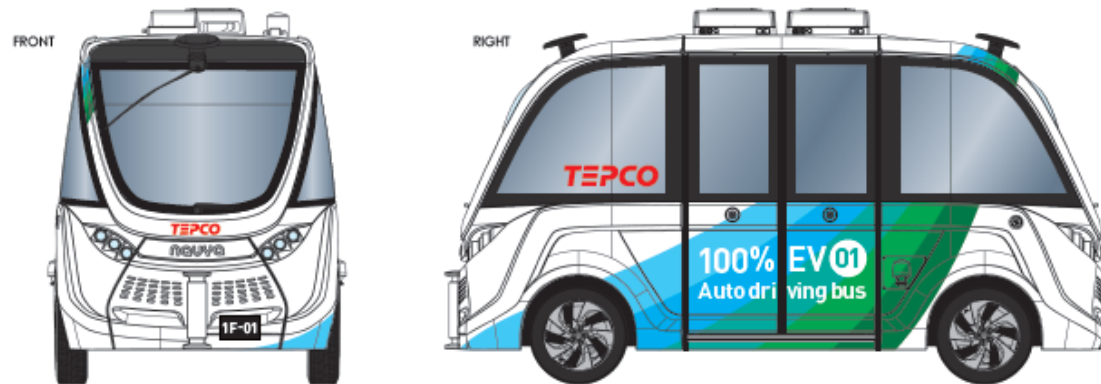
Length	4.75m
Width	2.11m
Height	2.65m
Max. Speed	45km/h
Total Weight	3450kg
Capacity	15(11 seats)



### 3. Vehicle Design and Name

- Employees and contractors voted on which vehicle design to use from amongst three choices  
【What the design is meant to convey】

The design is meant to express the “fresh breeze of Hamadori” by employing shades of blue to represent the sea and sky at Hamadori as well as the color of work uniforms in the G Zone, and shades of green which represent the mountains of Hamadori as well as “safety.”



- Name: “Hamakaze-e”  
【What the name is meant to convey】

The name “Hamakaze-e” was selected to match the design.

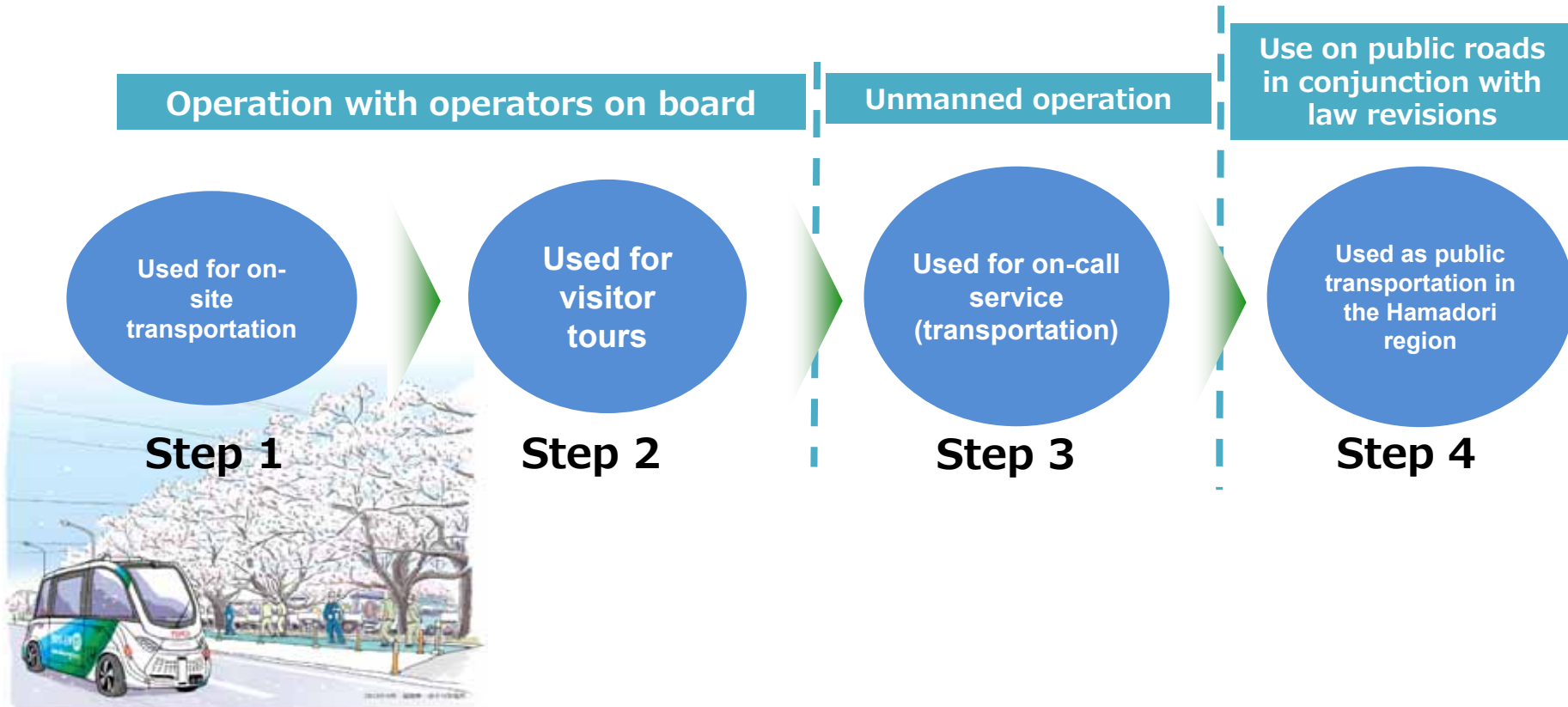
The “e” stands for EV, Ecology and Energy.

※ More than 100 potential names were submitted by employees and contractors

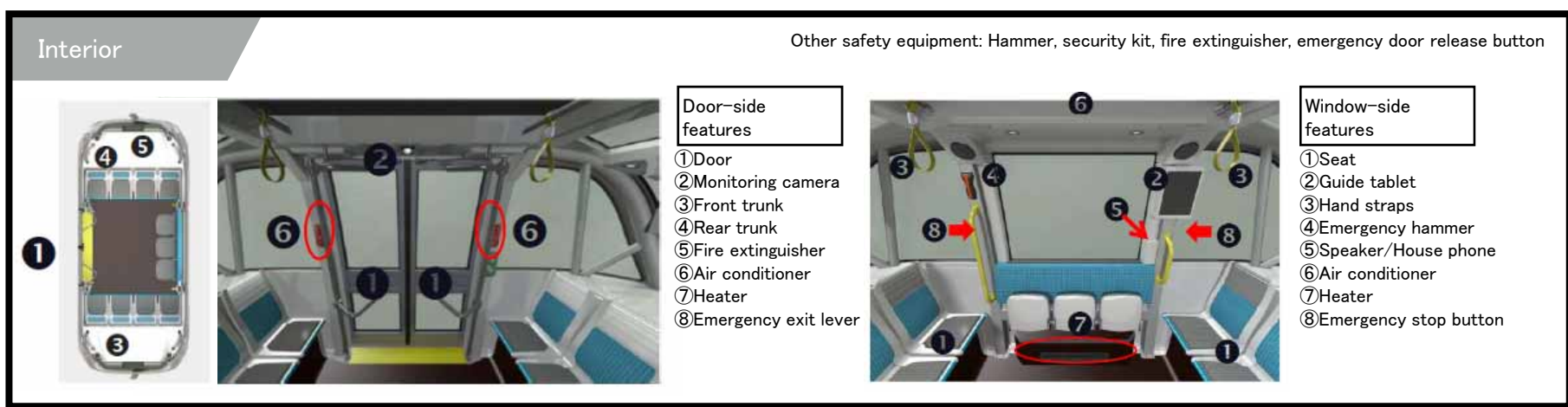
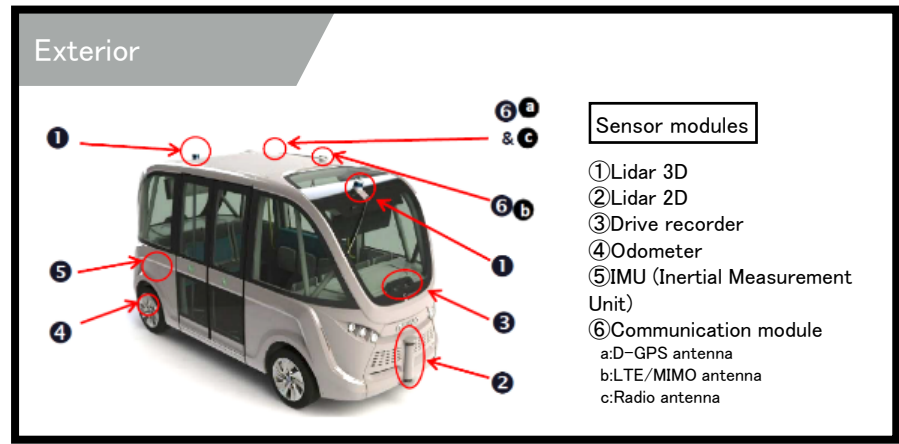
はまかせ<sup>e</sup>

## 4. Future plans for automated EV buses

- At the Fukushima Daiichi Nuclear Power Station we have repeatedly tested automated buses and are proactively sharing that know-how with the local governments in the hopes that we can contribute to the recovery of transportation services and revitalization in the Hamadori region.



**[Reference] Overview of automated EV buses (Vehicle Features)** **TEPCO**

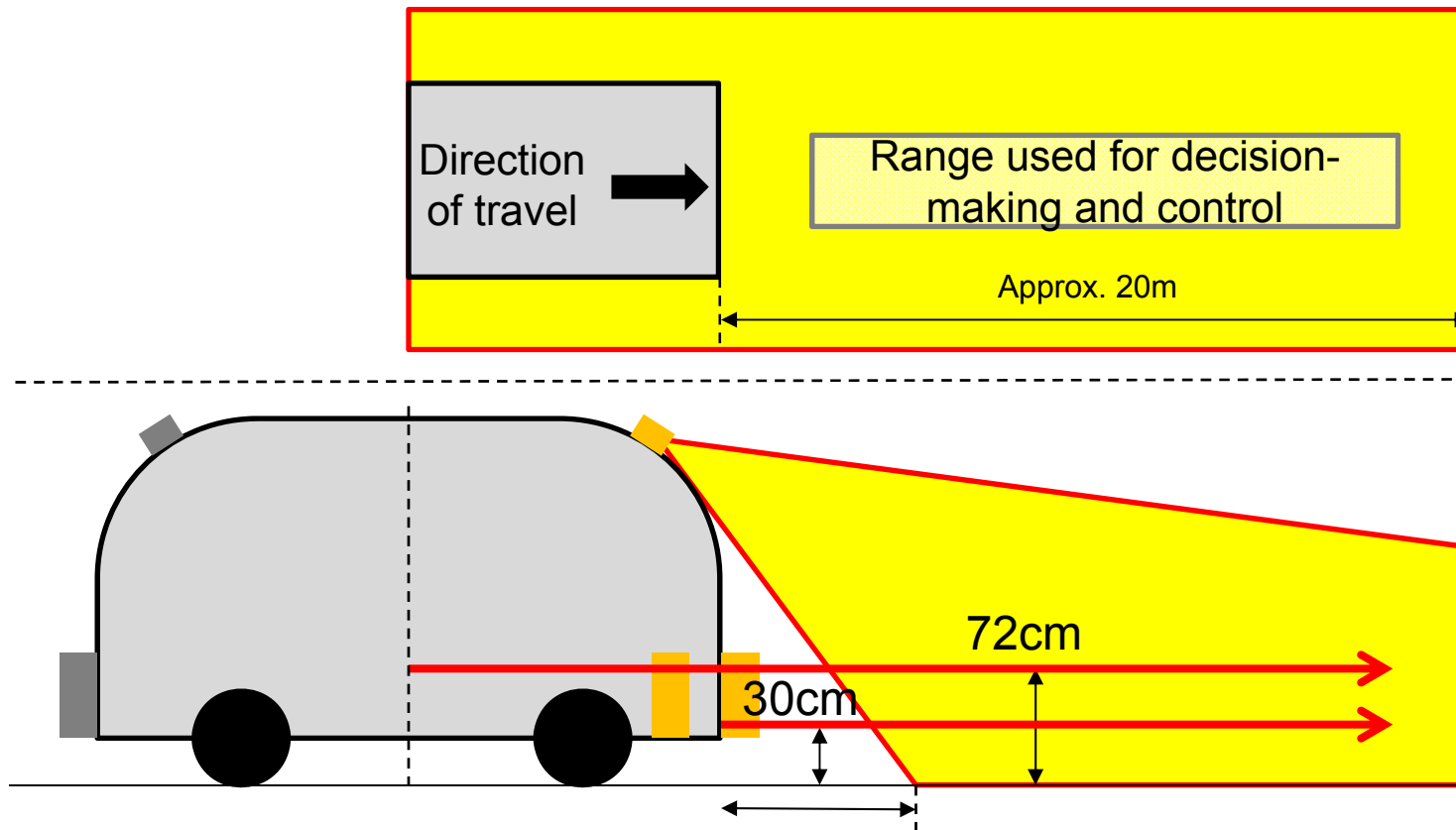


※ It is not shown in the pictures but seatbelts will be added to all seats

## 【Reference】 Range of obstacle detection

- 2DLiDAR + 3DLiDAR can scan even children and objects around knee-height.
- At the current time vehicle sensors cover all 360° around the vehicle, but the large volume of data that requires processing results in delayed decision-making and control, so the detection area will be limited.

< Concept diagram of sensor detection range.  
The range is shown by the red lines >



【Reference】 Partners that have enabled automated buses to operate safely

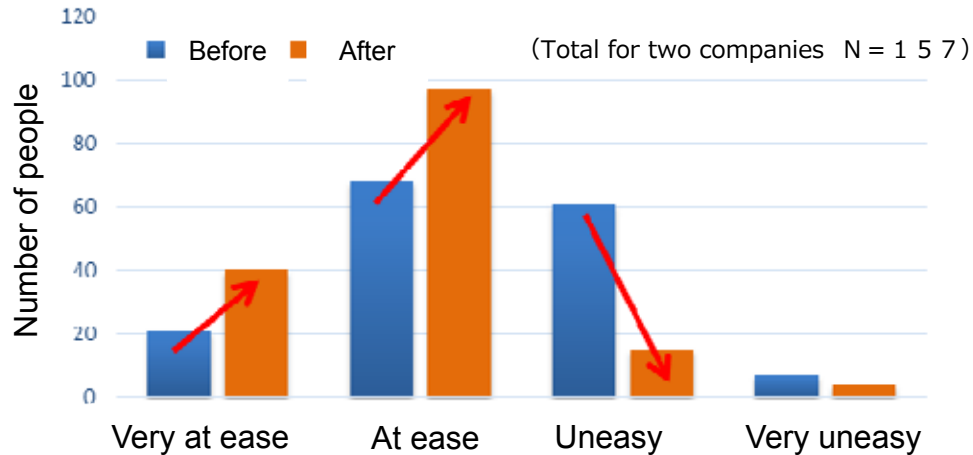


- In addition to help from companies specializing in vehicles, IT, and damage insurance/risk management, we also enlisted the help of local bus companies and mechanics that are intimately familiar with the weather attributes of the Hamadori region and have the maintenance and operation management know-how required to operate these buses safely.

Role	Company
Manufacturers of vehicles and develops the automated operations	NAVYA (France)
Import sales agent	Mitsui & Co. Plant Systems, Ltd.
Operation management system, operator training	SB Drive Corp.
Bus operation management	On-site bus companies ※Help enlisted from local bus companies familiar with the site
Vehicle maintenance (Including regular inspections required by law)	ICHINEN TD LEASING CO., LTD. ※Actual maintenance performed by local mechanics
Damage insurance/Risk management	Mitsui Sumitomo Insurance Co., Ltd. MS&AD InterRisk Research & Consulting, Inc.

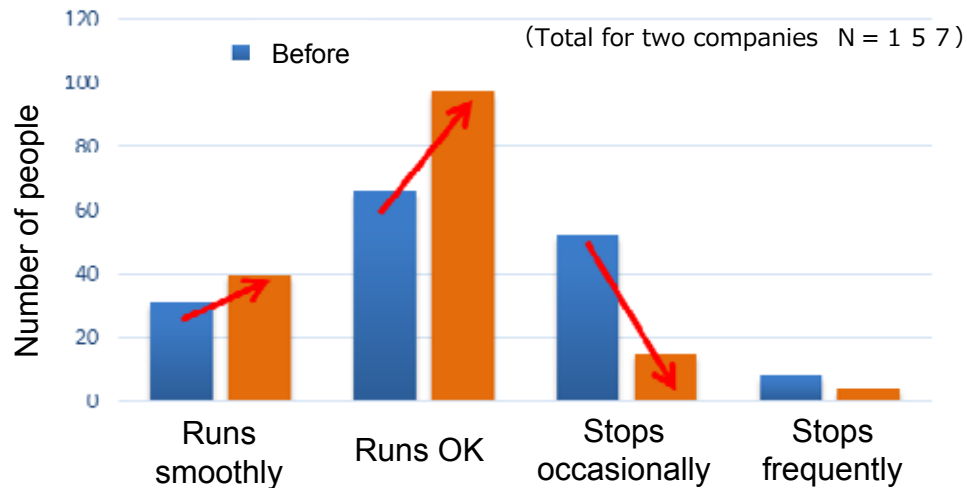


Changes in feelings of uneasiness before and after the test ride



- **The percentage of people whose minds were put at ease through test rides increased 50%.**
- **Some comments from people whose minds were put at ease:**
  - The test ride rid my feelings of uneasiness
  - The bus slowed down when it detected an obstacle

Changes in impression of bus operation before and after the test ride



- **The number of people that felt the bus operated well increased as a result of test rides.**
- **However, there were some participants that felt that the buses were traveling too slow so we need to adjust the speed in consideration of safety and gradually increase speed in the future.**

