

InterRisk Thailand Report <2024 No.01>

Thai school bus caught on fire, what could make the Thailand's roads safer?

[Summary]

- The fuel used in Natural Gas Vehicle (NGV) is highly flammable and lighter than air. In enclosed spaces like a bus, leaks can create explosive conditions. Therefore, proper regular maintenance of the fuel system is essential to ensure safety.
- Vehicles using compressed natural gas (CNG)* must follow strict fuel tank inspection and maintenance guidelines to prevent leaks or malfunctions.
- Children often lack safety awareness and the mindset of adults when the incidents occur; it is crucial that the children are properly taught in terms of safety skills.
- According to the Department of Land Transportation, the training curriculum states that the registered driver should be properly trained in road safety training.
- BEWAGON Principles help bus drivers understand safety procedures before turning on their car

* There are two types of NGV:CNG vehicles (Compressed Natural Gas) that compress and store gas in high-pressure containers, and LNG vehicles that liquefy and store natural gas. In many countries, including Thailand, NGV typically refers to CNG vehicles.

Tragic bus fire incident raises safety concerns

On 1 October 2024 at 12:00 P.M.

A tragic fire broke out on a double-decker bus carrying 38 students, 6 teachers, and 1 driver from Uthai Thani while traveling on Vibhavadi Rangsit Road. The accident resulted in **the deaths of 20 students and 3 teachers**. The fire was caused by a gas malfunction or leak in the front area of the bus. This incident has raised significant concerns about safety protocols, particularly for **NGV**. Additionally, the bus involved in the accident was originally registered on February 19, 1970, making it 54 years old, and was re-registered on October 26, 2018, due to modifications. However, **the fuel system installation did not comply with regulations**, as 11 gas tanks were installed despite the permit allowing only 6. The incident has sent shockwaves through the community and raised concerns about transportation safety.

This devastating incident underscores the critical risks associated with NGV, particularly when proper safety measures and regulatory standards are not adhered to. The fact that the bus operated with outdated registration and an improper fuel system highlights the dangers of mismanagement in the transportation sector. It is essential to reflect on the widespread safety implications for all NGVs, ensuring that stricter regulations and enforcement are in place to prevent such tragedies in the future.

Realizing the dangers of flammable gases and fire safety equipment

The fuel of NGV, primarily composed of methane (CH₄), is highly flammable and lighter than air, with 0.6-0.8 specific gravity, allowing it to disperse easily in open areas. However, leaks can create highly explosive conditions in enclosed spaces like a bus. If not properly maintained, NGV systems can malfunction, leading to gas leaks or fires.

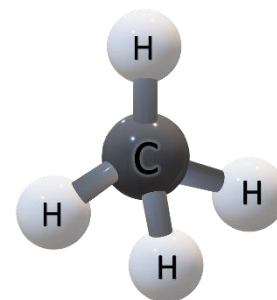


Figure 1. Methane molecular structure

Key Hazards of NGV

Flammability	The fuel of NGV is highly flammable and can ignite if exposed to a spark or flame. The flammability limit is 5% for the lower explosion limit and 15% for the upper explosion limit in terms of atmospheric volume.
Pressurization	NGV systems store gas at high pressure (2900 - 3600 psi), making leaks or container damage a severe risk.
Ignition Source	Electrical faults or heating components may act as ignition sources in a confined space, further increasing the fire risk. NGV autoignition temperature is approximately 537 - 540°C.

Fire Safety Management

The incident highlights the severe risks of flammable gases and improper fire safety measures in enclosed spaces like buses. Fire spreads rapidly in such conditions, and the lack of adequate fire extinguishing equipment may have exacerbated the tragedy.

Buses used for school trips should ensure that **all personnel**, including drivers and teachers, **are trained in emergency evacuation and in the use of suitable fire extinguishers.**

Having adequate fire extinguishers on buses is crucial. According to safety standards, every bus should be equipped with fire extinguishers appropriate for **Class B fires**. (Class B fires are fires in flammable liquids, combustible liquids, and flammable gases). Extinguishers effective for flammable liquids and gas fires, such as halon agents, are recommended. It's also essential that **extinguishers meet standards and are inspected regularly. All personnel should be trained in their use for effective response during an emergency.**



Figure 2. Class B fire
Reference: NFPA 10 Annex B

The importance of fire safety education for children

Public transportation is an essential part of daily life in many cities. **Ensuring the safety of passengers, especially children, is a top priority for transportation authorities.** One of the most severe safety risks is fire. This guide offers essential information and tips to educate children on how to respond appropriately in case of a fire emergency on public transportation because children often lack the self-preservation instincts of adults and may not fully comprehend the dangers of fire. **Teaching them about fire safety can empower them to make informed decisions and take appropriate actions in emergencies.** Adhering to these guidelines and educating children about fire safety can significantly contribute to their safety on public transportation and mitigate the risk of severe injuries.



Practice Low Crawling

Teach children to crawl low to the ground to escape a fire. This helps them avoid inhaling smoke and heat, which can be deadly.



Cover Mouth and Nose

Instruct children to cover their mouths and noses with a wet cloth or their hands to filter out smoke and toxic gases



Maintain Orderly Evacuation

Encourage children to exit the bus calmly and in an orderly manner. Rushing or pushing can lead to accidents.



Identify Emergency Exits

When boarding a bus, children should always locate the nearest emergency exit.



Never Re-enter

Once outside, children should never re-enter the bus under any circumstances.

Comprehensive training approach

Proper vehicle checks and driver training in emergency procedures, including handling NGV-related fire hazards, are essential for regulatory compliance and effective crisis responses. It helps prevent accidents from escalating and reduces potential liability for transport companies.

The Ministerial Regulation on Road Transport Safety B.E. 2558 (2015) issued by the Department of Land Transport specifies the following duration for driver training:

1. Article 3(9), second paragraph: For the first license, the minimum training duration is 20 hours of theoretical instruction and 10 hours of practical driving instruction.
2. Article 4(4): For subsequent licenses, the minimum training duration is 10 hours of theoretical instruction and 5 hours of practical driving instruction.

These training requirements are designed to ensure drivers have the necessary knowledge and skills to operate vehicles safely on the road. The training approach should emphasize safe driving practices and raise awareness of the potential consequences of accidents.

Training curriculum

1. License holders for land transportation businesses must provide training to their drivers at least once a year.
2. The training curriculum must include the following topics:
 - 2.1 Safety Driving Awareness
 - 2.2 Driver Physical Preparedness
 - 2.3 Vehicle Pre-trip Inspection
 - 2.4 Defensive Driving
 - 2.5 Emergency Response
 - 2.6 Managing Driver Fatigue
3. Each training session must be at least 3 hours long, focusing on one of the above-mentioned topics.
4. License holders who have provided training to their employees must submit a report to the licensing registrar within 30 days of completing the training.

Vehicle maintenance regulations and practices

The Department of Land Transport (DLT) has implemented a regulation to ensure the safety for public buses. These regulations require regular maintenance, including inspections every six months or 40,000 kilometers.

The principle for the reminder, so-called **BEWAGON**, has been introduced to license holders of land transportation. Additionally, the DLT has set bus age limits based on their travel distance. Buses traveling less than 300 kilometers per trip can operate for up to 40 years, while those traveling more than 500 kilometers can operate for a maximum of 30 years. These limits aim to guarantee the safety of passengers, especially those using NGV-powered buses.



Brake

inspect the brake system, including brake fluid, clutch fluid, and engine oil.



Water

inspect the cooling system, including coolant level in the radiator.



Gasoline

check the fuel system, including fuel and fuel filter, including bus has installed gas tank that comply with the Department of Land Transportation



Electricity

check the electrical system, such as battery water level, and mounts.



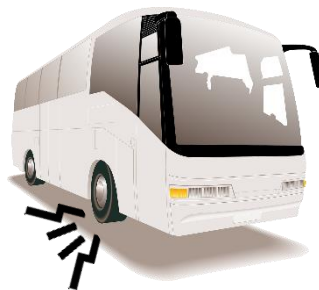
Air

check the air system, including tires (tread depth must be at least 3mm for buses) and black smoke.



Oil

check the coolant level and operation.



Noise

Buses, being large and complex vehicles, can produce a variety of noises. Knocking or pinging: This could be due to pre-ignition, detonation, or a lean fuel mixture.

Conclusion

A tragic fire on an NGV-powered school bus in Thailand has raised concerns about vehicle safety, highlighting the dangers of flammable gases and the need for regular inspections and standards. The incident stresses the importance of properly maintained fire extinguishers, vehicle inspection and well-trained personnel in preventing similar disasters.

Additionally, buses have regulated service lifespans based on their travel distances to ensure continued safety. The BEWAGON checklist is a standard inspection process for public buses and trucks, covering key components like brakes, electricity, water, air, gasoline, and more. Regular training and maintenance are crucial to prevent accidents on the road and protect passengers, especially drivers who must undergo regular training and safety protocols and children who may not have the same self-preservation skills as adults.

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Information on the Training menu from InterRisk Asia Thailand

- InterRisk Asia Thailand offers various risk management menus such as training about Road Safety, Fire Safety, Forklift Safety, BCP for private companies in Southeast Asia.
- We can flexibly respond to consultations regarding Safety training, such as onsite /online /hybrid training, Basic /Awareness /Manners /Motorcycle /Truck course.

Road Safety Training	Safety driving training for automobile/truck drivers and motorcycle users is provided.
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Fire Safety Training	Fire safety training for employees worked in factories and warehouses are provided. The topics of this training are basic knowledge of fire, firefighting equipment, and checkpoints for finding fire risk.
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Forklift Safety Training	A training for forklift operators and workers in forklift operation areas is provided mainly to reduce occupational accidents.
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