

# European incidents database HIAD

3<sup>rd</sup> seminar OECD

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*“High dwellings are the peace and harmony of our descendants.*

*Remember the calamity of the great tsunamis. Do not build homes below this point.”*

*Updated at 3:50 p.m. ET on March 16, 2022*

**T**WO HUNDRED FEET up in the foothills that surround Aneyoshi, a tiny coastal village in Japan, warnings are engraved into the rocks. Most of the messages come from 19th-century survivors of large tsunamis that terrorized people along the coast. “High dwellings are the peace and harmony of our descendants,” one inscription declares. “Remember the calamity of the great tsunamis. Do not build any homes below this point.”

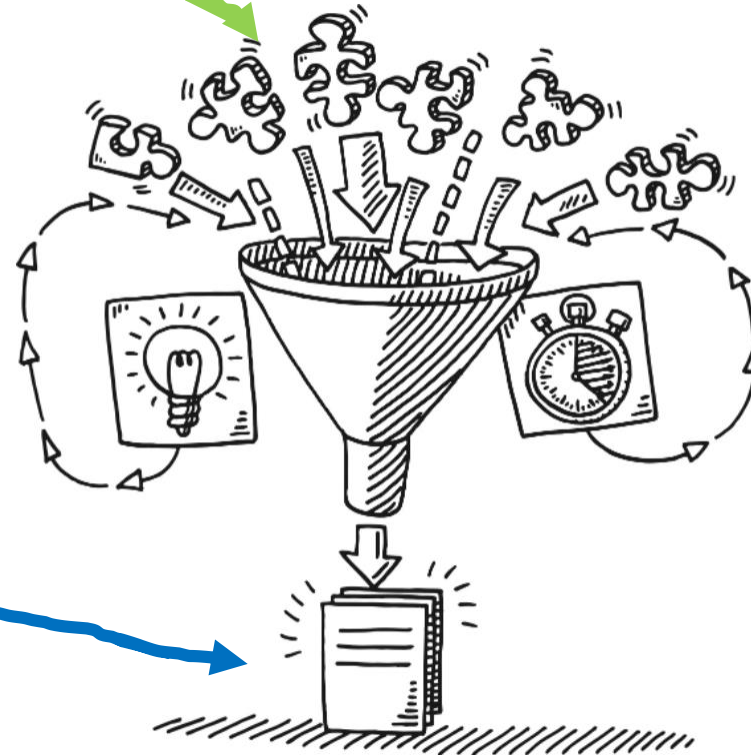
But more recent residents of coastal Japan did build below that point. Homes at first, but eventually nuclear facilities, which were built where they could be cooled by nearby ocean waters. On March 11, 2011,

*Never again* is a common refrain after traumatic disasters, but it’s also a hard promise to keep. Memories fade over time. But more important, societies change, and so do their risk calculations.

# Fighting Loss of Memory

The three human faculties of memorizing:

- storing
- encoding
- retrieving

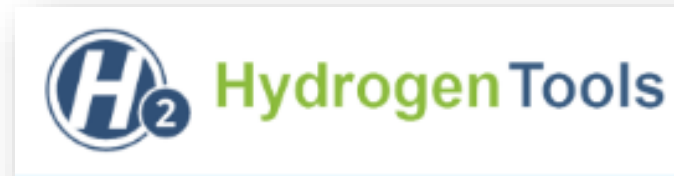


# Which datasets for lesson learned?

Industrial incidents

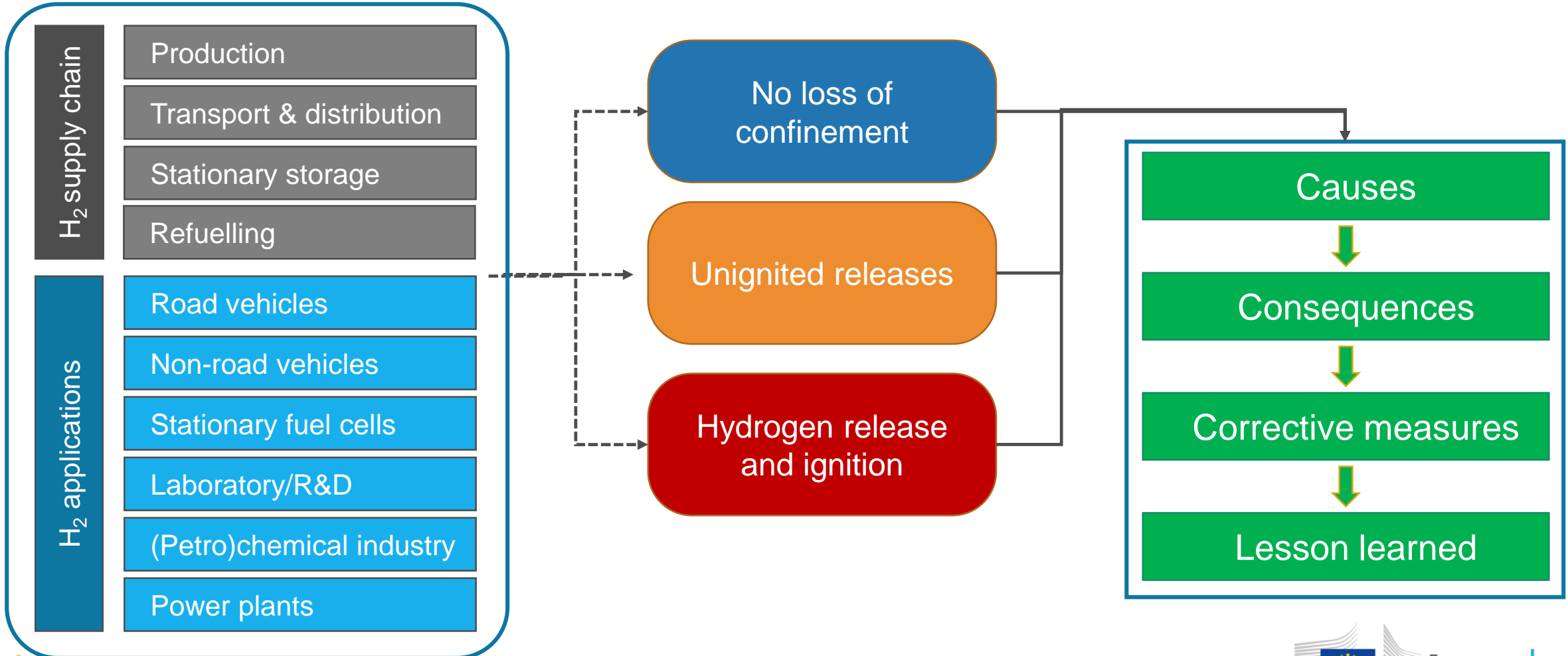


H2 specific





# Basic structure of the database HIAD



# Last version of HIAD

**HIAD 2.1 updated September 2023** available as EXCEL dataset, is downloadable from:

<https://minerva.jrc.ec.europa.eu/en/shorturl/capri/hiadpt>

For questions and specific requests, **JRC Hydrogen Safety addresses:**

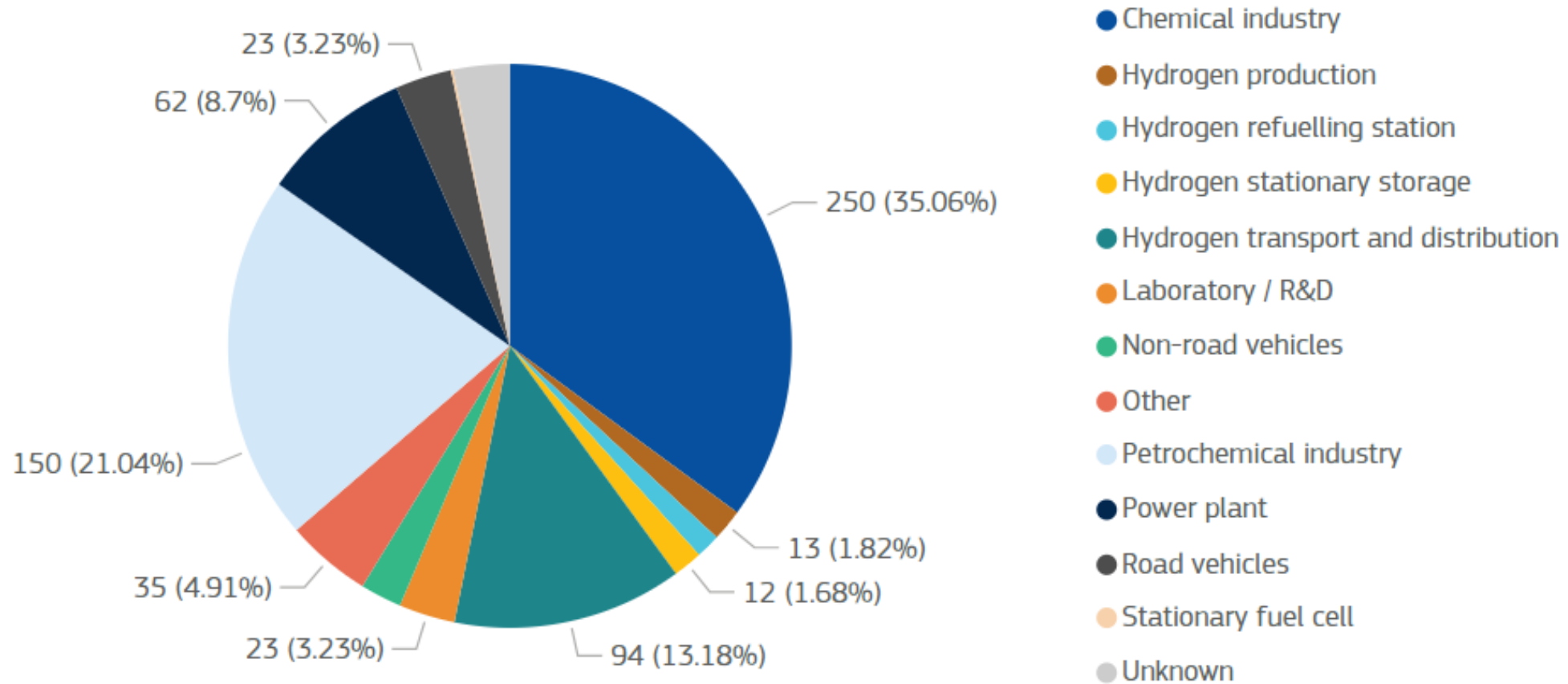
[JRC-PTT-H2SAFETY@ec.europa.eu](mailto:JRC-PTT-H2SAFETY@ec.europa.eu)

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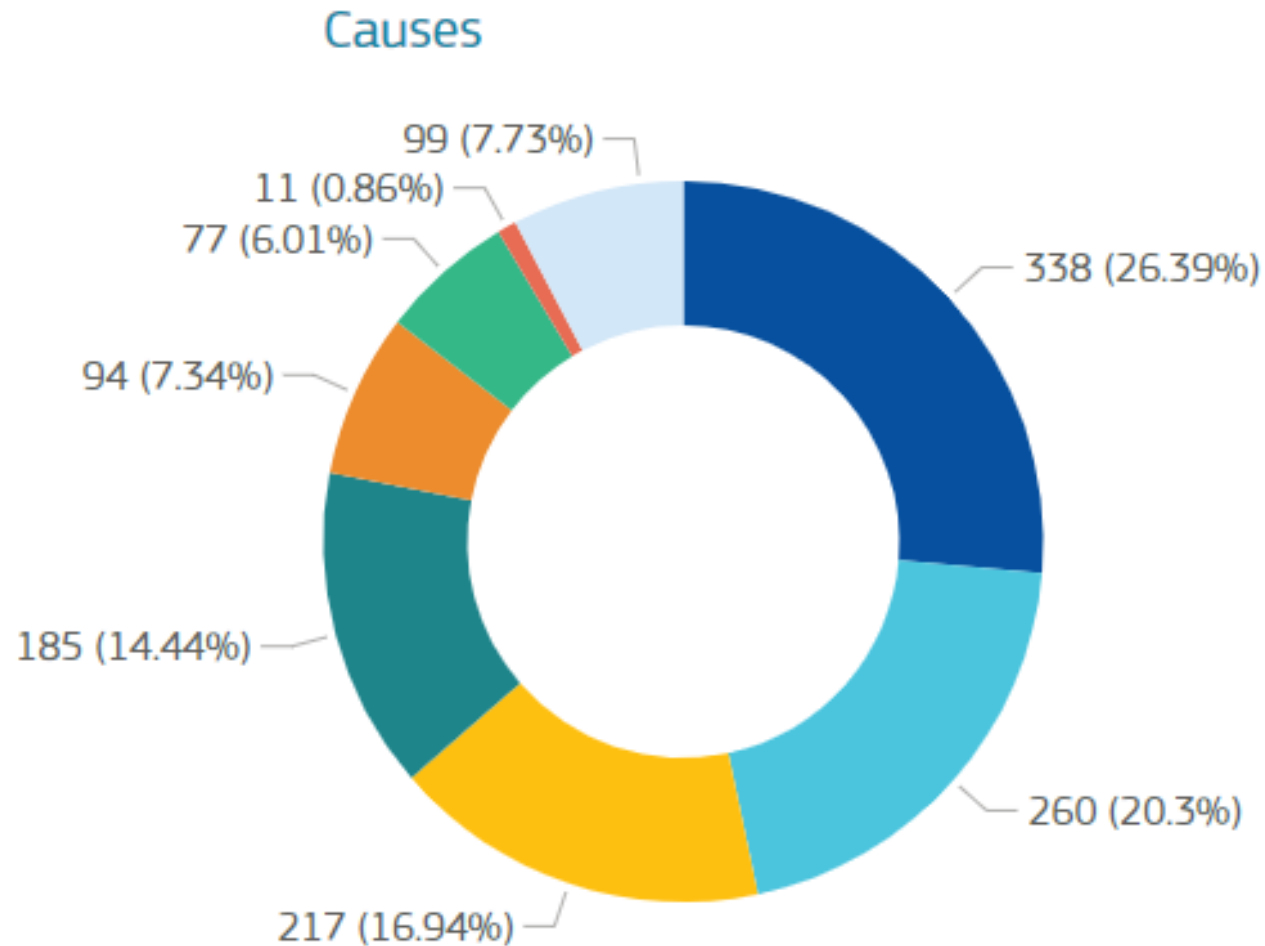
# Statistics

Events per application type





# Some statistics



- Management factors
- Material/ manufacturing error
- Human factors
- System design error
- Job factors
- Installation error
- Environment
- Unknown

**Please note:**

The same event may have more than one identified cause hence, the total number of causes may differ from the total number of events

# H2 pipeline – HIAD #891

**Fire from an underground hydrogen pipeline**

**Initial cause:** mechanical damage by excavation

**Root cause:** related to the failure to properly inform the excavating company of the presence of the pipeline.

**Comment:** A common type of accident for buried natural gas pipelines.



# H2 delivery - HIAD #174

**Mobile to stationary transfer**  
(hydrogen as coolant for power plant generator)

**Initial cause:** premature burst disk failure, vent line failure, leading to H2 accumulating under roof and exploding

**Root causes:**

Wrong maintenance: inspection (corroded burst disk and vent pipe)

Wrong (safety) design: vent pipe not able to sustain pressure wave of released H2

Failure to learn from past incidents: similar event already occurred



*A fatal hydrogen explosion occurred while a tube trailer (right) filled onsite hydrogen storage cylinders (yellow tanks, left).*

# Road transport HIAD #1025

## Fire on a hydrogen tube trailer truck

**Initial cause:** a defect in the vehicle's brake system, which overheated the tires causing a fire, which triggered the opening of the safety device of two of the hydrogen tubes.

**Root cause:** possibly shortcoming in maintenance and/or material failure.

**Comment:** no consequences. But if it would happened in the tunnel...

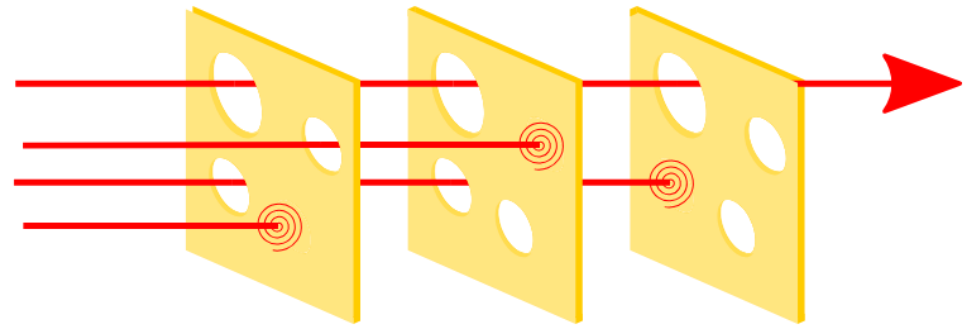




# What are HIAD stories telling us?

*(very generic conclusion!)*

Many of the incidents have multiple causes, which individually may not lead to large incidents, but simultaneously they do. (James Reason's swiss cheese model)



Reason, J. (1990). The contribution of latent human failures to the breakdown of complex systems. *Philosophical Transactions of the Royal Society of London. B, Biological Sciences*, 327(1241), 475-484.

# What are HIAD stories telling us?

*(very generic conclusion!)*

The past stories and their statistics teach that for hydrogen we have to pay particularly attention to:

- ➡ Transferring of hydrogen from one system to another (manual actions, flexible/mobile components).
- ➡ Repair/maintenance works.
- ➡ Integrating and operating sub-systems from several providers / contractors (quality assurance, suppliers trust, etc.).
- ➡ Operation involving general public (public safety!).



# What are HIAD stories telling us?

## *(continued!)*

Regarding handling of emergencies, the deployments of resources and the measures taken show the uncertainties and lack of consolidated procedures in case of hydrogen-related incidents.

This can cause high impact of local population (evacuations, road closures).

# JRC needs your stories!



We need your help because you know what has happened:

Safety database statistics are important but...

...stories and cases complement & complete knowledge from statistics.

# Thank you



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Slide 2 and 3: The Atlantic, 31, 2015, article by Danny Lewis August, <https://www.smithsonianmag.com/smart-news/century-old-warnings-against-tsunamis-dot-japans-coastline-180956448/>

Slide 5: ESREDA 2021, foresight-safety(chapter04) <https://www.esreda.org/wp-content/uploads/2021/01/ESReDA-foresight-safety-chapter04.pdf>

Slide 6: GetDrawing picture <http://getdrawings.com/database-drawing>

Slide 12: picture top left, source: presenter's ownership.

Slide 13: France bleu news of 7 September 2021, <https://www.francebleu.fr/infos/faits-divers-justice/pau-les-pompiers-appelles-pour-une-fuite-d-hydrogene-au-depot-des-bus-idelis-1630990960>