

Controlling new risks

According to the French Federation of Insurers, climate change, disruption of business sectors and cyber risks will be among the top three emerging risks by 2022. In parallel, the ARIA technological accidents database already contains numerous events involving emerging energy sectors. What are these new risks and can they be controlled?

1. New risks

1.1. Energy production and storage

Growing awareness that fossil fuels are not inexhaustible and that they have a detrimental effect on our environment encourages the emergence of **new energy sectors with technologies that have not yet matured**. Developments include solar energy with photovoltaic solar panels, wind energy with wind turbines, recycling of waste into units of fuel, and the use of decomposed organic matter through methanisation.



Do these sectors have any common characteristics as pertains to accidents?

One common feature is difficulties for the firefighters called to the scene:

☐ ☐ ☐ ☐ ☐ ☐ ☐ **ARIA 37736** - 14/01/2010 - Val-de-Reuil (Eure) - France

Photovoltaic panel fire and intervention difficulties

☐ ☐ ☐ ☐ ☐ ☐ ☐ A fire broke out at around 3:30 p.m. on the roof of a 15,000 m² warehouse covered with 1,000 m² of photovoltaic solar panels (i.e. 660 panels). The building, which had been inaugurated in November 2009, was certified High Environmental Quality (HQE).

Forty firefighters rapidly responded and were able to bring the fire under control in 6 hours. The emergency services encountered several difficulties during the intervention: lack of suitable equipment to dismantle the panels, the inability to stop the production of electricity and the need to cover the photovoltaic solar panels, risk of electrification, difficulties in accessing the space between the roof and the panels, propagation of fire via the cables and the waterproof covering.

The intervention required the use of a special tool (an electric screwdriver equipped with a specific tip) to dismantle the 200 panels on either side of the burning area. This operation prevented the fire from spreading via electrical arcing between the panels. Following a visit to the site, the Classified Facilities Inspection authorities asked the operator to implement a procedure to facilitate the intervention by the fire brigade in the event of a solar panel fire.

Another common characteristic is massive smoke emissions, with varying degrees of toxicity, depending on the materials burnt, as in the case of the fire in a 50,000 m³ wood chip storage facility in Gasville-Oisème (ARIA 50270) where post-disaster monitoring was requested by the administration.

In addition to the energy production sectors, **the storage of energy in pressurised tanks or batteries is a source of accidents**. The use of tanks **made of composite materials** in the automotive sector is on the rise owing to weight savings and the development of the hydrogen sector (with new-generation tanks at 700 bar!) of compressed natural gas (CNG).

☐ ☐ ☐ ☐ ☐ ☐ ☐ **ARIA 43036** - 29/10/2012 - The Netherlands

Fire in a CNG-powered bus

☐ ☐ ☐ ☐ ☐ ☐ ☐ A city bus operating on compressed natural gas (CNG) caught fire at about 11 a.m. due to a failure of the cooling fan's drive motor. The driver was able to evacuate all the passengers, attempted to put out the fire and then move the bus to a safe location. The heat from the fire triggered the safety system on the CNG's composite cylinders, causing the gas to be released laterally and thus spewing out flames, over a distance of 15 m, perpendicular to the direction of traffic. The direction of the flaming jet was contrary to the safety objectives defined in the best practices, which recommend orienting the thermal fuse openings in an upward direction. The fire brigade was able to put out the fire after the CNG had been completely released. The public transportation company inspected all of its vehicles.

Used lithium batteries also pose problems in waste **treatment centres**. The development of electric vehicles with new types of batteries (often containing lithium or sodium) is unlikely to improve the situation.

☐ ☐ ☐ ☐ ☐ ☐ ☐ **ARIA 38858** - 26/08/2010 - Dieuze (Moselle) - France

Fire in a battery and storage cell recycling centre

☐ ☐ ☐ ☐ ☐ ☐ ☐ In a battery and storage cell recycling centre, a fire broke out in a compartment containing used lithium batteries. The automatic powder-based extinguishing system was unable to contain the fire which spread to other cells used to store different types of batteries (lead, mercury, nickel-cadmium) and miscellaneous sub-products (scrap metal, nickel hydroxide). Employees from nearby companies were evacuated and examined owing to the toxic fumes released (sulphuric acid and lithium hydroxide). The 1,000 m² building was destroyed and batteries were thrown 200 m from the accident. The potential projectile effect due to fire in the lithium battery storage area had not been taken into account in the operator's hazard study. The extinguishing water was pumped and disposed of as hazardous waste (heavy metals, phenols and PCBs were detected).

1.2. Disruption or permanent adaptation to change

The “good health of a production facility” is often decisive in terms of industrial success. An accident which occurred in the Port of Antwerp (ARIA 52726) illustrates this: **properly inspecting one's equipment is cheaper than having to manage an accident or immobilising a unit**. In response, new **inspection methods** are beginning to appear throughout the industry. Predictive maintenance triggering curative maintenance via the use of IIoT (Industrial Internet Of Things) and inspection operations conducted by drones are only at an early stage. It would be worthwhile to discuss problems already encountered (what happens in the event of a drone crash, for example?).

ARIA 51339 - 08/04/2018 - Village-Neuf (Haut-Rhin) - France

Drone crash on a chemical plant

At around 8 a.m., a drone crashed on a warehouse belonging to a Seveso high threshold company specialised in the manufacture of pharmaceutical products. An investigation was initiated by the Air Transport Gendarmerie. A warning was issued by the Prosecutor's Delegate. The drone was seized and identification of the owner was requested. **The crash resulted from a loss of control by the pilot (a minor)**.



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The **regulations governing drones** are evolving to take into account the legitimate needs of operators and those of citizens in terms of environmental protection. In France, a decree covering multiple categories has been drafted specifically for the logistics industry in light of the deep-seated changes in the sector : development of e-business, a need for surface area and storage height, increasingly rapid delivery times... However, with storage facilities can now accommodating several types of combustible materials (wood, paper, tyres, etc.), it is all the more important to remain vigilant regarding the types of extinguishing media required for the materials being stored (e.g. sprinkler systems).

1.3. Climatic hazards

Flooding, heavy rainfall, snow and wind... climate change issues deserve continued attention and the implementation of good practices to manage them. Recent events in France and abroad show that these phenomena are becoming more and more intense.

□ □ □ □ □ □ □ **ARIA 50402 - 31/08/2017 - Crosby - United States**

Fire and explosion of drums of peroxide during flooding in a chemical plant

■ □ □ □ □ □ **Several fires and explosions occurred in a chemical plant manufacturing organic peroxides.**

□ □ □ □ □ □ Following the announcement of a pending hurricane in the region (ARIA 50399), the operator took the **precautions deemed necessary and in line with its procedures**: the plant's operations were shut down, emergency generators were mobilised, other generators were brought in to supply power to the storage buildings (containing 227 t of peroxides) in the event of a power failure, refrigerated containers were mobilised on site as an additional precautionary measure.

The hurricane caused **flooding throughout the plant**, with water reaching 1.80 m, and the site's power supply failed. The **higher-than-expected rise in water levels caused the loss of the permanent generators**, emergency generators and a liquid nitrogen emergency cooling system. The site was no longer accessible.

The operator moved its products into 9 refrigerated containers powered by diesel engines, but the rising waters flooded the engines.

1.4. Cyber risk

An industrial site's cyber “environment” is often vulnerable. Failure to transmit an alert by a remote alarm system (ARIA 50755), computer viruses (ARIA 51131), lack of updating of electronic components (ARIA 42931), and incorrect programming of PLCs (ARIA 5989) are just a few examples taken from the ARIA database.

2. Control of emerging risks

The **precautionary principle**, first affirmed in the Barnier's Law of 1995, and set out in the French Constitution through the **Environmental Charter**, is a necessity, now more than ever before:

“...when the occurrence of damage, the extent of which may not be fully scientifically understood, could affect the environment in a serious and irreversible manner, public authorities must ensure, under the precautionary principle and within the scope of their authority, that risk assessment procedures are set out and that provisional and proportionate measures are adopted in order to avert such occurrences”.



The website www.aria.developpement-durable.gouv.fr includes a number of studies containing recommendations on how to control these new risks (Summary on new energy sectors: wind turbines, methanisation, photovoltaic solar panels; News flash on lithium batteries; Memo on cybersecurity in industry; Articles on natural and technological risks...).