

“Potential dangers and fire risks in the use of alternative energy systems from the perspective of firefighting intervention.”

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- Senior Instructor Fire Behavior / Fire Suppression
- 35 yrs service at Zuid Limburg Fire Service, Department Sittard
- Author of Book Fire Attack
- Tech. Panel member UL FSRI Interior Fire Attack
- Retired Engineer aircraft engine fuel systems



Alternative Energy Systems —- Dangerous??

- The different Energy Systems available today:
- Photo Voltaic Panels. (PV)
- Electric Vehicles (EV)
- Wind Turbines
- Energy Storage systems
- LNG & CNG systems to power Trucks / Buses

What's the possible danger of these alternative energy systems?

Photo Voltaic systems:

- Generates DC power, more than 30 Milli Amps can be lethal.
- Cannot be switched off
- Damaged PV panels still operative, Hailstorm damage, fire etc.
- When involved in a fire, glass particles contaminate soil.

Case Study PV (solar panels) Systems Pumpkin Nursery



Case Study PV (solar panels) Systems. Pumpkin Nursery



What's the possible danger of these alternative energy systems?

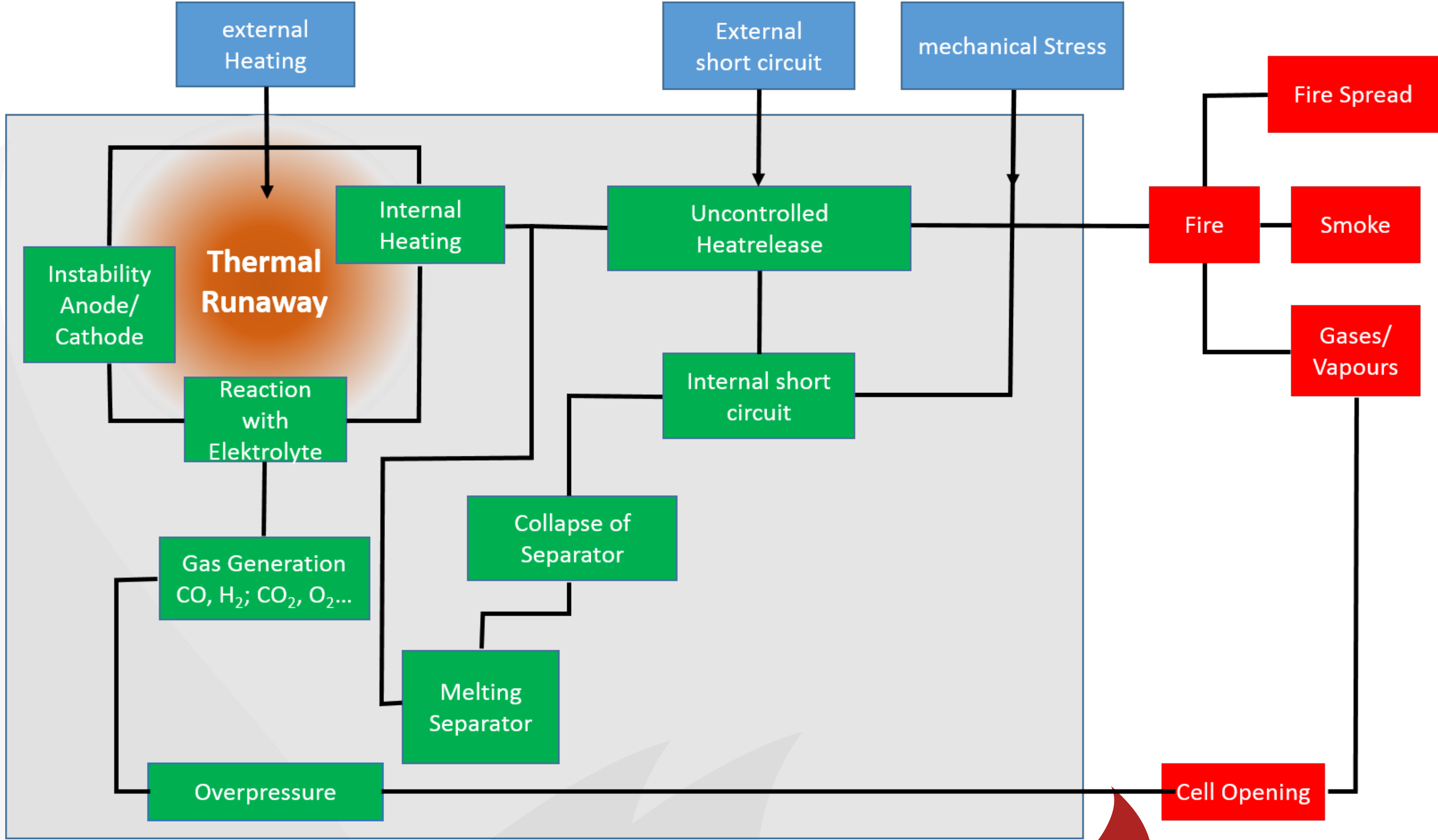
Electric Vehicles EV's:

- High Voltage and Amps, car accidents.
- EV fires, difficult to extinguish, Li batteries.
- During a car fire it is very difficult to extinguish

Case study EV's



Case Study EV's Electrical Vehicles Fire's



Case Study EV's Electrical Vehicles Fire's

- ▶ When happens at a thermal runaway?

Cathode: $\geq 130\text{ }^{\circ}\text{C}$ and $x < 0,5$ Reaction between Electrolyte and Li_xCoO_2

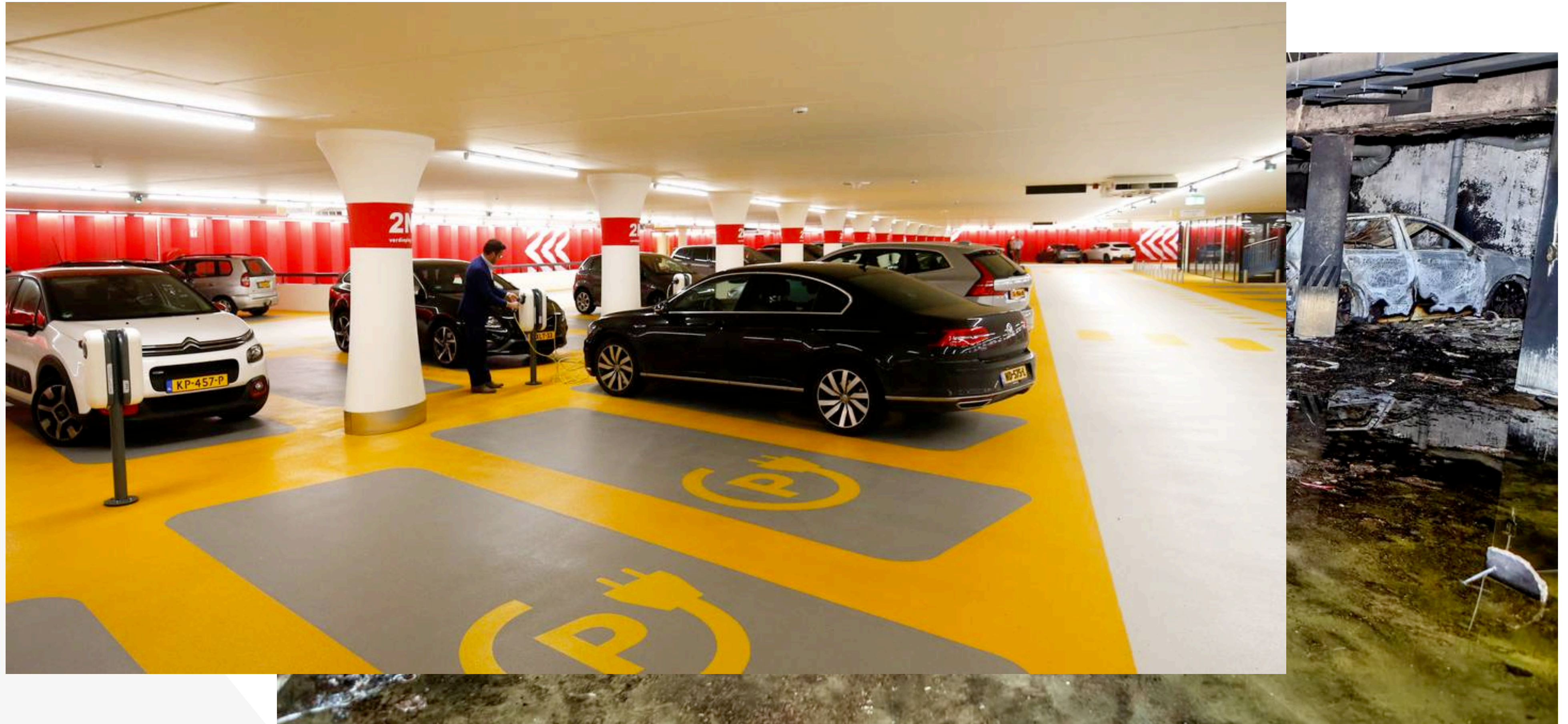
Reaction:



Increasing Temperature:



Case Study EV's Electrical Vehicles Fire's

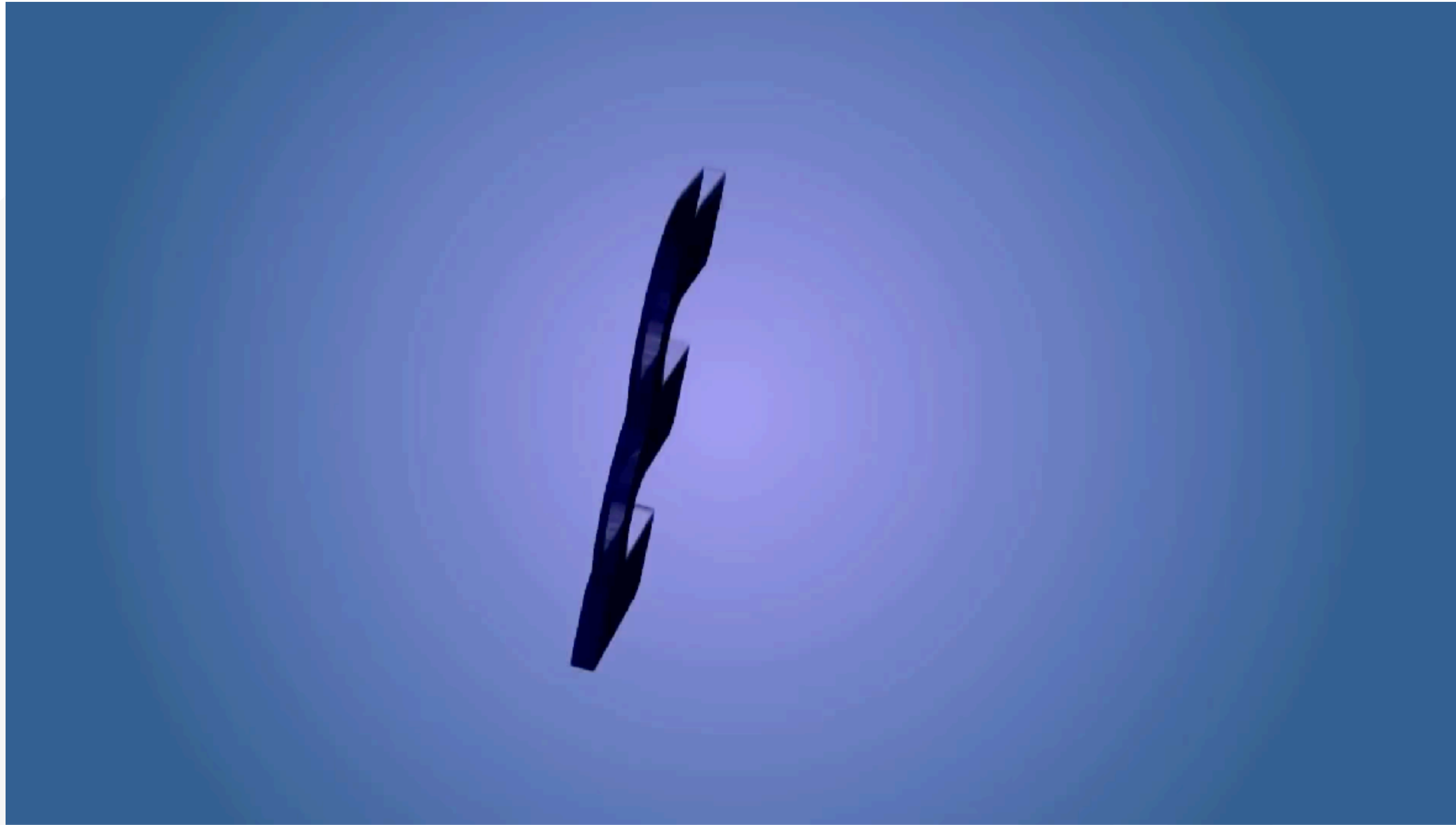


What's the possible danger of these alternative energy systems?

Wind Turbines:

- Erosion and Fatigue cracks at the turbine blades.
- Blades break off
- When fire breaks out, not able to extinguish

Case Study Wind Turbine Fire's



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What's the possible danger of these alternative energy systems?

Energy storage:

- Neighborhood energy systems in shipping containers.
- Huge amount of Lithium Ion batteries
- Overheating causes fire.
- Not knowing where they are placed, content of the container.

What's the possible danger of these alternative energy systems?



What's the possible danger of these alternative energy systems?

LNG & CNG systems

- No direct visible truck runs on LNG or CNG
- When involved at fire huge risks
- Explosion hazard
- Fire expansion risks are high

LNG & CNG Fuel systems

