

Overall Report on Accidents:

- Large number of bio-gas related occurred in India, Malaysia, Thailand and Vietnam, although data is limited due to lack of reports
- Thailand reported that over 80% of reported accidents are biogas related, with over 94% of those accidents being due to either explosions or suffocation when entering confined spaces.
- Main Factors of biogas accidents:
 - Fires and Explosions:
 - Open flames
 - Electrical sparks
 - Welding close to the plant
 - In distribution of the gas
 - Asphyxiation and poisoning:
 - Normally the result of entering underground pits and chambers, which are oxygen-starved regions, and entry there can cause suffocation and even death
 - Gas contains H_2S , which is can cause poisoning
 - Miscellaneous:
 - Contact with harmful liquids
 - Electric Shocks
 - Falling from heights

| Location and year of Accident | Cause of the accident + description | Suggestions/recommendations from the Accidents |
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| 1. USA; 2004 | Explosion in plant due to accumulation of sewage methane | Installing of gas venting systems by flaring, or installing higher capacity storage, to minimize pressure build-up |
| 2. Germany; 2005 | Hydrogen Sulphide gas released in the waste loading area, and due to failure to comply with health and safety regulations, 4 workers were killed | Minimizing leakages by installing sensors, properly sealing pipe-ways and tanks, and using corrosion resistant materials. Also, minimizing H ₂ S content in gas by adding chemicals (such as iron chloride) and H ₂ S-metabolizing bacteria to the feedstock. |
| 3. Germany; 2006 | Unidentified cause; digester burst causing spillage of 7 million litres of sludge and rainwater, resulting in €10 million in damages | Using strong and robust materials to construct reactor, properly designing reactor, proper monitoring of the reactor, installing leakage-control systems to minimize leakages/burst damage. |
| 4. Germany; 2007 | Unidentified cause; digester burst caused injury of 2 workers present and leaking of sludge | Implementation of strategies to prevent reactor bursting or leaking (as discussed in (3)) |
| 5. France; 2008 | Explosion in biogas plant injured two people; unidentified cause | Implementation of strategies to prevent reactor bursting or leaking (as discussed in (3)) |
| 6. Philippines; 2008 | Toxic release from biogas plant killed 4 people | Implementation of strategies to minimize leakages of gases from the plant (as discussed in (2)) |
| 7. India; 2009 | Concrete tank exploded during commissioning works in a plant in Edathala (Kerala), killing 4 people. Testing of animal manure as feedstock occurred prior to occurrence | Implementation of strategies to prevent reactor bursting or leaking (as discussed in (3)) Also, ensuring new feedstock is thoroughly checked and running simulations to ensure nothing goes wrong during testing |
| 8. Mexico; 2009 | 6 persons died in a biogas treatment plant due to poisoning from organic waste gas during tank cleaning | Proper Safety protocols must be followed, and workers must use protective equipment when entering hazardous areas of the plant. |
| 9. Germany; 2010 | An explosion and a fire occurred in a biogas plant and three people were injured; unidentified cause | Implementation of strategies to prevent reactor bursting or leaking (as discussed in (3)) |
| 10. Germany; 2011 | Two people were injured due to an explosion in a biogas plant | Implementation of strategies to prevent reactor bursting or leaking (as discussed in (3)) |
| 11. Czech Republic; 2011 | 3 workers suffered from carbon dioxide poisoning due to lack of care during maintenance works | Following proper safety protocols and ensuring all necessary measures are taken when carrying out maintenance operations |
| 12. Czech Republic; 2012 | Worker died during service check of condensate manhole due to suffocation, reportedly as he did not use a gas mask and entered without assistance | Proper Safety protocols must be followed throughout, and workers must use protective equipment when entering hazardous areas of the plant. |
| 13. Latvia; 2014 | Due to a leak of biogas or flammable gas, two people died from suffocation; | Implementation of strategies to minimize leakages of gases from the plant (as discussed in (2)) |
| 14. India; 2014 | Gas cylinder exploded in a biogas plant in Tuticorin, killing one and injuring three persons. The accident was caused when a worker lit a match near the cylinder. | Proper training when handling flammable gases, and strict adherence to safety protocols in the plant. |
| 15. Germany; 2015 | Two died in digester service hatch, due to asphyxia through inhaling gases in digester | Following proper safety protocols and ensuring all necessary measures are taken when carrying out maintenance operations. |

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| 16. France; 2018 | Explosion, followed by fire at a biogas plant in Saint-Fargeau, during testing of a stirrer after replacing the agitator. | Proper testing protocols must be followed, to ensure that nothing goes wrong during testing. Also, ensuring all safety protocols are followed and running test simulations should be done. |
| 17. India; 2023 | One was killed and four was hospitalised when a sudden leak occurred in a biogas plant in Bhojpur Ramnath Village in Bareilly district, due to a gas leak in transportation pipelines | Regular maintenance of gas pipelines to prevent any gas leaks; proper selection of materials to be used in constructing pipelines, to prevent leakages and resist corrosion due to the transported biogas. |
| 18. Thailand, 2024 | One person was killed when an explosion occurred in a biogas plant Map Ta Phut Industrial port, reportedly due to failure in the safety equipment | Regular maintenance and inspection of the plant, adequate training to all staff to prevent any accidents in the future and strict adherence to safety protocols. |
| 19. Germany; Unspecified year | Fire in the CHP (combined heat and power) and electrical room of a biogas plant, due to a leaky oil pressure line, which caused oil to ignite on the turbocharger exhaust system | Regular inspection and maintenance of the oil pressure line and other equipment could have prevented the leakage. Also, a proper fire protection concept, smoke detector, fire barrier, automatic gas gate valve, and sufficient extinguishing water could have minimized the damage |