ASIA PACIFIC BIOGAS ALLIANCE

ACCIDENTS AND SAFETY AT BIOGAS PLANTS: INTRODUCTION

By Joost Siteur, Director, Vector Energy Advisory

Biogas is increasingly providing multiple benefits at agro-industrial facilities in Asia, such as effective treatment of large volumes of waste water, onsite energy generation, and reduction of GHG emissions. Yet at the same time, as with other industrial facilities, biogas is not without risks and severe accidents have happened across Asia. It is crucial to understand and address these risks to prevent future accidents and improve the safety standards of the Asian biogas industry.

More than 60 people have been killed in accidents at biogas plants in Asia over the last decade. Most of these accidents could have been prevented with adequate safety measures and strict adherence to proper procedures. In order to prevent the occurrence of similar accidents, in this series of bulletins I will address the main safety risks at biogas plants, present case studies of accidents in the region, and discuss adequate safety measures and procedures to prevent their reoccurrence.

OVERVIEW OF ACCIDENTS IN ASIA

Limited statistics are available for biogas accidents in Asia. Information available shows that fatal accidents have occurred in India, Malaysia, Thailand and Vietnam. This is mostly based on reports in the press and other documentation of major accidents. It can be assumed that other incidents have occurred that have not been reported or documented. Reports from other Asian countries are unavailable but it can be assumed that there have been accidents elsewhere as well.

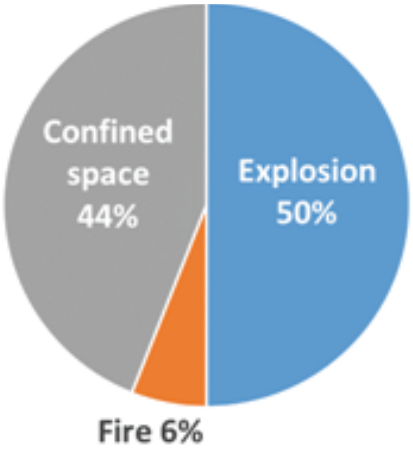
The most detailed data available come from Thailand, as compiled by the Department of Alternative Energy Development and Efficiency (DEDE), see Figure 1. Please note that these only cover cases of fire, explosion and accidents in confined spacesand most likely underestimate the actual number of incidents and injuries. The data show that both confined space accidents and fires/explosions are roughly equally major risks. It is also relevant to note that among renewable energy technologies, biogas accounts for more than 80% of recorded accidents in Thailand.

With a rapid increase in biogas plants over the last decade, the Thai authorities have been paying greater attention to biogas safety issues, especially since a major accident in 2011 that killed 30 people at a starch mill. Nevertheless, it is crucial to keep enhancing the awareness of safety issues, as shown by an accident at an ethanol plant in September 2016 that killed 3 people.

Figure 1. Number and categories of biogas accidents in Thailand (2006-2013)

Type of Biogas Plant	Accidents	Injuries	Deaths
Factory	10	18	40
Farm	3	2	10
Community/Household	3	4	3
Total	16	24	53

Source: DEDE, Thailand



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MORE BIOGAS PLANTS, MORE ACCIDENTS?

With more biogas plant being built, it is also likely that more accidents will occur, as shown by the experience from Germany (see Figure 2). Until 2010 there was a high correlation between the number of biogas plants and the number of accidents, after which there has been a significant drop in the number of accidents. While it is unclear whether this can be attributed to improved safety practices, in recent years the German biogas industry certainly has made considerable efforts to increase the awareness of safety risks among operators and technology suppliers, which can serve as guidance for the Asia Pacific region.

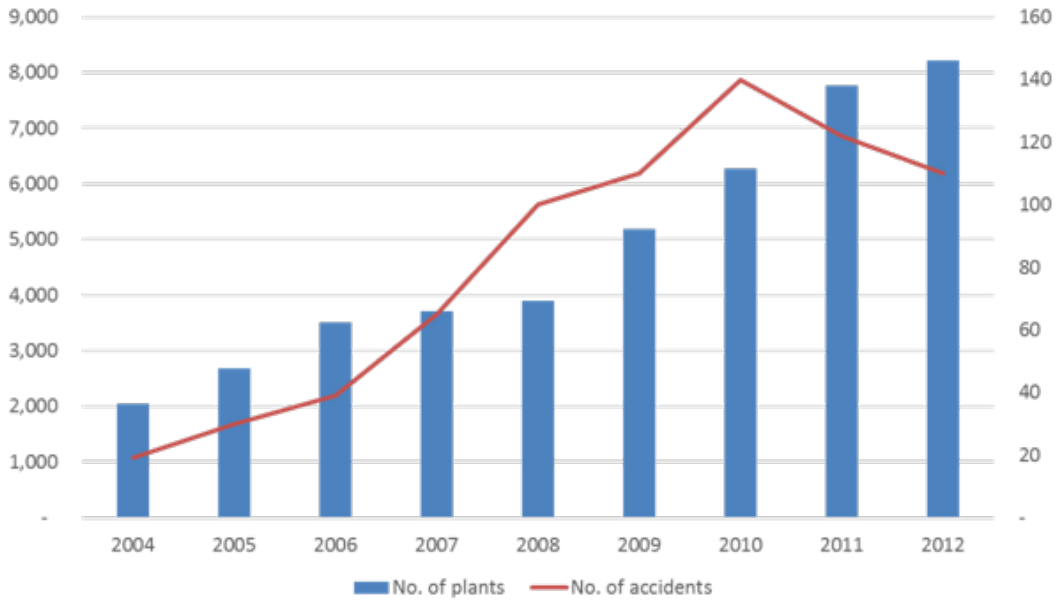

Figure 2. Number of biogas plants and reported accidents in Germany (2004-2012)
Source: German Biogas Association, INERIS

MAIN SAFETY RISKS

Risks of accidents at biogas plants can be categorized as follows:

- Fire & explosion: Biogas in combination with air is highly explosive. Major concerns are sources of ignition such as open flames, electrical sparks, welding and lightning close to the production, distribution and use of biogas.

- Asphyxiation & poisoning: In confined spaces such as underground pits and enclosed chambers, there is a high risk of asphyxiation caused by the displacement of oxygen by biogas. In addition, biogas often contains hydrogen sulfide, an extremely toxic gas even in low concentrations.

- Miscellaneous: This includes a variety of issues such as falling from heights, movable parts, electric shocks, contact with hot liquids and surfaces, etc. These are not unique to biogas plants but they can present significant safety risks if not acknowledged.

In future bulletins, I will discuss these risks in more detail, including case studies of accidents that have occurred in the region. In the meantime, feel free to contact me with questions or comments with regards to biogas accidents and safety issues.

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