

HyNet Hydrogen Production Plant 1 – Technical Note

EPR Response - 9ei - BAT for energy efficiency

Summary

Problem Statement

A quantitative estimate of waste heat, and its thermal level, that could be potentially recovered from the ASU / ASU compressor, by integrating this plant within the overall flow sheet or external users. Quantify the potential benefit on the overall energy conversion figure presented in Table 3-4 of the Application Supporting Document, from the potential heat integration of the ASU within the hydrogen production plant flow sheet.

Response

As per response to 9f ASU will not be integrated with the process on the basis of safety.

Liquid oxygen is very reactive. Pure oxygen can react violently with hydrocarbons and combustible gases resulting in fire and / or explosion.

There are a number of documented explosions on air separation units. Accumulation of hydrocarbons in liquid oxygen which can take place in the main condenser unit is a common cause.

To prevent the process plant feeding combustibles such as hydrogen and natural gas to the air separation units the areas of the plant are not integrated. The process systems are generally at a higher pressure than the cooling and heat transfer medium systems meaning in that any leaks have the potential to enter those systems. Any combustible leaks in cooling and heat transfer medium systems could potentially find their way to the ASU; with a mixture of oxygen and combustibles leading to a catastrophic explosion. The safest way to design is to ensure no potential mixing of ASU and process systems.

Whilst mixing of oxygen and flammable gases via transfer through the heating / cooling medium was not explicitly discussed during FEED, significant consideration has been given to segregating hydrocarbon and oxygen containing systems as far as possible. This included reviewing the design of the flare / drains systems to ensure that flammable atmospheres will not be formed within pipework / vessels. This same principle applies to the heating / cooling medium systems and separation of heating / cooling systems for the HPP and ASU is considered the safest option to prevent the potential formation of flammable atmospheres.

Segregation of these inventories constitutes part of the inherently safer design of the process.