HyNet North West

VERTEXHYDROGEN

HyNet Hydrogen Production Plant 1 – Technical Note

EPR Response – 9gii – Energy Efficiency of Combustion Equipment

Summary

Problem Statement

Provide further assessment of any internal or external waste heat recovery options from this combustion equipment and explain the process you have followed to identify the range of potential internal and external users, in support to your conclusion that there are not nearby users for this source of waste heat (reference: table 3-41 of the Permit Application Supporting Document).

Response

Two combustion systems are proposed as part of the HPP1 plant design. These are the Feed Fired Heater, F101 and the Steam Boiler B101.

Steam Boiler B101:

The Steam Boiler B101 has 4 functions requiring heat duty. These are

- E-107, MP Steam Boiler producing steam
- E-108, MP Steam Superheater which superheats the MP steam from Drum V110
- E-109, BFW Pre-Heater heating prior to routing to Drum V110
- E-121, Steam Boiler Combustion Air Pre-Heater which pre-heats air prior to combustion

Two process streams needing heating are integrated into the Steam Boiler – namely Boiler Feed Water which is preheated in E-109 and combustion air which is pre-heated in E-121

Feed Fired Heater F101

The Feed Fired Heater F101 has 3 functions requiring heat duty. These are

- E-102, Mixed Feed Pre-Heater
- E-101, Purification Pre-Heater
- E-122, Feed Fired Heater Air Pre-Heater which pre-heats air prior to combustion

Two process streams needing heating are integrated into the Fired heater – namely natural gas pre-heating which is preheated in E-101 and combustion air which is pre-heated in E-122

Other Process Streams needing heating

1. Demineralised Water heating: The water stream is heated from 4°C to 120°C by cooling a syngas stream from 135°C to 124°C. This system (demin water heating) is already heat integrated and is not available for waste heat recovery.
2. Oxygen from ASU: this stream is heated from 30°C (stream 114) to 210°C (stream 211) in heater E-103 requiring 1,200kW of duty. However, from Enquiry 9e, Table 2-4: HPP Utilities states: “It is noted in passing that for safety reasons there will be no integration between the ASU and the wider HPP.” This stream is excluded from waste heat recovery integration with the fired heaters.
3. NG Feed is heated in electrical heater 10-AAF-H-001A from 5°C to 40°C. The duty of the electrical heater is 789.9kW from data sheet 5194812-000-45ED-4-0037. Heat integration with this stream could save electrical import of 789.9kW however it is operated intermittently. This stream has been identified for heat integration from other heat sources within the process too.
4. NG Feed is also heated in electrical heater 10-AAF-H-002A. The heat duty from data sheet document 5194812-000-45ED-4-0039 reports a duty of 327kW heating natural gas from 4.5°C to 20.5°C however it is operated intermittently. This stream has been identified for heat integration from other heat sources within the process too.

Further study will be done during the planned value engineering and pinch study.