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Geraint Harris,
Lead Specialist,
Natural Resources Wales,

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Our Ref: SOL23_PO50_ PCML_ 4 yearly review

Dear Geraint,

RE: EPR Permit EPR/AB3790ZB - Energy Efficiency, Raw materials and Waste Management Four Yearly Review

In accordance with conditions 1.2.1(b),1.2.3, 1.3.1(c) and 1.4.2 there is a mandatory requirement to report the following every four years:

1.2.1(b) The operator shall review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and (c) take any further appropriate measures identified by a review.

1.2.3 The operator shall review the viability of Combined Heat and Power (CHP) implementation at least every four years, or in response to any of the following factors, whichever comes sooner:

(a) new plans for significant developments within 15 km of the installation;

(b) changes to the Local Plan;

(c) changes to the UK CHP Development Map or similar; and

(d) new financial or fiscal incentives for CHP.

The results shall be reported to Natural Resources Wales within two months of each review, including where there has been no change to the original assessment in respect of the above factors.

1.3.1(c) The operator shall review and record at least every four years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and (d) take any further appropriate measures identified by a review.

1.4.2 The operator shall review and record at least every four years whether changes to those [waste management] measures should be made and take any further appropriate measures identified by a review.

This document has been prepared on the behalf of the Operator to satisfy the above condition requirements, albeit the Installation has been subject to a series of significant technical, legal disputes and planning delays, resulting in the plant being unable to undergo final commissioning, completion and handover into Normal Operations.

Energy Efficiency:

Conditions 1.2.1(b) States: *The operator shall review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and (c) take any further appropriate measures identified by a review.*

Despite the Installation being non-operational, it has been held and maintained in a 'preservation-state' pending a planned restart during Qtr 1 2024. Since the issuance of the permit in 2019, the primary focus of the engineering and operations team has been to complete the installation works and prepare the plant for final commissioning and continuous operations. Fundimentally, placing the plant into a 'preservation-state' safeguarded the key plant and components whilst minimising the parasitic energy consumption of the facility.

Given that the plant has been largely non-operational and has not formally entered into the '*Normal Operations*', it has not been possible to collate any meaningful long-term energy performance and efficiency data to robustly identify any opportunities to improve the energy efficiency of the activities[1]. Once the Installation has been fully commissioned and placed into permanent operation, the Operator will be able undertake long-term monitoring of key plant items, i.e. combustion fans, boiler, turbine, air cooled condensing systems etc etc, and identify any opportunities for efficiency improvements.

Notwithstanding the above, the operator has undertaken an internal review of the potential [limited] energy efficiency and energy saving opportunities, with the following measures being identified:

1. *Replacement of existing Luminaires with PIR Unit alternatives:* The site has carried out a programme of lamp replacements for all external lights (over 100 in total) with LED replacements. The replacement of each luminaire significantly reduced the energy used per unit and lead to overall external lighting energy reduction of 90%. The long-term monitoring of the energy use and benefits provided by this scheme of improvements will be reported as part of the quarterly and annual EPR reporting. **Status: IMPLEMENTED**
2. *Modification of Shutdown Procedures:* A systematic review of all plant maintenance and shutdown procedures has been carried out and implemented resulting in a reduction of auxiliary fuel usage from 15,000L to 2,000L. The long-term monitoring of auxiliary fuel use provided by this scheme of improvements will be reported as part of the quarterly and annual EPR reporting. **Status: IMPLEMENTED**
3. *Installation of PV Solar Panels:* The site has identified and is considering an opportunity to installed integrated photovoltaic panels to the roof structure of the Gasification and Boiler House Buildings and the Turbine hall. The total area of roof space to be occupied by solar equates to approximately 750m^2 and is estimated to produce approximately 157,338 kWh/annum indicating an overall energy reduction of 6.9%. A decision on whether the installation of Solar Panels will be installed will be made during 2024 and will be subject to planning permission from Vale of Glamorgan County Council. **Status: PENDING**

CHP Implementation

The Installation has been configured to operate in a 'Power Generation' mode and has a gross boiler and steam cycle design efficiency of 77.2% and 32% respectively. Under full MCR the boiler can generate up to 36.3MWth of steam and has therefore the potential to bleed steam to nearby heat distribution networks and users should they become available.

[1] It has been agreed with the NRW that the formal commencement of operations (entering into 'Normal Operations' as defined by the permit will be the point at which the plant successfully achieves it 30 day continuous operation 'Reliability Test' (Activity A1460 and A1470 as defined by the recently submitted Restart Commissioning Programme).

At the time of construction, although the nearby industrial heat users of Dow Corning and the Atlantic Trading Estate were approached regarding the potential sale of industrial heat, the lack of any distribution infrastructure between the site prevented any further constructive dialogue being pursed.

Until such a time that the Installation can be proven to operate both reliably and can provide the necessary third party assurances regarding the plant performance the Operator will not be in a position to provide credible or viable heat take off / PPA with any commercial or industrial counterparties.

In accordance with Condition 1.2.3, the Operator has carried out a review of the viability of Combined Heat and Power (CHP) implementation and provided a review the following factors:

(a) *'New plans for significant developments within 15 km of the installation'*; The site is located within a coastal dockland location and therefore has no development opportunities to the south / south east or southwest of the site. Although the residential developments of Barry and Penarth lie to the North and North East of the site, the development density, the variable nature of the heat load and lack of connective infrastructure prevents the viable use of the site as a source of domestic heat. The facility is considered only suitable for the provision of large scale industrial and commercial heat only.

A review of the Replacement Local Development Plan (RLDP) has been carried out and no new viable major development sites have been identified.

(b) *'Changes to the Local Plan'*; The Vale Of Glamorgan Local Development Plan was reviewed in May 2022 and an addendum issued. Although the LDP has been revised in light of the Covid pandemic and changing strategies in light of the circular economy, net zero and climate emergency, no significant changes have taken place with regards to housing needs, labour force projections and allocated development sites.

As stated within the LDP review, since 1st April 2021, 38 of the 48 housing sites identified by the LDP have either been developed, are under construction, have been granted planning permission or are subject of a planning application pending a Council decision.

Within the list of allocated sites there are a number which are proximate or located within a commercially viable distance from the Installation namely:

- Phase 2, Barry Waterfront – 1,527 dwellings approved and constructed, with final phase of approx. 200 dwellings due for completion in 2024;
- Barry Island Pleasure Park – 25 dwelling allocated, 0 constructed, planning permission lapsed;
- Barry Magistrates Court – 52 dwellings all constructed and completed.
- Court Road Barry – 50 dwellings allocated, 0 constructed, no permission.

Of the above, only the Barry Waterfront development is considered to be of the scale and density to provide a suitable scale heat load for the plant. Given that this scheme is already 90% developed and does not have provision for the import of district heating, it is not considered to be a viable heat off-taker at ths time.

There are no new large scale industrial or commercial heat off-takers identified within the LDP.

(c) *'Changes to the UK CHP Development Map or similar'*; A review of the UK CHP Development Map has been carried out and no relevant changes identified. The only 2 viable commercial and industrial heat off-takers within the vicinity of the plant remain Dow Corning and Atlantic Trading each with an identified approximate 45,500 MWh of heat requirements each equating to an approximate continuous offtake of 5.5 MWth per site.

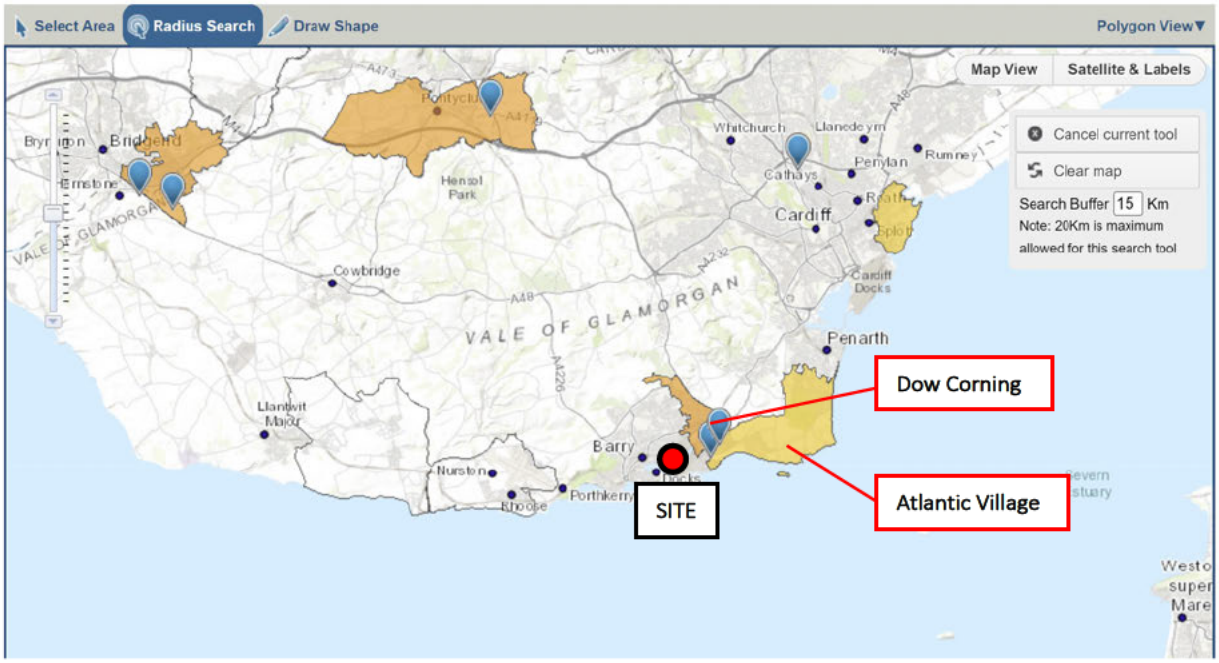

Figure 1: CHP Development Map – showing identified large scale industrial heat demands

Given both the commercial and environmental benefits of being able to provide heat from a certified renewable source, once the Installation has passed into reliable and continuous operations, further commercial discussions will be initiated.

(d) *'New financial or fiscal incentives for CHP'*. There are no new incentives that are available for CHP that were not otherwise available at the original time of construction. It is noted that in the last four years there has been a significant change in the energy markets, resulting from political instability in the Middle East and Russia. The increased the market volatility and pricing variability resulting from these events have changed the financial drivers for all forms of energy and therefore, as soon as the Installation has passed into reliable and continuous operations, further commercial discussions will be initiated.

Raw Materials and Water Use

Condition 1.3.1(c) states *'The operator shall review and record at least every four years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw material and water use; and (d) take any further appropriate measures identified by a review.*

A review of the existing raw materials has been carried out in conjunction with the conclusions of the 2019 sector BREF Note and accompanying BAT conclusions document. The conclusion of the assessment is that the plant currently meets BAT requirements and there are no suitable alternative raw materials that can improve the efficiency of raw material use.

Table 1: Raw Materials Options Review

Material	Nature of Use	BAT Alternatives Considered	Agreed / Best Option for site
Diesel	Used for the start-up burners and for the mechanical loading shovels	Gas / LPG	As existing: Site does not have adequate industrial gas supply to supply maximum loading of plant.

Table 1: Raw Materials Options Review			
Material	Nature of Use	BAT Alternatives Considered	Agreed / Best Option for site
Lubrication, Hydraulic and Turbine Oils	Hydraulics and Lubrication Combination of mineral oils and synthetic oils used.	None	As existing: No alternatives available.
Urea	40% urea Solution – used within SNCR systems	Liquid Ammonia	As existing: Liquid Ammonia presents a significant health and safety risk. Urea 'Prills' considered best all round solution.
Limestone	Approx. 140 tonnes per annum used within the gasifier bed.	Sand	As existing: Gasifier designed to operate with limestone bed. Limestone has significant advantages over bed materials in that it breaks down to form lime and reacts with acid gases and discharged as APC residue from bag filter.
Hydrated Lime	Approx. 540 tonnes per annum. Used to reduce acid gases in the gasifier combustion flue emissions.	Bi-Carb / Sorbical	As existing: Gasifier limestone bed works in complement with hydrated lime, Lime is considered BAT for process.
Activated carbon	Approx. 30 tonnes per annum used as a key reagent to reduce the heavy metal and dioxin emissions in the flue emissions.	None	As existing: Activated carbon considered BAT for the sector.
Water Treatment Chemicals	Internal bunded storage tanks <5m^3. Proprietary item	None	As existing: Used within water treatment system and ultimately discharged to foul sewer.

Once the plant has been fully commissioned and entered into continuous operation, the Operations team will be in a position to understand the long-term trending of key plant items and resource usage. The ability to monitor all dosing rates, resource consumption and plant performance in real time provides the opportunity to fine tune and optimise all resource usage and to maximise the efficiency of the plant.

Key areas of interest will be reagent dosing rates and consumption, water treatment and 'bleed down' rates and plant reliability [therefore reducing the quantity of operating using auxiliary fuels].

Waste and Resource Management

Condition 1.4.2 states that *'The operator shall review and record at least every four years whether changes to those [waste management] measures should be made and take any further appropriate measures identified by a review.'*

A review of the existing waste management options has been carried out in conjunction with the conclusions of the 2019 sector BREF Note and accompanying BAT conclusions document.

The conclusion of the assessment is that the plant currently meets BAT requirements and that the waste management and disposal options employed by the site have been optimised. All wastes and process by-products are currently recycled.

Table 2: Waste Summary

Waste	EWC Code	Source	R / D Code	Agreed / Best option for the site
Bottom Ash	10 01 15	Gasifier	R5 (Off site recycling)	As existing: Recycled as aggregate
Fly Ash (Air Pollution Control (APC) residues)	19 01 05*	Gas Scrubber	R5 (Off site recycling)	As existing: Recycled and reclaimed and reused
Oversized Particles	20 03 01	Fuel Screening	R5 (Off site recycling)	As existing: Recycled and reprocessed or transferred offsite for reuse as aggregate.
Metals	02 01 10	Fuel Screening	R5 (Off site recycling)	As existing: Recycled
Used Bed Material	10 01 15	Gasifier	R5 (Offsite recycling)	As existing: Recycled and reused as aggregate

Please accept this submission as the formal response to the obligations stipulated by conditions 1.2.1(b), 1.2.3, 1.3.1(c) and 1.4.2.

We hope that this information is all self-explanatory, however should you have any further questions in relation to the above please do not hesitate to contact me.

Yours sincerely,

[redacted]