Variation Application: Supporting Documents

Innospec, Permit number EA/EPR/BM0508IG/V008

15 December 2022

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Comments

Comments

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1. Non-technical summary

Innospec Limited (Innospec) has submitted an environmental permit variation to reflect the following operational changes to its Octane Additives manufacturing installation at Innospec Limited, Ellesmere Port Lead Alkyl, Innospec Manufacturing Park, Oil Sites Road, Ellesmere Port, Cheshire, CH65 4EY:

- The installation of a new energy centre with a combined heat and power (CHP) facility, consisting of two gas engines and two steam boilers.. The installation will have a total aggregated thermal input of 34.689MWth. The gas engines and the fired side of the steam boilers will be served by separate 17m flue stacks within a common chimney.
- Once successfully commissioned, the energy centre will replace the site's two existing steam boilers (emissions points A30 and A31). in addition, low grade heat from the energy centre will be used for space heating and will replace the existing site high pressure hot water boiler (emissions point A33).
- Removal of redundant activities from the existing permit, while retaining the existing permit installation boundary.

The replacement of the older boilers is necessary due to the efficiency and condition of the boiler house building. The new energy centre will deliver significant energy efficiency improvements. The gas engines and boilers have been selected to operate on up to 100% hydrogen from 2026, in line with the projected availability of hydrogen from Hynet as part of the Stanlow Industrial Cluster. Initially the engines and boilers will operate on natural gas. The development is vital to Innospec's ongoing manufacturing activities and to reducing the environmental impact of its operations.

The installation has been designed to constitute 'good quality' CHP, under the CHP Quality Assurance (CHPQA) scheme.

As the engines and boilers have a rated thermal input in excess of 1MWth and will be installed after 20 December 2018, they will all constitute 'new' Medium Combustion Plant (MCP) under the Environmental Permitting (England and Wales) Regulations 2016, as amended.

As the gas engines will be natural gas-fired 'new' medium combustion plant, an NOx emission limit of 95mg/m^3 will apply. A NOx emissions limit of 100mg/m^3 will apply to the steam boilers. These emissions limits are set by Annex II, Part 2 of the Medium Combustion Plant Directive (EU) 2015/2193. The engines and boilers have been selected to meet these limits. The gas engines will also constitute 'specified generators' and will meet the applicable NO_x emissions limits as these are less stringent than through the MCP regime.

Additionally, as the aggregated thermal input of combustion plant at the installation exceeds 20MWth and will continue to do so, a permit variation is required with respect to operations under Section 1.1 Part B (a) to Schedule 1, Part 2 of the Environmental Permitting (England and Wales) Regulations 2016.

The energy centre was subject to planning application 22/00070/FUL (submitted to Cheshire West and Chester Council on 7 January 2022) and received planning permission on 23 August 2022.

In addition, the company would like to consolidate this variation, alongside the previous variations and accepted technical change requests, into the permit.

This permit variation application does not concern Innospec's other installation permit (BU4112IK), which authorises the manufacturing of active chemicals.

2. Operational changes requiring a variation

2.1 Energy centre

This variation application concerns the addition of activities associated with a planned new energy centre to Innospec's existing environmental permit (BM0508IG). The energy centre will bring electricity generation on site and will replace the existing boiler house, which is authorised as a combustion activity under Section 1.1, Part B (a) to Schedule 1, Part 2 of the Environmental Permitting (England and Wales) Regulations 2016. In addition to activities under this Schedule reference, the energy centre requires a permit for the four associated items of medium combustion plant and two specified generators.

The new energy centre will constitute a combined heat and power (CHP) facility, including two gas engines and two steam boilers. Low grade heat from the energy centre will be used for space heating. The installation will have a total aggregated thermal input of 34.689MWth. The gas engines and the fired side of the steam boilers will be served by individual 17m flue stacks within a common chimney. The energy centre has been designed to fulfil the requirements of 'good quality' CHP under the CHPQA scheme.

Gas engines and steam boilers within the energy centre have been specified based on projected emissions performance against anticipated limits, with the most stringent applicable limits being drawn from Annex II, Part 2 of the Medium Combustion Plant Directive (EU) 2015/2193.

The gas engines and boilers have been selected to operate on up to 100% hydrogen from 2026, in line with the projected availability of hydrogen from Hynet as part of the Stanlow Industrial Cluster. Initially the engines and boilers will operate on natural gas. The development is vital to Innospec's ongoing manufacturing activities and to reducing the environmental impact of its operations.

2.1.1 Project programme

The construction programme of the new energy centre building (Appendix A.a presents a general layout drawing) commenced in late November 2022, with a planned completion date of early April 2023. Subsequently the gas engines and steam boilers are projected to be installed and commissioned as follows:

- **Gas Engine 1:**
    - installation between early April and early May 2023.
    - commissioning between mid-April and mid-May 2023.
- **Steam Boiler 1** and **Steam Boiler 2**:
    - installation between mid-April and mid-May 2023.
    - commissioning between mid-May and mid-June 2023.
- **Gas Engine 2:**
    - installation between late June and late-July 2023.
    - commissioning between mid-August and late August 2023.

2.1.2 Decommissioning of existing boiler house

The existing boiler house, including the high-pressure hot water boiler, will be retained during the commissioning of gas engine 1 and the two steam boilers but will be decommissioned and removed as soon as possible. It is necessary to retain the boiler house initially as a back-up to minimise potential disruptions to production.

It is anticipated that the boiler house plant would be switched off for the final time in late June 2023 at the earliest, providing the commissioning of the energy centre goes as planned. It is proposed that Innospec will notify the Environment Agency in writing as soon as the decommissioning of the boiler house commences. As part of the decommissioning, the boiler house site closure plan (Issue 1, dated April 2004) will be followed. Fuel oil tanks that formerly served the boiler house have already been decommissioned and removed.

The boiler house cannot be operated at the same time as the steam-raising capacity of the energy centre due to pressure issues this would cause. The steam-raising elements of gas engine 1 and the steam boilers will not be operational at the same time as the boiler house. This represents a physical constraint and means that the aggregated thermal input of the installation cannot meet or exceed 50MWth when in operation, which would require a permit under Section 1.1 Part A(1) (a) under Part 2 to Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2016.

The boiler house may be temporarily operated alongside gas engine 1, but only with gas engine 1 solely generating electricity and not steam. Commissioning gas engine 1 alongside the boiler house will not cause the aggregated thermal input of the installation to exceed 50MWth.

The compressed air system within the boiler house will be relocated as part of decommissioning before the building is closed and demolished.

2.1.3 Gas engines

The gas engines will comprise two MTU gas engines / gensets, with specifications as below:

- Gas engine 1 (full technical specification provided in Appendix B.a):
    - Model: Rolls Royce MTU 20V4000 GS
    - 2.535MW_e electrical capacity at 11kV
    - 5.955MWth maximum thermal input
    - NO_x emissions: below 95mg/m^3 at 15% oxygen
    - Calculated actual emissions volume flow rate: 15,182 Nm^3/h
    - Quoted total efficiency at 100% load: 87.8%
- Gas engine 2 (full technical specification provided in Appendix B.b):
    - Model: Rolls Royce MTU 12V4000 GS
    - 1.519MW_e electrical capacity at 11kV
    - 3.560MWth maximum thermal input
    - NO_x emissions: below 95mg/m^3 at 15% oxygen

- Calculated actual emissions volume flow rate: 15,182 Nm^3/h
- Quoted total efficiency at 100% load: 87.9%

Waste heat from the gas engines will be supplied for use by the steam boilers.

2.1.4 Steam boilers

The steam boilers will comprise two Danstoker OPTI 1400 combination high pressure composite boilers, with specifications as below:

- Steam boiler 1 (boiler technical specification provided in Appendix B.c, burner specification in Appendix B.e):
  - Burner model: Dunphy TG6.1200
  - NO_x emissions: $100mg/m^3$, on a dry basis
  - Calculated actual emissions volume flow rate: 11,273 Nm^3/h
  - Quoted efficiency (fired side): 93.6%
  - Steam capacity, fired side: 12 t/h
  - Steam capacity, waste heat side: 1.485 t/h
- Steam boiler 2 (boiler technical specification provided in Appendix B.d, burner specification in Appendix B.e):
  - Burner model: Dunphy TG6.1200
  - NO_x emissions: $100mg/m^3$, on a dry basis
  - Calculated actual emissions volume flow rate: 11,273 Nm^3/h
  - Quoted efficiency (fired side): 93.6%
  - Steam capacity, fired side: 12 t/h
  - Steam capacity, waste heat side: 0.891 t/h

Waste heat from the gas engines will be used to provide steam for process use and hot water for space heating of the administration building and of the plants/workshops. Waste heat will also be used to pre-heat boiler feedwater in conjunction with economisers on each boiler.

2.1.5 Plant sizing and mode of operation

The total rated thermal input of the energy centre will be 34.689MWth, presenting a minor (~2.5%) increase over the total rated input of the boiler house equipment (33.9MWth), which it will replace. However, significant energy efficiency improvements are projected, including delivering at least 97-99% of the site's electricity demand on site while reducing transmission losses.

Gas engines

The gas engines will have combined electrical capacity of $4.054MW_e$. The engines are not anticipated to be run at full output initially: the site's electricity demand is typically between 2.3 and 3.3MW. The

specification of the gas engines allows headroom for future expansion of the site. The gas engines will have a minimum availability of 92% each, equating to 8,059 hours per year.

Boilers

Steam will be generated in the waste heat side of the boilers as a priority to reduce energy demand. The fired side of the two boilers will be operated in a duty/standby arrangement. The standby boiler will be kept in hot standby. The boilers will be cycled weekly.

The site's current steam demand varies between 2 and 12 t/h, supporting the duty/standby arrangement planned. The fired side of one boiler will need to be available at all times.

The availability of the waste heat side of each boiler will reflect that of the respective associated gas engine.

2.1.6 Fuels and greenhouse gas emissions

Natural gas firing, as commissioned

Initially the energy centre will operate exclusively on natural gas. Efficiency improvements are expected to reduce natural gas consumption and in turn greenhouse gas emissions from the outset against the baseline for site steam generation. Further efficiency improvements are expected by providing a more central location for steam generation, reducing transmission losses. In addition, oversized pipework will be removed as part of the planned pipework replacement programme.

Hydrogen firing

The gas engines and steam boilers have been specified to enable future firing on hydrogen as soon as this becomes available as part of the 3rd party Hynet project (planned for early 2026). Innospec has registered its interest in the procurement of low carbon hydrogen from Hynet and has taken part in discussions with Essar Oil (the hydrogen producers) directly.

As initially installed, the gas engines will be able to operate on a 10% hydrogen blend by volume with natural gas with no impact on engine efficiency. The engines will also be able to operate on up to a 20% hydrogen blend with a marginal reduction in electrical efficiency. The engines will require an overhaul to run on 100% hydrogen, which is planned for later in 2026 once this fuel becomes available.

Once hydrogen blends are available, the boiler burners will be recommissioned to allow firing on hydrogen at concentrations up to 100%. Boiler modifications will not be required.

Option for carbon capture

A possible alternative option to hydrogen firing is available with the potential for post combustion carbon capture using the local Hynet infrastructure.

2.1.7 Raw and waste material storage and handling

A restricted range of new raw materials will be introduced to support the energy centre. This will include lubricating oils, coolants, maintenance consumables and spares. Water treatment chemicals will be stored locally within self-bunded tanks in the energy centre to prevent deterioration. Natural gas (and ultimately hydrogen) will be supplied directly to the installation by pipeline and there will be no gas storage Similarly there will be no bulk fuel oil storage for back up in the event of gas supply interruption.

Lubricating oil and water treatment chemical storage will be within suitable bunding, providing a secondary containment capacity of at least 110% of the total volume of the substances held. A dedicated 4 m^3 integrally-bunded tank will hold virgin lubricating oil. This tank will be external, adjacent to the energy centre.

Both gas engines will feature extended oil sump vessels. The engines, extended oil sumps and primary low temperature hot water circuits will be located within separate engine containers providing secondary containment meeting the 110% rule. The low temperature hot water circuit will contain a 65/35% water/glycol brine mixture.

The energy centre will not introduce novel waste streams. Waste coolants will be removed by the service contractor where possible, avoiding the need to store these on site. Waste oils will be removed by the service contractor where possible or stored in an external integrally-bunded 4 m^3 waste oil tank adjacent to the energy centre, pending collection by a waste contractor.

Spill kits will be provided for the energy centre, reflecting the inventory of potentially hazardous substances. Existing spill procedures developed under Innospec's management system will be applied to the energy centre and during deliveries and collections of materials. The spill procedures will be reviewed and updated as necessary to reflect risks associated with the energy centre.

2.1.8 Planned service and maintenance routines

The gas engines will be subject to a full operation and maintenance (O&M) contract. Innospec personnel will be required to undertake basic daily checks, but otherwise all maintenance will be delivered by the O&M contractor. In support of this contract, the gas engines will have full 24-hour remote monitoring. Service intervals will initially be set as every 2,000 hours, with oil sampling and analysis every 400 to 500 hours.

Maintenance of the steam boilers is planned to be delivered under a contract. The boilers will receive statutory inspections and annual burner servicing. However, Innospec is anticipated to be actively involved in the operation of the boilers. Daily checks of the boilers will continue to be carried out in accordance with the BG01 (Guidance on the safe operation of boilers) document.

2.2 Information on MCP and Specified Generators required by Appendix 1 to Form Part C2.5

2.2.1 Background

Appendix 1 to Form Part C2.5 includes a medium combustion plant checklist. This specifies information to be provided to the competent authority for each MCP and the planned specified generators. Sections 2.2.2 through 2.2.5 below present the required information for each MCP. Sections 2.2.2 and 2.2.3 also provide required information for each specified generator.

2.2.2 Gas Engine 1

Table 1: MCP and specified generator checklist: Gas Engine 1 (2.5MW)

MCP site specific identifier	Gas Engine 1 (2.5MW)			
Grid reference of the location of the MCP (either NGR or Latitude/Longitude)	Easting	Northing	Latitude	Longitude
	341667.3	376589.6	53.283054	-2.8763823
Rated thermal input (MW) of the MCP	5.955 MWth			
Type of MCP	Gas engine / Genset			
Type of fuels used:	Natural gas, hydrogen (Can operate on 20/80 hydrogen/natural gas blend from outset. May run on up to 100% hydrogen with future modifications)			
Date when the new MCP was first put into operation	May 2023 (planned date)			
Sector of activity of the MCP or the facility in which it is applied (NACE code)**	20590: Manufacture of other chemical products n.e.c.			
Expected number of annual operating hours of the MCP	8,059			
Average load in use (%)	Approximately 80% (run at 100% to maximise efficiency where possible, site demand permitting)			
Where the option of exemption under Article 6(8) is used, a declaration signed here by the operator (as identified on Form A) that the MCP will not be operated more than the number of hours referred to in this paragraph	N/A			
Stack height (m)	17			
Distance to nearest human receptor (m)	802m to the southwest (residences on Robinson Road)			
Distance to nearest ecological receptor (m)	100m to the north (Mersey Estuary SPA, Ramsar, SSSI site)			
Additional information required for specified generators				
Technology (engine/turbine)	Engine			
Background NO_2 ($\mu g.m^3$)	15.7 (annual average), 31.4 (hourly average)			
If your generator is in an AQMA please give details	N/A			

2.2.3 Gas Engine 2

Table 2: MCP and specified generator checklist: Gas Engine 2 (1.5MW)

MCP site specific identifier	Gas Engine 2 (1.5MW)			
Grid reference of the location of the MCP (either NGR or Latitude/Longitude)	Easting	Northing	Latitude	Longitude
	341667.3	376589.6	53.283054	-2.8763823
Rated thermal input (MW) of the MCP	3.560 MWth			
Type of MCP	Gas engine / Genset			
Type of fuels used:	Natural gas, hydrogen (Can operate on 20/80 hydrogen/natural gas blend from outset. May run on up to 100% hydrogen with future modifications)			
Date when the new MCP was first put into operation	August 2023 (planned date)			
Sector of activity of the MCP or the facility in which it is applied (NACE code)**	20590: Manufacture of other chemical products n.e.c.			
Expected number of annual operating hours of the MCP	8,059			
Average load in use (%)	Approximately 70% (run at 100% where possible to maximise efficiency, site demand permitting)			
Where the option of exemption under Article 6(8) is used, a declaration signed here by the operator (as identified on Form A) that the MCP will not be operated more than the number of hours referred to in this paragraph	N/A			
Stack height (m)	17			
Distance to nearest human receptor (m)	802m to the southwest (residences on Robinson Road)			
Distance to nearest ecological receptor (m)	100m to the north (Mersey Estuary SPA, Ramsar, SSSI site)			
Additional information required for specified generators				
Technology (engine/turbine)	Engine			
Background NO_2 ($\mu g.m^3$)	15.7 (annual average), 31.4 (hourly average)			
If your generator is in an AQMA please give details	N/A			

2.2.4 Steam boiler 1

Table 3: MCP checklist: Steam boiler 1

MCP site specific identifier	Steam boiler 1			
Grid reference of the location of the MCP (either NGR or Latitude/Longitude)	Easting	Northing	Latitude	Longitude
	341667.3	376589.6	53.283054	-2.8763823
Rated thermal input (MW) of the MCP	12.587MWth			
Type of MCP	Composite boiler			
Type of fuels used:	Natural gas, hydrogen (Can operate on up to 100% hydrogen from outset)			
Date when the new MCP was first put into operation	May 2023 (planned date)			
Sector of activity of the MCP or the facility in which it is applied (NACE code)**	20590: Manufacture of other chemical products n.e.c.			
Expected number of annual operating hours of the MCP	4,500			
Average load in use (%)	30% (in duty mode)			
Where the option of exemption under Article 6(8) is used, a declaration signed here by the operator (as identified on Form A) that the MCP will not be operated more than the number of hours referred to in this paragraph	N/A			
Stack height (m)	17			
Distance to nearest human receptor (m)	802m to the southwest (residences on Robinson Road)			
Distance to nearest ecological receptor (m)	100m to the north (Mersey Estuary SPA, Ramsar, SSSI site)			

2.2.5 Steam boiler 2

Table 4: MCP checklist: Steam boiler 2

MCP site specific identifier	Steam boiler 2			
Grid reference of the location of the MCP (either NGR or Latitude/Longitude)	Easting	Northing	Latitude	Longitude
	341667.3	376589.6	53.283054	-2.8763823
Rated thermal input (MW) of the MCP	12.587MWth			
Type of MCP	Composite boiler			
Type of fuels used:	Natural gas, hydrogen (Can operate on up to 100% hydrogen from outset)			
Date when the new MCP was first put into operation	May 2023 (planned date)			
Sector of activity of the MCP or the facility in which it is applied (NACE code)**	20590: Manufacture of other chemical products n.e.c.			
Expected number of annual operating hours of the MCP	4,500			
Average load in use (%)	31% (in duty mode)			
Where the option of exemption under Article 6(8) is used, a declaration signed here by the operator (as identified on Form A) that the MCP will not be operated more than the number of hours referred to in this paragraph	N/A			
Stack height (m)	17			
Distance to nearest human receptor (m)	802m to the southwest (residences on Robinson Road)			
Distance to nearest ecological receptor (m)	100m to the north (Mersey Estuary SPA, Ramsar, SSSI site)			

2.3 Processes and plant removed since last permit issue

Since the last consolidated permit was issued in 2006, the following processes have been decommissioned, demolished and/or repurposed as presented in Table 5.

Table 5: Processes and plant removed since 2006

Process	Status
Tetraethyl Lead 1 (TEL1) plant	Decommissioned and buildings demolished
Tetraethyl Lead 2 (TEL1) plant	Decommissioned and buildings demolished
Former lead melt building	Decommissioned and repurposed to blending warehouse
South sodium bay	Decommissioned, buildings remain
Former sodium plant and associated emissions points A25, A26 and A27	Decommissioned and buildings demolished. Footprint now occupied by Kemira (tenant)
Bung washing machine, drum washing machine 1, drum washing machine 3 and external drum washing process and associated emissions points A8, A9, A10 and A11	Decommissioned and removed
V835 catch tank and associated emissions points A15 and A16	Decommissioned and removed
Bulk storage tanks and spheres	Number of spheres decommissioned from ethyl chloride storage, but remain on site. Three large and three small ethyl chloride spheres remain in service Number of bulk storage tanks repurposed for use in fuel blending, as subject to variations (see Section 8.3 and 8.4) Acetone tank V797 decommissioned and removed, alongside associated vent emissions point (A19)
Methyl chloride storage 'torpedoes'	Decommissioned
Fuel tanks serving boiler house	Decommissioned and demolished
Electrostatic precipitator	Decommissioned and demolished. See Section 8.7
Gaseous TEL Oil Absorber (GTOA) distillation column and associated equipment	Decommissioned, see Section 8.7 The GTOA plant remains operational

2.4 Changes to operating techniques

Question 3a1 in application form Part C3 requires the applicant to identify where document references in the permit relating to operating techniques are no longer valid or have been superseded and why. Table 2.1.1 within the existing permit records these operating techniques. The current status of the operating techniques is presented in Table 6 below.

Innospec suffered a major IT failure in 2019. As a result, records of responses to the regulator's questions on operating techniques are not available in every case. However, unless the respective elements of the installation have subsequently been decommissioned (see Section 2.3 above) or modified by a variation or technical change (see Section 8) all operating techniques listed in the permit remain valid.

Table 6: Status of operating techniques listed in Table 2.1.1 to permit BM0508IG

Description	Parts	Date received	Status	Justification
Application	Response to questions B2.1, B2.2 and B2.3 in sections B2.1 and B2.3 of the application	31 March 2003	Remains active, other than with respect to decommissioned equipment (see Section 2.3) or modified equipment and processes (see Section 8)	No additions to process subsequently, only decommissioning
Response to Schedule 4 notice	The response to questions 6 through 10 and 12 and 13	24 October and 19 November 2003	Remain active, bar question 8 which is now partly non-applicable	Question 8: Gaseous TEL Oil Absorber (GTOA) distillation column no longer operated, see Section 8.7
Further information	Additional information from operation on modifications to boiler house	20 November 2003	No longer relevant upon decommissioning	The boiler house is to be decommissioned and demolished following successful commissioning and operation of the energy centre
Further information	Additional information from operator on air quality impacts and BAT	28 November 2003	Remains active, other than with respect to decommissioned equipment (see Section 2.3) or modified equipment and processes (see Section 8)	No additions to process subsequently, only decommissioning, except where subject to subsequent variations or technical changes (see Section 8)
Application for variation, reference HP3236SB	All	14 October 2005		

3. Environmental management system

3.1 Overview

Innospec operates an ISO certified integrated management system, known as the Ellesmere Port Integrated Management System (EPIMS). EPIMS provides a framework for managing the site's operations and covers health, safety, environmental, energy and quality management. EPIMS has been designed to meet, and is certified against, the following standards:

- ISO 14001:2015 on environmental management systems;
- ISO 45001:2018 on occupational health and safety management systems;
- ISO 50001:2011 on energy management systems; and
- ISO 9001:2015 on quality management systems.

EPIMS covers the site's entire operations, including those falling within the scope of environmental permit BM0508IG.

The integrated management system is divided into three sections:

- **Section 1:** The site SHE policy and Major Accident Prevention Policy (MAPP).
- **Section 2:** Overarching control policies, including the safety, health and environmental management system (EPIMS 2.15), ISO 14001 environmental management systems manual (EPIMS 2.15.1) and Innospec business' context, interested parties, risk and opportunities document (EPIMS 2.15.1.1).
- **Section 3:** Operational controls, including procedures covering, for example, risk assessments (EPIMS 3.1), safe by design (EPIMS 3.2) and safe operation (EPIMS 3.3) with relevant subsections including plant operations (EPIMS 3.3.1). **Section 3** also contains SOPs covering activities within the octane additives permit.

EPIMS documentation and local arrangements will be reviewed, updated and extended as necessary to reflect the energy centre development. This will include an assessment of staff competency, planned inspection and maintenance routines and arrangements for the monitoring and review of energy efficiency under ISO 50001. Accident and emergency management implications will also be assessed, as part of a HAZOP study in conjunction with a review of the site's safety report under COMAH.

Table 7 presents a summary of how EPIMS satisfies the Environment Agency's requirements on environmental management systems for permitted installations.

Table 7: Assessment of EPIMS arrangements against the Environment Agency's 'Develop a management system: environmental permits'[1] guidance

Points from Environment Agency guidance	Summary of associated EPIMS documents
Prepare your site infrastructure plan Plans to show • buildings, • storage facilities for hazardous materials, waste materials • locations of pollution prevention kits • entrances and exits for emergency services • inspection and monitoring points • effluent treatment plants • effluent discharge points • sensitive receptors (surface water features, residential commercial premises, conservation sites) • drainage • water, gas electricity supply locations	Most of these plans are integrated into the EPIMS system documentation as controlled documents undergoing periodic review and updates. Some plans have been amended to highlight relevant information relating to the areas within the installation boundary and these are included in Appendix A to this variation.
Site operations Break down the operations that will be carried out on your site during start up, normal operation and shut down into a list of activities and processes. List the steps you will take to prevent or minimise risks to the environment from each activity or process and type of waste. Be specific about the actions you will carry out to do this.	Section 3 of EPIMS, including: • Section 3.1: Risk assessment including environmental aspects and impacts risk assessment procedure (EPIMS 3.1.3), with embedded link to the most current aspects register • Section 3.2: Safe by Design • Section 3.3: Safe Operations containing SOPs for operations and activities on site • Section 3.4: Change control • Section 3.5: Safe maintenance • Section 3.6: Problems • Section 3.7: Selection and competency
Site and equipment maintenance plan	Procedures and SOPs contained within EPIMS Section 3.5
Contingency and accident prevention and Management, including issues such as online security	Covered in EPIMS Section 1.2 and 3.6, including amongst others the site emergency plan (EPIMS 3.6.3), actions on receipt of poor

[1] https://www.gov.uk/guidance/develop-a-management-system-environmental-permits#full-publication-update-history

Points from Environment Agency guidance	Summary of associated EPIMS documents
	tankers/containers (EPIMS 3.6.5), emergency exercises (EPIMS 3.6.7), cybersecurity (EPIMS 2.25) and chemical spillage control (EPIMS 3.6.9).
Climate change	Innospec is part of the Chemicals Sector CCA Umbrella agreement with a reduced rate certificate in place (facility number CIA/F00155). The site operates an ISO 50001-certified energy management system.
Complaints procedure	Complaints are handled through an online system (Airsweb).
Managing staff competence and training records	Covered by EPIMS 2.7 Training, Competency and Records (including site safety induction presentations)
Keeping records	Covered by EPIMS 2.17 (Documentation requirements) and EPIMS 2.10 (Document Control)
Audit and Review	Covered by EPIMS 2.5 (Monitoring and Auditing) and EPIMS 2.13 (Management Review)
Make sure people understand what you do	Covered by EPIMS 2.7 (Training, Competency and Records) and EPIMS 2.12 (SHE Communications, Briefings and Meetings)

3.2 Maintenance

EPIMS Section 3.5 addresses maintenance requirements for the entire site. The Maintenance Policy and Strategy (EPIMS 3.5) sets out how maintenance is undertaken around the principles of integrity management and reliability management strategies.

Innospec's aim is to achieve a high level of planned maintenance work. All work carried out is identified using a unique work order number and planned work is scheduled and agreed with the appropriate business unit on a weekly basis. Basis of Safety (BoS), safety and environmental work is uniformly assigned the highest priority and is scheduled as soon as is reasonably practicable.

Planning, scheduling, asset inventory and control is controlled using a Computerised Maintenance Management System (CMMS).

New plant and equipment introduced in connection with the energy centre development will be populated into the site asset inventory. Maintenance will be scheduled according to corresponding requirements and service contracts as described in Section 2.1.8 above.

3.3 Accident management

Due to the nature of the toxic and hazardous materials stored and produced across the wider Innospec the site, Innospec is highly regulated requiring compliance with a range of environmental and health and safety legislation in addition to the Environmental Permitting (England and Wales) Regulations 2016, including:

- Control of Major Accident Hazards (COMAH) Regulations 2015;
- Planning (Hazardous Substances) Regulations 2015;
- Dangerous Substances (Notification and Marking of Sites) Regulations 1990; and
- Dangerous Substances and Explosive Atmospheres Regulations 2002.

The site is an upper tier COMAH site and therefore is subject to a safety report and on-site emergency plan. The energy centre will not increase the inventory of substances subject to the COMAH or hazardous substance consenting regimes. However, the modifications subject to this variation application are being assessed through the site's management of change and HAZOP study processes, which are documented within Section 3.2 and 3.4 of EPIMS.

The site's incident and accident prevention, management and emergency response procedures are set out in Section 3.6 of EPIMS. These procedures will be reviewed and updated as necessary to reflect the new energy centre, although the energy centre is not foreseen to introduce novel types of emergency scenarios beyond those already present.

Where revised, incident and accident prevention, management and emergency response procedures will be updated throughout the workplace. Relevant changes will be communicated to all persons, with extended information for persons with an emergency response role.

4. Resource Consumption

4.1 Raw materials

Table 8 presents the site's projected raw material inventory associated with the new energy centre. Raw materials have been selected on the following basis:

- Fuels have been selected to achieve the best energy efficiency and emissions performance. The plant has been designed to permit the transition from natural gas to hydrogen, reducing greenhouse gas emissions for the installation and wider site (see Section 2.1.6 for further details);
- Consumables have been selected on the basis of the equipment supplier's experience in operating similar energy centres elsewhere. Consumption of oils and other maintenance consumables is necessary to avoid accelerated wear and tear or breakdowns; and
- Feedwater treatment is vital to maintain boiler efficiency and continued operation of the energy centre.

Potentially contaminative materials, such as lubricating oils, will be installed in appropriate tanks within secondary containment systems satisfying the CIRIA C736 guidance.

Table 8: Raw materials associated with the energy centre

Material	Projected annual consumption	Maximum site inventory	Description and main hazards
Natural gas	80,000 MWh	N/A	H220: Extremely flammable gas H280: Gas under pressure, may explode if heated H380: May displace oxygen and cause rapid suffocation
Hydrogen (in blends with natural gas or at a concentration up to 100%)	Initially zero, up to 80,000 MWh upon the availability of a 100% hydrogen supply	N/A	H220: Extremely flammable gas H280: Gas under pressure, may explode if heated
Engine lubricating oil	15,880 litres [2]	7,970 litres (2,050 litres in gas engine 1; 1,920 litres in gas engine 2, up to 4,000 litres in storage tank)	EUH208 - Contains Calcium long chain alkaryl sulfonate. May produce an allergic reaction Used engine oil is classified as a category 2 carcinogen

[2] Projected on basis of 4 oil changes per year

Material	Projected annual consumption	Maximum site inventory	Description and main hazards
Glycol coolant (in 65/35% water/glycol brine mixture)	Approx. 1,140 litres (averaged) [3]	2,850 litres (1,500 litres in gas engine 1,1,350 litres in gas engine 2)	H202 – Harmful if swallowed H373 – May cause damage to organs through prolonged or repeated exposure
Various dry maintenance consumables (e.g., filters)	-	-	N/A
Sodium bisulfite (Hydrex 1110)	Approx. 200 litres	30 litres	EH031 – Contact with acids liberates toxic gas H302 – Harmful if swallowed
Polymer dispersant (Hydrex 1258)	Approx. 1,500 litres	100 litres	N/A
Sodium hydroxide (Hydrex 1568)	Approx. 10,000 litres	100 litres	H314 – Causes severe skin burns and eye damage

4.2 Water

4.2.1 Baseline consumption by the boiler house

The existing boiler house consumes approximately 45,000 m^3 of potable water per annum.

4.2.2 Projected consumption by the energy centre

Water consumption is not initially anticipated to change significantly from the existing boiler house as the site's steam demand will not change. However, if found feasible by experiences gained during commissioning and operation of the energy centre, a condensate return system will be installed, reducing water consumption.

4.3 Energy consumption

4.3.1 Baseline consumption by the boiler house

The existing boiler house consumed 4,596,081 m^3 of natural gas during the 2021 calendar year. This was equivalent to 163.884 TJ or 45,523 MWh.

4.3.2 Baseline electricity consumption

The Innospec manufacturing park site consumed 22,701 MWh of electricity during the 2021 calendar year, inclusive of consumption by Innospec's tenants (Kemira, Astra and Tradebe). Excluding tenants, Innospec's own electricity consumption was approximately 20,500 MWh

[3] Calculated based on the most frequent replacement possible: every 20,000 hours

4.3.3 Projected consumption by the energy centre

Based on a projected per annum electricity demand of 23,000 kWh, steam demand of 34,500t and the delivery of hot water for space heating and domestic requirements, the energy centre is projected to consume 80,000 MWh of natural gas, hydrogen or a natural gas/hydrogen blend.

The energy centre has been designed to satisfy Innospec's electricity and steam demand. This will mean that natural gas consumed by the energy centre will be significantly (approximately 45%) greater than the existing boiler house, as electricity generation activities are brought on site. However, this will also mean that Scope 2 emissions associated with offsite electricity generation and Scope 3 electricity transmission and distribution losses will be eliminated.

The energy centre is anticipated to reduce overall energy consumption. This is due to the more central location reducing transmission losses of steam, steam pipework rationalisation and associated efficiency improvements delivered by the models of gas engine and the steam boiler selected. Both the gas engines and steam boilers have been selected based on their 'best in class' energy efficiency.

A suite of metering equipment will be installed to enable the monitoring and management of the energy centre's energy performance. This will include specific gas meters for each gas engine and steam boiler, metering of steam output and metering of electricity generation, including parasitic load.

5. Waste management

5.1 Introduction

The energy centre will generate a limited number of waste streams, none of which will be new to the site. Innospec's approach to waste management, including the application of the waste hierarchy, will continue.

Once commissioned, the energy centre will permit the removal of the existing boiler house and high-pressure hot water boiler. Removals will mean that the associated waste streams will no longer be generated.

5.2 Wastes associated with the variation

Table 9 presents wastes streams expected to arise from the operation of the energy centre. Non-routine waste streams, such as end-of-life parts or equipment replaced during breakdowns, are not listed. Foreseen wastes will be generated through maintenance that is key to the ongoing efficiency and availability of the energy centre.

Table 9: Wastes associated with the energy centre

Material	Estimated annual tonnage	Storage container and location	EWC code	R/D code
Waste lubricating oil	8.31 t	Bunded 4,000 litre tank external to energy centre	13 02 05* / 13 02 06*	R9
Oil filters	Approx. 0.2 t	Clip top drums; Drum/IBC store	16 01 07*	R3
Spent filter materials, absorbents, PPE and wiping cloths	Approx. 0.5 t	Clip top drums; Drum/IBC store	15 02 02*	D10
Various maintenance consumables	Approx. 0.2 t	Clip top drums; Drum/IBC store	Various	R3 / R13

EPIMS includes procedures for the duty of care assessment and selection of waste contractors, reflecting the duty to apply the waste hierarchy. Waste monitoring procedures will capture wastes associated with the energy centre, facilitating assessments of volumes and waste fates against the waste hierarchy.

6. Emissions and monitoring

6.1 Emissions to air

6.1.1 Emissions monitoring techniques

Section 3 of Form part C2.5A requires that details of emissions monitoring to be undertaken are provided for the new MCPs.

As 'new' natural gas fired MCP, the gas engines and steam boilers are required to meet a NOx emissions limit value set by Annex II, Part 2 of the Medium Combustion Plant Directive (EU) 2015/2193. This Annexe does not set limits on any other parameter and the proposed monitoring techniques have been selected on this basis.

Monitoring methods will be selected based on the Environment Agency's 'Monitoring stack emissions: techniques and standards for periodic monitoring'[4] guidance. NO_x emission monitoring will be undertaken against the BS EN 14792:2017 standard by an MCERTS-accredited contractor. In line with the forthcoming changes to the scheme, Innospec will require that portable analysers used by contractors are suitably MCERTS certified from 1 January 2025 at the latest.

Sample points will be provided on each energy centre stack. Sample ports and sampling arrangements will meet the requirements of the Environment Agency's 'Monitoring stack emissions: measurement locations'[5] guidance and the BS EN 15259 standard.

Innospec will require that testing follows the requirements of corresponding Environment Agency guidance. The sampling strategy will be selected to reflect operating characteristics.

Innospec will retain emissions monitoring data electronically on an indefinite basis, exceeding the six-year minimum set by the guidance.

6.1.2 Emissions monitoring frequency

As required by Annex III to the Medium Combustion Plant Directive (EU) 2015/2193, the first emissions measurements for the energy centre will be undertaken within four months of the grant of the varied permit or on the date operations start, whichever is latest.

It is proposed that periodic emissions monitoring is undertaken at least three-yearly, in accordance with the Environment Agency's 'Medium combustion plant (MCP): comply with emission limit values'[6] guidance. This guidance requires periodic monitoring to be undertaken at least three-yearly for MCP with a rated thermal input of 20MWth or below, which reflects the input of each of the four MCP within the energy centre.

6.2 Emissions to water and sewer

The energy centre will not generate any form of direct discharge to water or sewer under normal operating conditions.

The gas engines will not generate any form of liquid effluent. Effluents generated by the steam boilers will not differ from those generated by the existing boiler house and wastewater management will remain unchanged as a result of the variation application.

[4] https://www.gov.uk/government/publications/monitoring-stack-emissions-techniques-and-standards-for-periodic-monitoring/monitoring-stack-emissions-techniques-and-standards-for-periodic-monitoring
[5] https://www.gov.uk/government/publications/monitoring-stack-emissions-measurement-locations/monitoring-stack-emissions-measurement-locations
[6] https://www.gov.uk/guidance/medium-combustion-plant-mcp-comply-with-emission-limit-values#monitoring

Total dissolved solids (TDS) blowdown, bottom blowdown, steam-raising boiler condensate and water softener regeneration effluent will continue to be discharged to the cooling water system serving the Octane Additives conical cooling tower, where they will be reused.

6.3 Emissions to land and groundwater and fugitive emissions

The modified installation will not intentionally discharge to land or groundwater.

The risk of fugitive releases from the energy centre will be controlled through the pollution prevention and spill response measures described in this variation application.

7. Environmental risk assessment

7.1 Introduction

This section has been prepared to satisfy the Environment Agency's 'Risk assessments for your environmental permit'[7] guidance. Potential risks associated with the modifications covered by the variation application were assessed using the five-step process outlined in this guidance, with some risks dismissed at the first step.

The environmental risk assessment concluded that the modifications subject to this application will not lead to significant or unacceptable risks to the environment.

7.2 Identified risks

7.2.1 Emissions to air

The energy centre will include four items of medium combustion plant. This will initially be run entirely on natural gas. The medium combustion plant will be subject to NO_x emission limit values. Therefore, emissions to air from the modified installation are considered potentially significant and further assessment was required.

7.2.2 Emissions to Manchester Ship Canal

As noted in Section 6.2, effluents from energy centre will be reused in the cooling water system serving the installation. Therefore, the installation does not introduce new emissions to water. However, a risk of fugitive emissions remains and was assessed.

7.2.3 Noise

Gas engines and steam boilers will be installed within the energy centre. Due to the potential for noise generation by the gas engines and the boilers, acoustic measures will be installed. Due to the application of control measures, noise generation received further assessment.

7.2.4 Vibration

The energy centre will occupy a central location within the existing installation. Vibration risks will be non-significant and do not require further assessment.

7.2.5 Odour

Due to the combustion characteristics of natural gas and hydrogen, these fuels will not pose an odour risk during normal operating conditions. Therefore, this risk was not assessed further under normal conditions.

However, due to the odourant present within natural gas, odour risks were considered during abnormal or accident scenarios.

7.2.6 Litter or dust

Dedicated, lidded waste storage containers are available throughout the Innospec Manufacturing Park. These receptacles will be used during the construction, operation and maintenance of the energy centre.

[7] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

Waste streams associated with the energy centre are considered to pose a low risk of litter formation and volumes of waste stored will be low.

Processes at the energy centre will not generate dusts and travel to and from the site will be limited.

In addition to the above factors, the energy centre will be centrally located within the installation and will be accessible via surfaced roadways. Risks associated with litter or dust were not deemed to require further assessment.

7.2.7 Abnormal Scenarios / Accidents

A range of abnormal or accident scenarios were considered to require further assessment:

- Abnormal emissions from combustion plant stacks;
- Fugitive releases of natural gas and/or hydrogen due to a leak;
- Leaks from energy centre equipment or storage due to defects or damage;
- Failure of acoustic control measures; and
- Fire or explosion.

7.3 Habitat and human receptors

Table 10 presents sensitive habitats and human receptors identified for the purpose of the environmental risk assessment, their characteristics and distance from the installation.

Table 10: Relevant sensitive receptors

Name of receptor	Location	Type	Nature of receptor
Designated environmental receptors (SPAs, SACs and Ramsar sites) within 10km of the installation			
Mersey Estuary	100m north	SPA, Ramsar, SSSI	Estuarine area including fen, marsh and swamp
Designated environmental receptors (SSSIs, NNRs, LNRs, LWS and ancient woodland) within 2km of the installation			
Jack's Wood	1.2km west	LWS	Broadleaved, mixed and yew woodland
Whitby Park	1.4km southwest	LNR	Neutral grassland
Human receptors within 2km of the installation			
Residences at Robinson Road	800m southwest	Human Health	Residential
Residences at Griffiths Lane	850m west	Human Health	Residential
Residences at Shepherd Close	900m west	Human Health	Residential

Name of receptor	Location	Type	Nature of receptor
Wolverham Primary and Nursery School	1km southwest	Human Health	Sensitive Use
Residences at Oval Crescent	1.1km south	Human Health	Residential
St Bernard's Roman Catholic Primary School	1.3km southwest	Human Health	Sensitive Use
The Oaks Community Primary School	1.5km southwest	Human Health	Sensitive Use

7.4 Pathways

Possible pathways were determined from the energy centre to the receptors. These are listed in Table 11 for each risk and receptor.

7.5 Risk assessment

The findings of the risk assessment are presented in Table 11. Quantitative assessments were undertaken for air quality and noise impacts, as described in the sections below. All other hazards were either screened out (as stated in Section 7.2 above) or were deemed to have been adequately assessed by qualitative methods.

7.5.1 Air quality assessment

A quantitative air quality assessment was undertaken in support of the planning application for the energy centre (22/00070/FUL, submitted to Cheshire West and Chester Council on 7 January 2022). This was updated to include NOx emissions from the main stack (A1) to address the requirements of the environmental permitting regime. The updated assessment is presented as Appendix C.

As the energy centre will initially consume natural gas, projected emissions of any substances other than NO_x were not assessed as they were not deemed significant.

H1 Assessment

An H1 assessment was not undertaken of emissions to air, as an existing detailed assessment was available using the ADMS 5 model.

Cumulative impacts of emissions to air

The air dispersion modelling exercise determined maximum predicted concentrations across a grid centred on the installation with a resolution of 20m. Air quality data was assessed in accordance with the Environment Agency's '*Air emissions risk assessment for your environmental permit*' guidance[8]:

- The process contribution (PC) can be considered insignificant if:
    - the short-term PC is less than 10% of the short-term environmental standard; and
    - the long-term PC is less than 1% of the long-term environmental standard
- If these criteria are exceeded the following guidance is provided on when further consideration of potential impacts may be useful:

[8] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

- the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration; and
- the long-term predicted environmental contribution (PEC) is less than 70% of the long-term environmental standards.

- If these criteria are achieved, then predicted impacts are insignificant.

Conclusion

Air dispersion modelling undertaken concluded that PCs to NO_2 concentrations were not screened out, but that maximum predicted off site PECs are well below the air quality objectives applied.

PCs were screened out at Jack's Wood and Whitby Park. PCs were not screened out for the Mersey Estuary, but PECs are below the critical levels.

Maximum PCs for nitrogen deposition were screened out at Jack's Wood and Whitby Park, as they are less than 1% of the nitrogen critical load. At the Mersey Estuary the PC for one of the five modelled years based on meteorological data used was 1.1%, at the lower end of the critical load range. It is noted that existing nitrogen deposition at the Mersey Estuary exceeds the critical load.

Using the Critical Load Function Tool, the air dispersion modelling consultant identified that maximum PCs to acid deposition were screened out at Jack's Wood and Whitby Park, but not the Mersey Estuary. At the Mersey Estuary the calculated PC was only 2% of the critical load function but background acid deposition already exceeds the critical load function.

In addition to the findings of the assessment, it is important to note that the energy centre will replace the existing boiler house (emissions points A30, A31) and high-pressure hot water boiler (A33). This will remove the associated contribution to NO_x from the boiler house plant.

Furthermore, the air quality assessment was undertaken on a 'worst case scenario' basis that all four MCPs within the energy centre were fully operational at the same time. As noted in section 2.1.5, the energy centre will not be operated in this mode.

Full results of the air quality assessment are presented in Appendix C.

7.6 Noise impact assessment

The installation is within an industrial area, which is bordered to the north by the Manchester Ship Canal and to the south by Oil Sites Road and the M53 motorway. The closest noise sensitive receptor identified are residences at Robinson Road, which lie 802m to the southwest. Robinson Road lies on the other side of the M53 motorway from the installation. The new energy centre will also be screened from the Innospec site boundary by the other buildings present.

The gas engines and steam boilers will be installed within the energy centre. As detailed in Appendix D.a, the gas engines and steam boilers will be fitted with acoustic measures to achieve a sound level of 75dB(A) at 1m.

Noise impacts from the energy centre on the closest noise sensitive receptor were assessed in support of the planning application for the energy centre (22/00070/FUL, granted 23 August 2022). A copy of the noise impact assessment calculations is presented in Appendix D.a alongside receptor distance maps (Appendix D.b). Calculated residual sound pressure levels due to the energy centre at the nearest

noise sensitive receptor are 27.2dB(A). This does not reflect screening by structures within and outside Innospec's site boundary.

Due to the low residual sound pressure level calculated, further assessment or additional noise reduction measures were not deemed necessary. This position was accepted by the Lead Environmental Protection officer at Cheshire West and Chester Borough Council as part of the planning application (Appendix D.c).

7.6.1 Environmental risk assessment of modified installation

Table 11 presents the environmental risk assessment for the modifications subject to this variation application. This supplements risk assessments previously submitted as part of the original permit application and subsequent variation applications.

Table 11: Environmental risk assessment

Hazard	Receptor	Pathway(s)	Risk management techniques	Probability of exposure	Consequence	Overall risk
Emissions						
Emissions to air: NO_x	Site personnel, contractors, visitors Workers and users of adjacent industrial units Residences to S, SW and W Schools to the S and SW Mersey Estuary Jack's Wood and Whitby Park	Transported by air	Low NOx gas engine and burners Decommissioning of old boiler house Conclusion of air dispersion modelling Periodic emissions monitoring Operating procedures and operator competency Process monitoring Servicing and maintenance programmes Air dispersion from stacks	Low	Health effects subject to concentration in ambient air Nitrogen deposition Acid deposition	Low
Noise	Site personnel, contractors, visitors Workers and users of adjacent industrial units Residences to S, SW and W	Transported by air	MCPs enclosed within building located at centre of site Acoustic control measures Decommissioning of old boiler house Distance from receptors and central location of potential noise sources	Very Unlikely	Nuisance	Very Low

Hazard	Receptor	Pathway(s)	Risk management techniques	Probability of exposure	Consequence	Overall risk
	Schools to the S and SW		Complaints management and investigation procedures under EPIMS Process monitoring Servicing and maintenance programmes			
Abnormal Conditions / Accidents						
Abnormal emissions from combustion plant stacks	Site personnel, contractors, visitors Workers and users of adjacent industrial units Residences to S, SW and W Schools to the S and SW Mersey Estuary Jack's Wood and Whitby Park	Transported by air	Operating and emergency procedures Operator competency Process monitoring and alarms Periodic emissions monitoring Servicing and maintenance programmes Air dispersion from stacks	Low	Health effects subject to concentration in ambient air Increased carbon monoxide Nitrogen deposition Acid deposition Visual impacts	Low
Natural gas / hydrogen leaks	Site personnel, contractors, visitors Workers and users of adjacent industrial units Residences to S, SW and W Schools to the S and SW	Transported by air	Integrity testing programme to include gas tightness tests, including during commissioning, integrated with the existing integrity testing programme Gas detection, process monitoring and alarms Servicing and maintenance programmes	Very Low	Fire Explosion Odour	Very Low

Hazard	Receptor	Pathway(s)	Risk management techniques	Probability of exposure	Consequence	Overall risk
			Emergency procedures DSEAR assessment and ATEX-rating of equipment within potentially explosive atmospheres			
Fire or explosion	Site personnel, contractors, visitors Workers and users of adjacent industrial units Site personnel, contractors, visitors Neighbouring sites Ground and groundwater Manchester Ship Canal Mersey Estuary	Spread of fire Blast wave Products of combustion Firewater	Flame failure and safeguard devices Fire detection, alarm and response systems, specified on basis of HAZOP and linked to site-wide system Process monitoring and alarms Servicing and maintenance programmes Emergency procedures DSEAR assessment and ATEX-rating of equipment within potentially explosive atmospheres	Very Low	Personal injury Damage to property and potentially neighbouring premises Damage to process equipment and potential releases Firewater discharges	Very Low
Leaks of energy centre equipment or storage (other than fuel gases)	Site personnel, contractors, visitors Ground and groundwater Manchester Ship Canal Mersey Estuary	Discharge from effluent treatment plant via surface water drainage network Direct loss of containment to unmade ground	Limited inventory of stored chemicals and oils Secondary containment and tertiary containment throughout the installation Effluent treatment plant Dedicated pipework for routine effluent discharges Process monitoring and alarms Servicing and maintenance programmes	Low	Health effects from exposure to hazardous substances Discharges of hazardous substances to surface water, with impacts on biota Increased wastes from non-conforming substances and spent spill response materials	Low

Hazard	Receptor	Pathway(s)	Risk management techniques	Probability of exposure	Consequence	Overall risk
			Emergency procedures for catastrophic releases Spill kits and spill response procedures			
Failure of acoustic control measures	Site personnel, contractors, visitors Workers and users of adjacent industrial units Residences to S, SW and W Schools to the S and SW	Transported by air	MCPs enclosed within building located at centre of site Distance from receptors and central location of potential noise sources Complaints management and investigation procedures under EPIMS Process monitoring Servicing and maintenance programmes	Very Unlikely	Nuisance	Very Low
Power failure/Gas supply interruption	Site personnel, contractors, visitors Workers and users of adjacent industrial units	Transported by air	The energy centre would shut-down, with combustion processes ceasing Systems throughout the site designed to fail to safe Grid backup will be maintained: in the event of a power failure or trip, site will switch back to grid import Emergency plans and procedures under EPIMS	Very low	Temporarily increased NO_x emissions, nitrogen deposition and acid deposition	Very Low

8. Permit variations and technical changes since 2006 permit issue

8.1 Introduction

Since a consolidated environmental permit was last issued, a series of variations and technical change requests have been made. A modernised and consolidated permit is being requested as part of this application, which is expected to incorporate the variations and technical changes undertaken since January 2006.

8.2 Variation notice TP3134GR, effective 13 May 2009

Variation notice issued TP3134GR authorised two further permitted activities and an additional directly associated activity, as below. Variation notice TP3134GR is presented as Appendix E.a.

- **Hazardous waste incineration activities under Section 5.1 Part A(1)(d) of Part 2 to Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2007:** the incineration of metal process plant contaminated with a hazardous substance (sodium, EWC 17 04 09*);
- **Non-ferrous metal melting, including of recovered products, under Section 2.2 Part A(1)(b) of Part 2 to Schedule 1 of to the Environmental Permitting (England and Wales) Regulations 2007:** Lead alkyl recovery of refinery sludges from transport and storage tank cleaning (EWC 16 07 09*). This regulated activity reference was already included on the 2006 permit; and
- **A new directly associated activity:** Provision of 1,2dibromoethane (DBE) storage and tanker filling facilities for a third party. This covered 5,200 tonnes per annum of DBE.

These processes were undertaken in existing process plant. No new emissions points were added because of the activity, although the variation allowed the frequency of decontamination operations to increase.

The varied permit requires that records of wastes accepted are maintained.

8.2.1 Further details of hazardous waste incineration activities

Innospec was authorised to receive and decontaminate waste process plant contaminated with sodium from third parties. Decontamination of process plant was undertaken by destroying the sodium in the existing sodium burner bay. Emissions from decontamination were processed through water scrubbers and the electrostatic precipitator before discharge via the existing emissions point A1.

Waste acceptance criteria and a written waste acceptance procedure were required before the receipt of waste sodium.

8.3 Variation notice EPR/BM050IG/V005, effective 10 November 2009

Variation notice EPR/BM050IG/V005 (see Appendix E.b) added the directly associated activity 'blending of fuel additive products not produced at the installation' to the permit. This facilitated the introduction of a 'blend to order' facility at the installation. The blending facility was deemed to constitute part of the permitted installation as it shares site facilities and infrastructure with the authorised regulated activities. Five bulk storage tanks were reallocated to the blending process from the lead alkyl process, with the impact of reducing associated emissions to air from lead alkyl production.

The variation also required that the site protection and monitoring programme was updated to reflect blending activities within three months of blending commencing.

8.4 Variation notice EPR/BM0508IG/V006, effective 4 November 2010

Variation notice EPR/BM050IG/V005 (see Appendix E.c) revised the fuel additive blending directly associated activity. Changes to the process meant that six bulk storage tanks were assigned for use as fuel additive storage while two existing, smaller tanks were reallocated for use in blending operations. Due the smaller size of the blending tanks, emissions of Class B volatile organic compounds reduced slightly.

8.5 Variation notice EPR/BM0508IG/V007, effective 29 January 2014

This variation was initiated by the Environment Agency and updates the permit to reflect changes to the Environmental Permitting (England and Wales) Regulations 2010 as a result of the implementation of the Industrial Emissions Directive 2010/75/EU. Variation notice EPR/BM0508IG/V007 is presented as Appendix E.d.

The operation of the effluent treatment plant became a permitted activity under Section 5.4 Part A(1)(a)(ii) to Part 2 to Schedule 1 of the Environmental Permitting (England and Wales) regulations 2010, as amended. This authorises the disposal of non-hazardous waste in a facility with the capacity exceeding 50 tonnes per day by physico-chemical treatment. The effluent treatment plant was previously a directly associated activity.

A further directly associated activity was added: the blending of fuel additive products not produced at the installation. This authorised this process from the receipt of raw materials through to the dispatch of products.

8.6 Technical change request, dated 28 January 2019

The permit authorises the discharge of treated effluent to the Manchester Ship Canal via emissions point W1. The permit applies two limits 1,2 dichloroethane (DCE) discharges:

- An instantaneous limit of 4mg/l plus 50% for spot samples (effectively 6mg/l); and
- An annual limit of 50kg.

DCE is no longer used in the installation. However, DCE continues to be encountered on site, primarily through the washing of TEL storage ISOs and containers. Storage ISOs and containers are washed either for reuse or to permit destruction and disposal as scrap.

The January 2019 technical change request (see Appendix E.e) was made in response to elevated levels of DCE encountered during the washing of a particular ISO on 8 January 2019. The container led to a significant spike in DCE discharged, meaning that the installation was at around 35kg of the 50kg annual limit as of 28 January 2019. As the 50kg limit was likely to be exceeded in 2019, Innospec requested that the annual limit be applied as a five-year average.

It is understood that the Environment Agency agreed to the application of a five-year average. However, records of this agreement are not held, which may be due to data losses during Innospec's major IT failure in 2019.

8.7 Compliance Assessment Report (CAR) BM0508IG/0424074, dated 9 May 2022

This CAR was issued in response to a technical change request made on 19 October 2021. This CAR is presented as Appendix E.f.

The CAR authorised two changes:

- Removing the electrostatic precipitator, which had formerly served the TEL 1 plant and had been out of service for around 15 years.
- Removing the Gaseous TEL Oil Absorber (GTOA) distillation column and associated equipment. This equipment previously prevented lead alkyl saturation of the oil but was no longer required as TEL production volumes have reduced by more than two orders of magnitude.

At the time of the request on 19 October 2021, the electrostatic precipitator had been offline for around 15 years. The GTOA distillation column and all equipment bar the oil absorber column and associated oil cooling pumps have been offline since September 2018. Trials undertaken in January 2019 concluded that the removal of the GTOA distillation column and associated equipment had not led to increased lead emissions at A1. Redundant equipment on the GTOA will be removed before the end of 2022, while the GTOA itself will remain available for operation.

9. Site condition report

The modifications subject to this variation application do not affect the existing installation boundary. As a result, an updated site condition report has not been prepared.

Geotechnical site investigations were undertaken in support of the planning application. A geotechnical assessment report is presented in Appendix F.a and the corresponding borehole log is provided in Appendix F.b.

10. Best Available Techniques (BAT) assessment

Modifications to the installation subject to this variation application are consistent with applicable BAT (see below).

10.1 A note on Process Guidance Notes for Part B Combustion Activities

The modifications subject to this application **have not** been assessed against process guidance note 1/04 (11) (Statutory guidance for gas turbines with a 20 – 50MW thermal input) or process guidance note 1/03 (12) (Statutory guidance for boiler sand furnaces with 20 to 50MW thermal input). This is because the notes specifically only apply to 'single' items combustion plant (i.e. not aggregated) with a thermal input between 20 and 50MWth. Each item of combustion plant included within the energy centre will have a thermal input below 20MWth.

Regulated activities under Section 1.1 Part B to Schedule 1, Part 2 of the Environmental Permitting (England and Wales) Regulations were amended to require environmental permits to be obtained for installations with an *aggregated* thermal input of 20MWth after process guidance notes 1/04 (11) and 1/03 (12) were last updated.

10.2 Reference Document on Best Available Techniques (BREF) on Energy Efficiency, 2020

Modifications to the installation **have** been assessed against the BREF in accordance with the 'Energy efficiency standards for industrial plants to get environmental permits' guidance provided by the Environment Agency and Defra[9]. Changes forming the subject of this variation application are not assessed against non-relevant BAT points from the BREF.

Relevant BAT bullet point	BREF on Energy Efficiency	Compliance	Comments
Energy Efficiency Management Systems			
Section 2	Techniques to consider to achieve energy efficiency at an installation level	Met	The 'Energy efficiency standards for industrial plants to get environmental permits' guidance allows the operation and maintains of the installation to an energy management system like ISO 50001 as an alternative to the techniques stated in Section 2. Innospec operates an energy management system to ISO 50001 and this holds certification to this standard from a UKAS-accredited body. The energy management system will be updated to reflect the energy centre and its maintenance.

[9] https://www.gov.uk/guidance/energy-efficiency-standards-for-industrial-plants-to-get-environmental-permits

Relevant BAT bullet point	BREF on Energy Efficiency	Compliance	Comments
Section 3: Techniques to consider to achieve energy efficiency in energy-using systems, processes or activities			
Section 3	Design your installation to be energy efficient using the techniques listed in section 3	See below	The 'Energy efficiency standards for industrial plants to get environmental permits' guidance requires installations to be designed to be energy efficient in line with section 3 of the BREF.
Section 3.1.1	Reduction of the flue gas temperature	N/A	Not applicable due to waste heat recovery arrangements. Flue gas from the engines will be used for waste heat supply to the boilers. Heat from boiler flue gases is recovered to the economiser, pre-heating the incoming boiler feedwater.
Section 3.1.3	Reducing the mass flow of the flue-gases by reducing the excess air	Met	Burner management systems will be installed on the boilers, while engine management systems will serve the engines to maintain optimal combustion conditions.
Section 3.1.4	Automatic burner regulation and control	Met	See Section 3.1.3 above.
Section 3.1.5	Fuel choice	Met	The installation will initially run on natural gas but has been designed to permit combustion of up to 100% hydrogen, once available.
Section 3.1.6	Reducing heat losses by insulation	Met	Insulation on the engines will be installed on all pipework, including that associated with the waste heat systems. Insulation will also be applied for safety purposes. The steam boilers will be insulated with mineral wool at a 150mm thickness. An extra-insulated cover-door will be installed. Steam pipe runs are lagged. A thermal store will be provided for low temperature hot water consumption.
Section 3.2.2 Overview of measures to improve steam system performance			
Section 3.2.4	• Improve operating procedures and boiler controls • using sequential boiler controls • installing flue-gas isolation dampers	Met	Boilers will be operated in a duty/standby configuration, avoiding short cycling.

Relevant BAT bullet point	BREF on Energy Efficiency	Compliance	Comments
			Flue gas isolation dampers are not applicable – each boiler will have a separate stack.
Section 3.2.5	Preheating feedwater by using: • Waste heat, e.g., from a process • Economisers using combustion air • Deaerated feedwater to heat condensate • Condensing the steam used for stripping and heating the feedwater to the deaerator via a heat exchanger	Met	Waste heat from the gas engines will supply the waste heat side of the boilers and will also be used to pre-heat boiler feedwater in conjunction with economisers on each boiler. Softened water will be caustic dosed to raise the pH and eliminate carbon dioxide. If required, steam will be sparged into the hot well to further raise the temperature to 85-90^{o}C to further reduce dissolved oxygen levels.
Section 3.2.6	Prevention and removal of scale deposits on heat transfer surfaces (clean boiler heat transfer surfaces)	Met	Boiler feedwater will be treated to remove impurities, reducing the rate of scale accumulation. Automated, scheduled bottom blowdown and TDS blowdown processes will also reduce the rate of scale deposition. Statutory inspections will include thorough examinations of the condition of heat transfer surfaces, with remedial action to be taken as necessary.
Section 3.2.7	Minimise boiler blowdown by improving water treatment. Installing automatic total dissolved solids control	Met	The energy centre will include water treatment. The boilers will feature automatic total dissolved solids control.
Section 3.2.8	Optimise deaerator vent rate	Met	See Section 3.2.5 above. Dosing with an oxygen scavenger will be used to further eliminate dissolved oxygen in feed water.
Section 3.2.9	Minimise boiler short cycling losses	Met	Boilers will be operated in a duty/standby configuration, avoiding short cycling.
Section 3.2.10	• Optimise steam distribution system • Isolate steam from unused lines	Met	The energy centre will be installed at a more central location to manufacturing processes, reducing transmission losses. Pipework replacements will address oversizing as applicable. The network features an extensive range of isolation valves.

Relevant BAT bullet point	BREF on Energy Efficiency	Compliance	Comments
Section 3.2.11	Insulation on steam pipes and condensate return pipes	Met	Pipework throughout the steam network is and will be insulated.
Section 3.2.12	Implement and control and repair programme for steam traps	Met	Innospec operates a steam trap control and repair programme. The energy centre and associated modified steam pipework will be added to this programme.
Section 3.2.13	Collect and return condensate to the boiler for re-use	Met	If found feasible by experiences gained during commissioning and operation of the energy centre, a condensate return system will be installed, reducing water consumption.
Section 3.2.14	Re-use of flash steam (use high pressure condensate to make low pressure steam)	Met	High pressure steam will be let down to generate low pressure steam. Flash steam will be returned to the hot well for the boilers. A thermal store will be installed to maximise consumption of low temperature hot water within the energy centre.
Section 3.2.15	Recover energy from boiler blowdown	N/A	The projected discontinuous nature and frequency of the boiler blowdown does not support the viability of this BAT.
Section 3.4	Cogeneration	Met	The installation will comprise reciprocating gas engines with heat utilisation via the boilers. This technology has been selected on the grounds of its suitability for the installation.
Operating under the UK Emissions Trading Scheme and generating energy from fossil fuels			
N/A	you need to show the Environment Agency that you: • have designed your plant to maximise energy efficiency when you apply for a permit, taking into account any 'cross-media effects'	Met	Covered throughout this application.
N/A	• operate your plant in a way that maximises energy efficiency, for example by using techniques to reduce energy consumption during standby periods	Met	Boilers will be operated in a duty/standby configuration, avoiding short cycling.

Relevant BAT bullet point	BREF on Energy Efficiency	Compliance	Comments
			The deployment of the gas engines will be optimised to maximise efficiency. In periods of lower demand, Innospec will preferentially operate gas engine 1 alone. Energy consumption data will be monitored under the EPIMS system to identify and address opportunities to improve operating practices.
Section 4: Best Available Techniques			
BAT 1	Implement and adhere to an energy efficiency management system (ENEMS) that incorporates, as appropriate to the local circumstances, all of the following features (see Section 2.1)	Met	See Section 2 above.
BAT 2	Continuously minimise the environmental impact of an installation by planning actions and investments on an integrated basis and for the short, medium and long term, considering the cost-benefits and cross-media effects.	Met	This requirement is met through the operation of Innospec's ISO 50001-certified energy management system.
BAT 3	Identify the aspects of an installation that influence energy efficiency by carrying out an audit. It is important that an audit is coherent with a systems approach (see BAT 7).	Met	Audits are undertaken under Innospec's ISO 50001-certified energy management system.
BAT 4	When carrying out an audit, BAT is to ensure that the audit identifies the following aspects (as listed in the BREF)	Met	Audits under Innospec's ISO 50001-certified energy management system will address these aspects.
BAT 5	BAT is to use appropriate tools or methodologies to assist with identifying and quantifying energy optimisation	Met	Energy consumption data will be monitored under the EPIMS system to identify and address opportunities to improve operating practices.
BAT 6	BAT is to identify opportunities to optimise energy recovery within the installation, between systems within the installation (see BAT 7) and/or with a third party (or parties)	Met	As a cogeneration plant, the energy centre has been designed in accordance with this requirement.

Relevant BAT bullet point	BREF on Energy Efficiency	Compliance	Comments
BAT 7	BAT is to optimise energy efficiency by taking a systems approach to energy management in the installation	Met	The energy centre has been specified to optimise efficiency on a systems basis. The energy centre has been designed to satisfy the site's electricity and steam demand, allowing for future expansion.
BAT 8	BAT is to establish energy efficiency indicators by carrying out all of the following…	Met	Energy performance indicators have been established Innospec's ISO 50001-certified energy management system. The site is also subject to binding indicators through its UK ETS permit and climate change agreement.
BAT 9	BAT is to carry out systematic and regular comparisons with sector, national or regional benchmarks, where validated data are available.	Met	The energy consultancy involved in the project will have a continued involvement with the energy centre post-commissioning, which will include comparison against industry norms as a minimum with a continued focus on optimisation and efficiency improvements.
BAT 10	BAT is to optimise energy efficiency when planning a new installation, unit or system or a significant upgrade (see Section 2.3) by considering all of the following…	Met	The energy centre has been designed in accordance with energy-efficient design principles, both to deliver improved efficiency and to enable carbon emissions reductions through hydrogen combustion.
BAT 11	BAT is to seek to optimise the use of energy between more than one process or system, within the installation or with a third party	Met	As a CHP plant, the energy centre has been designed to satisfy the Innospec site's electricity and steam demand, allowing headroom for future expansion.
BAT 12	BAT is to maintain the impetus of the energy efficiency programme by using a variety of techniques, such as…	Met	The site has implemented an energy management system as part of EPIMS, which is certified to ISO 50001. The system includes requirements for energy monitoring, energy reviews, target and objective setting and management reviews.
BAT 13	BAT is to maintain expertise in energy efficiency and energy-using systems by using techniques such as…	Met	As noted for BAT 9, the energy consultancy involved in the project will continue to be engaged post-commissioning, providing additional support as needed to Innospec's own in-house engineering knowledge.

Relevant BAT bullet point	BREF on Energy Efficiency	Compliance	Comments
BAT 14	BAT is to ensure that the effective control of processes is implemented by techniques such as…	Met	These BAT requirements are met through the ISO 50001-certified energy management system element of EPIMS. Energy management procedures have been implemented and key performance indicators have been established.
BAT 15	BAT is to carry out maintenance at installations to optimise energy efficiency by applying all of the following…	Met	Clear responsibilities have been established for maintenance and a computerised planned preventative maintenance system is operated. This system facilitates record keeping and the identification of energy efficiency improvement opportunities. Maintenance routines for the energy centre will include monitoring measures to identify deterioration that could impact energy efficiency.
BAT 16	BAT is to establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of operations and activities that can have a significant impact on energy efficiency.	Met	Energy monitoring arrangements have been established under EPIMS in accordance with this condition.
BAT 17	Combustion: BAT is to optimise the energy efficiency of combustion by relevant techniques such as:	N/A	Points are covered in this table above, under Section 3.
BAT 18	Steam systems: BAT for steam systems is to optimise the energy efficiency by using techniques such as:	N/A	Points are covered in this table above, under Section 3.
BAT 20	BAT is to seek possibilities for cogeneration, inside and/or outside the installation (with a third party):	Met	As a CHP plant, the energy centre has been designed to satisfy the Innospec site's electricity and steam demand, allowing headroom for future expansion.

10.3 CHP-Ready guidance for combustion and energy from waste power plants, 2013

As the energy centre concerns a new combustion plant with a total net thermal input of more than 20MWth, the installation is required to comply with the Environment Agency's CHP-Ready guidance[10]. A cost-benefit assessment is required for operation of the planned plant as high-efficiency cogeneration plant or to supply a district heating or cooling network with waste heat.

The energy centre has been designed as a CHP installation from the outset and therefore meets BAT in accordance with this guidance.

[10] https://www.gov.uk/guidance/energy-efficiency-standards-for-industrial-plants-to-get-environmental-permits

10.4 Best Available Techniques Conclusions (BATC) for Non-ferrous Metals Industries[11]

Changes the subject of this variation application are not assessed against non-relevant BAT points from this Best Available Techniques Conclusions (BATC) Decision.

Relevant BAT bullet point	BATC Decision (EU) 2016/1032	Compliance	Comments
Environmental Management Systems			
BAT 1	In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features: (a) commitment of the management, including senior management; (b) definition of an environmental policy that includes the continuous improvement of the installation by the management; (c) planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; (d) implementation of procedures paying particular attention to: (i) structure and responsibility, (ii) recruitment, training, awareness and competence, (iii) communication, (iv) employee involvement, (v) documentation, (vi) effective process control, (vii) maintenance programmes, emergency preparedness and response, (viii) safeguarding compliance with environmental legislation; (e) checking performance and taking corrective action, paying particular attention to: (i) monitoring and measurement (ii) corrective and preventive action, (iii) maintenance of records,	Met	The EPIMS integrated management system is certified to ISO 14001:2015 and discharges these requirements.

[11] Decision (EU) 2016/1032 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for the non-ferrous metals industries, dated 13 June 2016

Relevant BAT bullet point	BATC Decision (EU) 2016/1032	Compliance	Comments
	(iv) independent (where practicable) internal or external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; (f) review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; (g) following the development of cleaner technologies; (h) consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; (i) application of sectoral benchmarking on a regular basis.		
BAT 2	In order to use energy efficiently, BAT is to use a combination of the techniques given below (non-relevant points excluded below) (a) Energy efficiency management system (e.g. ISO 50001) (l) Suitable insulation for high temperature equipment such as steam and hot water pipes (n) Use high efficiency electric motors equipped with variable-frequency drive, for equipment such as fans	Met	This requirement is met through the operation of Innospec's ISO 50001-certified energy management system. Regarding insulation, see Section 10.2, Section 3.2.11. Electric motors within the energy centre will include variable frequency drives.
Noise			
BAT 18	In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below. • Use embankments to screen the source of noise • Enclose noisy plants or components in sound-absorbing structures • Use anti-vibration supports and interconnections for equipment • Orientation of noise-emitting machinery • Change the frequency of the sound	Yes	The gas engines and steam boilers will be enclosed by the energy centre building. The following mitigation measures will be applied. Gas engines: external acoustic enclosures and fans, exhaust silencers and attenuators. Steam boilers: shrouded burners.

APPENDICES

A. Plans and drawings

A.a. Energy centre building general arrangement plan

A.b. Site layout plan

A.c. Emissions point plan

B. Equipment specifications

B.a. Gas engine 1 technical datasheet

B.b. Gas engine 2 technical datasheet

B.c. Steam boiler 1 technical datasheet

B.d. Steam boiler 2 technical datasheet

B.e. Boiler burners technical datasheet

C. Air dispersion modelling report

D. Noise assessment

D.a. Noise impact assessment for planning

D.b. Noise impact assessment: distance from receptors

D.c Noise impact assessment: Comments from Lead Environmental Protection Officer

E. Variations and technical change requests since 2006 permit

E.a. Variation notice TP3134GR, effective 13 May 2009

E.b. Variation notice EPR/BM050IG/V005, effective 10 November 2009

E.c. Variation notice EPR/BM0508IG/V006, effective 4 November 2010

E.d. Variation notice EPR/BM0508IG/V007, effective 29 January 2014

E.e. Technical change request, dated 28 January 2019

E.f. Compliance Assessment Report (CAR) BM0508IG/0424074, dated 9 May 2022

F. Site condition

F.a. Geotechnical assessment for planning

F.b Borehole log

UK and Ireland Office Locations