



Pollution Prevention and Control (Scotland) Regulations 2012 Systematic Assessment of Resource Use and Efficiency

- **The completion of this template is evidence that you have completed your systematic assessment of resource use and efficiency.**
- **Please note that once submitted to SEPA this template will be placed on the public register unless you apply to have it, or parts of it, excluded from the register on the grounds of commercial confidentiality.**

Introduction

As a PPC Permit operator you are required to submit a systematic assessment of raw material, water and energy use and waste management, at intervals specified in your permit. This template has been produced to assist you with that assessment. It allows you to:

- record annual data;
- identify opportunities to optimise the use of raw materials, water and energy in your process and manage waste production;
- assess the viability of those options;
- provide timelines for their implementation.

In addition to reducing your impact on the environment, these assessments should bring cost advantages and improve competitiveness. We also aim to simplify data collection and reduce duplication. If energy data has been collected for other purposes (e.g. The Energy Savings Opportunities Scheme - ESOS) then that data may be used for this report - depending on the scope of the requirement.

This template covers a 4 year reporting period. At the end of the first reporting period you will identify improvement opportunities. For each subsequent 4 yearly submission you will

review progress of those improvement opportunities and repeat the process of recording data and identifying future improvements.

What you should do now:

Complete Section A on an annual basis. You should start your data entry in the year corresponding to where you are in your reporting cycle in accordance with your permit e.g.

- If this is a new permit you should start at Year 1.
- For existing permits you should enter data into the column that corresponds to the year you are at in the systematic assessment cycle e.g.
 - If you are due to submit a systematic assessment in 2016 you should complete Year 4. (The data for Years 1-3 will already have been submitted to SEPA as part of your annual returns and should be left blank.)

Date systematic assessment is due	Column to start data entry in 2016	Action required
2016	Year 4	Data entry and SA due
2017	Year 3	Data entry
2018	Year 2	Data entry
2019	Year 1	Data entry

- If your reporting period is different to the 4 year period speak to your SEPA officer.

During the 4 year reporting period you should monitor the progress of your identified opportunities on an ongoing basis.

When your 4 yearly assessment is due, complete Section B and submit the entire template, by the date specified in your permit. By doing this you can demonstrate that you are meeting the requirements of the PPC Regulations.

Please contact your local office should you need assistance or wish to discuss any aspect of this template. You should retain a copy of the completed template for your records.

Installation Details	
Permit Number:	PPC/A/1013495
Operator:	Shell UK Ltd.
Name of Installation:	Fife NGL Plant

SECTION A**Data reporting****Part 1****Raw material and waste data**

The reporting of data should mirror the requirements identified in your PPC permit (as a minimum).

Using the relevant guidance

You should refer to the associated Supporting Guidance for the Systematic Assessment of Resource Use and Efficiency.

Table 1: Raw material and waste data

Raw Materials (as identified in permit) *Tonnes, Kgs, Litres, m ³	DATES (1 st – 4 th years)			
	Jan - Dec [2018]	Jan - Dec [2019]	Jan - Dec [2020]	Jan - Dec [2021]
Natural Gas Liquids (tonnes)	3,282,699	2,527,091	2,604,325	2,176,600
Ethane (fuel gas) (tonnes)	6,029.29	16,781.15	9,429.33	7,532.1
Propane (fuel gas) (tonnes)	52,578.02	9,429.33	41,657.27	35,253.45
Methane (fuel gas) (m3)	4,289.19	0	0	12,720.17
Diesel (tonnes)	96.19	74.75	52.82	76.22
Admin Heating Oil (litres)	67,526	55,979	50,500	59,000
U5500 Hot Oil (litres)	19,552	8,736	5,200	3,120
Methanol (tonnes)	0	0	0	0
Liquid Nitrogen (tonnes)	161.8	119.2	149.3	116.5
Mono-ethylene Glycol (MEG) (tonnes)	0	0	0	0
Fugitive emissions: (total combined fuel) (tonnes)	55,4	60,1	62,8	54,8

Water (m3)	119,389	90,730	119,493	109,983
Steam (tonnes)	8,895.7	38,914.06	67,093.83	60,651.52
Molesieve Bed Material (tonnes)	10.0	0	10.0	10.0
Fire Fighting Foam (AFFF) (m3)	0	0	0	0
Total Raw Materials (tonnes)	3,467,815	2,681,552	2,840,105	2,388,395
**Secondary raw materials (i.e. raw materials recovered from waste or production residues and is used as a substitute for virgin raw materials)				
a) From on-site sources:				
N/A				
b) From off-site sources:				
N/A				

Table 1: Raw material and waste data - Continued

*** State your reference measure for annual production e.g. number of widgets, Gigawatt output, tonnes of waste treated or disposed.				
	Jan - Dec [2018]	Jan - Dec [2019]	Jan - Dec [2020]	Jan - Dec [2021]
Export: Ethane to FEP	932,980.53	573,905.3	695,319.23	481,919.86
Export: Ethane to Grangemouth	0	0	0	9,002.13
Export: Propane to Ships	917,382.2	693,118	720,700.6	590,039.7
Export: Propane to Road tankers	96,953.4	99,308.22	103,286.2	126,412.1
Export: Propane to FEP	12,478.2	3,359.79	5,342.83	17,081.12
Export: Propane to Grangemouth (future)	0	0	0	0
Export: Butane to Ships	639,464.2	541,719.7	517,693.7	437,758.5
Export: Butane to Road tankers	84,127.2	81,524.6	82,695.8	76,988.26
Export: Natural Gasoline to Ships	526,721.9	448,905.9	430,810.8	379,871.1
Annual production figure (as gross tonnage)	3,210,107.63	2,441,841.51	2,555,849.16	2,119,072.77
Raw Material used per annual production	1.1	1.1	1.1	1.1
Reason for year on year variance	<p>Record for each year the reason(s) for variance:</p> <p>The ratio of raw material usage to annual production over the last four years has not varied. This demonstrates Shell's ongoing drive to improve efficiencies within the process and for continual improvement</p> <p>Due to FEP plant shutdown in 2021 part of ethane was exported to Grangemouth from usual FEP route.</p>			
Waste and Material Losses (*Tonnes)				
Amount of waste recycled off-site (Total)	843.4	181.6	127.4	103.2

Amount of waste disposed off-site (waste to energy)	86.3	58.5	37.1	42.6
Amount of waste disposed off-site (incineration)	2.5	2.8	2.7	0.8
Amount of Waste Disposed Off-site: Landfill	0.17	0	17.4	23.4
Amount of Waste Disposed Off-site: Treatment	977.8	1561.8	857.3	563.5
Amount of Waste Disposed Off-Site (total): Discharge Under Consent	97.6	0	0	0
Total Waste	2007.8	1804.7	1041.9	766.7
Reason for year-on-year variance	<p>Record for each year the reason(s) for variance:</p> <p>Overall, the amount of waste generated at the installation has reduced over the last four years, with significant decrease noted in 2021. The installation continues to maximise recycle/reuse options and minimise the amount of waste disposed to landfill waste in accordance with the waste hierarchy, however the nature and quantities of wastes generated is determined to a large degree by the projects and maintenance activities undertaken at the installation each year. In 2021 Total Plant shutdown and number of turnaround were executed that impacted the total waste generation.</p>			

* Or unit specified in your permit.

** Data identifying the quantity of closed loop recycling is not required here but you should note where you have closed loop recycling in the relevant sections that follow.

*** Where the reference measure cannot be easily determined, then this should be agreed with SEPA.

Part 2 Water sources

Identify all sources of water, how much you use and how much water is disposed of and where to.

N.B If figures are estimated rather than measured please indicate this with an (E).

Table 2: Water sources

Water Source *m ³ or Litres	DATES (1 st – 4 th years)			
	Jan - Dec [2018]	Jan - Dec [2019]	Jan - Dec [2020]	Jan - Dec [2021]
Mains supply water (m3)	119,389	90,730	119,493	109,983
Abstraction (surface water)	0	0	0	0
Abstraction (bore hole)	0	0	0	0
Collected Rainwater	0	0	0	0
Other e.g. Seawater (firewater)	0	0	0	0
Industrial (produced from off-shore)				
Potable water (from desalters on site)				
Total Water Used	119,389	90,730	119,493	109,983

Table 2: Water Sources - Continued

	Jan - Dec [2018]	Jan - Dec [2019]	Jan - Dec [2020]	Jan - Dec [2021]
Does this include non PPC activities such as offices, canteen etc?	No	No	No	No
** State your reference measure for annual production e.g. number of widgets, Gigawatt output, tonnes of waste treated or disposed.				
Annual production figure (as gross tonnage)	3,210,107.63	2,441,841.51	2,555,849.16	2,119,072.77
Water used per annual production (m3/tonnes)	0.04	0.04	0.04	0.05
Reason for year on year variance	Record for each year the reason(s) for variance: Whilst the ratio of water used per annual production has not varied over the last four years. The quantity of water used is not directly related to production but is a reflection of the maintenance and domestic activities at the installation, which will vary year on year.			
Water losses				
Total Water disposed	N/A	N/A	N/A	N/A
Where is water / effluent / treated effluent lost or disposed to: E.g. sewer; ***water environment; evaporation; product; wastes; recycled etc.				

* Or unit specified in your permit.

** Where the reference measure cannot be easily determined, then this should be agreed with SEPA.

*** The water environment means all surface water, ground water and wetlands. See Appendix 1.

Part 3 Energy consumption

If figures are estimated rather than measured please indicate this with an (E).

N.B Energy producing activities should refer to the associated Guidance about raw materials, waste, water and energy, which provides clarification about the purpose of this table.

Table 3: Energy Consumption

*Energy Used on site MWh	DATES (1 st – 4 th years)			
	Jan - Dec [2018]	Jan - Dec [2019]	Jan - Dec [2020]	Jan - Dec [2021]
Electricity (public supply) (MWh)	265,738	264,080	232,948	237,037
Electricity (other supply) (MWh)	0	0	0	0
Imported heat (steam) (MWh)	6,859.19	28,583.6	49,283.4	44,551.4
Gas (flare) MWh	6,2423.00	429,199.61	59,472.36	29,547.46
Gas (vent) MWh	0	0	0	0
Fuel Gas (MWh)	742,781.77	588,840.63	619,225.35	539,378.73
Diesel (MWh)	941.04	871.02	531.74	872.15
Heating Oil (MWh)	172.26	186.39	89.81	0.00
Coal	0	0	0	0
**Other e.g. Waste or materials, surplus heat used on site	0	0	0	0
Total energy used (MWh)	1,078,915	1,311,761	961,551	851,387

Table 3: Energy Consumption - Continued

	Jan - Dec [2018]	Jan - Dec [2019]	Jan - Dec [2020]	Jan - Dec [2021]
Does this include non PPC activities such as offices, canteen etc?	No	No	No	No
***State your reference measure for annual production e.g. number of widgets, Gigawatt output, tonnes of waste treated or disposed.				
Annual production figure (as gross tonnage)	3,210,107.63	2,441,841.51	2,555,849.16	2,119,072.77
Energy used per annual production (MWh per tonne of annual production)	0.34	0.54	0.38	0.40
Reason for year-on-year variance	Record for each year the reason(s) for variance: The ratio of energy consumption to annual production over the last four years has not varied much in exception of 2019 when prolong ethane flaring due to FEP shutdown, caused increase of flared gas for the year.			
Surplus Power (sent off-site)				
Surplus heat (including steam) provided to 3 rd party or heat network	0	0	0	0
Surplus electricity provided to 3 rd party or to the National Grid (MWh)	0	0	0	0

* Or unit specified in your permit.

** Specify additional fuels, including recovery of energy from wastes or other materials.

*** Where the reference measure cannot be easily determined, then this should be agreed with SEPA.

SECTION B**Systematic assessment of raw material, water, energy and fuel consumption****Undertaking a systematic assessment**

Completing the questions in each of the following sections will provide you with the information you need to manage your use of raw materials, water and energy more effectively. It will enable you to:

- Understand how much you use
- Understand where and why there are losses
- Identify opportunities to improve efficiencies
- Review outcome following implementation of opportunities
- Consider, where appropriate, next steps to ensure continuous improvement

Using the relevant guidance

Each of the following parts comprises a number of high level questions. Before answering each question you should refer to the more detailed guidance on the various aspects we expect you to consider:

- For Parts 4 – Part 9 you should refer to the associated Supporting Guidance for the Systematic Assessment of Resource Use and Efficiency.
- For Part 7, if you are a SME, then you may find the following guidance useful:
 - The [DECC Guide to Energy Efficiency](#)¹

In addition, you should also refer to any sector guidance and Best Available Techniques (BAT) Reference documents (BREFs) that apply to your installation. These documents can be found on SEPA's website at: www.sepa.org.uk/regulations/pollution-prevention-and-control/guidance/

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/417410/DECC_advice_guide.pdf

Part 4	General Management
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Table 4:

	We expect you to provide a short justification for your response to each question.	YES	NO	N/A
1	<p>Have you read the sections relating to resource efficiency in both the sector guidance and BREF documents that are relevant to your activity?</p> <p>Which sector guidance and BREF documents are you using and why?</p> <p>Refining of Mineral Oil and Gas that is applicable to facility</p>	Y		
2	<p>Are there any resource efficiency benchmarks available and applicable e.g. BREF or sector specific?</p> <p>Please record them here and also provide an outline of your plans to meet them in the box at the end of this table.</p>			N/A
3	<p>Have you undertaken a review of technologies and technique advances?</p> <p>If applicable advances have been made, briefly summarise in the box at the end of this table how and by when you plan to implement these, including what impact this will have on the efficient use of resources?</p> <p>Where you are not planning to implement these identified advances, provide here a brief explanation about why they are not suitable for your process(es):</p> <p>We are in continuous process of identification of energy efficiency opportunities and plans that are then selected and included in every year's business plan. Some of abatement emissions opportunities are included in opportunities section of the report</p>	Y		
4	<p>Are your Staff aware of and engaged in process efficiency?</p> <p>If YES, provide examples:</p> <p>Site personnel is well aware of environmental saving opportunities and efficiencies that are identified via site HSE Forums on regular basis.</p> <p>If NO, please explain why:</p>	Y		
5	<p>Do you monitor / assess basic housekeeping measures to minimise your use of raw materials?</p> <p>Housekeeping monitoring program is in place and is implemented via regular site auditing and awareness programmes.</p> <p>Briefly describe how you do this:</p> <p>Site Visible Safety Leadership assessments that are scheduled weekly to ensure effective communication and identification of any housekeeping and other issues at early stages. This program also helps to keep focus and awareness of site personnel on housekeeping.</p>	Y		

6	Having considered the above questions, please record here any current plans or new opportunities that will support your drive to improve resource efficiency. These will be considered in Part 8 of this template: Please refer to Part 8 of the report	Y		
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Part 5 Raw materials and waste management (excluding water)
Table 5: Managing Raw Materials and Waste

We expect you to provide a short justification for your response to each question.		YES	NO	N/A
1	<p>Have you reviewed the selection of your raw materials to reduce your overall environmental impact?</p> <p>If YES, provide a brief summary:</p> <p>We have allocated Waste site focal point in charge of waste management activities to support waste reviews and improvements, along with day-to-day compliance. We also maintain site Waste Management plan that is reviewed and updated annually.</p> <p>If NO, please justify why not:</p>	Y		
2	<p>Are you tracking losses of materials and generation of waste or defective materials?</p> <p>If YES, please outline how:</p> <p>We track any waste losses via appointed waste contractor who provide regular reports on our waste performance. Quality assurance process is in place to manage any defective materials supply that is managed via Material Controllers</p> <p>If NO, please justify why not:</p>	Y		
3	<p>To avoid, reduce or reuse materials, have you implemented any in-house or any formal process efficiency programmes such as LEAN or Six Sigma etc?</p> <p>Please provide details:</p> <p>Our LEAN approach is about getting the right material to the right place at the right time. We aim to reduce over-production and therefore over-ordering. As an example, we have introduced a scaffolding trailer to reduce the number of forklift trips needed to deliver material to jobs. There are 6S audits in place in our scaffold yard and insulation workshop areas. These are completed monthly to identify any gaps to close and monitor continuous improvements. Another example to reduce disposal of waste to landfill and opting to use recyclable materials where possible, is National Hard Hat Recycling Scheme, which our team have signed up to to allow for our used hard hats to now be recycled rather than the usual disposal to landfill</p>	Y		
4	<p>Do you have a process to review the substitution of any of the virgin materials you use / purchase with secondary raw materials or production residues?</p> <p>If YES, record any opportunities that you have identified in the box at the end of this table.</p> <p>We do so by waste contractors Performance Reviews and KPI tracking, as well as carefully selecting materials we order, for example, we use recycled abrasive medias for grit blasting activities. These are primarily a by-product of</p>	Y		

	<p>other industries</p> <p>If NO, will you look at opportunities to use secondary raw materials or production residues?</p>			
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Table 5: Managing Raw Materials and Waste - Continued

5	<p>Describe how you are managing your waste in line with the waste hierarchy.</p> <p>FNGL manages their waste through the Waste Hierarchy, in accordance with legislative and internal standards requirements, that require all efforts to be made to minimise the generation and optimise the reuse, recycling and disposal of waste. Site Waste Management Plan establish controls and identifies opportunities to reduce waste generation according to the Waste Hierarchy.</p>
6	<p>Having considered the above questions, please record here any current plans or new opportunities to improve resource efficiency and / or waste management. These will be considered in Part 8 of this template:</p> <p>UK Waste Circularity Project – supporting the asset to agree the Top 5 waste streams from assessment on our onshore waste data.</p>

Part 6	Water
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Table 6: Managing Water Use

We expect you to provide a short justification for your response to each question.		YES	NO	N/A
1	<p>Can the use of water be avoided / eliminated?</p> <p>If YES, please provide in the box at the end of the table any opportunities that you have identified.</p> <p>If NO, please justify why not:</p> <p>Water is not used in processing activities at the installation. Water usage is limited to maintaining pressure in the firewater ringmain at the installation, as safety critical equipment, and occasional washdown purposes, and for domestic and sanitary purposes. (i.e. cleaning, toilets, canteen food preparation, etc.)</p>		N	
2	<p>Can you reduce water use?</p> <p>If YES, please provide in the box at the end of the table any opportunities that you have identified.</p> <p>If NO, please justify why not:</p>			N/A
3	<p>Can you reuse and / or recycle the water used within your process?</p> <p>If YES, please provide in the box at the end of the table any opportunities that you have identified.</p> <p>If NO, please justify why not:</p>			N/A
4	<p>Where water is disposed to sewer, the water environment, or other, could this be reused / re-circulated?</p> <p>If YES, please provide in the box at the end of the table any opportunities that you have identified.</p> <p>If NO, please justify why not:</p>			N/A
5	<p>Having considered the above questions, please explain what water is used for and record here any current plans or new opportunities to improve water efficiency. These will be considered in Part 8 of this template:</p> <p>Considering minimal water use on site, currently there are no new opportunities identified to improve water efficiency at this time</p>			

Part 7 | Energy

Table 7: Managing Energy Use

We expect you to provide a short justification for your response to each question.		YES	NO	N/A
1	<p>Is your activity covered by a climate change agreement or are you a participant in the EU Emissions Trading System or both?</p> <p>If YES, provide details and then answer questions 2 and 3 below.</p> <p>FNGL is a participant of Emissions Trading System and holds GHG permit number UK-S-IN-12350</p> <p>If NO, answer questions 2, 3 and 4 below.</p>	Y		
<p>Basic energy requirements - This section applies to all PPC activities and relates to the processes and process buildings associated with the PPC permit (but excluding any office and accommodation buildings).</p>				
2	<p>Can you demonstrate that your process is operating in line with good practice in respect of the following areas?</p> <p>a) Monitoring and understanding your energy usage If YES, please provide a brief summary:</p> <p>Energy consumption is monitored and reported on regular basis via internal environmental reporting system and in accordance with Shell Performance Management Standards. Energy performance is reviewed at regular intervals via business performance reviews at site and at UK Operated level.</p> <p>If NO please justify why not:</p> <p>b) Energy management techniques If YES, please provide a brief summary:</p> <p>Below are some examples of energy saving techniques used on site: In conjunction with UKDCC (system operator) the site operations team continually monitor expected throughputs with the aim of taking one of our three operating modules down to slipstream mode of operation. In this mode the main refrigeration compressor is switched off and the energy savings realised. The hot oil furnace loop operates with a bypass valves to ensure there is a continuous return flow to the furnace once the demand to each exchanger is met. The Control room Operator manipulates the flow to ensure that this bypass valve operates in the 0% – 10% range, thus minimising any losses. The control room operator manages tank levels to remove the requirement to carry out tank transfers between ship loading operations, thus removing the need to run 3.3kv motor drive unnecessarily.</p> <p>If NO please justify why not:</p> <p>c) Operating and maintenance procedures If YES, please provide a brief summary:</p>	Y		

	<p>Our Plant Operating Procedure Manuals (POPMs) demonstrate that we are operating in line with 'good practice' and operations requirement, including energy saving operating modes, as covered within those procedures.</p> <p>If NO please justify why not:</p> <p>d) Basic physical measures for heating and cooling losses: If YES, please provide a brief summary:</p> <p>The main source of cooling medium is fin fan cooling of our column overheads. The control room operator monitors the required demand and starts/stops fin fans as required. We have a closed loop Propane refrigeration system to facilitate product rundown cooling. This is a closed system so no losses are incurred.</p> <p>If NO please justify why not:</p> <p>e) Building services If YES, please provide a brief summary:</p> <p>The admin boiler is thermostatically controlled to only provide heat to the building as and when the building is occupied, for example auto switches off in evenings and weekends.</p> <p>If NO please justify why not:</p>			
3	<p>Can you optimise your energy consumption using the Energy Efficiency Checklists located in Appendix 1 of the supporting guidance?</p> <p>If YES, please provide in the box at the end of the table any opportunities that you have identified.</p> <p>Yes, the Energy Efficiency Checklists will be used in our future projects to allow further optimisation.</p> <p>If NO, please justify why not:</p>	Y		

Table 7: Managing Energy Use - Continued

Further energy efficiency techniques				
We expect you to provide a short justification for your response to each question.		YES	NO	N/A
4	<p>Describe here proposals for further, process related energy efficiency measures, which go beyond the low-cost basic physical measures described above (refer to the supporting guidance for detail):</p> <p>We are currently working with process engineering and rotating specialists to tune of main refrigeration compressor controls to reduce the demand on fin fan cooling on the outlet to the compressors. This will increase efficiency of the machines so reduce electricity usage and also decrease fin fan demand.</p>			

5	<p>Having considered the above questions, please record here any current plans or new opportunities to improve energy efficiency. These will be considered in Part 8 of this template:</p> <p>FNGL is committed to reduce energy, in accordance with Shell operations net zero goals. In recent years number of assessments has been undertaken to identify improvement opportunities that led into development of abatement program. These energy saving opportunities are listed in Part 8 of the report.</p>
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Part 8 Identifying opportunities as part of your assessment

Are you confident that the techniques you are using are not wasting any resource and costing you money? Are you using the best techniques available to you? Even if you have ticked “NO” to any of the boxes above there is likely to be an opportunity for you to use resources and manage your waste more efficiently.

Carry forward, to the tables below, each of the improvement opportunities identified in Parts 4 – 7 of this template:

- Copy the table to record additional opportunities, as required.
- Complete the various sections in accordance with the supporting guidance.

Opportunity Number __ Energy
Reference the relevant Part and Question
<p>Outline the opportunity with your current system:</p> <p>Within the system there is an opportunity to reduce fuel gas consumption, power demand and CO2 emissions by progressing with ESOS opportunities identified.</p> <p>Opportunities being considered at FNGL are:</p> <ol style="list-style-type: none"> 1. Control modification on refrigerant compressor (K1501) discharge pressure control 2. Control modification on E1506 outlet/E1507 inlet temperature (refrigerant desuperheater and condenser) 3. Tuning of furnace (F5501) combustion air supply and hence flue gas oxygen content (thermal efficiency) 4. Ground flare upgrade 5. Isolate non-critical pilot groups on ground flares to reduce fuel gas consumption
<p>What improvement options are available / have been considered?</p> <ol style="list-style-type: none"> 1. Control modification on refrigerant compressor (K1501) discharge pressure control 2. Control modification on E1506 outlet/E1507 inlet temperature (refrigerant desuperheater and condenser) 3. Tuning of furnace (F5501) combustion air supply and hence flue gas oxygen content (thermal efficiency) 4. Ground flare upgrade 5. Isolate non-critical pilot groups on ground flares to reduce fuel gas consumption

Along with the future opportunities being considered (as listed above), we continue to focus on the following energy/resource saving techniques:

1. In conjunction with UKDCC (system operator) the site operations team continually monitor expected throughputs with the aim of taking one of our three operating modules down to slipstream mode of operation. In this mode the main refrigeration compressor is switched off and the energy savings realised.
2. The hot oil furnace loop operates with a bypass valve to ensure there is a continuous return flow to the furnace once the demand to each exchanger is met. The Control room Operator manages the flow to ensure that this bypass valve operates in the 0% – 10% range, thus minimising any losses.
3. The control room operator manages tank levels to remove the requirement to carry out tank transfers between ship loading operations, thus removing the need to run 3.3kv motor drive unnecessarily.

Which if any are you implementing (provide justification for your decision including cost vs environmental benefit):

All opportunities should be considered for implementation however a thorough study must be undertaken to understand whether the opportunity is feasible. Projects considered for implementation thus far are:

1. Control modification on K1501 discharge pressure control
2. Control modification on E1506 outlet/E1507 inlet temperature control
3. Tuning of F5501 combustion air supply and hence flue gas oxygen content (thermal efficiency)
4. Ground flare upgrade
5. Isolation of non- critical pilot groups on ground flares

Implementation timeline:

1. Due to be implemented Q3 2022
2. Due to be implemented Q3 2022
3. Furnace analyser upgrades are required first before this opportunity can be realised. Upgrades on all 3 modules are due to be implemented by Q3 2023
4. Due to be implemented Q4 2025
5. Due to be implemented Q2 2022

Review of progress:

I.e. has it been implemented – when? If not, why not?

As per timeline above.

Opportunity Number __Waste

Reference the relevant Part and Question

Outline the opportunity with your current system:

UK Waste Circularity Project – supporting FNGL to agree the Top 5 waste streams from assessment on our onshore waste data.

What improvement options are available / have been considered?

Analyse FNGL waste streams to identify further opportunities to limit disposal of waste

Which if any are you implementing (provide justification for your decision including cost vs environmental benefit):

Implementation timeline:

2022-2023

Review of progress:

I.e. has it been implemented – when? If not, why not?

Project and asset working together throughout 2022 and 2023.

Part 9 Reviewing progress and next steps**Step (i)**

Briefly summarise the focus of the work undertaken in the last 4 years. In the second half of this table summarise the improvements implemented, and the benefits achieved as a result. In addition, any improvement opportunities that failed to progress should be recorded here.

Brief summary of work undertaken during the 4 year period:	
The Shell Fife NGL installation has implemented a number of programmes and projects to minimise the consumption of valuable resources, and as part of this drive and continues to do so	
Summaries for successful and unsuccessful projects:	
Opportunity 1 Title	<p>Energy efficiency 1</p> <p>Maximisation of slipstream operation – The Modules operation strategy was altered in 2020 to one whereby we continually realise opportunities to wind modules back to slipstream rates or if possible, to take modules offline completely. This is coordinated daily between the duty operations shift team and the system operator (UKDCC) where as soon as feed rates are expected to drop below module capacity, we move a module to slipstream mode or take a module fully offline. Slipstream is where the module is operated at a reduced throughput and we don't run the main refrigeration compressor, thus realising the energy saving of shutting down our largest single electricity user. Taking a module fully offline realises this saving as well as shutting down the furnace, saving on fuel gas use.</p>
Opportunity 2 Title	<p>Energy efficiency 2</p> <p>Completion of surge trials on Module 2 & 3 K1501 compressors – We undertook surge trials on 1/2 & 3-K1501 over the period 2019 to 2021. This was carried out after each machine had undergone a major overhaul and allowed us to accurately plot the surge line, which in turn allows the machines to operate at close to maximum efficiency and reduce losses incurred by the recycle valves being open more than required.</p>
Opportunity 3 Title	<p>Energy efficiency 3</p> <p>Cleaning / changing angle of Fin-fan condensers E1004/E1007 – In 2021 a program was commenced to clean our fin fan tubes across all three modules. The main purpose of this was to minimise heat loss while the fin fans are in operation by cleaning the external surfaces of the tubes. This in turn allows us to operate the electric motors at a reduced capacity, thus saving electrical energy. The method used was as follows: clean the exchangers using our REACH compliant Pro-XL™ low pressure soft-blasting technique to gently sweep modified inert dry chemical media across the fin fans to remove external contamination.</p>

Part 9 Reviewing progress and next steps - Continued

Step (ii)

To ensure the continuity of implementation or to justify why a different direction or course of action is being taken at the start of the new 4 year review period, please record below those opportunities (either ongoing or pending) that will be carried forward.

Opportunity W Title	Summary of progress New opportunities are described in Part 8 of the report
Opportunity X Title	Summary of progress N/A
Opportunity Y Title	Summary of progress N/A
Opportunity Z Title	Summary of progress N/A

Step (iii)

Once you have completed your systematic assessment send it to SEPA by the timeline indicated in your permit. Your site officer will review your report and discuss your progress with you.

Contact details

Date resource efficiency assessment completed:	26/03/2022
Contact name: <i>No Signature required</i>	██████████ ████████████████████

Appendix 1: Water environment

The definition of water environment is stated in Regulation 3 of the Water Environment and Water Services (Scotland) Act 2003:

3 The water environment: definitions

(2) “The water environment” means all surface water, groundwater and wetlands.

(3) “Surface water” means inland water (other than groundwater), transitional water and coastal water.

(4) “Groundwater” means water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

(5) “Wetland” means an area of ground the ecological, chemical and hydrological characteristics of which are attributable to frequent inundation or saturation by water and which is directly dependent, with regard to its water needs, on a body of groundwater or a body of surface water.

(6) “Inland water” means—

(a) all standing or flowing water on the surface of the land (other than transitional water),
and

(b) all groundwater,

within the landward limits of coastal water.