



Environmental Performance Report 2019

Offshore Operations



Table of Contents

SECTION 1 INTRODUCTION	3
SECTION 2 OVERVIEW OF OPERATIONS AND ACTIVITIES IN 2019	4
OUR OPERATIONS.....	4
ITHACA ENERGY OPERATED ASSETS	4
FUTURE DEVELOPMENTS	7
DECOMMISSIONING.....	7
SECTION 3 OVERVIEW OF ITHACA ENERGY’S ENVIRONMENTAL MANAGEMENT SYSTEM	8
OPERATIONAL EXCELLENCE	8
OE POLICY	8
ENVIRONMENTAL STEWARDSHIP.....	10
SECTION 4 ENVIRONMENTAL PERFORMANCE.....	11
PERFORMANCE METRICS	11
ENVIRONMENTAL STEWARDSHIP IMPROVEMENT PROGRAM	11
ATMOSPHERIC EMISSIONS, CARBON DIOXIDE	12
TOTAL ATMOSPHERIC EMISSIONS.....	16
OIL IN PRODUCED WATER	17
CHEMICALS.....	17
OIL AND CHEMICAL RELEASES/SPILLS TO SEA	21
OIL SPILL RESPONSE ARRANGEMENTS.....	21
WASTE	21
ABBREVIATIONS	23

Section 1 Introduction

Ithaca Energy (UK) Limited, hereinafter referred to as Ithaca Energy, is an independent oil and gas company with production, development and exploration operations focused on the UK North Sea, headquartered in Aberdeen. The Company was founded in 2004 and has grown through a combination of acquisitions and new field developments.

Ithaca Energy is a wholly owned subsidiary of the Tel Aviv stock exchange listed Delek Group Limited (TASE: DLEKG, US ADR: DGRLY), Israel's leading integrated energy company.

Further information on Ithaca Energy can be found at: <https://www.ithacaenergy.com/>

Pursuant to OSPAR Recommendations 2003/5, all operators of offshore installations on the UK Continental Shelf (UKCS) are required to produce an annual public statement and make it available to the public and the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED).

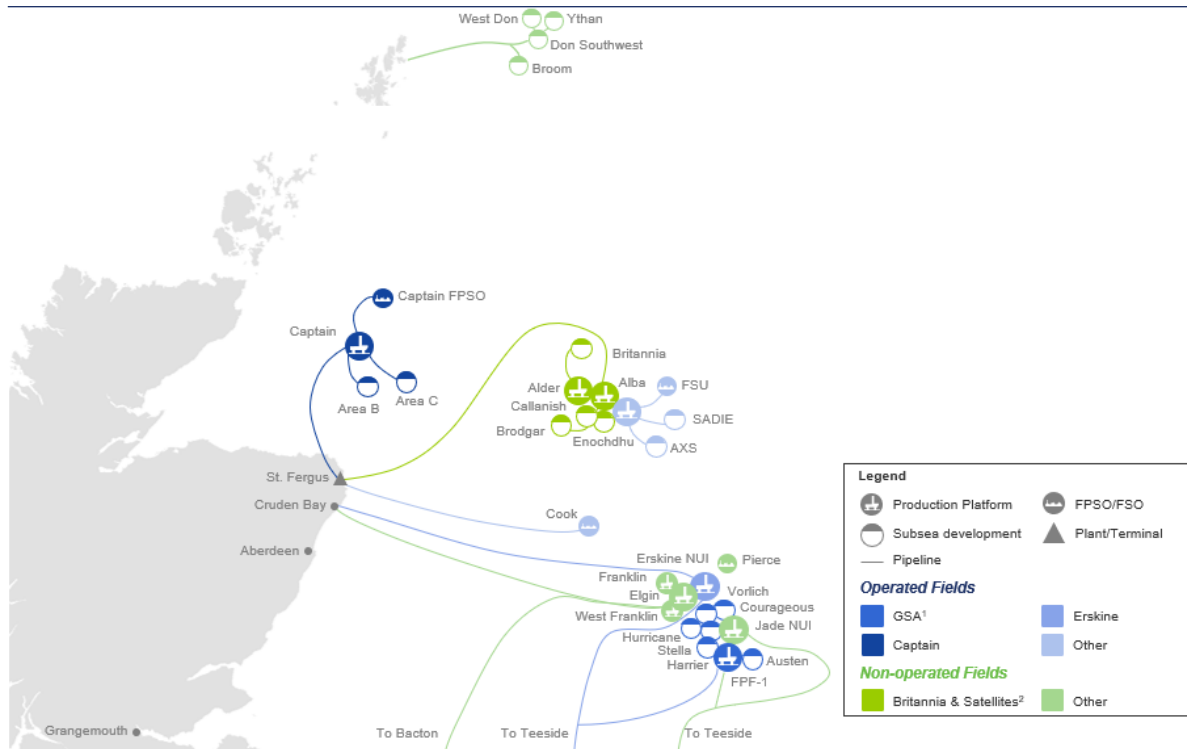
This is the fourteenth annual public environmental statement and it covers offshore installation activities carried out during 2019.

Section 2 of the report provides a general description of the company and its activities; Section 3 provides an overview of Ithaca Energy's environmental management system, environmental policy and high level environmental objectives; and the final section presents 2019 environmental performance data for relevant operations, together with performance against environmental targets.

Section 2 Overview of Operations and Activities in 2019

2019 was a transformational year for Ithaca Energy. Completion of the Chevron North Sea Limited acquisition in November 2019 marked a major milestone in the long term development of the Company. The transaction (Effective Date: 1 January 2019) significantly strengthened the operational and financial position of the business, establishing the Company as a major UK North Sea oil and gas producer with an excellent portfolio of high-quality assets that have strong growth potential.

Our Operations



Ithaca Energy is one of the largest independent exploration and production companies in the UK with substantial production assets in the North Sea. The Company has a high quality, diverse portfolio of assets including operated and non-operated assets. The portfolio consists of 18 producing field interests, which lie predominantly in the Central North Sea area of the UK Continental Shelf. The portfolio is heavily weighted towards operated assets, both in terms of production and reserves, providing the Company with significant control and flexibility. It comprises six operated fields (Alba, 23.4%; Captain, 85%; Erskine, 50%; Alder, 73.7%; Cook, 61,35%; and Greater Stella Area (GSA) 100%) and twelve non-operated fields (Britannia and Satellites, 32.38%; Brodgar, 6.25%; Callanish, 16.5%; Don Southwest, West Don, Conrie and Ythan oil fields, 40%; Elgin, Franklin, 3.9%; Enochdhu, 50%; Jade, 19.93% and Pierce, 7.48%).

The scope of this environmental report will cover Ithaca Energy operated assets only.

Ithaca Energy Operated Assets

Our operated assets are located in the Northern and Central North Sea and Moray Firth areas of the UK Continental Shelf.

The Alba Field

The Alba field lies about 130 miles (210 km) north-east of Aberdeen, Scotland, in the UK Central North Sea. Alba is a heavy oil field. The field facilities include a fixed steel platform, the Alba Northern Platform, and a Floating Storage Unit (FSU). Ithaca Energy continues to implement projects designed to sustain production and increase recovery at Alba.



The Alder Field

Alder is a high-pressure, high-temperature (HPHT) gas condensate field, approximately 17 miles (28 km) to the west of the Britannia field. Alder produced gas condensate (a mixture of hydrocarbon liquids from natural gas) is processed at new dedicated facilities on the Britannia platform. Condensate and gas is then exported to Scotland-based terminals at Grangemouth and the Scottish Area Gas Evacuation, St Fergus, respectively.

The Captain Field

The Captain field lies approximately 90 miles (145 km) north-east of Aberdeen, Scotland, in the Outer Moray Firth. Captain crude oil is offloaded from the Floating Production, Storage and Offloading (FPSO) vessel to a dynamically positioned shuttle tanker and transported to customers. Captain gas is exported (and imported) via subsea pipeline to the Frigg UK Gas Transportation System and then on to St Fergus gas terminal.

Ithaca Energy continues to implement projects designed to sustain production and increase recovery at Captain. This includes active platform and subsea well in-fill drilling and completion programmes targeting key areas of the reservoir. Continued development drilling is expected through the next decade.



The Cook Field

The Cook field lies approximately 105 miles (170 km) north-east of Aberdeen, Scotland, in the UK Central North Sea, in water depths of approximately 301 feet (92 m). The Cook field development consists of one production well (on natural depletion) tied back approximately 10 kilometres to the Anasuria Operating Company operated Floating Production, Storage and Offloading (FPSO) vessel, which also serves as a host facility for a number of nearby fields.



The Erskine Field



The Erskine field lies approximately 150 miles (241 km) north-east of Aberdeen, Scotland, in the Central North Sea, in water depths of about 296 feet (90 m). The field includes a normally unattended installation and is remotely controlled from Chrysaor's Lomond platform.

Processing takes place in a dedicated module on the Lomond platform. Gas and condensate are exported separately to Chrysaor's North Everest platform before gas is finally exported via the Central Area Transmission System and condensate is exported through the Forties Pipeline System.

The Greater Stella Area

The Greater Stella Area is located in the heart of the Central Graben area of the Central North Sea, on the UK Continental Shelf approximately 158 miles East of Aberdeen. It is an area surrounded by various large producing fields, and numerous undeveloped discoveries.

The Greater Stella Area licences contain the Stella and Harrier fields, both of which are in production, and the Vorlich field, which is currently in the process of being developed. The Company also owns operated interests in a number of satellite fields that are planned for development via the hub infrastructure, being the Hurricane, Austen and Courageous discoveries.



Production commenced from the Stella field in early 2017 and from Harrier in 2018. The development involved the drilling of subsea wells tied back to the Ithaca Energy owned and operated “FPF-1” floating production facility. Petrofac Facilities Management Limited became the Facilities Management Company for the FPF-1 in Q3 2018 and holds and reports on the relevant environmental permits.

Future Developments

A key focus of Ithaca Energy’s operational activities is the delivery of lower risk growth through the appraisal and development of UK undeveloped discoveries.

Isabella

The Neptune Energy operated licence containing the Isabella prospect is a gas condensate prospect, defined as a four-way dip closed structure, with the updip part stratigraphically trapped against the Jane diaper. The “Isabella” exploration well (Ithaca Energy 10% working interest), which commenced drilling in September 2019, identified hydrocarbons in the Upper Jurassic and Triassic sandstone reservoirs. This is an encouraging high-pressure high-temperature gas condensate discovery in a location close to existing infrastructure.

F-Block

During 2019 the Company completed the technical and engineering studies required for drilling of an exploration well on the “Fotla” prospect (60% working interest) in Block 22/1b. The “F-Block” lies adjacent to the Alba field and contains two gas exploration prospects, “Fotla” and “Fortriu”.

Decommissioning

In 2019 preparation for execution of the Ithaca Energy-operated Jacky field (100% working interest) decommissioning programme was completed. The programme involves the decommissioning of three platform wells and removal of the suction-piled, monopole unmanned platform.

The decommissioning plan for the Ithaca Energy-operated Anglia field (30% working interest) was submitted to OPRED for approval in November 2019. The Anglia field, which ceased production in 2015, is located in Blocks 48/19b and 48/18b in the Southern North Sea. The facilities to be removed consist of a normally unmanned platform and a number of platform and subsea wells.

Submission to OPRED of a decommissioning plan for the Causeway and Fionn fields is scheduled for 2020. These fields, which were developed as a subsea tieback to the Taqa-operated Cormorant platform, ceased production in 2018.

Cessation of production from the Broom field (8% working interest), a subsea tieback to the EnQuest-operated Heather platform in the Northern North Sea, arose at the end of 2019. It is anticipated that the decommissioning programme for the field will be completed in the late 2020s as part of an overall campaign to plug and abandon wells and remove infrastructure associated with various facilities in the Northern North Sea area of the UK Continental Shelf.

Section 3 Overview of Ithaca Energy's Environmental Management System

Ithaca Energy's objective is to provide a safe and healthy working environment for all its employees, contractors and other personnel working for the Company, while simultaneously minimising the environmental impact of the Company's operations by working to operate in an ever-cleaner manner. The control and management of these issues lies at the centre of the policies and procedures that constitute the "Operational Excellence" (OE) health, safety and environmental management system and the culture of the business.

Operational Excellence

The OE objectives set the priorities:

- Eliminate fatalities, serious injuries and illnesses
- Eliminate high-consequence process safety incidents and operate with industry-leading reliability
- Assess and manage significant environmental risks
- Use energy and resources efficiently
- Prevent high-consequence security and cybersecurity incidents
- Address OE business risks through stakeholder engagement and issues management

Ithaca Energy has an Operational Excellence Management System (OEMS) into which is integrated the Environmental Management System (EMS) certified to ISO 14001:2015 standard. The EMS was last verified as meeting the ISO 14001:2015 standard on November 2019. It is designed to implement the environmental policy of Ithaca Energy. It demonstrates a commitment to compliance with environmental legislation and Ithaca Energy standards, processes, activities and objectives for environmental management of hydrocarbon exploration and production.

Ithaca Energy's policy for protecting people and the environment is the primary statement of Ithaca Energy's expectations for health, safety and environmental management, and provides a shared understanding throughout the Company of environmental performance expectations.

Our Vision is to be the highest performing UK North Sea independent oil and gas company, focused on sustainably growing value.

We take pride in:

- Having a relentless focus on high performance
- Continuously improving the health, safety and environmental impact of our operations
- Developing an engaged workforce, in an inclusive, dynamic workplace
- Striving for efficiency and simplicity in all that we do

OE Policy

Ithaca Energy vision is reflected in the following OE Policy which meets the requirements of The Corporate Major Accident Prevention Policy (CMAPP) required by The Offshore Installations (Offshore Safety Directive) (Safety Case etc) Regulations 2015; The Safety Policy required by the Health & Safety at Work etc. Act 1974; and The Environmental Policy required by ISO 14001 environmental management standard.

The OE Policy is endorsed by the Chief Executive Officer of Ithaca Energy on behalf of the Board of Directors. The OE Policy is a commitment to assess and manage the risks and impacts associated with our operations; and a commitment to comply with legislative requirements and corporate policies.

Ithaca Energy (UK) Limited Operational Excellence Policy

Ithaca Energy (UK) Limited's Operational Excellence (OE) vision is to be recognised and admired by the industry and the communities in which we operate as a world-class performer in process safety, personal safety and health, environment, reliability and efficiency. Ithaca recognises the need to operate in a safe and responsible manner.

We will systematically manage OE with the aim of:

- Identifying and reducing the risk of major accident hazards including environmental and process safety risks.
 - Achieving an incident and injury free workplace.
 - Promoting a healthy workplace and mitigating significant health risks.
- Operating incident free with industry leading asset integrity and reliability.
 - Efficiently using natural resources and assets.
- Ensuring continual improvement in all aspects of our business.

Through consistent application of OE, this policy and our Safety and Environmental Management Systems (SEMS), we aim to address the following:

Leadership

Our leaders are accountable for:

- Providing clear and consistent leadership in accordance with this policy and our tenets of operation.
- Ensuring clear roles, responsibilities and communications.
- Trusting and empowering their teams to apply a risk based approach to decision making in accordance with this policy.
- Creating a culture that is built on our values and behaviours, enabling safe, reliable and secure operations and environmental protection.
- Engaging with community and other stakeholders.
- Ensuring that we comply with all applicable policies, codes and regulations and that we constructively engage in consultation with regard to proposed legislation.

Organisation

Our organisation is fit-for-purpose and is designed to:

- Achieve results in accordance with Ithaca policies.
- Ensure suitable and sufficient control of Major Accident Hazards.
- Ensure that staff and contractors are competent of their roles through the application of the Ithaca Competence Assurance Process.
- Encourage structured and timely decision making.
- Ensure the management of safe work.

A Strong Safety Culture

Based on:

- Our tenets of operation.
- Compliance with the provisions of our safety cases and this policy.
- The identification and management of Major Accident Hazards.
- The involvement of, and consultation with, our staff and contractors.
- The reporting and investigation of incidents and near misses.
- The use of stop work authority.
- The recognition and reward of desired behaviours through the use of stop work authority, performance process and our recognition and award process.
- The implementation of corporate safety initiatives.

Risk Management

Our people, at all levels of the organisation will:

- Systematically assess, prioritise and manage risk.
- Regularly review and re-evaluate risks.
- Maintain the integrity of dedicated systems through fit-for-purpose design and operating practices.
- Ensure that there are multiple, independent barriers in place to prevent Major Accident Hazards including, but not limited to, unplanned releases of hydrocarbons.

Asset Integrity Management

Our facilities, reservoirs and wells are designed and maintained to be fit-for-purpose throughout their lifecycles. This includes

- Designing, constructing, modifying, operating and maintaining our facilities and wells to recognised safety and environmental

protection standards, to avoid unplanned releases of hazardous substances and to prevent injury to people or harm to the environment.

- Minimising the potential for human error through the design and operation of our facilities.
- Maintaining the integrity of safety and environmental critical elements.
- Managing risks on a whole of life-cycle basis.
- Managing change in accordance with our management of change process.
- Compliance with all applicable codes, regulations and Ithaca standards.

Monitoring and Audit

Through a process of audit and workplace monitoring, we will examine our processes and operations to confirm:

- That we review and re-evaluate our goals and our organisational capability.
- That our plans and processes are being correctly implemented.
- That we continually improve the effectiveness of our management system including our verification and well examination schemes.
- The suitability and effective implementation of this policy.

Emergency Management

While prevention is the first priority, we are prepared for an emergency and have the tools to mitigate any incident quickly and effectively:


- We maintain a fit-for-purpose command and control system, based on defined scenarios and meet all UK legal requirements.
- We regularly test the effectiveness of the system through audits and exercises.
- We aim to prevent future incidents by identifying and eliminating their root causes.

This policy applies to all offices and facilities operated by Ithaca Energy (UK) Limited.

The Leadership Team shall champion the implementation of this policy across Ithaca and lead the monitoring and auditing of its ongoing effectiveness.

Every individual has a duty to ensure that they always comply with, and hold others accountable for compliance with this policy, and prevent harm to themselves and others, and to the environment. This policy is applicable without distinction between Ithaca employees and contractors working for the company.

This policy meets the requirements of the corporate major accident prevention policy pursuant to Regulation 7 of the Offshore Installations (Offshore Safety Directive) (Safety Case etc) Regulations 2015.



Les Thomas, Chief Executive Officer
Ithaca Energy (UK) Limited

Environmental Stewardship

Our Environmental Stewardship (ES) process identifies and addresses significant environmental aspects relating to our operations, driving continuous improvement in environmental performance and reducing our environmental impact. The expectation of Ithaca Energy's ES process is to strive to continually improve environmental performance and reduce impacts from our operations. It is applied across the life cycle of an asset and is used to identify, assess and manage potential environmental impacts and benefits. To achieve this, Ithaca Energy has implemented a step-wise process to be followed on an annual basis. First, an inventory of all emissions, releases, wastes and potentially impacted natural resources is prepared. This is followed by a procedure to identify, assess, mitigate and manage any significant risks and impacts to the environment associated with operations, emissions, releases and wastes. The outcome is an annually updated ES plan. The management system is independently certified to the international standard ISO 14001:2015 and requires Ithaca Energy to engage independent auditors who verify that our onshore and offshore operations meet requirements. A successful independent surveillance audit to assess that the environmental management system is maintained in accordance with Ithaca Energy's environmental policies, processes and procedures and the requirements of ISO 14001:2015 was conducted in November 2019 which raised no non-conformances. All Ithaca Energy assets will be included in the next ISO 14001:2015 certification.

The ES plan includes objectives and targets for environmental performance, details of improvement implementation programmes and the process for tracking progress in meeting environmental objectives. The ES plan is approved by senior management and is aligned with other business and OE plans.

All Ithaca Energy operations and projects have the potential to impact on the environment and they are all subject to strict environmental regulatory controls which require Ithaca Energy to prepare and submit regulatory applications to gain approval before activities begin and during the ongoing operational activities. We monitor and report our ongoing emissions, discharges and waste streams to ensure we meet regulatory requirements and do not cause significant impact on the environment. In the event of an unplanned release/spill to sea, or a non-compliance with regulatory requirements, notification would be made to the appropriate regulatory authorities and action taken to respond to any threat of or actual pollution. Investigations of incidents are conducted to gain any learnings or actions to prevent recurrence.

The ES process is used to help provide assurance that we are protecting the environment and meeting our internal and regulatory requirements and obligations.

In 2020 the Company's environment stewardship planning includes a commitment to analysing and reducing greenhouse gas emissions, both direct and indirect, in order to contribute towards the industry goal of net zero emissions by 2035.

Section 4 Environmental Performance

Ithaca Energy is committed to continually improving environmental performance through responsible design, development and operations. This is achieved by integrating environmental objectives and targets into the environmental stewardship plan and regularly evaluating progress to adjust if required.

Performance Metrics

Ithaca Energy sets performance targets annually for key environmental aspects (produced water, oil releases/spills, waste and air emissions) to achieve the OE objectives.

Ithaca Energy's performance against targets for key 2019 environmental focus areas is summarised in the table below:

Table 1 - Ithaca Energy 2019 Performance Metrics¹

	Units	Ithaca Energy	
		Result	Metric
Oil spill volume rate	bbls/MMbbls produced	0	0.1
Total CO₂²	tonnes	540,758	-
Oil-in-produced water mass	tonnes	141.43	145.85³
ISO 14001 re-certification	yes/no	Yes	Yes
Environmental audits completed	percent	80 ⁴	100
Production operations waste recycling/reuse⁵	percent	93.29	70

Environmental Stewardship Improvement Program

As part of the preparation of the annual ES plan, improvement opportunities were identified by Ithaca Energy. These actions were grouped into improvement plans for Ithaca Energy's UK producing assets and for activities associated with drilling, including the use of a mobile offshore drilling unit (MODU).

The improvement opportunities centred around strengthening arrangements associated with prevention of, and response to, incidents and releases; produced water management; reduction of air emissions and management of waste. Progress in completing these actions was tracked throughout the year and was used as a leading measure of continual environmental performance improvement. By the end of 2019, Ithaca Energy achieved 90% completion of its environmental stewardship high priority opportunities, with the remaining 10% in progress and carried forward to 2020.

¹ Unless otherwise stated figures shown are for Ithaca Energy operated assets, excluding Alder and Cook field. The Alder field environmental emissions are reported through the Chrysaor operated Britannia platform.

² This metric is total CO₂ for Captain, Alba, Erskine, FPF-1 and drilling operations. This does not include emissions from Alder and Cook which are accounted for by the operators of the Britannia Platform and Anasuria FPSO respectively.

³ Target figure shown is the combined Alba FSU and ANP oil discharge permit figures for 2019.

⁴ FSU audit was postponed to 2020 due to bed space issues.

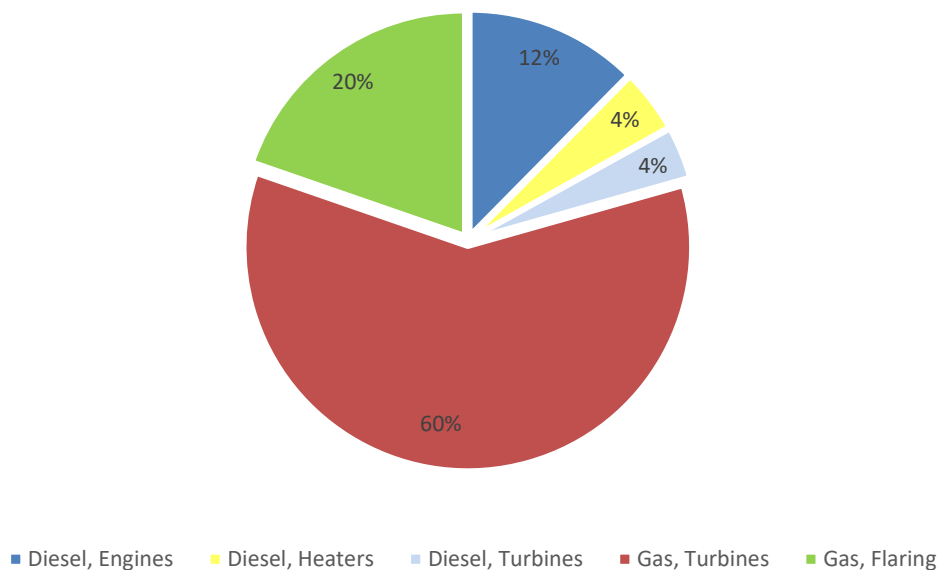
⁵ This metric relates to the proportion of waste from UK production operations for which waste recycling is possible. The figure excludes drilling-related wastes and waste generated from occasional operations for which there is no current alternative but disposal in accordance with applicable law. Such disposed waste streams are tracked and reported. The metric is set this way to allow meaningful comparison of year on year performance in managing our routine waste streams.

In addition to improvement opportunities raised directly via the ES process there are also arrangements in place to drive continual improvement in response to compliance audits; regulatory inspections/changes; and/or ongoing OE and asset work scopes.

Atmospheric Emissions, Carbon Dioxide

In 2019 Carbon Dioxide (CO₂) emissions from Alba, Captain, FPF-1 and Erskine were 533,028 tonnes. In addition, there were 7,730 tonnes CO₂ produced by drilling rigs on hire to Ithaca. The chart below shows the CO₂ emission by source for combined production and drilling operations. CO₂ emissions for Cook and Alder are reported by the Anasuria and Britannia facilities to which these fields tie back and are therefore not included in this breakdown.

Figure 1: Carbon Dioxide Emissions by Source



The majority of Ithaca’s CO₂ emissions result from the combustion of fuel gas and diesel offshore, accounting for 76% of emissions. Fuel gas is used for power generation in gas turbines. Diesel is used for power generation in engines and turbines, in process heaters heating the well fluids, and marine services, such as engine thrusters used to keep the Alba Floating Storage Unit (FSU) on location. Wherever possible Ithaca preferentially uses fuel gas for power generation. This has multiple benefits: fuel gas is co-generated with the oil offshore, it reduces transport emissions associated with importing diesel, fuel gas burns more cleanly than diesel resulting in less CO₂ emissions and using it as a fuel gas as the fuel stock reduces flaring.

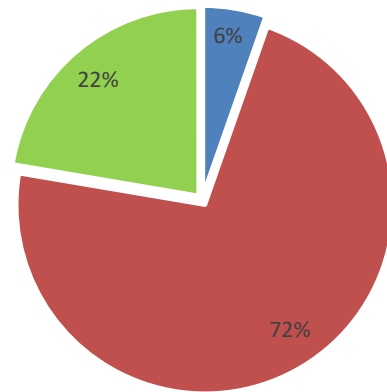
In 2019 flaring accounted for 20% of Ithaca’s CO₂ emissions. During 2019 Ithaca completed engineering work on the Alba Northern Platform (ANP) to further reduce flaring from this asset. The benefits of this investment should be seen in 2020.

During 2019 Carbon Dioxide emissions from the Alba Northern Platform were predominantly from gas consumed in the gas turbines for power generation and a fifth from flaring.

Figure 2

**Carbon Dioxide by Source
Alba Northern Platform**

Facility	Emission Source	CO ₂ (tonnes)
Alba Northern Platform	Diesel, Turbines	8,200
	Gas, Turbines	110,511
	Gas, Flaring	34,111
	Gas, Venting	17
	Fugitives	1
Total		152,839

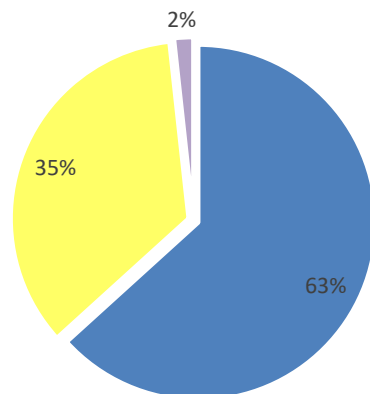


■ Diesel, Turbines ■ Gas, Turbines ■ Gas, Flaring

During 2019 Carbon Dioxide emissions from the Alba FSU were predominantly from diesel consumed in the diesel engines for power generation, and by the heaters to keep the fluids warm to allow them to be pumped into the awaiting cargo vessel during offloading.

Figure 3

**Carbon Dioxide by Source
Alba FSU**



■ Diesel, Engines ■ Diesel, Heaters ■ Oil Loading

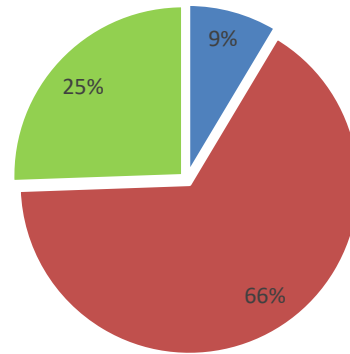
Facility	Emission Source	CO ₂ (tonnes)
Alba Floating FSU	Diesel, Engines	4,772
	Diesel, Heaters	2,640
	Oil Loading	130
Total		7,543

During 2019 Carbon Dioxide emissions from the Captain WPP / BLP were predominantly gas consumed in the gas turbines for power generation, and gas flared.

Figure 4

**Carbon Dioxide by Source
Captain WPP/BLP**

Facility	Emission Source	CO ₂ (tonnes)
Captain, WPP/BLP	Diesel, Turbines	10,674
	Gas, Turbines	81,957
	Gas, Flaring	31,802
	Fugitives	<1
Total		124,434

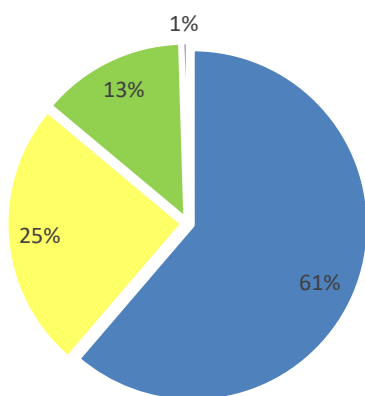


■ Diesel, Turbines ■ Gas, Turbines ■ Gas, Flaring

During 2019 Carbon Dioxide emissions from the Captain FPSO were predominantly diesel consumed in the diesel engines for power generation, and by the heaters to keep the fluids warm to allow them to be pumped into the awaiting cargo vessel during offloading.

Figure 5

**Carbon Dioxide by Source
Captain FPSO**



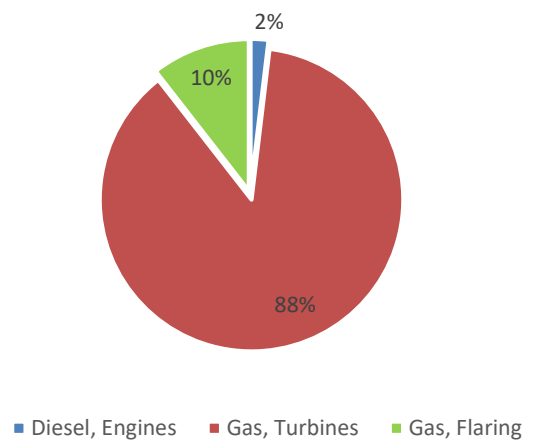
■ Diesel, Engines ■ Diesel, Heaters
■ Gas, Flaring ■ Oil Loading

Facility	Emission Source	CO ₂ (tonnes)
Captain FPSO	Diesel, Engines	53,140
	Diesel, Heaters	21,505
	Gas, Flaring	11,664
	Oil Loading	413
Total		86,721

During 2019 Carbon Dioxide emissions from the Erskine were predominantly gas consumed gas turbines for power generation.

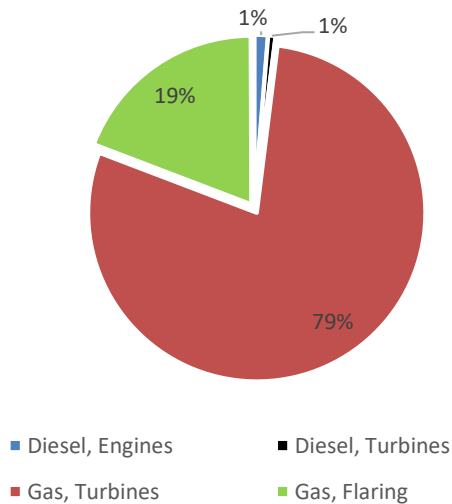
Facility	Emission Source	CO ₂ (tonnes)
Erskine	Diesel, Engines	630
	Gas, Turbines	29,071
	Gas, Flaring	3,497
Total		33,197

Figure 6
Carbon Dioxide by Source Erskine



During 2019 Carbon Dioxide emissions from the FPF-1 were predominantly gas consumed gas turbines for power generation, and approximately one fifth as a result of gas flaring.

Figure 7
Carbon Dioxide Emissions by Source FPF-1

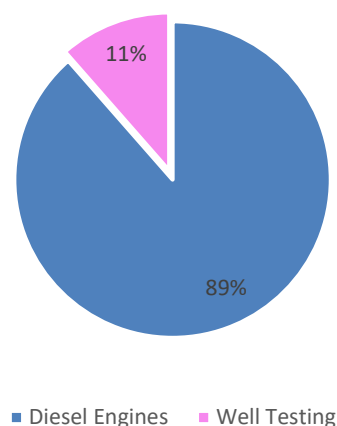


Facility	Emission Source	CO ₂ (tonnes)
FPF-1	Diesel, Engines	1,644
	Diesel, Turbines	892
	Fugatives	2
	Gas, Turbines	101,116
	Gas, Flaring	24,569
	Gas, Venting	72
	Total	

During 2019 Ithaca Energy hired two drilling rigs. Most emissions from the rigs were from diesel consumed in the diesel engines for power generation, with some emissions resulting from gas flaring during well testing.

Facility	Emission Source	CO ₂ (tonnes)
Drilling Rigs	Diesel, Engines	6,845
	Gas, Flaring	886
Total		7,730

Figure 8
Carbon Dioxide by Source
Drilling Rigs



Total Atmospheric Emissions

In addition to Carbon Dioxide, other pollutants arise from the combustion of diesel and gases offshore. The table below shows the total tonnes of atmospheric pollutants emitted by each installation, and by the two mobile drilling rigs used by Ithaca Energy during 2019. CO₂ accounts for 98.7% of these emissions, 0.6% was Oxides of Nitrogen (NO_x), 0.4% Methane (CH₄) and 0.2% Carbon Monoxide (CO). The combined emission of Sulphur Dioxide (SO₂), Nitrous Oxide (N₂O) and Volatile Organic Compounds (VOCs) account for less than 1%.

Emissions for FPF-1, Cook and Alder are reported by Petrofac, Anasuria and Chrysaor respectively.

Table 2 – Total Atmospheric Emissions

Source	CO ₂ (t)	NO _x (t)	N ₂ O (t)	SO ₂ (t)	CO (t)	CH ₄ (t)	VOC (t)
Alba Northern Platform	152,839	350	11	103	336	995	82
Alba FSU	7,543	77	<1	4	20	45	33
Captain WPP/BLP	124,434	634	9	7	290	433	3
Captain FPSO	86,721	1,014	6	47	296	258	37
Erskine	33,197	76	3	1	44	86	13
Drilling Rigs	7,730	128	1	9	37	11	8

Oil in Produced Water

Oil extraction results in the co-production of produced water containing hydrocarbons, some naturally occurring materials and other substances and residues of the chemicals used in the offshore production process.

In the Captain field, all produced water is re-injected back into the reservoir with none being discharged to sea. At Alba, produced water is treated to reduce the concentration of residual oil before being discharged to sea. Both these activities are regulated under the provisions of a permit issued by the environmental regulator OPRED. Erskine produced fluids are exported and processed on the Lomond installation (operated by Chrysaor) and produced water is discharged and reported from this location under the provisions of a discharge permit issued to Chrysaor. The Alder field is tied back to the Britannia Platform operated by Chrysaor, with any water produced from it discharged in accordance with the Britannia regulatory discharge permit. Produced Water discharge from the Cook field is managed under the existing Oil Pollution Prevention Control (OPPC) permit for the Anasuria FPSO, operated by Petrofac. Produced Water discharge from the Stella and Harrier field is managed under the existing OPPC permit for the FPF-1, managed by Petrofac.

In 2019, Ithaca Energy re-injected more than 60% (18.2 million tonnes) of total produced water. A total of 141.34 tonnes of oil in produced water was discharged into the sea at an average oil-in-water concentration of 14.16 mg/l from the Alba field. See table 3 below for more information.

Produced water handling remains a key challenge at Alba because the volume of water co-produced with the oil is rising as the field matures. Further initiatives and projects are being pursued through the 2020 ES plan.

Table 3 – Ithaca Energy 2019 oil-in-produced water data

Facility	Oil-in Produced Water Discharge Concentration (mg/l)	Oil Discharged (tonnes)	Water Discharged (tonnes)	Water Injected (tonnes)
Captain Wellhead Protector Platform (WPP)	N/A	N/A	N/A	18,242,692
Alba Floating Storage Unit (FSU)	21.74	0.276	12,756	N/A
Alba Northern Platform (ANP)	13.41	141.06	10,774,094	N/A
Total	14.16⁶	141.34	10,786,850	18,242,692

Chemicals

Chemicals are an essential requirement in drilling and production operations with many different types being used – primarily to control corrosion, inhibit bacterial growth, assist with the production process, and assist with the drilling process. Due to the nature of these processes some discharge of chemicals to the sea will occur. Chemical use and discharge is strictly regulated and a permit is required before any use or discharge to sea of a production or drilling chemical can take place.

⁶ This figure is not the direct average of the FSU and ANP discharge concentrations, but is weighted to capture the average oil in water in relation to the total water discharged to surface water.

In 2019, approximately 6% of the production chemicals used were discharged to sea, most of which were low hazard - that is chemicals classed E or banded Gold under the regulated Offshore Chemical Notification Scheme. A breakdown of Ithaca Energy chemical use by operation is provided in table 4 below, with a breakdown of discharge by chemical type provided in table 5 below.

Ithaca Energy continues to focus on replacement of higher hazard chemicals with less hazardous substitutes where this is technically feasible. Discharge of chemicals is affected significantly by increased water production at Ithaca Energy's Alba field as it matures. Since 1998, all water produced from Ithaca's Energy Captain field reservoir has been used either as reinjection water for reservoir pressure maintenance or as power water for downhole hydraulic pumps; chemical discharges at this field are therefore already minimal.

Ithaca Energy discharged 3,662.8 tonnes of chemicals from drilling operations during 2019, approximately 15% of the total chemicals used in these activities. Most of these chemicals were low hazard chemicals.

Ithaca Energy discharged 943.99 tonnes of chemicals as a result of well workover operations during 2019, approximately 57% of the total chemicals used in these activities, most of which were low hazard.

All chemical use and discharge are subject to strict regulatory controls and are managed in accordance with internal procedures and processes.

Table 4 – Ithaca Energy 2019 chemical use and discharge

Facility/Operation	Mass Used (kg)	Mass Discharged (kg)
Alba Floating Storage Unit (FSU) Production Operations ⁷	125	24,473
Alba Northern Platform (ANP) Production Operations	1,687,897	896,279
Alba Northern Platform (ANP) Drilling Operations	0	0
Alba Northern Platform (ANP) Workover Operations	1,122,396	943,990
Captain Wellhead Protector Platform (WPP) drilling operations	17,675,826	2,968,898
Captain Wellhead Protector Platform (WPP) Workover Operations ⁸	524,300	0
Captain FPSO Production Operations	16,805,898	121,668
Erskine Production Operations ⁹	260,432	0
Erskine Workover Operations	4,335	0
Pipeline Operations	0	1,068
MODU Drilling Operations	6,262,663	693,936
total	44,343,872	5,650,312

⁷ No processing occurs at the FSU; therefore, little chemical is used there. The apparent discrepancy in FSU chemical use and discharge figures is as a result of the FSU receiving processed crude from ANP, from which water that requires discharging settles out, meaning some chemicals applied at the ANP get discharged at the FSU.

⁸ There is no produced water discharge at Captain, chemicals were either re-injected into the reservoir along with the produced water or remained downhole.

⁹ Erskine production fluids are processed at Lomond (operated by Chrysaor), therefore discharge of chemicals used at Erskine occurs there. These chemical discharges are covered on, and reported against, Chrysaor's chemical permit for Lomond.

Table 5 - 2019 chemical use and discharge (detailed) ¹⁰

Facility/Operation	kg	A	B	C	D	E	Orange	Blue	White	Silver	Gold	Total
Alba Floating Storage Unit (FSU) Production Operations	Used (kg)	0	0	0	0	0	0	0	0	0	125	125
	Discharged (kg)	0	0	0	0	14,706	0	0	0	0	9,767	24,473
Alba Northern Platform (ANP) Production Operations	Used (kg)	0	0	0	0	224,973	0	61,322	0	148,021	1,253,581	1,687,897
	Discharged (kg)	0	0	0	0	224,513	0	475	0	16,462	654,829	896,279
Alba Northern Platform (ANP) Drilling Operations	Used (kg)	0	0	0	0	0	0	0	0	0	0	0
	Discharged (kg)	0	0	0	0	0	0	0	0	0	0	0
Alba Northern Platform (ANP) Workover Operations	Used (kg)	0	0	0	0	296,999	0	3,021	0	0	822,376	1,122,396
	Discharged (kg)	0	0	0	0	296,999	0	3,021	0	0	643,970	943,990
Captain Wellhead Protector Platform (WPP) drilling operations	Used (kg)	0	0	0	0	16,540,397	0	0	0	0	1,135,429	17,675,826
	Discharged (kg)	0	0	0	0	2,709,982	0	0	0	0	258,916	2,968,898
Captain Wellhead Protector Platform (WPP) Workover Operations	Used (kg)	0	0	0	0	0	0	0	0	0	524,300	524,300
	Discharged (kg)	0	0	0	0	0	0	0	0	0	0	0
Captain FPSO Production Operations	Used (kg)	0	0	0	726	129,401	0	0	7,135,367	89,387	9,451,017	16,805,898
	Discharged (kg)	0	0	0	726	115,624	0	0	0	0	5,318	121,668
Erskine Production Operations	Used (kg)	0	0	0	0	19,145	0	0	0	0	241,287	260,432
	Discharged (kg)	0	0	0	0	0	0	0	0	0	0	0
Erskine Workover Operations	Used (kg)	0	0	0	0	4,331	0	0	0	0	4	4,335
	Discharged (kg)	0	0	0	0	0	0	0	0	0	0	0
Pipeline Operations	Used (kg)	0	0	0	0	1,043	0	0	0	10.53	15.415	1,068
	Discharged (kg)	0	0	0	0	1,079	0	0	0	0.106	0.946	1,080
MODU Drilling Operations (Deepsea Bergen and Maersk Resilient)	Used (kg)	34,580	0	12,350	20,129	6,140,894	0	0	0	2,226	52,484	6,262,663
	Discharged (kg)	0	0	0	120	686,131	0	0	0	0	7,685	693,936
Total	Used (kg)	34,580	0	12,350	20,855	23,357,182	0	64,343	7,135,367	239,645	13,480,619	44,344,941
	Discharged (kg)	0	0	0	846	4,049,034	0	3,496	0	16,462	1,580,486	5,650,324

¹⁰ The Offshore Chemical Notification Scheme (U.K.) (OCNS) conducts Chemical Hazard and Risk Management (CHARM) assessments on chemical products that are used offshore. They use colour banding to risk rank each product, with Gold products posing the lowest potential hazard and, on the table above, Orange being the highest risk. Products not applicable to the CHARM model (i.e. inorganic substances, hydraulic fluids or chemicals used only in pipelines) are assigned an OCNS grouping, A - E. Group A includes products considered to have the greatest potential environmental hazard and Group E the least.

Figure 9: 2019 Chemical Discharges from Production

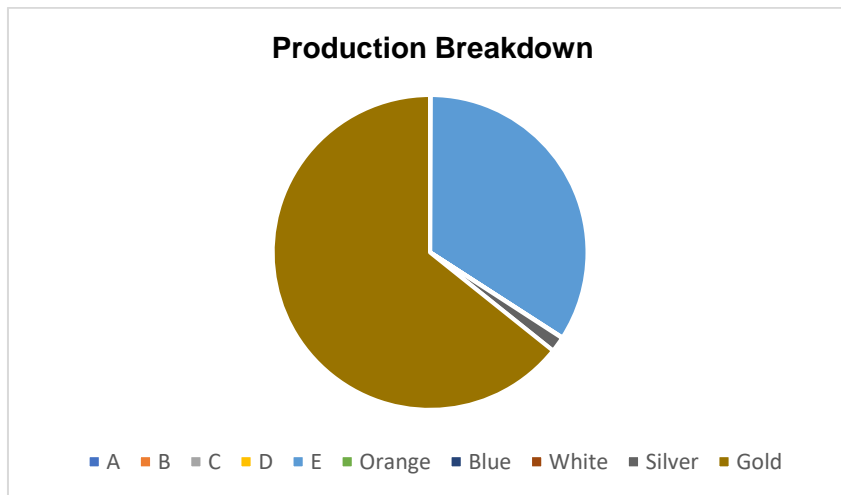


Figure 10: 2019 Chemical Discharges from Drilling

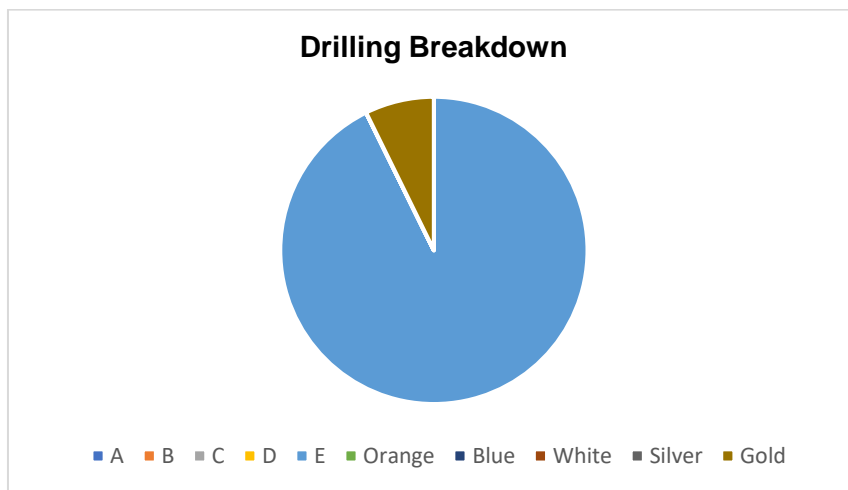
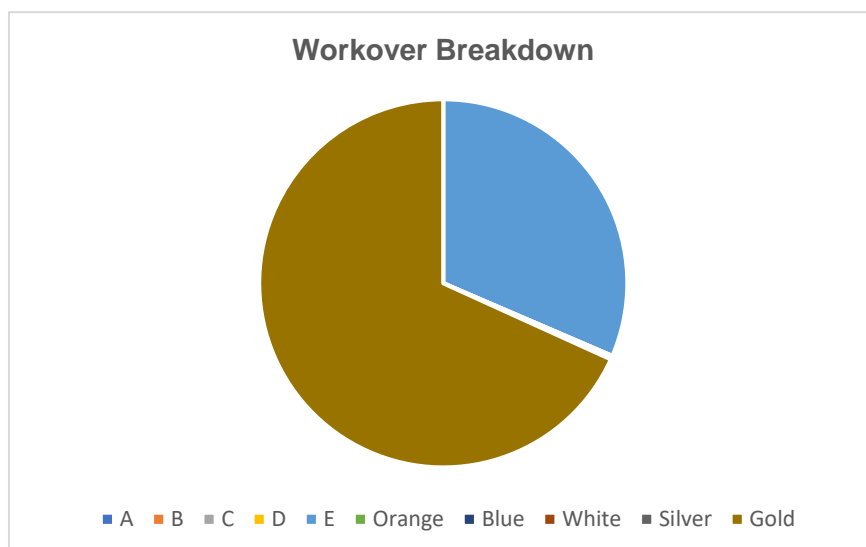


Figure 11: 2019 Chemical Discharges from Well Interventions/Workovers



Oil and Chemical Releases/Spills to Sea

Table 6 – Ithaca Energy 2019 unplanned oil and chemical releases to sea

Facility	Number of PON1s	Oil Released (tonnes)	Chemicals Released (kg)	PON1 - Oil or Chemical
ANP	1	0.037		Oil Release
Alba FSU	1	0.0000248		Oil Release
Captain WPP	5	0.0000047		Oil Release
			9	Chemical Release - Hydraulic Fluid
			4848	Chemical Release - Hydraulic Fluid
		0.0000353		Oil Release Hydraulic Oil
		0.0001853		Oil Release
Captain FPSO	1	0.00007		Oil Release - Hydraulic Oil
Total	8	0.0373201	4857	

In accordance with regulatory requirements all unplanned accidental releases of oil or chemicals to sea, regardless of quantity, must be reported on a Petroleum Operations Notice No.1 (PON1). A summary of Ithaca Energy's 2019 oil and chemical releases to sea is provided in table 6.

During 2019 Ithaca Energy reported 6 unplanned oil release events to sea and 2 chemical release events with the maximum reported release being 4,848 kgs. Also 4 permitted discharge notifications requiring PON1 were reported. All incidents were reported and investigations conducted. There was one incident where greater than 2 tonnes/2000 kgs was released which is summarised as follows:

During routine monitoring and trending of subsea hydraulic fluid use and discharge a potential subsea release on the Annular Master Valve (AMV) of B23 well was identified. A worst case release rate was determined as 185 kg/24 hours. A very minor discharge was observed by the diver when the AMV was in the open position. The valve has been replaced and well B23 was monitored when back in use. Any hydraulic fluid use increases will be closely monitored and reported where applicable. However, no further release was observed.

HW540E is OCNS category E and therefore low toxicity. It is routinely discharged to sea under the provisions of the regulatory approved platform chemical permit under normal operations. The product is expected to disperse rapidly in the marine environment and no significant environmental impact was anticipated or counter pollution response required.

Oil Spill Response Arrangements

Ithaca Energy has regulatory approved Oil Pollution Emergency Plans in place for each fixed asset and robust procedures in place for responding to any incidents which may occur. Personnel are trained and regular exercises take place to ensure effective response.

Waste

Ithaca Energy's offshore operations produce a variety of waste streams which include packaging, scrap metal and redundant chemicals. Ithaca Energy works actively to reduce the amount of waste that it produces and to reuse or recycle what remains. Improvements in the proportion of recycled or reused waste have been identified – for example, wooden storage pallets are used for chipboard and plastic drums are shredded for recycling and reuse. Waste

which is not reused, recycled or sent for energy production is mainly sent to landfill with small amounts being incinerated.

Ithaca Energy works with our waste management contractor to continuously improve waste management and minimise landfill volumes. Ithaca Energy's 2019 waste production is shown in table 7.

In 2019, Ithaca Energy exceeded its target of recycling 70% of the recyclable waste in its production and office operations (see in table 1: 2019 Performance Metrics, page 11 of this report). This target was achieved through initiatives implemented at each of the installations and by the individual efforts of members of the offshore workforce.

Table 7 - 2019 reported total waste data

Category	Recycle/Waste to Energy (tonnes)	Landfill/Incinerate (tonnes)	Total (tonnes)
Special/Hazardous Waste	375.289	31.60	406.89
Non-Hazardous Waste	3,724.957	258.216	3,983.17
Total	4,100.246	289.817	4,390.06

For the purpose of relative annual performance tracking, the drilling-related and tank washings waste streams are excluded in the target as these are extremely variable and operationally dependent, and their inclusion would not allow for long-term performance tracking. These are often the largest Ithaca Energy contributors to landfill volumes and consequently the Company is working to reduce the quantities and potential hazards of these waste streams. The use of non-aqueous drilling fluids can be necessary when drilling in certain reservoirs or long horizontal wells.

Abbreviations

ANP	Alba Northern Platform
bbbl	barrel
CH ₄	Methane
CMAPP	Corporate Major Accident Prevention Policy
CO	Carbon monoxide
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
EMS	Environmental Management System
ES	Environmental Stewardship
ETS	Emissions Trading System
EU	European Union
FPSO	Floating Production, Storage and Offloading
FSU	Floating Storage Unit
GSA	Greater Stella Area
HPHT	High Pressure High Temperature
HSE	Health, Safety and Environmental
ISO 14001:2015	International standard for environmental management systems
mg/l	Milligrammes per litre
MODU	Mobile Offshore Drilling Unit
N ₂ O	Nitrous oxide
NO _x	Oxides of nitrogen
OE	Operational Excellence
OEMS	Operational Excellence Management System
OCNS	Offshore Chemical Notification Scheme
OIW	Oil in water
OPEP	Oil Pollution Emergency Plans
OPPC	Oil Pollution Prevention and Control
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo and Paris conventions
PON 1	Petroleum Operations Notice Number 1
PW	Produced Water
Q1 Q2 Q3 Q4	Quarter of the Year
SO ₂	Sulphur Dioxide
T	tonnes
UKCS	United Kingdom Continental Shelf
VOC	Volatile Organic Compounds
WPP	Wellhead Protector Platform



Ithaca Energy (UK) Limited
Hill of Rubislaw, Aberdeen, AB15 6XL
www.ithacaenergy.com

© 2020 Ithaca Energy (UK) Limited. All rights reserved.