Responsiable business

We work to reduce our environmental impact and manage our operations safely and responsibly. Safety and respect for people - our employees, contractors and neighbours - are fundamental to how we do business.

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RESPECTING HUMAN RIGHTS

We recognise our responsibility to respect human rights in all aspects of doing business. We focus on four areas where human rights are critical to the way we operate: communities, security, labour rights and supply chains.

Our approach applies to all our employees and contractors and is informed by the Universal Declaration of Human Rights, the core conventions of the International Labour Organization, and the United Nations Guiding Principles on Business and Human Rights. Our approach is set out in our Shell General Business Principles, Code of Conduct, and Shell Supplier Principles.

We have embedded human rights into our existing frameworks and processes to demonstrate we respect human rights across the business.

Our Health, Safety, Security, Environment and Social Performance (HSSE&SP) Control Framework sets out how we identify, assess and manage our impacts on communities where we operate - including any impact on human rights - and how we engage respectfully with our neighbours. Our goal is to keep employees, contractors and facilities safe, while respecting the human rights of local communities in accordance with the UN Voluntary Principles on Security and Human Rights.

The Shell Supplier Principles include specific expectations for contractors and suppliers covering business integrity, health and safety, social performance, and labour and human rights. Our joint venture partners are expected to implement our control framework or an equivalent [see Non-operated ventures].

We have made several external regulatory declarations that describe how we manage human rights risks in our supply chains. We expect our contractors and suppliers to obey the national laws and international standards that require them to treat workers fairly, and to provide a safe and healthy work environment.

In 2018, we joined forces with our industry peers to create a Common Framework for Supplier Labour Rights Assessment. The initiative is designed to make it easier for suppliers to demonstrate how they respect human rights and care for people; this transparency is intended to improve working conditions in our companies’ supply chains.

We have community feedback mechanisms at all our major facilities. These mechanisms, along with a global helpline operated by an independent provider, enable employees, people in the communities where we operate, contractors and any third party to raise concerns, so they can be resolved.

We also consult with international organisations, companies and civil society to understand and respond to current and emerging human rights issues relevant to our business. These include the global oil and gas industry association for environmental and social issues IPIECA, and the human rights working group of Business for Social Responsibility.

Read more on our approach to human rights at www.shell.com/humanrights and our external regulatory declarations at www.shell.com/external-voluntary-codes.

MANAGING OUR IMPACT ON PEOPLE

Our projects and operations can affect our neighbours. Our social performance team, working with environmental specialists, assesses and manages the impact of Shell’s business to ensure that work is carried out in a responsible way.

We manage the impact we may have on people living near our operations in line with the International Finance Corporation’s Performance Standards and the UN Guiding Principles on Business and Human Rights.

Our Health, Safety, Security, Environment and Social Performance Control Framework expects us to, first, avoid or, where this is not possible, minimise our impacts on people through project design. For example, in 2018, original plans for an above ground pipeline in Germany, which would have impacted three roads, were changed to a tunnel design following community engagement and agreement with the road agency.

Approach to human rights
We work with local communities to jointly identify solutions and opportunities. For example, in 2018, we worked with fishermen in Malaysia on a programme called “Safety at sea” to promote awareness of the dangers of fishing near oil platforms. We have also worked in a similar way to help communities in Colombia to adopt better fishing practices.

INDIGENOUS PEOPLES
Our activities in certain parts of the world affect indigenous peoples who hold specific rights for the protection of their cultures, traditional ways of life and special connections to land and water. Shell has developed a public position statement on Free Prior Informed Consent (FPIC), a principle recognised in the United Nations Declaration on the Rights of Indigenous Peoples. Our statement is based on a prerequisite to engage in dialogue with local indigenous communities and come to a joint agreement on the way forward in project development. For example, the LNG Canada joint venture (Shell interest 40%) was planned and designed by working closely with local communities, First Nations (indigenous peoples) and governments.

We continue to seek the support and agreement of indigenous peoples potentially affected by our projects. We do this through mutually agreed, transparent and culturally appropriate dialogue and impact management processes.

CULTURAL HERITAGE
Preserving cultural heritage is an important part of managing social impact. When two slave cemeteries were discovered five years ago in a sugar cane field next to Shell Convent Refinery in Louisiana, we commissioned an archaeological and genealogical study. The property is owned by Shell and contains the remains of more than 1,400 people. Together with the River Road African American Museum, we decided to invest in protecting and preserving the cemeteries for future generations. Dedication ceremonies were held in March 2018. The project has resonated strongly with descendants, members of the local communities and our employees.

INVOLUNTARY RESETTLEMENT
Shell company operations sometimes require temporary or permanent access to areas of land or sea where people are living or working. Where resettlement is unavoidable, we work with local communities to help them relocate and maintain, or improve, their standard of living. If necessary, we help support them as they establish alternative livelihoods.

In Kazakhstan, an expansion of the safety perimeter around the Karachaganak field, owned and operated by Karachaganak Petroleum Operating B.V. (KPO) (Shell interest 29.25%) required 464 families from the villages of Berezovka and Bestau to be resettled. The physical resettlement of the families was successfully completed in 2018 with work currently underway to support the restoration of their livelihoods and monitor their resettlement.

KPO worked with the government and communities to help people obtain comparable or better housing and restore their livelihoods. Resettlement started in 2015 and was carried out in accordance with KPO’s final production sharing agreement, current legislation of the Republic of Kazakhstan and international standards for resettlement [IFC Performance Standard 5]. Read more at www.shell.com/resettlement.

EXTERNAL VOICE
When the safety zone around Karachaganak Petroleum Operating BV’s (KPO) facility in Bestau, Kazakhstan, was expanded, nearby residents like Zauresh were required to move home.

“I have lived over 40 years in Bestau and my children were born here. This is my home. So, I would like to thank the KPO management for this opportunity to spend the rest of my life in favourable and good living conditions. This means the world to me and my family. We have a community grievance procedure in place so we can contact the community liaison officer at KPO any time. KPO continues to monitor the resettlement and assist with repairs and other problems when we report them via the community feedback tool.”

Zauresh Selbayeva
Resident of Arai tal, Kazakhstan

SECURITY
Managing security risks helps protect our employees, contractors, fence-line communities and the environment.

In line with our goal of no harm to people, we carefully assess the security threats and risks to our operations. We work with governments and partners to safeguard assets and provide a secure working environment for employees and contractors. Shell only uses armed security in countries where the threats are most severe, or if it is a requirement under local laws.

Given our digitalisation efforts and increasing reliance on information technology systems for our operations, we continuously monitor external developments and actively share information on threats and security incidents. Shell employees and contract staff are subject to mandatory courses and regular awareness campaigns aimed at protecting us from cyber threats.

We periodically test and adapt cyber-security response processes and seek to enhance our security monitoring capability. Read more about our approach to cyber security in our Annual Report.

Security and human rights
We work to maintain the safety, security and human rights of our employees, contract staff and local communities. The Voluntary Principles on Security and Human Rights (VPSHR) are implemented across Shell where there are identified threats of infractio

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We continue to play an active role in the Voluntary Principles Initiative, considered the benchmark for human rights standards related to security. In 2018, a Shell representative was a member of its steering committee, working with other partners on the initiative to advance security and human rights implementation. The steering committee drives the initiative’s agenda and helps build consensus across the various stakeholders, who include governments, civil society organisations and major oil and gas companies.

We include VPHSR clauses in our private security contracts and raise the principles in engagements with public security forces. We carry out annual risk assessments and develop plans to manage the identified risks. For example, in 2018 in Iraq, we trained the Iraqi Oil Protection Force (the government security force) on VPSHR as part of a broader skills training programme. And in Nigeria, we maintained a regular dialogue on VPSHR with the government security agencies and work to deliver human rights training.

Read more about our approach to security and human rights at www.shell.com/humanrights.

KEEPING SAFE

We work to deliver energy responsibly and safely. We aim to do no harm to people and to have no leaks across our operations. We refer to this as our Goal Zero ambition.

Every employee and contractor is expected to meet our safety standards and requirements, including following our 12 Life-Saving Rules. We continue to strengthen the safety culture among our employees and contractors.

We expect everyone working for Shell to intervene and stop work that may appear unsafe.

We investigate incidents and aim to learn from them, sharing findings to improve safety performance across our industry.

Read more about our 12 Life-Saving Rules at www.shell.com/lifesavingrules.

PERSONAL SAFETY

Every one of our people plays an important role in maintaining a safe working environment. We aim for a safety culture that goes beyond compliance. This means people should feel listened to and cared for, and comfortable raising concerns or dilemmas.

We hold a safety day each year when employees and contractors across Shell share perspectives about safety hazards in their work. In 2018, sessions focused on care, dilemmas and avoiding complacency towards everyday risks (or “risk normalisation”).

Our facilities are often located in harsh environments and our people often work in demanding roles, having to manage many different hazards. We ensure that people have the necessary safety training and skills. For example, everyone working in an offshore location must complete basic offshore safety induction and emergency training in survival skills.

Personal safety performance

In 2018, following steady and significant improvements in our safety performance over the past decade, the number of injuries per million working hours – the total recordable case frequency (TRCF) – increased slightly to 0.9 compared with 0.8 in 2017.

The level of injuries that led to time off work in 2018 also increased compared to 2017.

Tragically, two people lost their lives while working at Shell locations in 2018: one person died at a refinery in Germany and another at an onshore well in the USA. Our fatal accident rate – the number of fatalities per 100 million working hours – remained flat in 2018 compared to 2017.
PROCESS SAFETY

Process safety management is about keeping our hazardous substances in pipes, tanks and vessels so they do not cause harm to people or the environment. It starts with designing and building projects and is implemented throughout the life cycle of the facilities to ensure they are operated safely, well-maintained and regularly inspected.

Shell operates a liquefied natural gas regasification terminal in Hazira on the west coast of India.

Our global standards and operating procedures define the controls and physical barriers we believe are necessary to prevent incidents. For example, our offshore wells are designed with at least two independent barriers in the direction of flow to mitigate the risk of an uncontrolled release of hydrocarbons. Shell companies regularly inspect, test and maintain these barriers to ensure they meet our standards.

In 2018, leaders throughout Shell continued to work with their teams to develop a better shared understanding of process safety challenges and behaviours, and how to jointly design improvements. For example, at the Moerdijk chemicals site in the Netherlands, leaders and frontline operators co-created an improved approach to safe isolation, which is intended to ensure people and dangers – such as electricity or hazardous chemicals – are separated during operations.

We continue to take steps to better align and improve the various approaches to managing facilities across our businesses with the aim of having simpler and safer ways of working. These steps include starting to introduce a single global asset management system to be adopted by Shell-operated facilities and some non-operated ventures. The system provides asset managers with an overview of steps they should take for safe and efficient management of facilities. For example, it includes expectations related to asset equipment care, maintenance, learning from incidents and conducting assurance. Having a single system is expected to help Shell companies improve the way they manage the safety performance of assets. It also helps to foster better knowledge management and networking across businesses to enable us to accelerate lessons learned across Shell.

Process safety fundamentals

Since 2016, we have been embedding a set of process safety fundamentals across Shell, which provide clear guidelines for good operating practice to prevent unplanned releases of hazardous materials. We have encouraged employees and contractors at facilities to use these fundamentals in everyday conversations to give visibility to safety dilemmas, so they can be resolved.

Read more about our approach to process safety at www.shell.com/process-safety.

Process safety performance

In line with industry standards, we measure and report process safety incidents according to significance, with Tier 1 as the most significant. Following the disappointing results in 2017, when our process safety performance deteriorated, there has been renewed focus and effort in all businesses in 2018 to improve performance, including further implementation of our Process Safety Fundamentals.

10 process safety fundamentals

<table>
<thead>
<tr>
<th>Always use two barriers for hydrocarbon and chemical drains and vents</th>
<th>Do not leave an open drain or critical transfer unattended</th>
<th>Take interim mitigating measures in case of failure of Safety Critical Equipment</th>
<th>For all defined high risk activities, follow the procedures and sign off after each step</th>
<th>Walk the Line – Verify and validate any line up change</th>
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<tbody>
<tr>
<td>Do not make a change without a proper Management of Change</td>
<td>Verify for complete tightness after maintenance work</td>
<td>Always check that equipment is pressure free and drained, and provides safe isolation before starting maintenance work</td>
<td>Perform Management of Change and install backflow protection when connecting utilities to process</td>
<td>Respond to critical alarms</td>
</tr>
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Read more about our approach to process safety at www.shell.com/process-safety.
RAISING STANDARDS
ACROSS THE INDUSTRY
We share our safety experience and standards with other operators, contractors and professional organisations, including the International Association of Oil & Gas Producers (IOGP) and the Energy Institute.

In 2018, we shared training materials with the Energy Institute, including toolkits that encourage reflection on how incidents with potential safety risk could be managed and how participants could apply the lessons learned in their line of work.

We have also started sharing what we have learned from the tragic road tanker incident that took place in Pakistan in 2017 with others in the fuel transport industry (see Pakistan section below).

IN TRANSPORT
Moving large numbers of people, products and equipment by road, rail, sea and air poses safety risks. We develop best-practice standards within Shell to reduce transport safety risks, and work with specialist contractors, industry bodies, non-governmental organisations and governments.

In shipping, for example, we are working with our contractor partners on a programme to improve the quality and consistency of their safety management and on tools to help learn from incidents. In 2018, we visited more than 700 ships to engage mariners on safety and make the programme more effective.

We also launched a new risk model for accident prevention. In the past, the shipping industry mostly relied on learning about incidents after they have happened. This new statistical model recognises precursors or small leading events, such as a small leak or technical issue, to predict the risk of a serious incident. Identifying the precursors allows companies to address them, which helps to reduce the potential for significant incidents.

In the air, chartered planes, which fly around 11,000 hours a year for us, are used to transport passengers, observe pipelines and carry out geophysical surveys. Everyone at Shell working in an offshore location must complete basic offshore safety induction and emergency training (BOSIET) in survival skills.

We use helicopters for about 52,000 flying hours a year to carry people to and from facilities onshore and offshore.

In 2018, we worked on a programme with offshore helicopter safety association HeliOffshore, the IOGP, aircraft manufacturers and aviation regulators to drive safer ways of working with aircraft. This included improving helicopter vibration monitoring systems, passenger survival training and survival equipment.

The number of Tier 1 and 2 operational process safety events decreased from 166 in 2017 to 121 in 2018, of which 35 were Tier 1 and 86 were Tier 2, returning to our multi-year improvement trend.

In 2018, the most significant incidents related to process safety were a fatality at our Rheinland refinery in Germany and a spill at the Trans Ramos pipeline in Nigeria.

![Tier 1+2 process safety events excluding sabotage](image)

Process safety events related to sabotage and theft in Nigeria are recorded separately. There were nine Tier 1 events in 2018, the same as in 2017.

Read more about Shell and safety at [www.shell.com/safety](http://www.shell.com/safety).

**PRODUCT STEWARDSHIP**

We work to ensure our products - such as fuels, lubricants and chemicals - are safe throughout their life cycle. Our goal is to protect employees, customers, communities and the environment from potential risks posed by these products.

Good product stewardship means we assess and manage the products’ potential health, safety and environmental risks. We work with our customers and suppliers, monitor changes in the science behind our products and support research to reduce risks. We communicate the potential hazards associated with our products and publish safe handling information on labels and safety data sheets.

We also comply with, and monitor changes to, applicable regulations. In regions around the world, various regulations designed to create a more circular economy are in development and we are preparing to meet those requirements when they are introduced.

We also support safe and sustainable products through the use of internal reviews for products we develop. Our OilSafe programme uses a classification process, for example, to identify lubricant additives that have characteristics that could lead to handling risks, such as a low flash point or hazardous or toxic components. When these substances are part of a formulation, our process requires that their use be reviewed. Based on our review results, we either stop use, replace the additive, or implement controls to reduce the risk of handling the final product.

You can read more about our product stewardship, as well as our commitment to animal welfare in relation to product safety testing at [www.shell.com/product-stewardship](http://www.shell.com/product-stewardship).
Also in 2018, we saw growth in the use of remotely-piloted aircraft systems – or drones – and they are now used regularly. This technology helps our teams to conduct tasks, such as inspecting the condition of oil and gas facilities and infrastructure in high or hard to reach places, more safely and efficiently.

An inspection of QGC Pty Limited’s gas production operations in Australia only took two days compared to weeks of traditional ground inspection, saving around 6,500 kilometres of driving.

Road traffic accidents claim around 1.35 million lives every year, according to the World Health Organization. Shell employees and contractors drove a combined distance of around 600 million kilometres on business in 2018 in more than 60 countries. There were no road transport related fatalities in 2018 in assets and activities under the operational control of a Shell company.

We run road safety programmes, such as our mandatory defensive driving course, which teaches safe techniques and behaviour.

We require everyone driving more than 7,500 kilometres a year on Shell business on public roads and those who drive in high risk road safety countries to take an in-vehicle defensive driving course.

In 2018, around 3,200 people completed some form of in-vehicle training. We also introduced an annual online defensive driving training course, which consists of seven different modules with a focus on hazards such as fatigue, for all who drive on public roads on Shell business.

In the USA, rising energy industry activity in the Permian Basin has led to increased traffic and more serious road accidents and fatalities.

SWEPI LP, a subsidiary of Shell Oil Company, has taken proactive steps to improve safety in the Permian Basin, including piping water to operations to reduce water trucks on the road and building accommodation for workers to split up long journeys.

We also work with our industry peers, such as operators and contractors, to develop policies that improve road safety. For more information about these efforts, see The road to better safety.

Outside our operations, we also work to improve road safety in several communities and countries where we operate.

Myanmar
The Yangon-Nay Pyi Taw highway is known for its high accident rate. In 2017, Shell Myanmar Energy Private Limited launched a road safety campaign with the Myanmar Red Cross Society and the Global Road Safety Partnership to educate drivers and communities on safe road use. In October 2018, the second phase of the campaign was launched, covering the entire Yangon-Nay Pyi Taw-Mandalay highway.

The campaign reminds motorists to drive carefully and return home safely by using billboards and signs with messages from children. We also worked with the campaign partners using social media to educate and encourage a wide audience on safe driving habits and road use.

More than 6.5 million drivers have been exposed to the road safety messaging on the highway and 7.5 million people have been reached through the national campaign.

In December 2018, our road safety campaign on the Yangon-Nay Pyi Taw highway was recognised for its effectiveness in delivering change by the prestigious Prince Michael International Road Safety Award.
EXTERNAL VOICE

TechnipFMC is a global contractor that has worked with Shell on several major construction projects, including the Kaikias deep-water oil and gas project in the Gulf of Mexico. TechnipFMC participates in our contractor safety leadership initiative which encourages us to work more closely to improve safety.

“We set out to optimise the design of the Kaikias deep-water project in the Gulf of Mexico by taking an integrated approach, working closely with the Shell team. This meant taking steps included executives engaging early with each other and their people, using a single execution team, a simplified architecture and using next generation products. Shell empowered us to implement our health, safety, security and environmental management plan, which was a key factor for both companies to focus on a common safety goal, Goal Zero, which is to achieve no harm and no leaks across all operations. All this helped us achieve an exceptional safety record. Our aligned objective was to deliver an accelerated time to first oil and a sustainable capital expenditure reduction in a safe and responsible manner. Shell’s contractor safety leadership programme allowed us to identify collaborative strategies to successfully accomplish our shared objective.”

Doug Pferdehirt
Chief Executive Officer, TechnipFMC

Pakistan
In June 2017, a devastating rollover incident occurred in Pakistan involving a road tanker hired by a company that was providing road transport services to Shell Pakistan Limited, following which people from a nearby village approached the incident site to collect spilled fuel. Tragically, the fuel ignited resulting in the loss of more than 200 lives and left many other people seriously injured.

Following the incident, Shell Pakistan Limited provided immediate relief support including providing food supplies for 150 affected families for nine months and medical supplies to hospitals. Shell Pakistan Limited has also contributed to long-term relief efforts for those impacted. For example, the CARE Foundation, in partnership with Shell Pakistan Limited, has ‘adopted’ two public schools within the impacted villages to improve infrastructure and education standards. Shell Pakistan Limited is also working with the National Rural Support Programme to help restore livelihoods of people in affected communities, providing vocational training and support for setting up small businesses.

We finalised our internal investigations in 2018 and we continue to implement our learnings from the incident. This includes deep reflection by the Royal Dutch Shell plc Board and Executive Committee, who have initiated several improvement programmes to be adopted throughout Shell globally. We have developed and started the implementation of a road transport improvement project, specifically targeted at the management of fuel transport in high-risk countries. We are working with road transport companies in other locations where factors relevant to the Pakistan incident may exist and have also started sharing what we have learned with others in the fuel transport industry.

Shell Pakistan Limited continues to work with regulators, emergency services and the wider oil and gas industry in Pakistan with a view to improving safety standards. Shell Pakistan Limited has also required the road transport companies it hires to improve the safety of their transport fleets and has ongoing safety engagements with hauliers and their drivers, seeking to help them to identify and address the risks associated with driving fuel tankers. This has included emergency response drills to build and test capability.

Road transportation remains a challenging and complex area for industry worldwide. Sadly, in October 2018, there was another rollover incident in Pakistan involving a customer tanker, which resulted in the death of the relief driver and a spill. This incident was outside of Shell’s operational control and outside of our reporting scope.

India
In India, Shell India Markets Private Limited worked with the transport ministry on an awareness campaign on social media which reached close to 7 million people across the 10 most accident-prone cities in the country. IndiGo airlines and Mahindra Logistics have now joined the campaign.
WITH OUR CONTRACTORS
We employ a large number of contractors who often perform activities with high safety risk. We work with our contractors to ensure they understand our safety requirements and together we build skills and expertise to improve safety performance.

For example, Shell’s Pulau Bukom Manufacturing Site in Singapore continued to embed a programme to improve safety by encouraging people to identify hazards and take ownership of barriers to keep themselves and others safe. The Blue Zone Barrier Thinking programme, originally successful in our lubricants business, uses briefing materials with clear, simple language and visuals that enhance daily safety sessions, and encourages supervisors to hold discussions rather than tell teams about risks. Around 6,000 Shell employees and contractors, from diverse backgrounds and nationalities, work at the Bukom site.

Working together
Since 2014, executives from Shell have collaborated in pairs with executives of major contractor companies – as part of Shell’s contractor safety leadership programme – to identify strategies and practical steps to improve safety culture and achieve our Goal Zero ambition of no harm and no leaks, including driving standardisation together. The programme has a joint safety vision – what they call a declared future – and now includes 19 companies. One of these companies, TechnipFMC worked with us to deliver the Kaikias project in the Gulf of Mexico ahead of schedule, with an outstanding health, safety and environmental rating. Together, we set the project up to succeed through early engagement and by agreeing to simplified structures and processes.

After five years of preparation and onshore work, and eight months of offshore work, Heerema Marine Contractors (HMC) completed the offshore installation of the Appomattox (USA) project for Shell in October. The executive pair’s close collaboration and alignment, nurtured throughout the project execution, helped to deliver an outstanding safety performance. Almost 830,000 offshore man hours of work were spent on HMC’s deep-water construction vessel Balder without significant incidents.

In 2018, Shell and these major contractor partners signed up to a set of principles with the goal to improve worker welfare within our industry [see Supply chain].

PREPARING FOR EMERGENCIES
We make sure that we have the necessary resources to deal with spills, leaks, fires and explosions, both offshore and onshore. We regularly test our oil-spill and emergency response procedures and capability to ensure employees and contractors can respond rapidly to an incident.

In 2018, we trained around 850 employees on four large-scale oil spill exercises – two in the USA, one in Kazakhstan and one in the Philippines. All the exercises involved our emergency response contractors and joint venture partners, and local authorities. The events included training followed by two-day exercises to test and practice our organisational capability to manage a worst-case spill incident.

For example, in our Kazakhstan joint venture North Caspian Operating Company (NCOC) (Shell interest 16.81%), an exercise designed and led by Shell simulated a leak from a damaged oil pipeline near reed beds in shallow water, making it difficult to respond by boat. The simulation tested the necessary procedures required to effectively use dispersants and control in-situ burning. The exercise involved close collaboration with our joint venture partners and local government officials.

All our offshore facilities have plans in place to respond to spills. We have resources available on location, for example, floating barriers to contain an oil spill, or through our contractors, such as collection vessels and aircraft used for spill monitoring or dispersant spraying when permitted. We were founding members of the Subsea Well Containment Company, a non-profit industry body providing a response system for the Gulf of Mexico. During drilling operations, we gather and analyse information about wells to better understand the geology of the area. Pressure and temperature sensors track conditions in real time so that we can immediately detect any changes. Shell-operated drilling activities are continually monitored from onshore operating centres which allow oversight and timely technical support.

Environment

OUR APPROACH
We carefully consider the potential environmental impact of our activities and how local communities might be affected during the lifetime of a project.

We aim to comply with all applicable environmental regulations, continually improve our performance and prepare for future challenges and opportunities. We use external standards and guidelines, such as those developed by the World Bank and its International Finance Corporation, to inform our approach.

We follow global environmental standards for managing our emissions, minimising our use of fresh water and conserving biodiversity. Within our operations, we also focus on reducing energy use, flaring less gas and preventing spills and leaks of hazardous materials.

When planning new major projects, we carry out detailed environmental, social and health impact assessments [see Embedding sustainability into projects].

As a member of the Natural Capital Coalition, we continue to follow work on the evolving concept of natural capital – the value of nature to people, society, business and the economy.
BIODIVERSITY AND SENSITIVE AREAS
We seek to understand and respond to any potential impacts our activities may have on biodiversity. This includes the benefits that people or businesses derive from ecosystems, such as food and clean water.

In our projects and operations, we aim to avoid impacts on biodiversity and ecosystem services. Where avoidance is not possible, we aim to minimise our impact. Where our operations have affected biodiversity and the communities who rely on biodiversity for their livelihoods, we take measures to help restore impacted habitats. We look for opportunities to make a positive contribution to conservation where we operate.

Once barren, an area of 1,200 hectares along the Hazira peninsula now thrives with animal and plant life. Shell and its partners planted mangroves as part of the coastline restoration project.

We develop biodiversity action plans when operating in areas that are rich in biodiversity, known as critical habitats, to assess and mitigate our impact on local biodiversity and dependent communities. To help us improve our environmental performance, including protecting biodiversity, we work with scientific and conservation organisations around the world.

We support research programmes to protect life below water, for example to increase our understanding of marine mammals and their behaviour and find ways to minimise the impact on them when working in marine environments. Shell is a member of the International Association of Oil & Gas Producers Joint Industry Programme on Sound and Marine Life, an initiative to improve understanding of the effect that sound generated by oil and gas exploration and production has on marine life.

In 2018, the joint industry programme worked with academia and regulators to review progress of its research. Since 2006, it has funded $60 million of research leading to about 120 peer-reviewed publications, which help operations planning and to inform industry mitigation strategies and government regulations. An example of this is the study carried out by Leiden University and its partners in 2018, where cod in the North Sea were tagged and observed during an experiment using seismic sounds.

BIODIVERSITY MANAGEMENT IN CANADA
The LNG Canada project has carried out impact assessments and developed comprehensive management and mitigation plans to respond to and offset the impacts that activities may have on the local marine environment.

In Canada, we are releasing about 50,000 square kilometres of exploratory permits off coastal British Columbia to support marine conservation efforts. We are working with the Government of Canada in consultation with indigenous peoples and environmental groups to support effective conservation outcomes.

Shell’s contribution is in line with the Government of Canada’s commitment to conserve 10% of Canada’s coastal and marine areas by 2020, and the aim of government, indigenous communities and environmental organisations to advance marine conservation.

At Shell Canada’s Groundbirch natural gas project in British Columbia, a collaboration with the Twin Sisters Native Plant Nursery, a local indigenous-owned business, is enabling reclamation of the natural landscape using traditional knowledge and native plant species (see Delivering natural gas in Canada).

Read more at www.shell.com/biodiversity.
WATER USE
Few natural resources are as essential as fresh water and its importance will only rise as the world’s population increases and developing economies continue to grow. The availability of fresh water is a growing challenge in some parts of the world, as it is not always available where people need it or in a form that is easy to use.

Water use

We carefully manage our water use and discharges. We design and operate our facilities to help reduce fresh water use, and we tailor our use of fresh water to local conditions because water constraints affect people at the local or regional level.

ASSESSING WATER CONSTRAINTS
Our environmental, social and health impact assessments help us to better understand the water risks for our projects and broader watershed impacts. We evaluate the long-term sustainability of water resources to select the option that avoids or minimises disruption to the environment and other users.

We assess risks based on water availability, quality and accessibility. To help us define water stress conditions, we use a combination of publicly available water stress tools, such as the World Resources Institute’s Aqueduct Water Risk Atlas, and information specific to the local environment.

In water-scarce areas, we develop water management plans for our facilities. These plans describe the long-term risks to water availability and define measures to minimise our use of fresh water or recommend alternatives, such as recycled water, processed sewage water and desalinated water.

For example, in 2018, Shell affiliate QGC Pty Limited’s natural gas project in Queensland, Australia, continued to conduct research into groundwater-dependent ecosystems in the Surat Basin. We want to determine the impact of water use in areas where surface water is absent for large parts of the year and where ecosystems are dependent on groundwater. We have a robust monitoring programme with response plans in place to identify and mitigate any impacts from our operations.

Read more at www.shell.com/water-use.
FRESH WATER USE PERFORMANCE
In 2018, our intake of fresh water was 199 million cubic metres, about the same as 2017. Around 90% of our fresh water intake was used for refining oil products and chemicals, with the balance mainly consumed in oil and gas production. Around 40% of fresh water intake was from public utilities such as municipal water supplies.

The volume of fresh water withdrawn by our Downstream business increased in 2017 and 2018, due primarily to the inclusion of two refineries previously operated by the Motiva joint venture in the USA in our data from May 2017. This increase was partly offset by the exclusion of oil sands when operatorship was transferred to another company, Canadian Natural, in 2017 [oil sands data are included in Others in the graph].

WASTE WATER AND PRODUCED WATER
We develop technologies to treat, reuse and recycle water from our operations so that we can manage our water footprint in a responsible way while meeting environmental standards. Where appropriate, we look for ways to treat water from our operations using natural solutions such as constructed wetlands.

We have worked for several years to improve water management at our unconventional projects. For example, SWEPI LP – a subsidiary of Shell Oil Company – at its operation in Appalachia, USA, shares produced water with other operators in the region so it can be reused, thereby minimising disposal of waste water.

At the Groundbirch shale gas project near Fort St. John, Canada, we minimise the use of fresh water by storing, recycling and reusing produced water. However, the asset still has excess waste water in the system that needs to be managed responsibly. In 2018, we started testing a new technology unit which enables us to dehydrate waste water at the point of creation and evaporate clean water back to the atmosphere, reducing waste water volumes for disposal.

We track low-level concentrations of oil, grease and other hydrocarbons within water returned to the environment from the day-to-day running of our facilities [collectively referred to as “discharges to surface water”]. We work to minimise these discharges in line with regulatory requirements and our own standards to reduce the potential for environmental impacts on local water quality. In 2018, the combined total hydrocarbons discharged to surface water from our facilities was 1.4 thousand tonnes, up from 1.2 thousand tonnes in 2017. This was mainly due to changes in how we collect and analyse samples and calculate the amount of oil discharged to water at our Pulau Bukom site in Singapore.

WORKING WITH OTHERS
We support open innovation and work closely with organisations, such as the World Business Council for Sustainable Development (WBCSD) and IPIECA, the global oil and gas industry association for environmental and social issues.

In 2018, Shell led the development of water horizon scanning through IPIECA’s Water Working Group. As water trends, regulation and policy advance, it is important that IPIECA tracks these trends proactively to allow members to plan for the future.

Shell is a member of the Water Nexus consortium in the Netherlands, a collaboration between universities, government bodies and industry. The consortium supports research on innovative approaches to secure water supply essential for domestic, industrial and agricultural use, such as green infrastructure and the use of saline water instead of fresh water.

SOIL AND GROUNDWATER
We assess and carefully manage the risks of potential soil and groundwater contamination. We conduct scientific research on the behaviour and potential risks of contamination from petroleum activities and share our findings with government agencies, researchers and other stakeholders to support the development of environmental guidelines.

Soil and groundwater remediation is designed to mitigate risks to health and the environment, but can also generate its own environmental, social and economic impacts. We believe remediation activities can be made more sustainable and have co-authored the first ISO Standard on Sustainable Remediation. We have started to apply the approach in our own soil and groundwater projects.
Shales – also known as tight gas and oil – will continue to play an important role in meeting global energy demand. We remain focused on producing oil and gas from shales safely and responsibly, using advances in technology and by following our onshore operating principles.

We are involved in six shale plays in the Americas and expect the shales business to become a significant growth priority for Shell in the next decade.

In 2018, we focused on production growth at the SWEPI LP (a subsidiary of Shell Oil Company) light tight oil facilities in the Permian Basin in the USA and our facilities at Fox Creek in Canada, bringing new wells online and investing in supporting infrastructure.

TACKLING EMISSIONS
Addressing air quality and fugitive emissions is a top priority in our shale operations. Our approach includes voluntary methane leak detection and repair programmes, primarily using optical gas imaging cameras (see Methane emissions).

In 2018, Shell and its partner Avitas Systems, were the first in the USA to gain approval for flying commercial drones beyond visual line of sight with the support of radar, which enables next generation detection technology such as surveillance drones.

Drones use onboard sensors and cameras to collect data. They can allow us to automate tasks, including detecting oil and gas leaks, corrosion, abnormal heat signatures, and monitoring road conditions. They also mitigate significant risk to personal safety by reducing the road exposure of our operations teams and providing better insight into the overall condition of facilities. This could enable teams to proactively identify issues and fix them faster, while also reducing safety exposure.
ROAD SAFETY
Rising oil and gas production activity in recent years in the Permian Basin has led to increased traffic and more serious accidents and fatalities.

The shale revolution has transformed the Permian region, bringing thousands of oil and gas workers and causing a massive spike in traffic.

As a founding member of the Permian Road Safety Coalition, we successfully advocated and helped secure $1.8 billion in funding from the Texas Department of Transportation to help find ways to reduce risks on the roads. This work includes agreeing to policies such as lowering the 75 mile-per-hour (120km/hour) speed limit, widening roads and constructing passing and turning lanes to minimise conflict points prone to crashes.

Read more about this ongoing work at www.shell.com/permian-basin-road-safety.

In 2018, Shell also collaborated with 16 energy companies that together pledged to set aside $100 million over the next few years to ease the increase in demand for roads, healthcare, education and affordable housing from the rising shale activity in West Texas and New Mexico. The aim is to preserve the quality of life that make so many want to live and work in the region.

WATER USE
We have worked for several years to improve water management at our shale facilities in Canada. At Shell’s Groundbirch project, in British Columbia, we minimise the use of fresh water by storing, recycling and reusing produced water (see Delivering natural gas in Canada).

At Fox Creek, Alberta, we also agreed with the municipality to use treated waste water for hydraulic fracturing and the municipality helped upgrade the town’s reclaimed water facilities.

For more details on our approach, see Water use.

LOCAL COMMUNITIES
In 2018, we held extensive engagement sessions with indigenous people, local farmers, and nearby communities in the Vaca Muerta shales basin in Neuquén, Argentina. This included training programmes for local community members interested in joining the industry and a programme that promoted livestock production and farming, and helping local farmers gain better access to water. Through this outreach, we have managed to develop strong relationships with the community in the basin, avoiding impact on other people and disruption to our activities.
DECOMMISSIONING AND RESTORATION

Safe and responsible decommissioning is a priority for Shell. This includes restoring the surroundings of platforms and facilities in line with relevant legislation, while taking our own environmental standards into account.

Decommissioning is part of the normal life cycle of every oil and gas structure when a facility reaches the end of its life. A growing number of oil and gas platforms and facilities are ageing, and their economically recoverable reserves offshore extracted, so we expect decommissioning will increase over the next few decades.

Every decommissioning project is different and needs to be tailored to the facility design, local context and local legislative requirements. Some of our more complex decommissioning projects take place offshore.

Our largest decommissioning project to date is the Brent oil and gas field, which lies in the North Sea between the UK and Norway. Preparation for decommissioning the four Brent platforms – Alpha, Bravo, Charlie and Delta – started more than a decade ago.

In 2018, Shell also received regulatory approval to decommission the Tapti field, a former BG project in India. Through our subsidiary BG Exploration and Production India Limited, we jointly operate the project (Shell interest 30%) with Indian National Oil Company, Oil and Natural Gas Corporation and Reliance Industries Limited. Production at Tapti stopped in March 2016 and plugging and abandonment of all 38 wells has been completed. Work is underway to decommission the field’s five platforms and its pipelines.

WASTE

We aim to reduce the amount of waste we generate and to reuse or recycle materials.

In 2018, we disposed of 1,999 thousand tonnes of hazardous and non-hazardous waste, which is broadly comparable to 2017.

We also track the amount of residual materials sent off-site for recycling or reuse that otherwise would have been disposed of as waste.

In 2018, we sent close to 400,000 tonnes off-site for recycling or reuse. Six of our downstream manufacturing sites sent more than 50% of their waste generated during the year for recycling or reuse in 2018. Of these six, three sites sent more than 80% of their waste for recycling and reuse.

We identify effective partnerships when it comes to managing our waste. Shell’s floating liquefied natural gas (FLNG) facility Prelude, off the coast of Australia, set up a waste management process with Rusca Environmental Solutions, which is the only 100% indigenous-owned waste management contractor in Australia. The partnership has generated capacity building opportunities with Rusca, enabling the company to develop new skills and improvements in waste management.

In 2018, Shell’s logistics, information technology and waste support team identified a waste management software solution. We believe the system will generate significant value through greater transparency and automation of our waste management procedures around the world.
PLASTICS
We produce chemicals that are the raw materials for plastics and plan to produce more as global demand increases. Plastics provide important benefits, helping to improve living standards, hygiene and nutrition around the world. Plastics are often associated with disposable and throwaway packaging but many products have different and long-term uses such as medical equipment, computers, smart phones, window frames, sports equipment and roofing.

Most plastics use fewer resources and have a lower carbon footprint than the glass, paper and metal they have replaced. For instance, efficient plastic insulation and lightweight plastic parts in cars and planes save energy, which helps to avoid CO₂ emissions. Plastics are also integral in the construction of renewable energy infrastructure, such as wind turbines and solar panels.

We share public concern about plastic waste and want to play an active role in finding lasting solutions to this challenge. The problem is not with plastics themselves, but what happens after people use them. Sometimes waste management infrastructure and traditional recycling do not exist, or plastic waste is not managed appropriately. And as a result, plastic waste can end up as litter.

We are a founding member of the new Alliance to End Plastic Waste. This alliance of global companies includes chemicals and plastic manufacturers, consumer goods companies and waste management companies, along with the World Business Council For Sustainable Development. The alliance has committed more than $1 billion with the goal of investing $1.5 billion over five years to help end plastic waste in the environment. It focuses on four areas: waste infrastructure, innovation, education and clean-up.

WHAT ELSE IS SHELL DOING?
We are exploring process technologies to make better use of plastics after consumers have finished using them. For example, by turning them into useful liquids that could be used as a source of energy, as chemicals or as new products, which would help develop a circular economy of plastics.

The Shell Pennsylvania Petrochemicals Complex (Shell Chemical Appalachia LLC) in the USA is collaborating with local groups to encourage more plastics collection, recycling and education. Shell Retail is helping its service stations reduce, reuse and repurpose food, paper and packaging waste across its operations and supply chain, for example by incentivising the use of reusable bags and cups. And Shell Lubricants, our business that makes and sells engine and industrial oils, has a strategy to reduce, reuse and recycle packaging across its supply chains. Shell Lubricants is also exploring different and more sustainable packaging solutions, such as new packaging formats and dispensing and refill solutions.

Read more at www.shell.com/plasticwaste.

FLARING
The flaring of natural gas wastes valuable resources and contributes to climate change. We are working hard to reduce flaring associated with oil and gas production.

Flaring is used to safely dispose of hydrocarbons that could otherwise pose a hazard to workers, nearby residents and facility equipment during non-routine occurrences. These occurrences include startups, process upsets, maintenance turnarounds, and equipment or power failures where production system pressure must be safely relieved.

In some situations, gas that is produced alongside oil, known as associated gas, may also be flared when there are insufficient or no facilities to gather the gas.

As a signatory to the World Bank’s “Zero Routine Flaring by 2030” initiative, Shell continues to actively pursue its 2015 commitment to eliminate associated gas flaring at its operations by 2030. Shell’s flaring and venting policy, as set out in our Health, Safety, Security, Environment and Social Performance (HSSE&SP) Control Framework, calls for facilities to meet strict performance criteria, including being designed to export, use or reinject associated gas.

Our policy also aims to minimise all types of flaring, managed through annually updated greenhouse gas and energy management plans.

OUR FLARING PERFORMANCE
Flaring of gas in our Upstream and Integrated Gas businesses contributed around 7% of our overall direct greenhouse gas emissions in 2018. More than 40% of this flaring took place at facilities where there was no infrastructure in place to capture the associated gas.

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<th>Flaring – upstream</th>
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<tr>
<td>million tonnes hydrocarbons flared</td>
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Our upstream flaring decreased to 5.2 million tonnes of CO₂ equivalent in 2018 from 8.2 million tonnes in 2017.

In the Upstream business, reductions in the emissions from flaring were primarily a result of the divestment of the Majnoon asset in Iraq, and our continuing focus to bring additional gas-gathering facilities online in Nigeria to reach our goal of zero routine flaring by 2030.

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Read more at www.shell.com/flaring.

FLARING PERFORMANCE
Reduced flaring is a key focus of our integrated gas-to-liquids (GTL) investments.

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Across our Integrated Gas projects and plants, where flaring occurs only for operational reasons, greenhouse gas emissions from flaring have decreased by more than 30% since the start of 2016. This has primarily been due to reduced flaring in our Pearl gas-to-liquids plant (Qatar Shell GTL Ltd, QSGTL), which continues to deliver a multi-year flare reduction programme. Shell affiliate QGC Pty Limited has also implemented upstream flare reduction projects.

IRAQ
In 2018, Shell completed the divestment of the Majnoon facilities (Shell interest 45%). Flare reduction programmes are continuing and have captured around 52% of the associated gas that would have been flared in the past. The gas is exported to a local power plant for electricity generation.

Basrah Gas Company (BGC, Shell interest 44%), is a non-operated joint venture with Iraq’s South Gas Company and Japan’s Mitsubishi. It continued to capture gas that would otherwise be flared from three non-Shell-operated oil fields in southern Iraq (Rumaila, West Qurna 1 and Zubair).

NIGERIA
In Nigeria, the levels of hydrocarbons flared from Shell Petroleum Development Company’s joint-venture (SPDC JV – Shell interest 30%) facilities have fallen by 90% since the start of the programme in 2002. This decrease is mainly due to investing in facilities that capture the associated gas and commercialise it through domestic and export markets. Divestments also provided further reduction.

Flaring at SPDC JV facilities decreased by around 9% to 0.5 million tonnes in 2018 from 0.6 million tonnes in 2017, mainly due to improved compressor availability and facility outages in the Western Delta.

SPDC remains committed to eliminating associated gas flaring with reductions already realised from associated gas gathering initiatives such as Adibawa, Otumara and Bonny associated gas gathering projects. In 2019, the Forcados Yokri Integrated Project and Southern Swamp Associated Gas Gathering Solutions project are planned to come on-stream to add to these efforts.

Following successful engagements with the Federal Government of Nigeria, the SPDV JV has included the remaining flare sites in the Nigeria Flared Gas Commercialisation Program. This government-led programme is expected to address these remaining sites.

Nigeria LNG (Shell interest 25.6%), a non-operated joint venture, is identifying ways to reduce flaring by improving the reliability of equipment, reducing train start-up time and delivering operational improvements.

QATAR
In Qatar, at QSGTL’s Pearl gas-to-liquids plant, flaring takes place for operational reasons. In 2018, further enhancements have been made to the plant to limit the amount of operational flaring as part of a multi-year flare reduction programme (see Natural gas). Pearl has reduced its total flaring year on year since 2015 with flaring in 2018 nearly 50% lower than in 2015.

USA
We continued to take steps to reduce flaring at the SWEPI LP (a subsidiary of Shell Oil Company) Permian unconventional oil asset in the USA in 2018. For example, we are investing in operational upgrades that remove flares from well pad design and in new technologies to improve the reliability of our vapour recovery systems. Since 2017, we have invested around $10 million in operational improvements to reduce flaring at Permian. In 2018, we achieved a reduction in the volume of gas flared per total gas production of more than 80% compared to the 2017 levels.

BRUNEI
A review of greenhouse gas performance in 2018 highlighted the importance of flare reduction in Brunei Shell Petroleum (BSP, Shell interest 50%), a non-operated joint venture. Through detailed analysis across all facilities, BSP developed a multi-year target and plan to reduce flaring intensity.

TRINIDAD AND TOBAGO
Atlantic LNG in Trinidad and Tobago implemented a flare reduction project in 2017 to recover LNG vapour (gas) during ship loading activities. A year later, the project continued to recover the gas, routing it back into the liquefaction process rather than to the flare.
SPILLS, ENERGY EFFICIENCY AND NON-GHG EMISSIONS

We improved or maintained our environmental performance across many business areas during 2018. This was due to operational improvements as well as reduced activities at some of our facilities and divestments. Details about our environmental performance are provided below and in the Greenhouse gas emissions, Managing methane emissions and Flaring sections.

SPILLS

Shell has requirements and procedures in place to prevent operational spills. Shell companies have routine programmes to maintain facilities and pipelines, and improve their reliability, to reduce spills. However, spills still occur for reasons such as operational failure, accidents or unusual corrosion.

The volume of operational spills of oil and oil products in 2018 was 0.8 thousand tonnes, an increase from 0.4 thousand tonnes in 2017, in part due to operational spills on the Trans Ramos pipeline in Nigeria and an underground leak in Majnoon in Iraq. The number of operational spills decreased to 92 in 2018 from 104 in 2017. We have programmes in place to reduce the number of operational spills over the long term (see 10-year data table).

We investigate and learn from all spills to improve our performance and Shell companies aim to clean up the areas around operations that are affected by spills, irrespective of the cause.

ENERGY EFFICIENCY IN OUR OPERATIONS

Improving the energy efficiency of Shell-operated facilities is one of the ways we manage greenhouse gas emissions. The main metric is energy intensity, the amount of energy consumed for every unit of output.

Shell-operated facilities and proposed projects that generate more than 50,000 tonnes of greenhouse gas emissions a year are required to produce a greenhouse gas and energy management plan with annual updates. These plans must include the sources of greenhouse gas emissions, as well as a forecast of expected emissions at the site for at least 10 years, and must identify options for improving energy efficiency or reducing emissions.

Some of the ways Shell improved energy efficiency in 2018 include making our equipment more reliable through regular maintenance, by smart scheduling of maintenance activities and by installing more energy efficient equipment.

We aim for the Shell-operated refineries and chemical plants to be leaders in energy efficiency. We invest in combined heat and power units and implement heat integration and waste gas recovery systems. We replace steam turbine drives with electrical motors and end-of-life equipment with higher efficiency types.

The overall energy intensity index of the 17 Shell-operated refineries and chemical plants in 2018 was similar to the year before: refineries improved slightly to 94.3 in 2018, from 94.8 in 2017 and chemical plants declined slightly to 88.5 2018 from 88.2 in 2017.

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In 2018, the overall energy intensity for the production of oil and gas in our Upstream and Integrated Gas businesses (excluding liquefied natural gas and gas-to-liquids) increased slightly compared with 2017, partly due to lower production from the NAM joint venture (Shell interest 50%) in the Netherlands. We expect it will be difficult to maintain the energy intensity levels of recent years, as existing fields age and new production comes from more energy-intensive sources. This may increase our upstream energy intensity over time.

**Energy intensity – upstream**
(excluding oil sands, GTL and LNG) gigajoules/tonne production [A]

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy Intensity</th>
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<tbody>
<tr>
<td>2016</td>
<td>1</td>
</tr>
<tr>
<td>2017</td>
<td>1</td>
</tr>
<tr>
<td>2018</td>
<td>1.5</td>
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(A) Methodology was updated in 2012. Data for previous years are not directly comparable.

**NON-GREENHOUSE GAS EMISSIONS**

We track emissions released into the atmosphere from our upstream and downstream facilities and work to reduce air pollution from our operations. This includes making investments to lower our emissions of nitrogen oxides, sulphur oxides and volatile organic compounds that are released during oil and gas production and processing. These pollutants can affect air quality in the areas where we operate. We evaluate and take action to mitigate potential adverse impacts of our emissions.

Our sulphur oxide emissions in 2018 decreased to 69 thousand tonnes compared with 81 thousand tonnes in 2017, primarily due to higher sulphur recovery at the Pulau Bukom refinery in Singapore in 2018 (the sulphur recovery unit was offline for part of 2017 due to planned maintenance).

Our nitrogen oxide emissions increased from 107 thousand tonnes in 2017 to 111 thousand tonnes in 2018, primarily the result of additional vessels joining our shipping fleet.

Our emissions of volatile organic compounds (VOCs) decreased to 59 thousand tonnes in 2018 from 95 thousand tonnes in 2017, mainly due to the divestment of our interest in the Majnoon project in Iraq. We expect our VOC emissions to further decrease in the coming years as a result of our efforts to reduce flaring and venting.

Read about Shell’s Greenhouse gas emissions.
Economic development in Nigeria

Shell has interests in several companies in Nigeria that help power economic growth and improve the quality of life for Nigerians. Safety and security remain top priorities and we continue to work closely with federal and state government agencies, communities, civil society, contractors and joint venture partners to create a safe operating environment.

Shell Companies in Nigeria produce oil and natural gas, distribute gas to industries and for domestic power generation, produce liquefied natural gas (LNG) for export and generate revenues for the government.

The companies also contribute social investment in communities and support the development of Nigerian communities and indigenous companies.

DEEP-WATER PRODUCTION OF OIL AND GAS
Unlocking the rich oil and gas resources in the deep waters of the Gulf of Guinea can help meet growing energy demand in Nigeria and international markets.

Since 2005, the Shell Nigeria Exploration and Production Company (SNEPCo), operator of the Bonga field, has produced more than 819 million barrels of oil cumulatively that generated a stable source of revenue for the Nigerian government through taxes, royalties and levies.

In 2018, SNEPCo continued to use its knowledge, experience and proven deep-water technologies to unlock new resources safely and efficiently.

SUPPLYING GAS TO MARKETS
The Shell Petroleum Development Company of Nigeria Ltd (SPDC), the operator of the SPDC Joint Venture (SPDC interest 30%), is working closely with its government partner, the Nigerian National Petroleum Corporation, to increase gas for power supply.
In 2018, SPDC made a commitment to deliver three of the government’s seven biggest gas projects, one of which – the Assa North Gas Development Project in Imo State – received its final investment decision in December. At peak production, this project is expected to produce 300 million standard cubic feet of gas per day, contributing to increased power generation and industrialisation.

A new financing model was developed in 2017 to overcome challenges with government funding for the SPDC JV. The model’s purpose is to help fund future projects, including those to commercialise the country’s gas resources.

Shell Nigeria Gas, the only wholly-owned subsidiary of an international oil company involved in gas distribution in Nigeria, expanded its capacity in 2018 by the equivalent of 400 megawatts of gas to power. This was achieved by adding production facilities in Ogun State. It will help to increase gas supply to industries and boost local economies, while also providing job opportunities to the country.

The safety of employees and contractors in Nigeria remains our top priority. Shell companies there continue to strengthen the safety culture and leadership, which is focused on achieving no harm to people and no leaks across their operations. We refer to this as our Goal Zero ambition.

In 2018, the number of personal injuries that required medical treatment or time off work decreased to 13 from 19 in 2017.

The focus in safety was on three areas in 2018: improving how managers stop unsafe work in their teams, preventing objects being dropped from height – a common hazard in the industry – and marine safety. This included a business-wide stand-down moment to give employees and contractors time to reflect on how to prevent incidents. Campaigns were also run in production operations to help people better understand the safety culture in their workplace.

Shell Companies in Nigeria continue to contribute to the safety of communities around assets by responding to third-party fires and emergencies. In 2018, Shell companies responded to 69 of these incidents, including an overturned fuel tanker and a search and rescue operation on a collapsed hotel building under construction, both in Port Harcourt.

EXTERNAL VOICE

Tarakiri Cluster is a collection of six communities in Bayelsa State in the Niger Delta that undertakes development projects and programmes supported by the SPDC JV and delivered through the global memorandum of understanding (GMoU).

“We are working to empower communities to undertake their own development by themselves. The GMoU cluster in Tarakiri started in 2010 and has received around $5.8 million to finance about 92 projects and programmes, including job training, and for basic services and infrastructure. Around 85 of the projects have been completed. One ongoing programme focuses on enterprise and business skills development for women, part of the mandatory 15% funding allocation under the terms of the GMoU, and provides grants to get their projects off the ground.”

Dr. Jude A. Ebibokefie
Tarakiri Cluster Development Board

SECURITY IN THE NIGER DELTA

Security issues, sabotage and crude oil theft in the Niger Delta remained significant challenges in 2018. Shell companies there continued to address safety and environmental challenges related to illegal activities and operational spills. Although there has been no major damage to key oil and gas infrastructure caused by militant activity since November 2016, the security situation remains volatile in this region of the country.

CONTRIBUTION TO SOCIETY

Shell Companies in Nigeria continue to support the development of local communities and companies as part of their contribution to the economy. We also work with the government, communities and civil society to fund and implement social investment programmes. Community-driven development programmes and initiatives also are funded, with focus areas as determined by benefiting communities.

Shell Companies in Nigeria have provided technical and financial support to Nigerian companies across a range of sectors, including transport, manufacturing and research and development. For example, SAIDEL Nigeria Limited, working on the SPDC JV South Swamp Associated Gas Project, acquired the first Nigerian flagged pipelay vessel in Nigeria (S900).
At state government and local community levels, Shell Companies in Nigeria focus their social investment activities on areas such as enterprise development, education, health and access to energy. In 2018, Shell’s flagship youth development programme, Shell LiveWIRE, was launched in the Ogbia community in Bayelsa State. The Ogbia community is located close to Oloibiri where the first oil well was drilled in Nigeria in 1958 and near to SPDC JV’s Kolo Creek Flow Station. Three categories of beneficiaries – university graduates, secondary school leavers and informal women traders – undertook entrepreneurship training and on graduation received business start-up grants totalling about $90,000. This will enable them to convert their bright ideas into sustainable businesses, creating wider employment and income opportunities for their communities.

Graduates of the Ogbia LiveWIRE programme received entrepreneurship training and start-up grants.

Social and economic contribution

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<td>$17.8 billion</td>
<td>92%</td>
<td>96%</td>
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Shell share of royalties and corporate taxes paid to the Nigerian government in 2018 (SPDC $0.9 billion, SNEPCo $0.8 billion).

Shell Companies in Nigeria spend on contracts awarded to Nigerian companies in 2018.

Niger Delta youth trained in enterprise development and management since inception in 2003.

$1.7 billion

Funds disbursed by the SPDC JV to GMoU clusters for community-driven projects since inception in 2006.

SPDC JV and SNEPCo secondary and university educational grants awarded since 2011.

$1.3 billion

$56.2 million

$239 million

$1.3 billion

$1.7 billion

$56.2 million

$1.3 billion

All On, an independent impact investing company with seed funding from Shell, works with partners to increase access to commercial energy products and services for underserved and unserved off-grid communities in Nigeria, with a special focus on the Niger Delta. Off-grid energy solutions span solar, wind, hydro, biomass and gas technologies deployed by both foreign and local access-to-energy companies that complement available grid power across Nigeria and help bridge the significant energy gap.

In 2018, All On focused on partnerships to help accelerate access to electricity at scale. For example, it approved investments for solar home system provider Lumos and for Cold Hubs, a company that provides solar powered refrigeration for agricultural products. It also co-invested in a dedicated debt fund for off-grid energy companies – the Off-Grid Energy Fund – along with the African Development Bank and other leading development financial institutions. In addition, All On partnered with the United States African Development Foundation to provide $100,000 in grants and convertible debt to several enterprises providing off-grid solutions that deploy renewable resources and power local economic activities.

NIGERIAN LITIGATION

Authorities in various countries are investigating our investment in Nigerian oil block OPL 245 and the 2011 settlement of litigation pertaining to that block (see Note 25 to the Consolidated Financial Statements in our Annual Report).
Spill response and prevention in Nigeria

Shell Companies in Nigeria continue their relentless focus on working with communities and managing their impact on the environment. This means addressing environmental challenges related to oil spills in areas with significant oil theft and illegal refining.

The vast majority of oil spills in the Niger Delta continue to be caused by crude oil theft or sabotage of pipelines, as well as illegal oil refining. In 2018, close to 90% of the number of oil spills of more than 100 kilograms from SPDC JV facilities was due to illegal activities by third-parties.

In 2018, the SPDC JV experienced an increase in the number of sabotage related spills. Regrettably, operational spills also increased (more below on Spill and response data). Regardless of the cause, SPDC cleans up and remediates areas impacted by spills that come from its facilities. In the case of operational spills, SPDC also pays compensation to people and communities impacted by a spill. Once the clean-up and remediation are completed, the work is inspected, and, if satisfactory, approved and certified by Nigerian government regulators.

To reduce the number of operational spills, SPDC is focused on implementing its ongoing work programme to appraise, maintain and replace key sections of pipelines and flow lines. Over the last seven years, more than 1,300 kilometres of pipelines and flow lines have been replaced.

More details on how Shell Companies in Nigeria are responding, reporting and preventing oil spills in their operations can be found at www.shell.com.ng/environment and www.shell.com.ng/security-theft-and-sabotage.

COLLABORATING WITH THE IUCN

SPDC has worked with the International Union for Conservation of Nature (IUCN) since 2012 to enhance remediation techniques and protect biodiversity at sites affected by oil spills in SPDC’s areas of operation in the Niger Delta.

An independent scientific advisory panel, the Niger Delta Panel, was set up and based on its input SPDC strengthened its approach to oil spill response and remediation of soil and groundwater contamination.

In 2018, SPDC and IUCN formed the Niger Delta Biodiversity Technical Advisory Group, which also includes representatives from the Nigerian Conservation Foundation and Wetlands International, to monitor biodiversity recovery of remediated sites.

Wildlife return to the Bodo creeks following the first phase of clean-up activities, a sign of ecosystem recovery.
CLEAN-UP IN BODO
In 2015, SPDC – on behalf of the SPDC JV – and the Bodo community signed a memorandum of understanding granting SPDC access to begin the clean-up of areas affected by two operational spills in 2008. As part of this initiative, two contractors were selected to conduct the clean-up, overseen by an independent project director.

After two years of significant engagement with the Bodo community and other stakeholders, managed by the Bodo Mediation Initiative, the first phase of clean-up activities started in September 2017. The clean-up consists of three phases: removal of free-phase surface oil; remediation of soil; and planting of mangroves and monitoring. The first phase was completed in August 2018 and the preparation for phase two has commenced.

We saw further progress in 2018 with vital clean-up work in Bodo, an area affected by oil spills from various sources, entering its next phase.

Should activities continue uninterrupted, phase two (remediation of soil) is expected to take around two years. However, for it to be successful, the repeated re-contamination of cleaned-up sites from illegal third-party activities such as crude oil theft and illegal refining, must stop.

CLEAN-UP EFFORTS IN Ogoniland
SPDC is working with the relevant stakeholders to implement the 2011 UN Environmental Programme (UNEP) report on Ogoniland. Over the last seven years, SPDC has taken action on all, and completed most of, the UNEP recommendations addressed specifically to it as operator of the joint venture.

The UNEP report recommended the creation of an Ogoni Trust Fund with $1 billion capital, to be co-funded by the Nigerian government, the SPDC JV and other operators in the area. The SPDC JV remains fully committed to contributing its share of $900 million over five years to the fund and made $10 million available in 2017 to help set up the Hydrocarbon Pollution and Remediation Project (HYPREP), a government-led body. In July 2018, the SPDC JV deposited a further $170 million into the escrow account to fund HYPREP’s activities, which completes its first-year contribution of $180 million.

HYPREP has issued contract award letters for phased remediation activities and is aiming for contractors to be in place at sites in early 2019.

SPILLS AND RESPONSE PERFORMANCE
Crude oil theft from SPDC JV’s pipeline network amounted to around 11,000 barrels of oil a day (bpd) in 2018, an increase from around 9,200 bpd in the previous year. The increase in 2018 can in part be explained by increased availability of our production facilities following the repair of a major export line in 2017. Since 2012, SPDC has removed more than 1,160 illegal theft points.

The number of operational spills from Shell companies in Nigeria increased from 10 in 2017 to 15 in 2018. The volume of oil spilled in operational incidents also increased to around 0.4 thousand tonnes compared to 0.1 thousand tonnes in 2017. The number of sabotage-related spills in 2018 over 100 kilograms increased to 111 from 62 in 2017. Theft and sabotage caused around 90% of the number of spills of more than 100 kilograms from SPDC JV pipelines, with the balance being operational spills. The increase can in part be explained by increased availability of our production facilities following the repair of a major export line in 2017; crude theft activities in a pre-election year; and the price of crude oil and refined products that is seen as an opportunity for more illegal refining.

At the beginning of 2018, 202 sites required remediation. During the year, 116 sites were remediated and 46 certified, while 148 new sites requiring remediation were identified. At the end of 2018, there were 234 oil spill sites requiring remediation.