BARCLAYS

Environmental and Social Risk Briefing

Oil & Gas

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1. Introduction

This Environmental and Social Risk Briefing covers the oil and gas industry from exploration to production to refining to retail. It includes natural and petroleum gas, fuel oils, petrochemicals, lubricants, petroleum and other by-products as well as the emerging market of bio fuels (biodiesel).

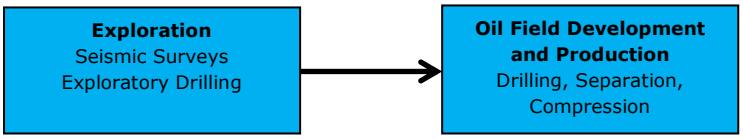
Oil and gas are natural products created by the degradation of organic material in geological deposits within the earth's surface. They are made up of mixtures of thousands of organic substances, which once processed provide a very adaptable commodity from fossil fuels to a variety of petrochemicals.

The oil and gas sector is spilt into upstream and downstream activities. The upstream industry includes exploration and production and transfer of oil and gas to the refining or processing facility. The downstream industry involves the production (including refining), distribution and sale of refined hydrocarbon products as illustrated below.

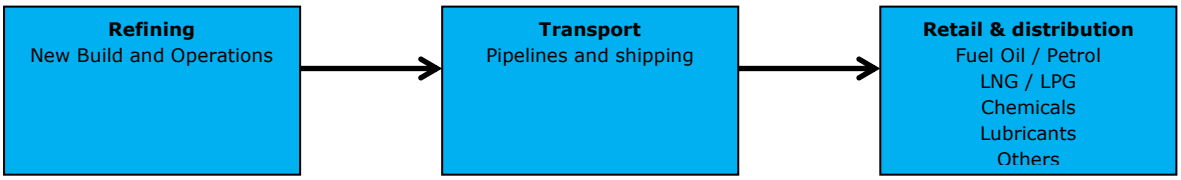
Oil and gas projects can be onshore (terrestrial) or offshore (marine) or a combination of both at a variety of scales and may transect international boundaries.

2. Oil and Gas Lifecycle

Upstream



Downstream



2.1 Exploration

Oil and gas, historically, was recovered as crude oil and natural gas from natural reservoirs contained within sedimentary rocks. Recent advances in production technologies and the upturn in petroleum prices have enabled alternative hydrocarbon reservoirs to now also be exploited (e.g. tar sands, oil shale and biomass (vegetable materials)).

Exploration includes identifying likely geological reservoirs based on intrusive (drilling) or non-intrusive (seismic) surveying techniques. Exploration fields are typically large areas, may be terrestrial or marine or both and may span international boundaries or non-territorial waters. Exploration evaluates the potential for oil and gas bearing strata, enables an estimate of the reserves present to be made and gains an understanding of the quality of the oil and gas contained within the reservoir. Impacts during this phase can be considerable, though these can generally be minimised (or avoided) by careful consideration of siting and management of activities,

2.2 Development and Production

Once a commercially viable reserve has been identified, oil and gas is extracted by drilling production wells into the reserve using highly specialised technologies. A variety of synthetic or natural drill fluids are used to keep the drill bit cool and lubricated and to bring drill cuttings to the surface.

Oil is either pumped or pressure forced to the surface. Natural gases may be re-circulated to increase oil recovery rates. Water or steam flooding (including the use of potentially hazardous chemicals) of the reserve is commonly completed to induce movement of oil in the reservoir. The permeability of the bedrock (and hence recovery rate of oil and gas) may also be improved by fracturing using explosives or water, with a variety of chemical additives, at high pressure. Acids and other compounds are typically injected to prevent clogging. When extracting oil and gas the excess gasses are typically flared off to atmosphere.

Extracted hydrocarbon product is separated in to gas and liquids and dehydrated to remove excess water. Oil and gas extraction fields are often exploited using a network of extraction wells feeding individual processing and handling plants. The infrastructure to manage and distribute the extracted oil and gas may be widespread including a variety of flaring points.

The construction of production facilities can cause significant environmental and social impacts. These should be documented in an Environmental and Social Impact Assessment (ESIA), which includes consultation with affected stakeholders including local communities. Where necessary, mitigation for impacts should be identified in an environmental management plan.

2.3 Refining

Once extracted, oil and gas are processed to form a consistent saleable product, or more typically, split in to a variety of different products.

Oil refining involves two types of processing: the physical separation of the raw material and the subsequent chemical refinement of this raw material into different petroleum products (called fractions).

Crude oil and gas undergoes primary separation by distillation to yield a range of different fractions including gases, naphtha, paraffin and gas oil. The production of different products is dependent upon the composition of the crude oil (raw material), the technology of the refinery (principally a distillation process) and market demand. The types and amount of product can be adapted to market requirements by secondary conversion processes that use heat, catalysts and hydrogen. This is called "cracking" and breaks down heavy fractions into lighter fractions such as gas oil and petroleum spirit.

Refineries use a large number of chemicals and additives in their process plants and for blending into the finished products. Some of these may be classified as potential contaminants including metals, metal compounds, organic and inorganic acids, caustic and laboratory chemicals, lead compounds, oxygenates (used as octane enhancers) and solvents.

Refineries include crude receiving facilities, distillation and cracking plant with a variety of ancillary treatment processes. A typical refinery will also include provision for the storage of crude and finished product as well as a distribution network.

2.4 Transport

The distribution of crude and refined hydrocarbons requires a significant infrastructure that typically requires trans-boundary shipments; pipeline, boat or tanker may transport oil and gas. Spillage from distribution can cause contamination of the surrounding area and therefore should be carefully planned.

Pipelines transport natural fuels such as oil and gas and can be located above or below the ground or seabed. They can range in size up to two meters in diameter and range from several to hundreds of kilometres in length over a path known as the pipeline Right of Way (ROW). Overland and near-shore pipelines are usually buried while offshore pipelines are generally located on the seabed. Pipelines may transport unrefined oil or gas from a wellhead to transfer or processing facilities, or refined oil and gas to an end user (e.g. a petrochemical or power plant). A pipeline is not confined to the pipe itself, it also includes ancillary facilities such as receiving dispatch, pump and control stations; access or maintenance roads, booster stations (required at regular intervals for long distances to cope with internal friction changes in elevation along the line) and compression stations (to maintain pipeline pressure at regular intervals).

LNG is transported by specially designed vessels and stored in specially designed refrigerated tanks. There are a variety of international standards for the design of oil and gas shipping vessels following the well-documented Exxon Valdez oil spills and others from oil tankers at sea.

2.5 Retail and Distribution

Following processing, oil and gas is distributed to bulk fuel storage facilities typically via pipeline. These dedicated facilities will typically be located at strategic logistical hubs to enable ease of distribution to the customer. These "terminals" will have infrastructures to receive and distribute fuels. Fuel is typically transferred from the terminal to road tanker for delivery to the forecourt. Petrochemicals are typically containerised or tankered to the customer in specialist vessels. LPG is typically distributed in dedicated gas canisters for immediate use. Natural gas may be piped directly to the customer from a bulk storage gasometer.

Processed fuel is stored in either above ground or underground storage tanks (AST and UST respectively). These tanks are now required to have dedicated containment measures to control spills or accidental releases. Most modern tanks are double skinned and fitted with alarms to warn when leaks are occurring. Older tanks however, are unlikely to incorporate such systems but may have wet stock reconciliation records compiled through manual dip readings of tank contents.

Large distribution networks may exist in the oil and gas industry including significant portfolios of retail petroleum stations. Given the large volume and variety of distribution networks, careful management of environmental impacts is required.

3. Products

3.1 Petrochemicals

The production of petrochemicals requires the synthesis of refined raw products such as ethylene, referred to as "precursors". These precursors are further distilled, converted, cracked or reformed to produce a chemical of choice. The infrastructure for petrochemical production involves a significant chain of heating, cooling, hydrating and chemical addition.

3.2 Liquefied Natural Gas (LNG)

In order to cost effectively distribute natural gas where pipelines do not exist, it is first processed to remove impurities and recoverable hydrocarbons and then liquefied to reduce the volume of gas for transport. Transportation is undertaken in bespoke vehicles (typically ships) and moved from a LNG processing plant to a receiving or re-gasification plant. Gas is condensed in to a liquid at atmospheric pressure by cooling to temperatures –120OC to –170OC. A typical LNG plant consists of at least one liquefaction train that includes gas receiving and cooling plant. Significant distribution infrastructure such as ports and loading gantries are required for LNG and re-gasification plants.

New technology is being developed to enable offshore processing of LNG. This will minimise the need for gas to be transported onshore for processing, and will lead to faster distribution to market.

3.3 Oil Sands and Oil Shale (Tar Sands)

Oil Sands contain significant amounts of solid bituminous material (called kerogen) that can be extracted and processed into a crude oil substitute. Resources are predominantly located in Alberta in Canada, Venezuela and DRC.

Extracting oil from oil sands is more complex than conventional oil recovery and currently more expensive. The oil substances are solid and cannot be pumped directly out of the ground. The oil sand is first mined and then heated to a high temperature (a process called retorting). The resultant liquid is then separated and collected.

The environmental impacts caused by oil sand extraction are frequently criticized by environmental groups such as Greenpeace. These impacts include:

- Water- A huge amount of water is required as it is used in ash disposal, to cool spent shale, and as a vector to transport pollutants. Mining may also require groundwater levels to be lowered and there is a possibility of leeching, especially from in-situ extraction sites, affecting surrounding forest and arable land. This is a particular concern in arid regions, such as Western US and Israel's Negev Desert, where plans exist to expand oil shale extraction despite a water shortage.
- Land- Vast areas of land are required for mining, as well as for the disposal of mining waste and spent shale oil. This may cause significant surface disturbance, deforestation, erosion and a reduction in traditional land uses. In situ projects cause less surface disturbance.
- Air- An increase in air pollution may also result from the production of particulates during processing. In addition, green house gases are emitted when oil shale is converted into usable oil, as well as from shale oil fired power stations.

Steam Assisted Gravity Drainage (SAGD)

There are a number of methods of extracting oil sand, and SAGD is considered one of the most cost effective. It is an in-situ oil recovery method and as such, is predicted to produce more crude oil than mining in the future. The process involves the injection of low pressure steam into the oil reservoir through a pair of horizontal wells. The steam heats the oil, reducing its viscosity, which causes the oil to drain into the well where it is pumped out, along with any water from the condensation of injected steam.

SAGD offers a number of advantages in comparison with conventional surface mining extraction techniques and alternate thermal recovery methods. For example, SAGD has significantly higher production rates (60-70%) and the cost of drilling the wells is relatively low. In addition there is a greater reservoir recovery rate, reduced water treating costs and dramatic reductions in SOR (Steam Oil Ratio). The environmental impacts associated with SAGD are similar to those of other methods, though this process uses four times the energy used for open pit mining (for heating water into steam). As a result, SAGD produces 2.5% higher levels of CO2 than traditional pit mining. In addition, the emissions are geographically dispersed across large areas, making it challenging and expensive to install capture facilities.

Currently, there is not an overwhelming amount of negative media coverage for SAGD; however the process is still relatively new.

3.4 Shale Gas

New technologies such as hydraulic fracturing ('fracking') and horizontal drilling have enabled shale gas to become an increasingly important source of natural gas. It is found in many places worldwide, but the largest deposits are found in Estonia, Brazil, China, United States in the Green River Formation (covering portions of Colorado, Utah, and Wyoming), Poland and the UK.

Shale rock has extremely low natural permeability and so hydraulic fractioning is required to create fractures that extend from the well bore into rock or coal formations. These fractures allow the gas to travel more easily from the rock pores, where the gas is trapped, to the production well. A mixture of water, proppants (sand or ceramic beads) and chemicals are pumped into the rock to facilitate fracturing.

Significant environmental concerns have emerged regarding the hydraulic fracturing of shale rock:

- Water- It is estimated that 20-40% of fracking fluids remain underground, potentially contaminating nearby aquifers and groundwater. As well as this, a large amount of water is required, possibly affecting local water supply, especially in dry areas.
- Air- The burning of shale gas produces significantly less greenhouse gas emissions than coal or oil. However, if methane leaks are included it has been suggested that the overall greenhouse gas contribution from shale gas is higher than that of other fossil fuels.

3.4 Biofuels

Palm oil

Palm oil has become a major, global agricultural commodity which is used in a wide range of food and non-food products. 85% of global output comes from Indonesia and Malaysia, with China, the EU, India and Pakistan being major importers.

Various environmental issues are associated with the production of palm oil including deforestation, biodiversity loss, greenhouse gas emissions and conversion of high conservation value and peat land. Social issues include concerns regarding legal and traditional land use rights, land acquisition, and treatment of local and indigenous communities. In recent years, cultivation of oil palm has grown exponentially which has resulted in increased attention on the environmental and social sustainability of the sector, particularly in Indonesia and Malaysia.

Roundtable on Sustainable Palm Oil (RSPO)

The RSPO is a non-profit association, developed to promote the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders from seven sectors of the palm oil industry. It has developed a code of practice, known as the Principles and Criteria (P&C), which certifies that palm oil plantations are managed in a sustainable way. In November 2008, the RSPO implemented an auditable certification system, CSPO (Certified Sustainable Palm Oil), based on the P&C, which provides certification that palm oil production is being managed in a sustainable fashion and tropical forests have not been cleared during its production. In addition to the RSPO, other relevant certification bodies can be consulted, such as the Roundtable on Sustainable Bio fuels and/or the Rainforest Alliance.

Several Asian and European companies are actively seeking to invest in suitable areas in Liberia, Cameroon, Democratic Republic of Congo, and Brazil where prospects for palm oil growth are moderate to good. In the immediate future, expansion of the industry will most likely continue to be centred in Southeast Asia where governments are supportive of the palm oil sector.

Soya

Soy monocultures are expanding to supply the growing markets for cheap animal feed and agro fuels. Soya is mainly produced in the US, Brazil and Argentina.

There are numerous environmental and social impacts of soya monoculture production, especially linked to their continued expansion. Conversion of forests and savannas has resulted in deforestation and loss of biodiversity, as well as disruptions to groundwater and rain water patterns. Environmental groups, such as Greenpeace, claim that soya bean production in Brazil is destroying huge areas of the Amazon rainforest. Rivers have also been affected by leeched herbicides used on crops, from siltation due to removal of forest cover and from disruption to downstream flows due to dams built by farmers. Large-scale use of synthetic fertilizers and pesticides can pollute ground water, affecting both wildlife end human health.

Social problems include land conflicts and displacement, loss of livelihoods and increased local unemployment. Thousands of small farmers, who cannot compete with large producers in an increasingly globalised market, have been driven out of employment.

Roundtable on Responsible Soy (RTRS)

The RTRS is an international multi-stakeholder initiative founded in 2006 that promotes the production of soy in a responsible manner to reduce social and environmental impacts while maintaining or improving the economic status for the producer. In June 2010, the RTRS Standard for Responsible Soy Production was published, providing guidelines for responsible soy production. Basic requirements for certification include responsible ,responsible labour conditions, community relations, good agriculture and environmental practices; legal compliance and good business practises.

Environmental groups, such as Friends of the Earth, criticised the RTRS for failing to address the major social and environmental impacts of industrial scale cultivation and asserted that certification provides a façade of sustainability for multinationals and agribusinesses.

Jatropha

The jatropha plant was thought to be a sustainable source of plant oils which would require less water than other biofuel crops and could grow on marginal land, unsuited to conventional agriculture. Studies have since shown that this is not the case and that although it is possible for the plant to survive with little water, yield is low.

4. Key Sector Risks and Headline Issues

In large-scale oil and gas operations some critical issues of particular public concern may result in reputation or credit risk to a lender or an investor, these include:

- Coastal and marine ecology - impact on corals and marine biodiversity from offshore and coastal operations and tankers (spills); particularly in the Arctic, where freezing conditions can hamper clean up activities following spills;
- Climate change - finite fossils fuel resources, long term impact from ozone depletion and global warming from greenhouse gas emissions from refining and processing;
- Climate change impacts on the sector - Production faces increasing risks from the impacts of climate change from extreme weather, sea level rise and water availability and the sector will need to build resilience to adapt to changing conditions.
- Coastal and marine ecology - impact on corals and marine biodiversity from offshore and coastal operations and tankers (spills),
- Security of workforce supply and human rights violations of workers and communities - child labour, terrorism and sabotage, social conflict and unrest;
- Revenue transparency - bribery and corruption particularly in developing economies and states with weak governance structures;
- Sustainable community development - exporting of fuels and revenues from energy poor communities, economic dependency of project affected communities at project closure, employment strategy and expectation management;
- Health and safety and environmental risks of major explosions, leaks or spills;
- Destruction or irreversible impacts on critical environmental or social habitats (this could include rainforests, coastal and marine ecology, communities, and any protected areas wetlands, etc)
- Involuntary resettlement / displacement (physical and economic) of peoples as a result of project activities
- Community health and safety - spread of diseases, prostitution, increase in road accidents, managing HIV/AIDS, etc.
- Impacts on vulnerable people (the poor, indigenous, women, children - the disadvantaged)

The following tables detail potential environmental and social risks associated with industry processes and appropriate control measures. These may include Environmental and Social Management Plans and may form part of a wider Environmental Social Management System.

5. Environmental and Social Risks

5.1 Environmental Risks

5.1.1 Exploration

Life Cycle Phase and Activity	Risks	Controls
Seismic Survey	**Habitat depletion, fragmentation and degradation** - • Land clearance/disturbance, loss of vegetation, erosion • Opening up of previously inaccessible land to agriculture and development - habitat loss • Use of explosives **Atmospheric emissions: vehicular and plant exhaust emissions** • Pollutants (VOC, NOX, SOX, PM10, CO, CO2, etc) • Greenhouse gas production • Dust and noise local air quality **Landscape scarring and visual impact** - habitat fragmentation	**Minimise facility footprint** - optimization of operations and processes to minimize energy and water consumption **Emissions management-** • Equipment maintenance and use of silencers, Noise and Vibration Management Plan • Emissions inventory, air quality monitoring and management, Air Quality Management Plan • Explosives – use non TNT (dynamite) based, or thumper trucks in preference to explosives **Use of Best Available technology Not Entailing Excessive Cost (BATNEEC)**
Exploratory Drilling	**Drill muds and cuttings** **Gas venting and flaring** **Natural hazards and risks** - well blow outs, localised land subsidence, land/water contamination	**Emergency preparedness and spill prevention plan-** • Controlled venting • Control and management of pressurised oil and gas from borehole **Use of Best Available technology Not Entailing Excessive Cost (BATNEEC)**

5.1.2 Oil Field Development and Transportation (Pipelines and Tankers)

Life Cycle Phase and Activity	Risks	Controls
Exploration and Production Drilling	**Atmospheric emissions:** • Pollutants (VOC, NOX, SOX, PM10, CO, CO2, etc) • Greenhouse gas production Gas venting and flaring, releases of hazardous/volatile gases and greenhouse gases, odour, climate change • Dust and noise local air quality **Natural hazards and risks** - well blow outs, combustion and explosions, land and/or water contamination, toxic spillages **Drill muds and cuttings -** release of contaminated water **Disruption and pollution of surface water (hydrological) and groundwater (hydrogeological) systems and flows** - hydraulic fracturing **Pressure on natural resources -** loss of habitat **Climate change** - Extreme weather, sea level rise, temperature rise and water availability **Regulatory risks** – increasing regulatory burden as development moves into new and more challenging	**Emergency preparedness and spill prevention plan** • Controlled venting • Control and management of pressurised oil and gas from boreholes • Use of low impact extraction chemicals where alternatives exist • Water management - securing of a sustainable water supply, recycling and reuse wastewater **Marine management plan** - especially for offshore drilling **Use of Best Available technology Not Entailing Excessive Cost (BATNEEC)** **Environmental and Social Impact Assessment** forward looking assessment of • climate impacts and need to adapt to changing climate conditions over the life of the asset • regulatory developments

Life Cycle Phase and Activity	Risks	Controls
	geographies and less well known technologies.	
Separation, Compression and Dehydration	**Disruption and pollution of surface water (hydrological) and groundwater (hydrogeological) systems and flows** **Odour** - sulphur production **Atmospheric emissions:** • Release of hazardous/volatile gases, greenhouses gases, air quality, climate change	**Water management** - securing of a sustainable water supply, recycling and reuse wastewater **Emissions management** - air quality monitoring and management, Air Quality Management Plan
Pipelines	Habitat depletion, fragmentation and degradation – • Land clearance/disturbance, loss of vegetation, erosion • Opening up of previously inaccessible land to agriculture and development - habitat loss **Localised geotechnical risks** - e.g. subsidence **Natural hazards and risks** - pipeline/pumping station leakage, leading to land/water contamination **Significant engineering works** **Hydrostatic testing** **Liquid and Solid Waste (production and disposal)** - e.g. Pigging (cleaning), sludge disposal	**Emergency preparedness and spill prevention plan** - leak detection systems, cathodic protection, and predictive maintenance in addition to a Habitat Restoration and Remediation Plan **Water disposal and monitoring systems** **Waste Management** **Use of Best Available Technology Not Entailing Excessive Cost (BATNEEC)**

Life Cycle Phase and Activity	Risks	Controls
Tankers (road and sea) – *excluding port development*	**Atmospheric emissions:** • Pollutants (VOC, NOX, SOX, PM10, CO, CO2, etc • Greenhouse gas production • Dust and noise (vehicles and seismic shots) **Road haulage and sea transportation** - oil spillages, discharge of tank washing residues and oily ballast water **Liquid and Solid Waste (production and disposal) -** tanker loading and unloading	**Emissions management -** emissions inventory, air quality monitoring and management, Air Quality Management Plan **Emergency preparedness and spill prevention plan** **Use of Best Available Technology Not Entailing Excessive Cost (BATNEEC)** - e.g. appropriate transportation vessels and loading and unloading procedures

5.1.3 Refining

Life Cycle Phase and Activity	Risks	Controls
Refining (new build)	**Habitat depletion, fragmentation and degradation –** • Land clearance/disturbance, loss of vegetation, erosion • Opening up of previously inaccessible land to agriculture and development – habitat loss	**Habitat and biodiversity management**
Refining (facility operations	**Atmospheric emissions:** gas venting and flaring, hazardous/volatile emissions, greenhouse gases, air quality, climate change noise, **Pressure on natural resources -** water use and hot water discharges	**Emissions management -** emissions inventory, air quality monitoring and management, Air Quality Management Plan **Emergency preparedness and spill prevention plan** **Use of Best Available Technology Not Entailing**

Life Cycle Phase and Activity	Risks	Controls
	Odour **Toxic spillage** - contaminated fire water	**Excessive Cost (BATNEEC**

5.1.4 Retail

Life Cycle Phase and Activity	Risks	Controls
Petrol Stations and Bulk Storage	**Handling and bulk storage** – natural risks and hazards **Liquid and Solid Waste (production and disposal)** - accidental spills and tank leakage, ground/water contamination	**Emergency preparedness and spill prevention plan** - regular equipment maintenance, integrity testing, implementation of Tank Management Plans

5.1.5 Decommissioning

Life Cycle Phase and Activity	Risks	Controls
Planning and Execution	**Land rehabilitation and restoration** **Site remediation / clean-up**	**Rehabilitation and Remediation Management Plan**

5.2 Social Risks

5.2.1 Exploration

Life Cycle Phase and Activity	Risks	Controls
Seismic Survey and Exploratory Drilling	**Community health and safety** - noise, vibration, dust creation, vehicular movement, emissions and air quality **Strain on infrastructure and public nuisance** - noise, odour, vibration, dust creation, transport movement, and air quality, strain on transport networks and local infrastructure **Communicable diseases** - spread of diseases to local/foreign populations **Site security and vandalism** **Cultural / archaeological heritage** - damage to /destruction of cultural/historical/archaeological/religious sites **Impacts to existing landuse:** eg agriculture, leading to loss of livelihood; changes to access to water resources; impacts to nomadic/grazing routes. Impacts are usually only temporary.	Community / stakeholder relations management • Management of interface between local communities and outsiders/foreign workers through stakeholder identification and consultation (including governmental/national/regional/local stakeholders) • Management of community tensions, grievances and concerns through transparent formal grievance mechanis • Cross-cultural community awareness training for project contractors **Community health and safety management** - instigation of safety buffer zone around land clearing operations **Site security plans** **Health and safety plans** - vaccinations and awareness raising on communicable diseases **Cultural heritage / archaeology management** - identification, classification and protection of cultural / archaeological sites in accordance with the country's laws/international standards and conventions

Life Cycle Phase and Activity	Risks	Controls
		Procurement and supply chain management **Compliance with national/regional/local regulations or World Bank guidelines/IFC performance standards** **Compensation for any loss of livelihood that cant be avoided.**

5.2.2 Oil Field Development and Transportation (Pipelines and Tankers)

Life Cycle Phase and Activity	Risks	Controls
Exploration, Production Drilling, Separation, Compression and Dehydration	**Community health and safety** - noise, vibration, dust creation, transport movement, emissions and air quality social conflict and unrest **Strain on infrastructure and public nuisance** – noise, vibration, fore/explosions, dust creation, vehicular movement, emissions and air quality, ability of social services capacity to absorb new/foreign populations (supply and demand) e.g. water resources, power, health, education, housing **Communicable diseases** - spread of diseases to local/foreign populations **Land acquisition** - displacement - temporary and permanent land acquisition leading to poverty, social disruption, migration, involuntary resettlement requiring	**Social / community baseline assessment** - establish community profiles (e.g. livelihoods and employment) in project area, through detailed social baseline assessments to inform mitigation measures and the development of long term agreed community investment/development **Community / stakeholder relations management** • Management of interface between local communities and outsiders/foreign workers through stakeholder identification and consultation (including governmental/national/regional/local stakeholders) • Management of community tensions, grievances and concerns through transparent formal grievance mechanism • Cross-cultural community awareness training for

Life Cycle Phase and Activity	Risks	Controls
	relocation and compensation claims **Land acquisition** - loss of access –loss of crops and land access/ use- nutritional source e.g. staple root crops **Loss of livelihood (income and employment** • Economic displacement, job competition • Impact on livelihoods and land value, compensation claims), temporary/permanent relocation to communities **Employee health and safety** - Employment and Labour standards, e.g. lower standards enabling child labour to take place **Disruption of Social / community cohesion and exclusion of vulnerable groups** • Breakdown of social networks and structures • Socio-economic exclusion of ethnic minorities and indigenous peoples • Socio-cultural tensions between local and foreign workforce from influx and outflow of migrants/ temporary workers and attraction of seasonal residents to project area **Stakeholder / public consultation and disclosure** - inadequate consultation and disclosure with NGO's, local and national advocacy groups, badly managed	project contractors **Community investment and development** - community investment (both long and short term) e.g. health care facilities, micro-finance initiatives and access to employment **Site security plans** - security plans and awareness raising **Health and safety plans** - including safe buffer zones around facilities and pipelines **Community health and safety plans** - vaccinations and awareness raising on communicable diseases **Resettlement and relocation management** - including proper compensation, restoration of livelihoods and living standards developed based on socioeconomic studies **Human resources policies** - maximization of local employment Cultural heritage / archaeology management - identification, classification and protection of cultural / archaeological sites in accordance with the country's laws/international standards and conventions **Community / stakeholder relations management**

Life Cycle Phase and Activity	Risks	Controls
	social and community relations, negative exposure, compensation claims **Impacts on local procurement and business** - e.g. unregulated trade **Host country governance, national economy and revenue transparency** - economy, sustainable growth and inflation, bribery, corruption and extortion, revenue transparency Site Security – inappropriate/heavy handed responses of security personnel may lead to injury to local communities and workers.	• Management of interface between local communities and outsiders/foreign workers through stakeholder identification and consultation (including governmental/national/regional/local stakeholders • Management of community tensions, grievances and concerns through transparent formal grievance mechanism • Cross-cultural community awareness training for project contractors **Procurement and supply chain management** **Supporting and partnering with host governments to encourage revenue transparency and good governance** **Compliance with national/regional/local regulations or World Bank guidelines/IFC performance standards** **Appropriate training of Security Personnel** to the Voluntary Principles on Security and Human Rights.
Pipelines	***As Exploration, Production Drilling, Separation, Compression and Dehydration***	***As Exploration, Production Drilling, Separation, Compression and Dehydration***
Tankers (road and sea) – *excluding port development*	**Stakeholder / public consultation and disclosure** - inadequate consultation and disclosure with NGO's, local and national advocacy groups, badly managed social and community relations, negative exposure,	**Community / stakeholder relations management** - management of community tensions, grievances and concerns especially mitigation of impact on traditional fishing grounds

Life Cycle Phase and Activity	Risks	Controls
	compensation claims **Impacts on local procurement and business** - unregulated trade **Communicable diseases** - spread of diseases to local/foreign populations **Host country governance, national economy and revenue transparency** - economy - sustainable growth and inflation, bribery, corruption and extortion, revenue transparency	**Procurement and supply chain management** **Community health and safety plans** - vaccinations and awareness raising on communicable diseases **Supporting and partnering with host governments to encourage revenue transparency and good governance** **Compliance with national/regional/local regulations or World Bank Guidelines/IFC Performance Standards**

5.2.3 Refining

Life Cycle Phase and Activity	Risks	Controls
Refining (new build)	***As Oil Field Development and Transportation (Pipelines and Tankers)***	***As Oil Field Development and Transportation (Pipelines and Tankers)***
Refining (facility operations)	**Community health and safety** - noise, dust creation, transport movement, emissions and air quality **Strain on infrastructure and public nuisance** - noise, vibration, fore/explosions, dust creation, vehicular movement, emissions and air quality, ability of social services capacity to absorb new/foreign populations (supply and demand) e.g. water resources, power, health, education, housing	**Social / community baseline assessment** - establish community profiles (e.g. livelihoods and employment) in project area, through detailed social baseline assessments to inform mitigation measures and the development of long term agreed community investment/development **Community health and safety plans** - vaccinations and awareness raising on communicable diseases

Life Cycle Phase and Activity	Risks	Controls
	Communicable diseases - spread of diseases to local/foreign populations **Land acquisition** - displacement - temporary and permanent land acquisition leading to poverty, social disruption, migration, involuntary resettlement requiring relocation and compensation claims **Loss of livelihood (income and employment) –** • Economic displacement • Job competition and impact on livelihoods and land value, compensation claims), temporary/permanent relocation to communities **Employee health and safety** - poor employment and labour standards, e.g. dangerous employee conditions including below standard/regulation health and safety conditions **Host country governance, national economy and revenue transparency** - economy, sustainable growth and inflation, bribery, corruption and extortion, revenue transparency	**Supporting and partnering with host governments to encourage revenue transparency and good governance** **Compliance with national/regional/local regulations or World Bank guidelines/IFC performance standards**

5.2.4 Retail

Life Cycle Phase and Activity	Risks	Controls
Petrol Station and Bulk Storage	**Significant engineering works** - Significant engineering works, construction interference with populations **Community health and safety** - noise, dust creation, transport movement, emissions and air quality **Public nuisance** - noise, vibration, fore/explosions, dust creation, vehicular movement, emissions and air quality	**Social / community baseline assessment** - establish community profiles (e.g. livelihoods and employment) in project area, through detailed social baseline assessments to inform mitigation measures and the development of long term agreed community investment/development **Human resources policies** - maximization of local employment **Compliance with national/regional/local regulations or World Bank guidelines/IFC performance standards**

5.2.5 Decommissioning

Life Cycle Phase and Activity	Risks	Controls
Planning and Execution	**Loss of livelihood** - economic displacement - loss of community financial support and dependency on project related jobs **Loss of livelihood (income and employment)** - job competition and – impact on livelihoods and land value, compensation claims), temporary/permanent relocation to communities **Land rehabilitation and restoration**	**Community investment and development** - community investment (both long and short term) e.g. health care facilities, micro-finance initiatives and access to employment **Rehabilitation and remediation management plan**

Life Cycle Phase and Activity	Risks	Controls
	Site remediation/clean-up	

6. Key considerations

1. Does the process require authorisation, and if so has this been obtained?
2. Are there any outstanding legal actions or prosecutions relating to the plant, including problems of public nuisance such as odour, which may become a liability?
3. How old are the existing facilities, particularly refineries? (Pollution will be greater in older works).
4. Has on-site disposal of process by-products and wastes taken place?
5. How is effluent and/or process wastewater controlled?
6. Are any materials used or produced subject to environmental phase out or reduction agreements?
7. Have decommissioning options been assessed if required, and have costs been fully accounted for and independently confirmed as adequate?
8. What contingency plans are in place to deal with spillage, leaks, etc?
9. Is the company diversifying into alternative fuels and renewable energy?
10. For new sites/extension projects has an Environmental Impact Assessment been commissioned to assess the environmental impacts? Are plans in place for mitigation measures to be implemented?
11. For brand new operations, were environmental and social impacts considered when determining the site of the facility? How were impacts minimised through this process?
12. Have affected communities been involved in a public engagement process? Are identified risks being managed appropriately? Is a fit for purpose Grievance Mechanism in place?
13. Have labour issues been considered, particularly where operations are remote and/or labour has been migrated?

7. Regulation and Best Practice

Permits, consents and licences are likely to be required for oil and gas operations, the specifics of which will depend on the jurisdictional framework in the geographical location of a given project. In developing regions, weaker governance structures may mean that there is less stringent implementation of local controls and regulations or indeed there may be no controls at all. In such cases the project proponent of best practice should ideally adhere to international environmental and social standards and industry Best Practice.

In the case of almost all large-scale new build, expansion and development projects an Environmental and Social Impact Assessment (ESIA) will be required particularly where project debt financing is being sought. A comprehensive ESIA undertaken to international standards allows both the project sponsor and the investors to assess the full range of potential environmental and social impacts related to a project development, operation and decommissioning. Part of the ESIA process is to design appropriate mitigation measures and to set a framework for the monitoring the performance of these measures on a long-term basis. This limits and controls compliance and remediation costs as well as long term credit and reputation risks.

For smaller scale projects and operations a full ESIA may not be required. Focused studies on particular issues of concern may however, be helpful in identifying potential environmental and social risks associated with certain project activities.

The table below lists key international standards and publicly available best practice reference materials relevant to the oil and gas industry.

8. Additional resources

Multilateral:

1) IFC Performance Standards
2) World Bank Institute: Energy Sector Management Assistance Program
3) WHO: Air Quality Guidelines for Europe 2005
4) World Health Organisation Guidelines for Community Noise
5) WHO Guidelines for drinking-water quality
6) Ex-Im Environmental Procedures and Guidelines
7) Overseas Private Investment Corporation Environmental Handbook
8) Environmental management in oil and gas exploration and production (developed by International Association of Oil and Gas producers)
9) EU Policies: Integrated Pollution prevention and control.
10) EU policy on petrol storage (VOC leak)
11) Greenhouse Gas Protocol Initiative (a tool that can be used to determine the emissions of your specific project/industry) from the World Business Council for Sustainable Development
12) Security Issues and Human Rights - Voluntary Principles

Government:

1) Environment Agency UK Monitoring Guidance notes for emission levels
2) Air Quality Criteria for Particulate Matter Environment Protection Agency
3) US EPA Study on the effects of 'Fracking' on Drinking Water (relating to shale gas extraction)

Industry Association:

1) Extractive Industries Transparency Initiative
2) IMO/ IPIECIA established contingency plan for international oil spills.
3) Prevention of Water Pollution by Oil compiled by the International Maritime Organization
4) IPIECA Key Biodiversity Questions in the Oil and Gas lifecycle
5) International Association of Oil and Gas Producers
6) IPIECA:A Guide to Health Impact Assessments
7) International Association of Oil and Gas Producers (OPG)
8) International Gas Union
9) Roundtable on Sustainable Palm Oil
10) Roundtable on Responsible Soy