BANK OF GHANA

Environmental and Social (E&S) Risk Management Sector-Specific Guidance

Oil & Gas, and Mining

Preamble to All Sector Specific Guidance

While the guidance notes to the Principles provide high-level, all-sector guidance on the purpose and implementation of (and additional resources for) each Principle, some sectors represent higher environmental and social risk and require greater scrutiny. Therefore, we have provided sector-specific guidance notes, to assist with the implementation of the Principles in these high-risk sectors. These notes draw upon the IFC Environmental, Health and Safety Industry Sector Guidelines and the EBRD Subsectoral Environmental and Social Guidelines and have been adapted to reflect the Ghana-specific context.

Index

Oil & Gas, and Mining in Ghana 4

Summary of Key E&S Issues 6

Potential Costs Associated with Key E&S Issues 7

Analysis of Key E&S Issues 8

Key E&S Opportunities 22

Due Diligence Questions for Clients 23

Key Performance indicators 24

Sources of Additional Information 25

Oil & Gas, and Mining in Ghana

Oil & Gas Industry in Ghana

The oil & gas industry in Ghana encompasses both upstream and downstream activities.

The majority of upstream drilling activities are currently conducted offshore from the Deepwater Tano Block, the West Cape Three Points and the Jubilee Field. Exploration activities are on-going in other off-shore areas. In addition to these offshore activities, some upstream activities are also undertaken onshore in the Volta basis area oil sands.

Downstream refining is largely undertaken onshore by Ghana's only petroleum refinery, Tema Oil Refinery. Refined oil products are then distributed to retail sites throughout the country.

Regulation of the sector

The Ministry of Energy is the governing entity that oversees the exploration, development, processing, transportation and utilization of Petroleum resources in Ghana. It is guided by agencies such as the National Petroleum Agency, which regulates and monitors the petroleum downstream industry, and Petroleum Commission which also regulates and manages all activities in the Upstream Petroleum industry.

Regulations in this sector includes the Petroleum Revenue Management Bill, Petroleum Commission Act 821 2011, Petroleum Income Tax PNDC Law 188, Petroleum Exploration & Production Law 1984 PNDC Law 84, Oil & Gas Insurance Placement for the Upstream Sector, Ghana National Petroleum Corporation Law 1983, Ghana Model Petroleum Agreement, Local Content & Local Participation Regulations LI 2204, Petroleum Commission Fees and Charges, Petroleum (Exploration & Production) Act, 2016 [Act 919], Petroleum Exploration and Production (Measurement Regulations) Guidelines, Petroleum Measurement Regulations, Petroleum Income Tax PNDC 188, Petroleum Revenue Management Act 815 – 2011.

The Ghana Environmental Protection Agency serves as an environmental regulator with oversight of the oil & gas industry in Ghana.

Technical Servicing

Upstream	• Exploration • Production • Decommissioning
Downstream	• Refinery • Distribution and Retail

Upstream activities

Exploration: Seismic surveys use sound waves to identify subsurface oil & gas reserves. Exploration wells are then drilled where these surveys have demonstrated a likely site for oil & gas in order to gather more information about the reserve (e.g. possible amount and quality of product).

Production: In the case of offshore drilling, an offshore platform or floating vessel is installed. A variety of different types of offshore platforms exist, but in Ghana the majority of operations use floating production storage and offloading (FPSO) vessels, which are quick to set up and can be moved to new locations as required.

In the case of onshore oil sands, bitumen mixed with rock and sand is removed from the ground and brought to facilities which separate the bitumen from the rock and sand and further process it into crude oil which is similar to that which is drilled offshore.

Decommissioning: Wells are plugged and downhole equipment is removed. Facilities are treated to remove contaminants and physical structures are removed. Oil sands areas should be reclaimed.

Downstream activities

Onshore refining involves separation and processing of crude oil into finished petroleum products. In Ghana, the Tema Oil Refinery executes the process of distillation of the various components of crude oil followed by conversion of some of these components through a range of cracking, coking, reforming and alkylation processes. The finished products are then stored in bulk storage tanks until they are distributed to retail fuelling facilities, generally via road tankers, where they are typically stored underground.

Technical servicing activities

Upstream and downstream activities require technical support to assist with logistics, procurement of supplies and other business maintenance activities. A large number of contractors are required to support oil & gas operations.

Mining Industry in Ghana

Ghana is a major producer of various minerals, including bauxite, manganese, diamonds and gold. The Mining industry accounts for 4.2% of the country's GDP and minerals make up 37% of total exports (Ghana Statistical Service, 2016). Of which, gold is the most significant, comprising approximately 95% of nonfuel mineral revenue in Ghana. In fact, Ghana is the largest producer of gold in Africa after South Africa.

Based on estimates from the Ghana Chamber of Mines, at the end of 2016, total direct employment by the industry stood at 11,628.

Gold is typically found in either placer deposits, which are composed of loose material, or in hard rock deposits. Placer deposits are typically extracted using water or dredging techniques whereas hard rock deposits are typically mined using open-pit techniques, including deployment of explosives for blasting. Cyanide is often used to extract the gold from rocky ore.

Regulation of the sector

The Ministry of Lands and Natural Resources oversees all aspects of Ghana's mineral sector and is responsible for granting mining and exploration licenses. Within the Ministry, the Minerals Commission is the regulatory body for the mining industry. The overall legislative framework for the mining sector in Ghana is provided by the Minerals and Mining Act of 2006 (Act 703) which was reiterated in 2012 into Minerals and Mining (General) Regulations, 2012 (L.I.2173)
Under the Law, mining companies must pay royalties; companies may also pay corporate taxes at standard rates.
Other legislation that affects mining and mineral exploration in Ghana includes the Minerals Commission Law of 1986 (PNDC Law 154), the Small-Scale Gold Mining Law 1989, the Investment Promotion Act, 1994 (Act 478), the Minerals (Royalties) Regulations,1987 (LI 1349).

The Ghana Environmental Protection Agency serves as an environmental regulator with oversight of the mining industry in Ghana. It is guided by the Environmental Protection Agency Act, 1994 (Act 490) and the Environmental Assessment Regulations, 1999 and as amended, 2002.

Summary of Key E&S Issues

ESG Risk category key

- Environment – Affects the natural environment
- Health and safety – Affects the health and safety of employees
- Labour – Affects workplace conditions and treatment of employees
- Community – Affects the health and safety, livlihoods and environment of the community and wider public

Note:

Key risk ordering based on significance of the potential financial impact to the company in question. O&G assessment is based on offshore extraction but also considers the impacts of distribution on land

Key risks	Oil & gas	Mining
Fire and explosion	● ▲ ◆	● ▲ ◆
Soil and surface water contamination	● ▲ ◆	● ▲ ◆
Acid Mine Drainage (AMD) and leachate		● ◆
Decommissioning and rehabiliation	● ▲ ◆	● ▲ ◆
Occupational health and safety	▲ ■	▲ ■
Naturally occurring radioactive materials	▲	▲
Security	▲ ■ ◆	▲ ■ ◆
Water management and waste water	● ▲ ◆	● ▲ ◆
Hazardous materials	● ▲ ◆	● ▲ ◆
Community displacement and resettlement		◆
Air emissions	● ▲	● ▲ ◆
Habitat loss and biodiversity		● ◆
Distribution and transport	● ▲ ◆	● ▲ ◆
Geotechnical stability		● ▲ ◆
Labour rights	■ ◆	■ ◆
Waste management	● ▲	● ▲
Noise and vibration	● ▲ ■	● ▲ ■ ◆
Financial dependency		■ ◆
Visual impact	● ◆	● ◆
Worker accommodation	▲ ■	▲ ■

Potential Costs Associated with Key E&S Issues

Potential costs *to banks' clients* associated with key E&S issues

Fines from regulatory authorities, or third party claims for fatalities and injuries to employees or local communities due to accidents or exposure to toxins.

Fines from regulatory authorities or third party claims for clean-up/ remediation costs associated with environmental impacts.

Fines from regulatory authorities or third party claims for impacts to natural capital resource.

Reputational damage leading to protests and increased operational costs.

Potential capital expenditure required to meet environmental and labour conditions attached to operating licenses.

Potential costs *to banks' credit portfolios* associated with key E&S issues

Any of the above costs to clients could cause a client's operations to be suspended

This may impede the client's cash flow, potentially leading to credit default

This may lead to a potentially significant loss in revenue for lending banks

In order to protect themselves, banks should consider including, in loan documentation, environmental and social Conditions Precedent, Warranties, Covenants and Events of Default.
Please see the Guidance Note associated with Principle 1 for further details.

Analysis of Key E&S Issues

Fire and Explosion

Major accidents from explosions, fires, and emissions of dangerous substances can lead to fatalities, injuries, and production downtimes. They can also lead to detrimental impacts to the surrounding environment and nearby infrastructure which can negatively affect local populations.

Oil & Gas: Operations across the oil & gas supply chain involve storing large volumes of flammable fuels which can be highly explosive unless appropriately stored and managed. There are several high profile and well documented cases where extraction facilities, fuel terminals and retail stations have suffered catastrophic fires or explosions owing to ignition of fuels. For example, in 2015 a fire disaster at a petrol station in Accra claimed at least 150 lives.

Mining: Mining operations also store and use large quantities of explosives which must be appropriately managed in order to avoid catastrophic impacts on the environment, employees and local populations.

Regulations in the that prevent the exposure of fire accidents in the oil and gas and mining sector include the; The Fire Precaution (Premises) Regulations 2003, LI 1724, and the Ghana National Fire Service Act, 1997 ACT 537.

Risk Management

Client companies should implement the following risk management practices:

- Ensure that facilities are designed, constructed, and operated according to the latest local Ghanaian (and international, where appropriate) regulations for the prevention and control of fire and explosion hazards. For example, international best practice standards recognize guidance that is provided by the ISO 13702:2015 standard for petroleum and natural gas industries control and mitigation of fires and explosions on offshore production installations (Oil & Gas). For further resources see the final section of this document.
- Ensure that written procedures are in place and agreed with all facility operators.
- Ensure that equipment undergoes scheduled inspection and maintenance and meets international standards of operational performance in order to avoid failure.
- Ensure that appropriate emergency procedures are in place in the event of an accident. This includes establishing suitable communications with the appropriate local emergency authorities.
- Provide local emergency service offices with a list of possible flammable or explosive products stored on the premises.
- Consider setting up an onsite firefighting facility and specific staff who are designated and available to respond to any fire or explosion events. This may include an Offshore Support Vessel in the case of offshore Oil & Gas.
- Install flammable gas detection equipment in places where large quantities of highly flammable liquids are stored and vapor may be released.
- Ensure all staff have been trained and are sufficiently competent in the handling of any flammable and explosive materials.
- Ensure all staff have been trained on safety procedures in the case of an emergency.
- Ensure security of storage areas to prevent third parties tampering with any flammable or explosive materials.
- In the event of any flaring activities, consider making use of resources from the Global Gas Flaring Reduction Partnership (GGFR) in order to explore flaring reduction.

Soil and Surface Water Contamination

Oil & Gas: In offshore drilling operations, leaks and spills can lead to oil & gas or other materials (such as substances present in drilling mud) contaminating the ocean. Marine contamination can also occur during the transfer of oil from an FPSO to an oil tanker. Contamination of soil and groundwater may arise due to the loss of products during onshore separating (in the case of oil from sands), refining, storage and land transfer operations. Potential areas where there is a high risk of contamination include areas used to load and unload product as well as "older" areas of the site where management practices and storage standards may not have been as good as modern day requirements.

Mining: The large amounts of water used in mine drainage, mine cooling and aqueous mineral extraction can lead to run off and contamination of nearby soil and surface water. Contaminants can range from rock and other debris to chemicals used in the extraction process. Chemicals are also generally used in the processing phase. These chemicals can also contaminate soil and surface water by up to 20%.

Regulations that prevent soil and surface water contamination include the Land planning and soil conservation Act 1953, Land Planning and Soil Conservation (Amendment) Act 1977, The EPA Act 1994 (Act 490), the Mining Act 2006 (Act, 703).

not properly contained and disposed of. Cyanide is most typically associated with the processing phase for gold, Ghana's main mineral export, and therefore one of the most likely soil and surface water contaminant risks in Ghana.

Often times, contaminated water is captured by dams or structures in order to prevent run off. These are often referred to as tailing dams.

Risk Management

Client companies should implement the following risk management practices:

- Ensure that wastewater treatment systems are installed, operational and subject to regularly scheduled maintenance and cleaning.
- Ensure that storage tanks and equipment are maintained to a local Ghanaian standards or where appropriate an internationally recognized standards (such as ISO 16961:2015 and ISO 28300:2008).
- Consider availability of environmental impairment liability insurance.
- Ensure that the facility is regularly subject to soil and groundwater monitoring.
- Develop and implement an Oil Spill Response Plan (Oil & Gas).
- Provide employees and local communities with training in oil spill prevention, containment and response (Oil & Gas).
- Ensure spill response and containment equipment is installed (Oil &Gas).
- Ensure regulations and best practice are followed during well abandonment to prevent leaks (Oil &Gas).
- Ensure the integrity of any tailings dams that are used to capture toxic waste water (Mining).
- Ensure gold processing operations comply with local Ghanaian principles and standards (or with the principles and standards of the voluntary International Cyanide Management Code where deemed appropriate) (Mining).
- Ensure equipment and procedures are in place for timely and effective response to any contamination of soil and groundwater following spills or losses (Mining).
- Ensure potential water quality issues that may arise at mine closure have been assessed during the mine development stage (Mining).

Acid Mine Drainage (AMD) and Leachate (Mining only)

Acid Mine Drainage (AMD) poses risks at many mineral processing plants and metal mines, because metals such as gold, Ghana's main mineral export, are often found in rock with sulphide minerals. When the sulphides in the rock are excavated and processed, some of the sulphide minerals remain in the waste.

If this waste mixes with water and air, it can form sulphuric acid which can leach into the wider environment. While leaching, the acid can also dissolve metals and other contaminants in rock, becoming full of toxic heavy metals (including concentrations of cadmium, copper, lead, zinc, arsenic, etc.). If uncontrolled, the acid rock drainage may contaminate streams, rivers or groundwater.

Risk Management

Client companies should implement the following risk management practices:

- Develop a programme to minimize and control acid leachate production and run-off. This programme may include any of the following points:
  - Use lime treatment systems to neutralise acid.
  - Use wetland systems (where possible) to prevent contaminated water from reaching water bodies in the wider environment.
  - Use acid base accounting to calculate the net acid-producing potential of acid sulphate in nearby soil and to analyse acid content in waste rock. Consider using ISO 14388:2014 as a guideline.
  - Provide waste dump drains to capture acidic water.

Decommissioning and Rehabilitation

In order to avoid a variety of environmental and social risks, offshore wells, onshore oil sands and onshore mining sites must be decommissioned and abandoned at end of life, using safe and stable methods. Moreover, appropriate closure of oil & gas, and mineral processing plant sites is crucial to reduce ongoing risks to the environment and health and safety.

Risk Management

Client companies should implement the following risk management practices:

- Prepare a Closure and Rehabilitation Plan before production commences. This plan should include sufficient funding for its implementation, and ensure that:
  - Future health and safety in the local area is not compromised.
  - Biodiversity and natural capital is enhanced or at least not compromised.
  - Socio-economic impacts are beneficial or at least not detrimental to local communities.
- Update the plan during the operation of the offshore well, onshore oil sand, onshore mining site or onshore processing site.
- Ensure plans are in place for post-closure monitoring of the site for no less than 5 years, to confirm desired environmental, health and safety and socio-economic outcomes.

Occupational Health and Safety

Oil & gas extraction and storage facilities and mining facilities are often located in areas where there is little or no access to emergency medical services.

Many of these facilities also pose heightened risks to personnel. Some of these risks include:

- Exposure to fire and explosion.
- Injuries and fatalities from operation of heavy equipment and machinery.
- Conditions associated with prolonged exposure to toxins.
- Dangers associated with boat and helicopter transport (Oil & Gas).
- Mine collapse (e.g. Dompoase illegal mine collapsed in the Ashanti region on 12 November, 2009, leading to the death of 18 workers) (Mining).

In accordance with the Labour Act 2003 (Act 651), it is obligatory for employers to ensure health, safety and welfare of persons at workplace by minimizing the causes of hazards inherent in the working environment.

Risk Management

Client companies should implement the following risk management practices:

- Ensure that an appropriate health and safety management system is in place, ideally independently certified to OHSAS18001 or ISO45001 standards.
- Ensure all personnel are trained in appropriate safety procedures and are provided with appropriate safety equipment.
- Adopt a programme of illness prevention through a combination of education and sanitation measures.
- Provide personnel with appropriate personal protective equipment (PPE).
- Train personnel in the proper use and maintenance of PPE.
- Ensure regular inspection and maintenance of all PPE.
- Develop specific safety procedures for helicopter and boat transport of personnel (Oil & Gas).

Naturally Occurring Radioactive Materials (NORMs)

By nature, extractives operations are at risk of disturbing NORMs, such as potassium, thorium and uranium, radon and radium, present in the Earth's crust. However, if these NORMs are not appropriately contained and disposed of, they can pose health and safety threats to exposed personnel or local populations.

Risk Management

Client companies should implement the following risk management practices:

- Develop procedures for the management of NORMs.
- Provide adequate training to all those who could potentially be exposed or who are required to manage NORMs as part of their every day jobs.
- Ensure that a Radiation Protection Supervisor and a Radiation Protection Advisor are appointed.
- Define and enforce an appropriate decontamination standard.
- Engage with the Ghana Atomic Energy Commission (GAEC) to organise a site visit to determine the level of exposure risk and suggest appropriate control measures.

Security

Oil & gas, and mining materials such as gold all have high values and are therefore targets for criminals. Facilities where these material are extracted, stored and refined, as well as routes by which they are transported, can therefore be at high risk of theft or piracy as well as violence towards workers. This is relevant in Ghana, which has received a corruption rating of 43 out of 100 (with 0 indicating “very corrupt” and 100 indicating “very clean”) from Transparency International, indicating a risk of theft and piracy.

Risk Management

Client companies should implement the following risk management practices:

- Ensure staffing of sufficient security teams (e.g. security or Offshore Support Vessels stationed near offshore drill platforms at all times; stationed security at oil sands, mining sites and all refining and distribution facilities at all times) to discourage theft.
- Install motion sensitive cameras, up-to-date alarm system, remote and computer monitoring and other security equipment, particularly at storage centres.
- Provide training for employees such that they are prepared to respond in a professional and proportionate manner in the event of a security breach.
- Ensure plans are in place to insure against potential financial losses from theft.

Water Management and Waste Water

Extractive operations tend to require large amounts of fresh water and also create large amounts of wastewater. This is particularly relevant in Ghana which can be prone to water shortages during the drier times of year, typically November to April.

Oil & Gas: In offshore oil & gas operations, water is brought to the surface during exploration and production and is also used on the facility to cool engines and other equipment. This water needs to be managed, treated and disposed of safely in order not to pollute the surrounding marine environment and/or local populations. Other wastewater created by offshore oil & gas exploration and production include, sewage waters, storage displacement water, bilge water, and deck drainage water.

Oil sands processing is a very water intensive because hot water is required for the separation of bitumen from rock and sand. Furthermore, when oil sands are far below ground level, a highly water intensive technique called steam assisted gravity drainage is used to extract them. This can cause disturbances to the local water table which could impact nearby companies, populations or wildlife. Moreover, once this water has been used, it must be managed and treated appropriately in order to avoid pollution of surrounding wildlife or populations.

Oil from refining and retail operations can get caught in stormwater and washed into local surface water networks, potentially causing disturbance to nearby ecosystems.

Mining: Mining also uses high volumes of water in mineral extraction and processing. The largest quantities of water tend to be used for dust suppression and for mineral processing. Withdrawal of groundwater may cause changes in the water table which could impact nearby companies, populations or wildlife. Moreover, once this water has been used, it must be managed and treated appropriately in order to avoid pollution of surrounding wildlife or populations. Mining activities can also generate suspended sediment. In regions with heavy rainfall, this sediment may spread into local surface water networks.

Risk Management

Client companies should implement the following risk management practices:

- Reduce costs associated with sourcing freshwater and disposing of waste water by developing a sustainable water supply management plan that incorporates both reuse and recycling.
- Find secondary uses for waste water, such as in cleaning.
- Minimize the quantity of water used in cleaning.
- Install equipment to capture and thus reduce any solid materials in wastewater streams.
- Install equipment to accurately record the concentrations of contaminant in wastewater prior to discharge to ensure they are below regulatory limits. Ensure that this equipment is regularly inspected and calibrated.
- Manage storm water carefully to minimise run-off.
- Use lagoons to capture and manage any run-off water used for fire-fighting.
- Avoid water-induced erosion of exposed ground surfaces.

Hazardous Materials

Oil & Gas: Oil & gas extraction, storage and distribution facilities typically host a broad range of hazardous materials such as:

• Flammable and combustible fuels (e.g. petroleum and diesel)

• Toxic sludges

• Paints and cleaning chemicals used during maintenance work

• Fire-resistant chemicals and suppressants

In offshore extraction operations, the release of hazardous materials may contaminate the surrounding marine environment and wildlife. Onshore oil sands and processing facilities may also release hazardous materials that could contaminate the surrounding environment and negatively impact nearby wildlife and populations.

Mining: Mining typically uses heavy equipment which requires diesel-power as well as lubricating and hydraulic oils and other hazardous substances. Furthermore, a number of hazardous materials, including cyanide (in gold processing in particular), are used in mineral processing operations. If these materials are leaked into soils, surface water, and groundwater they may pose risks to surrounding people and wildlife.

The Hazardous and Electronic Waste Control and Management Act 2016 (Act 917) provides for the control of management and disposal of hazardous waste, electrical and electronic waste and for related purposes.

Risk Management

Client companies should implement the following risk management practices:

- Provide personnel with appropriate personal protective equipment (PPE).
- Train personnel in the proper use and maintenance of PPE.
- Ensure regular inspection and maintenance of all PPE.
- Ensure that contact with hazardous materials is minimised or eliminated (where possible) through application of the hierarchy of hazard controls, which designates a hierarchy of risk-prevention steps and the order in which they should be undertaken.
- Ensure that storage facilities are locked and accessible only to trained and approved personnel.
- Ensure that all hazardous materials storage has secondary containment to prevent the release of these materials to the environment.
- Ensure that facilities are inspected regularly to track and minimize any leaks or spills.
- Ensure that procedures are in place in the event of a leak or spill.
- Ensure that a record of all hazardous materials is maintained onsite.

Community Displacement and Resettlement (Mining only)

Rural communities are often vulnerable to eviction when a mining lease is granted, and at times evictions can occur without appropriate communication or compensation. Residents may refuse to leave and consequently be exposed to health and safety risks associated with mining activities. Furthermore, there are likely to be socio-economic implications associated with environmental damage to the resources on which residents rely for agriculture or other traditional livelihoods.

Chapter 5 of 1992 Constitution title Fundamental Human Rights and Freedom protects the rights of displaced communities.

The Environmental Impact Assessment process and the resulting implemented conditions tends to serve as regulatory obligations on mining projects to protects the environment and communities.

Risk Management

Client companies should implement the following risk management practices:

- Review socio-economic baseline conditions to assess any impacts potentially associated with mining operations.
- Assess opportunities for employment of members of the local community either directly in mining operations or in companies that supports these operations.
- Ensure implementation of a grievance system to handle community complaints.
- Ensure engagement with the local community and relevant stakeholders prior to any resettlement.
- Where resettlement takes place, quality of life should be maintained or improved. Fair compensation should also be provided for any lost assets or reduced economic opportunities and should consider gender equality issues/impacts.
- Ensure that all communication with local populations (including written communication) is undertaken in the local language.

Air Emissions

Oil & gas, and mining activities can result in the emission of the following:

- Carbon monoxide (CO)and dioxide (CO2)
- Methane (CH4)
- Sulphur dioxide (SO2)
- Sulphur oxides (SOx)
- Volatile organic compounds (VOCs)
- Oxides of nitrogen (NOx)
- Particulate matter (PMs)

Emissions of these gases are harmful because they contribute to atmospheric carbon stocks which contribute to climate change (particularly from the greenhouse gases CO2 and CH4), because they can cause ground level acidification (SO2 combines with water to create sulphuric acid) and because they can be toxic to human health (VOCs, CO, NOx and PMs).

Oil & Gas: Air emissions from offshore oil & gas operations and onshore oil sands operations can be driven by the following:

- Emissions associated with electricity used for power and heat generation (particularly for water heating in the case of onshore oil sand processing). The intensity of air emissions is often dependent on the composition of the fuel used.
- Fugitive emissions through equipment leaks (more likely to occur with older equipment).
- Combustion in mechanical or transport equipment including water vessels and helicopters in the case of offshore drilling.
- Flaring and venting (offshore).
- Degassing of drilling muds (offshore).

Risk Management

Client companies should implement the following risk management practices:

- Ensure that power, heat generation and transportation operations use the least carbon intensive method available.
- Ensure that plans are in place to minimize personnel exposure to any toxic air emissions.
- Avoid gas flaring as much as possible. Gas should be transported onshore via a pipeline and used for power generation wherever possible.. Consider making use of resources from the Global Gas Flaring Reduction Partnership (GGFR) in order to explore flaring reduction (Oil & Gas).
- Where flaring is unavoidable, estimate likely flaring volumes during commissioning and set minimisation targets. Track flaring against these targets (Oil & Gas).
- Ensure that infrastructure is well maintained and monitored. Develop plans to control fugitive emissions in the case of a leak (Oil & Gas).
- Ensure facilities are equipped with a reliable gas detection system (Oil & Gas).
- Ensure that storage equipment has been designed to reduce VOC emissions (Oil & Gas).
- Ensure that plans and equipment are in place to minimize the leaching of cyanide and inorganic compounds (Mining).

Mining: Air emissions risks associated with mining include:

- Emissions associated with electricity used for power and heat generation. The intensity of air emissions is often dependent on the composition of the fuel used.
- Combustion in other mechanical or transport equipment.
- The gold leaching process may release hydrogen cyanide into the air.

Habitat Loss and Biodiversity

Oil & Gas: The following can impact marine ecosystems and wildlife:

- Release of drilling muds.
- Disposal of sewage and food waste.
- Spills of fuel or other hazardous materials.
- Light pollution surrounding operations.

These pollutants can have detrimental impacts on marine life and coastal ecosystems. Depending on the currents and extent of the pollution, protected areas could be affected across a coastal region.

Mining: The following can lead to alteration and degradation of surrounding habitats:

- Changes and/or degradation of the nearby hydrological regime (e.g. by changing the flow of rivers and/or changing the water table), through water use and waste water disposal. This can lead to impacts to the ecosystem which may result in loss of vegetation, loss of biodiversity and desertification.
- Changes and/or degradation of land at extraction, mineral processing and waste dumping sites which can lead to habitat loss and loss of biodiversity.
- Exposure of local populations to toxic materials used in extraction and processing operations.

Risk Management

Client companies should implement the following risk management practices:

- Minimise habitat alteration to the extent feasible, and protect and preserve critical habitats.
- Implement a Biodiversity Action Plan, including purchase of biodiversity offsets where possible and needed.
- Minimize land alteration for any onshore activities.
- Develop a rehabilitation plan that includes reintroduction of natural species (see rehabilitation section for further details).

Distribution and Transport

Transportation of dangerous goods such as fuels and explosives by road increases the risk of serious road traffic accidents. Accidents may cause fires, explosions and release of pollutants which can lead to destruction of property as well as fatalities and injuries. Moreover, increased vehicle movements in general can cause increased risk of accidents and increased risk of fatalities and injuries. Vehicle traffic may also result in congestion, air pollution and noise disturbance to nearby businesses and residents.

Risk Management

Client companies should implement the following risk management practices:

- Ensure that only licenced and well trained employees are involved in the use of heavy goods vehicles and the transport of dangerous goods.
- Ensure that all vehicles are equipped with appropriate safety measures in order to decrease the likelihood and/or intensity of catastrophic impacts in the event of an accident.
- Install GPS monitoring equipment to monitor the behaviour of drivers. Reward good performance and penalise poor performance.
- Consider different modes of transport (e.g. pipeline, rail, shipping)

Geotechnical Stability (Mining only)

Most mining structures increase risks of landslides, rock falls, and/or land collapse. Mining operations located in areas of high seismic activity are particularly vulnerable to instability.

Risk Management

Client companies should implement the following risk management practices:

- Ensure that all planning and design prioritises safety with respect to geotechnical stability.
- Monitor and manage structures during the lifecycle of mining operations to maintain the integrity of the site over time.
- Implement additional monitoring measures in active seismic areas.
- Implement additional monitoring measures in areas exposed to extreme weather events.

Labour Rights

Oil & gas, and mining operations may attract large numbers of short term workers, some or many of whom may be foreign migrant workers who are vulnerable to exploitation. They may be hired directly or by sub-contractors.

The Labour Act, 2003 (Act 651) regulates employment and labour issues in Ghana. It covers a broad array of topics such as employee security, sick leave, domestic and compensation, works and wages in Ghana.

Risk Management

Client companies should implement the following risk management practices:

- Ensure migrant workers, or their labour supply agencies, comply with the latest International Labour Organisation (ILO) requirements on working hours, pay, and overtime.
- Ensure they or their labour supply agencies include all of the latest ILO prohibitions on child labour into contracting agreements.
- As needed, provide appropriate worker accommodation which meets, at a minimum, the basic needs of workers, and adheres to local Ghanaian and international good practice (see Accommodation section for further details).
- Provide a code of conduct in a language accessible by migrant workers and sub-contractors.
- Ensure that labour standards are in line with local Ghanaian labour law and practices.

Waste Management

Processes across the extractives sector supply chains may produce a variety of hazardous and non-hazardous wastes –including, but not limited to:

- Waste oils
- Paraffin
- Waxes
- Hydraulic fluids
- Used batteries
- Waste chemicals
- Used filters
- Waste drilling fluids and drill cuttings
- Organic waste

Risk Management

Client companies should implement the following risk management practices:

- Develop a Waste Management Plan which outlines a strategy for eliminating, reducing and recycling all forms of wastes.
- Ensure non-hazardous waste is collected for recycling or disposed at an approved sanitary landfill.
- Ensure any hazardous wastes are handled by specialised licensed providers (see Hazardous Materials section for further details).
- Where possible, use chemicals with the lowest potential human health and environmental impacts.
- Consider using waste oil as a fuel for power generation.

Noise and Vibration

Oil & gas: Noise and vibration associated with oil & gas extraction, processing and transportation may be generated by seismic surveys, construction, drilling and production, sea and air transportation, engines and power generation, flares and vents, pumps and compressors.

Mining: Noise and vibration is associated with many types of equipment used in mining operations including noise from excavation equipment, vehicle engines, loading and unloading of rock into steel dumpers, chutes and power generation.

Noise and vibration can affect wildlife and any nearby residents or exposed members of the public. For example, it may deter the migration routes of marine life or birds in the case of offshore oil & gas operations. It may also have health and safety impacts on a company's workforce or any nearby populations.

Risk Management

Client companies should implement the following risk management practices:

- Ensure systems are implemented and maintained to monitor and control employee exposure to noise and vibration.
- Provide personnel with additional PPE in areas exposed to heightened noise and vibration.
- Where possible, enclose noisy equipment to protect residents and/or the public from noise.
- Avoid conducting seismic surveys during productive times of the year in fishing areas (offshore Oil & Gas).
- Alter the timing of blasts and other high noise activities to minimize disturbance (Mining).

Financial Dependency (Mining only)

Mining and mineral processing facilities are often developed in remote areas where workers and communities might not otherwise exist. Therefore, workers are often required to relocate in order to take employment in mining operations. In some cases, this will result in entire communities being built around a mine. However, this can cause such communities to be economically dependent on the existence and success of the mine, and they can be left disenfranchised if and when mining operations cease.

Risk Management

Client companies should implement the following risk management practices:

- Work with local authorities to develop plans to ensure that communities in remote areas have access to adequate services such as education and health care.
- Work with local authorities to develop plans that prioritize economic stability for mine workers once the mine has been decommissioned.

Visual Impact

Oil sands and mining operations can have negative visual impacts, particularly if tourism or recreation areas are nearby.

Risk Management

Client companies should implement the following risk management practices:

- Where possible, conceal the location of any oil sand, mine or processing plant.
- Maintain buffer zones between recreational or residential areas and oil sands, mining operations or processing plants.
- Improve unsightly landscapes by planting trees or other types of vegetation.
- Rehabilitate the unsightly landscapes that are most visible to local populations.

Worker Accommodation

Due to the nature of oil & gas, and mining operations, worker accommodation may be in remote and harsh locations. Accommodation will be provided for offshore oil & gas workers, normally on the platform or vessel. Similarly, temporary accommodation is often provided for oil sands and mine workers in proximity to extraction and processing sites.

Risk Management

Client companies should implement the following risk management practices:

- Ensure accommodation is clean, safe and meets workers' basic needs.
- Ensure accommodation complies with all of the latest local Ghanaian legislation and meets international good practice standards (as specified by the World Health Organisation).

Key E&S Opportunities

There are also a variety of opportunities for oil & gas and mining sector clients to deliver positive E&S impacts which can benefit their financial bottom lines and engender good will.

In turn, these benefits to oil & gas and mining sector clients can also lead to benefits to banks in the form of:

- **Increased revenue and profitability from working with clients that have strong, sustainable financial positions;**
- **Increased business opportunities for work with new clients that arise as a result of working in strong sustainable, affluent communities; and**
- **Improved reputation from working with clients who effectively manage E&S issues.**

In order to benefit from these opportunities, banks must first encourage their oil & gas and mining sector clients to pursue the opportunities specific to their sector, which are detailed below.

Opportunities that may improve a client's profitability include but are not necessarily limited to:

- Capturing and selling natural gas that would otherwise be flared and lead to air emissions (potentially using resources available under the Global Gas Flaring Reduction Partnership) (Oil & Gas).
- Using drilling fluid recycling practices can diminish the cost and effort of both disposing of drilling mud and purchasing of new drilling fluid (Oil & Gas).
- Installing water recycling facilities (particularly in oil sand and mine processing sites) that can decrease the costs of sourcing freshwater and safely disposing of waste water.
- Following best health and safety and labour rights practices can enhance employee wellbeing and lead to a more productive workforce. This could include the use of new and emerging technologies such as virtual reality training and drones to remotely monitor and inspect assets.
- Using storage and transportation equipment that follows requisite standards can help control leaks and limit the unintentional loss of process inputs (e.g. liquid chemicals etc.) or outputs (e.g. refined oil).
- Using more up to date vehicles with higher fuel efficiency standards can lead to fuel savings, particularly when transporting heavy materials and/or equipment.
- Implementing requisite security procedures can reduce the likelihood of theft (particularly of valuable materials e.g. gold) and may in some cases also lead to lower insurance premiums.

Opportunities that may strengthen communities and lead to improved reputation:

- Providing training and equipment in order to prepare the local community in the event of an emergency (e.g. in the event of an explosion or a toxic leak).
- Providing quality decommissioning and rehabilitation to sites, thereby enabling a local community to enjoy these sites either visually or for recreation.
- Working to ensure a smooth transition (e.g. post-mine closure) for any communities that are financially dependent on the company's operations (particularly relevant in the case of remote mining or onshore drilling areas).
- areas).
- Ensuring that local communities directly benefit from oil & gas and mining activities, not just regional or central government/communities. This should be in line with the Sustainable Development Goals, such as access to fresh water, health care and education.
- Where possible, using rail or shipping instead of road vehicles and thereby reducing road traffic, congestion and air emissions.
- Providing quality decommissioning and rehabilitating to sites, thereby providing a habitat for a variety of species, including marine species in the case of offshore drilling.

Due Diligence Questions for Clients

- Do you have a board member dedicated to addressing E&S issues?
- Does your company have any links between safety performance and executive compensation?
- Have you had an environmental impact assessment, if so how did you perform, if not then why not?
- Do you operate in a stable ecosystem or one with biodiversity risks?
- How much capital have you committed to pollution prevention and rehabilitation? How is this capital managed?
- How do you source fresh water and dispose of waste water?
- Do you track your emissions?
- Do you have any programs for flaring reduction?
- Do you have any programs for energy efficiency?
- Do you control for run-off? If so, how?
- Do you have non-zero accident targets?
- Do you have recognized certifications of your operating system e.g. ISO 14001 (environmental management) and/or OHSAS 18001/ISO 45001 (health and safety management)?
- Have you had any local community opposition?
- Do you devote resources to community investment?
- Do you have policies and procedures in place to control/limit noise exposure?
- Do you have a system in place to respond to community grievances?
- Are you aligned with the Voluntary Principles for Security and Human Rights?
- Do you adhere to the Extractives Industry Transparency Initiative?
- Have you incurred any environmentally and socially related fines in the last 5 years?
- What is your track record on accidents that have led to spills?

Key Performance Indicators

- Release of SOx, NOx, VOCs
- Release of Hazardous Waste
- GHG emissions
- Embedded GHG content of oil reserves
- Freshwater withdrawal intensity
- Wastewater discharge
- Number of permit non-compliances
- Number of oil spill events
- Capital committed to pollution avoidance
- Capital committed to closure and reclamation/rehabilitation
- Capital committed to mitigation of unforeseen environmental costs
- Presence and performance on environmental impact assessment(s)
- Land area converted for operations
- Sustainability policies implemented at the operational level (not just the corporate level)
- Number of incidents
- Number of injuries
- Number of fatalities
- Number of near misses
- Cases of employee opposition
- Cases of local community opposition
- Expenditure on community investment
- Human rights incidents
- Adherence to Voluntary Principles for Security and Human Rights
- Fines incurred in the last 5 years

Sources for Additional Information

For further reading banks may find resources from the following organisations useful:

- IFC Environmental, Health and Safety Industry Sector Guidelines (http://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/EHS-Guidelines/)
- EBRD Sub-sectoral Environmental and Social Guidelines (http://www.ebrd.com/who-we-are/our-values/environmental-emanual-toolkit.html)
- Ghana Environmental Protection Agency (EPA) (http://www.epa.gov.gh/epa/)
- Ghanaian National Petroleum Corporation (GNPC) (http://www.gnpcghana.com/)
- American Petroleum Institute (API) (http://www.api.org/)
- Petroleum Industry Environmental Conservation Association (IPIECA) (http://www.ipieca.org/)
- Global Gas Flaring and Reduction Partnership (GGFR) (http://www.worldbank.org/en/programs/gasflaringreduction)
- International Association of Oil and Gas Producers (IOGP) (http://www.iogp.org/)
- Extractive Industries Transparency Initiative (EITI) (https://eiti.org/)