10.3.1 Introduction

The Oil and Gas (O&G) industry, by its very nature, is environmentally intrusive. Various environmental problems arise throughout the entire petroleum cycle, including upstream and downstream phases, but they especially occur at the stage of O&G Exploration and Production (E&P) and transportation. The international petroleum industry is encountering increasing pressure from governments and civil society for continued enhancement of its performance from the point of view of limiting its impact on the environment.

Posing a serious challenge to the O&G industry are: a) demands for significant reduction of hazardous wastes at source; b) more stringent regulation of discharges and emissions from petroleum production installations and refineries; c) stricter controls of oil transportation by ships and pipelines; and d) rehabilitation of the production sites upon abandonment and increased energy efficiency. At the same time, international petroleum companies are exposed to a rapidly growing body of international and national regulations, standards and various guidelines, as well as to risks associated with environmental litigation.

Three main levels of regulation can be identified within the complex and intertwined web of environmental norms and standards that currently exist: international (global and regional); national; and corporate self-regulation in the form of industry-wide or individual company guidelines. The balance between various levels of regulation and their relative importance primarily depends on the type and nature of activity in question. The higher the potential for international implications – whether in the form of pollution or any other transboundary effect – the more prominent the role played by international law. On the whole, the world is witnessing an internationalization of environmental controls, as international law-making on environmental matters is becoming more centralized, thus reducing the room for standard setting at the individual state level.

International regulations, primarily in the form of various international treaties, often directly or indirectly determine (through the process of national implementation), both the content of national regulations, and the general conduct of states and the industry. At the global level, there is a large group of binding instruments as well as numerous soft law (non-binding) type documents of relevance to the oil and gas industry. The most important of these will be discussed in this paper, which will provide an in-depth analysis of some selected areas of international environmental regulation of particular concern to the E&P activities. This will be followed by a more general overview of the national environmental legal frameworks and industry-specific environmental management practices.

10.3.2 Environmental impact of the petroleum industry

O&G activities always entail certain environmental effects, or impacts, at local, regional and even global level. These impacts vary depending on the type of activity – petroleum E&P, transportation by ships or pipelines, refining, processing of crude oil and gas products and burning of fossil fuels for energy production, as well as its scale, location (onshore or offshore) and the nature and sensitivity of the surrounding environment.

Petroleum E&P activities are accompanied by a variety of operational discharges, some of which are more harmful than others. At the E&P stage, most of
the impact is relatively localized, but may acquire a transboundary dimension in the case, for example, of an offshore development. Seismic operations and exploratory drilling are usually associated with noise, vibration, various disturbances of the local environment – including vegetation and wildlife – soil erosion and changes in surface hydrology. Onshore activities may require construction of roads and vegetation clearance over significant territories. During exploration drilling, discharges are mostly composed of drilling fluids and cuttings, which may contain hydrocarbons and surface-active chemicals. Similarly, produced waters at varying degrees of salinity are discharged. Disposal of waste, atmospheric emissions and discharges of effluents, containing oil, chemicals and other harmful substances is a common environmental problem. These may also contain hydrocarbons and residual treatment fluids. Although impact during this stage of operations is usually relatively minor and confined in terms of time and space, it can be substantial in sensitive areas.

Impact becomes more pronounced during production activities, as this phase involves active recovery of hydrocarbons from producing formations. Operations at the development and production stage often result in increased discharges. This stage is also characterized by growing risks of accidental pollution by oil, soil and water contamination from spillage and leakage.

Rehabilitation, restoration, reinstatement, reclamation of the petroleum E&P sites – including the disposal of offshore oil platforms – are among the most technically and economically serious problems which face the petroleum industry in the long-term perspective. As oil fields approach the end of their productive life, the question of what to do with existing structures has to be addressed. Decommissioning covers: \(a\) cessation of well operations; \(b\) removal of plant and equipment; \(c\) removal or partial removal of any fixed or floating structures; \(d\) removal or stabilization of drill cuttings; \(e\) decommissioning or removal of pipelines; \(f\) and rehabilitation of the seabed, along with any related onshore activities (e.g. recycling or stabilization of waste). Although decommissioning, as such, does not pose serious threats to the environment, abandoned offshore installations can create obstacles for other uses of the sea – primarily navigation and fishing activities – and their complete removal is seen as the best solution in the majority of cases.

At the transportation stage of oil and petroleum products, the operational pollution by discharges of oily waters and drainage from ships, as well as oil spills resulting from collisions or other accidents involving oil tankers is of primary concern. On-land or submarine petroleum pipelines’ construction and operation have the potential for a variety of environmental impacts, from the destruction of habitats and clearance of vegetation during the construction, to oil spillages and leakages resulting from possible pipeline ruptures due to natural and man-related causes. The impact of thousands of construction workers on the local environment during several years of construction can be massive. Trenching for buried submarine pipelines creates major impact on the benthos environment and habitats. Impact on wetlands and surface water bodies may be particularly serious.

At the stage of processing oil and gas, petroleum refineries and petroleum distribution systems generate a series of different kinds of hazardous wastes. Refining operations produce wastes from each step of the refining process: both water and sludges contaminated with petroleum, hazardous waste containing persistent and toxic contaminants, spent catalysts (which often contain heavy-metal constituents), as well as atmospheric emissions such as benzene, toluene and other toxic air pollutants.

Finally, petroleum processing – especially burning of the fossil fuels – is the major source of criteria air pollutants: Particulate Matter (PM), carbon dioxide (\(\text{CO}_2\)), nitrogen oxides (NO\(_x\)), carbon monoxide (\(\text{CO}\)), hydrogen sulphide (H\(_2\)S), and sulphur dioxide (SO\(_2\)). In particular, these emissions lead to two principal environmental problems: long-range transboundary air pollution causing acid rain; and more importantly, global warming as a result of build-up of the so-called greenhouse gases in the atmosphere. The latter is a problem of a truly global proportion, of concern to both international community and global petroleum industry.

Thus, the main environmental media affected by various oil and gas activities include the atmosphere, aquatic environment (both freshwater and marine), terrestrial ecosystems – especially environmentally-sensitive, including wild fauna and flora. The primary sources of atmospheric emissions include combustion processes, gas flaring, fugitive gases from loading operations, and particulates from other burning sources. Waste streams from E&P operations, including produced water, drilling fluids, process and drainage water and so forth affect the aquatic environment. Potential impact on terrestrial ecosystems, including soil, plant and animal communities, arise from construction, contamination as consequence of spills and solid waste disposal, and other physical disturbances. Consequently, various petroleum activities constituting the entire hydrocarbon fuel cycle are exposed to environmental regulations – international and national – that deal
with specific areas of the global environment, such as water, air, biodiversity and others.

10.3.3 International environmental legal frameworks relevant to the petroleum industry

International legal principles

International law plays an increasingly important role in determining the response to the energy-related environmental problems by governments, industry and international institutions. Some basic concepts that emerged at the international level and that have been endorsed in numerous global and regional agreements and accepted at the national level, provide the legal foundation that individual countries and petroleum companies have to follow or take into account while enacting, enforcing or complying with relevant national legislation. These concepts have crystallized into a set of legal principles that are governing the petroleum industry’s operations worldwide.

Sustainable development. This is commonly defined as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Economic development and environmental conservation should be mutually supportive and should be pursued nationally and internationally. The concept of sustainable development calls for integrating environmental considerations into developmental policies, programmes and specific projects. It implies that natural resources should be exploited in a wise or optimal manner. Sustainable development is about ensuring that the petroleum industry contributes lasting benefits to society through the consideration of social, environmental, ethical and economic aspects by maximizing its broader contributions to society while minimizing its negative impacts. While a particular petroleum development may not be sustainable because the reserves will deplete over time, it can still make a valuable contribution to a society’s overall pursuit of sustainable development by creating employment and paying taxes and royalties that can contribute to government services. With respect to non-renewable natural resources, including petroleum, which are finite by definition, a concept of quasi-sustainability has been advanced. In essence, this means, that petroleum development should be aimed at ensuring the maximum recovery of the resource while minimizing adverse effects on the environment. More generally, quasi-sustainability is understood as a compensating investment in a sustainable substitute in such a manner as to provide, at the end of the life of petroleum resources, an annual sustainable yield equal to the income portion of the receipts from petroleum resources (Gao, 1998). The overall objective of this approach is to save a portion of the state’s wealth for future generations by, among other things, creating petroleum trust funds and similar financial mechanisms.

The principle of prevention. Protection of the environment is better achieved by preventing environmental harm than by remediining or compensating for such harm. Not only is harm sometimes irreversible, but preventive measures are usually more effective and less costly than ex post facto action. They are also most efficient when aimed at the sources of environmental impact. The preventive approach is applicable to all actors wherever the consequences of the activities may be felt. This principle does not require the prevention of all possible harm, but rather imposes an obligation to minimize detrimental consequences of permissible activities through regulation. The principle of prevention is usually implemented by means of application of minimum standards (emission controls, emission limit values, environmental quality standards and objectives) or use of the Best Available Techniques (BATs) or Best Environmental Practices (BEPs). BAT is understood as the latest stage of development (state of the art) of processes, facilities or methods of operation, which indicate the practical suitability of a particular measure for limiting emissions and waste. Techniques include both the technology used, and the way in which the installation is designed, built, maintained, operated and dismantled. BEP refers to the application of the most appropriate combination of environmental control measures and strategies. Environmental impact assessments are also widely employed to identify potential threats to the environment so that preventive measures can be taken.

The precautionary principle. Precaution requires taking appropriate action, to anticipate, prevent and monitor the risks of potentially serious or irreversible environmental harm from human activities, even without scientific certainty. The precautionary approach is linked with the principle of prevention, but is designed to apply to a situation of scientific uncertainty by reversing the traditional burden of proof. It calls for action even when there is no full scientific knowledge about the precise degree of risk of potentially serious or irreversible environmental damage. The precautionary principle’s relevance to the petroleum activities is obvious.

The ‘polluter pays’ principle. The costs of preventing, controlling and reducing pollution (harm to the environment) are to be borne by those responsible for causing such harm and the
The European Community environmental legal framework represents probably the most extensive and comprehensive body of environmental principles, rules, standards and procedures at the regional level. While the general objectives and principles of the EC law are set out in the European Community Treaty, the Community policy on the environment has been progressively developed in six action programmes, addressing among other key areas; a) sustainable management of natural resources; b) climate change; c) integrated pollution control and prevention of waste; d) reduction in consumption of non-renewable energy. These policy objectives are reflected in more than 250 environmental directives, regulations and decisions, which affect – either directly or indirectly – the petroleum industry.

Among the most important EC instruments is the 96/61/EC Directive on Integrated Pollution Prevention and Control (IPPC Directive), which is aimed at enforcing an integrated approach to controlling pollution arising from various activities. These include combustion energy installations, mineral oil and gas refineries, chemical installations for the production of simple hydrocarbons, oxygen-containing hydrocarbons, and sulphurous and nitrogenous hydrocarbons. The IPPC Directive establishes a mechanism of pollution control through the system of authorizations and permits based on the concept of BAT. Under the 1985/1997 EIA Directives (Directives 85/337/EEC and 97/11/EC on Environmental Impact Assessment) both up and downstream operations and facilities (petroleum E&P, crude oil refineries, oil and gas pipelines, large thermal power plants, storage installations, and so on) are subject to mandatory assessment.

A wide range of the EC legislative instruments deal with the protection and improvement of various environmental components, such as air, freshwater resources, marine environment, nature and biodiversity, ozone layer, climate change. They also address specific activities, issues or substances of concern, such as industrial plants, sulphur dioxide and nitrogen dioxide, waste disposal and hazardous substances, etc. Suffice it to mention in this respect Directive 94/22/EC on the Conditions for Granting and Using Authorizations for the Prospection, Exploration and Production of Hydrocarbons, or the Directive 84/360/EEC on the Combating of Air Pollution from Industrial Plants.

**International protection of the marine environment**

**General remarks**

There are a large number of global and regional conventions which are primarily applicable to
pollution of the marine environment by oil – either as a result of operational discharges or accidents involving vessels and offshore platforms. International legal regime of pollution prevention by oil and other hazardous substances can be regarded as the most developed and is based on: the 1982 United Nations Convention on the Law Of the Sea (1982 UNCLOS); the 1973/1978 International Convention for the Prevention of Pollution from Ships (known as MARPOL 73/78, MARine POLlution); and some framework regional conventions adopted with respect to specifically defined maritime areas.

The 1982 UNCLOS is an ‘umbrella’ instrument whose primary objective is to create a comprehensive legal regime for the world’s seas and oceans. It aims to apportion rights and obligations among various categories of states, and to serve as a basis for further development of particular rules and standards in combating marine pollution, including pollution arising from navigation and seabed activities. The UNCLOS grants states the sovereign right to exploit their natural resources pursuant to their environmental policies, in accordance with their duty to protect and preserve the marine environment. Part XII of the UNCLOS specifically deals with the protection of the marine environment from various sources, including exploration and production of offshore mineral resources. It requires states to take measures to prevent, reduce and control marine pollution from any source, using the best practical means at their disposal, and applying generally accepted standards, norms and recommended practices and procedures.

Many such standards are contained in the MARPOL 73/78, which is aimed at combating pollution of the marine environment by discharges of harmful substances or effluents containing such substances, including oil. Its primary objective is to prevent and control the vessel-source marine pollution but it also applies to certain environmental aspects of the offshore E&P operations.

Alongside cooperation at global level, regional approaches have proved to be a popular way of dealing with environmental problems of common concern. Frequently, in fact, the appropriate level for environmental action is the regional one, partly because this approach offers the opportunity for custom-built regimes and more stringent legislative standards – as limited membership often implies a higher common denominator. The importance of regional approaches, of course, is recognized in the law of the sea itself. While the 1982 UNCLOS is primarily concerned with establishing a global legal framework governing all aspects of ocean use, it makes express reference to regional rules, programmes and cooperation.

Since the early 1970s a variety of regional treaties and protocols covering distinct maritime areas have evolved to deal with various forms of marine pollution, including pollution from offshore E&P activities. Currently, there are some 20 conventions dealing with marine environmental protection on a regional basis. A regional approach, for example, has been chosen by the states bordering the north-east Atlantic, the Baltic, the Mediterranean and the Black seas, the Persian (Arabian) Gulf, the Red Sea and the Gulf of Aden, the west and central- African region, the east-African region, the east-Asian region, the South Pacific region, the south-east Pacific region, the south-west Atlantic region and so forth. The United Nations Environment Programme (UNEP) in particular, has been instrumental in fostering a regional identity in combating marine pollution through its Regional Seas Programme.

**Operational pollution from petroleum E&P operations**

The 1982 UNCLOS is the principal global instrument which deals with prevention and control of marine pollution, including from land-based sources and offshore petroleum development. Articles 208 and 214 embrace both aspects of anti-pollution measures: regulation and implementation. Coastal states are required to adopt and enforce laws and regulations in respect of marine pollution arising from seabed activities. Such laws and regulations are to be no less effective than international rules, standards and recommended procedures and practices. Similarly, states are called upon to harmonize their policies at the appropriate regional level and to establish global and regional rules to control and prevent marine pollution from offshore installations.

In its Agenda 21, the 1992 UN Rio Conference on Environment and Development (UNCED) expressly referred to the offshore petroleum activities as requiring additional measures to address degradation of the marine environment from discharges and emissions.

The MARPOL 73/78 applies to discharges from both vessels and offshore platforms, specifically to any releases – including “any escape, disposal, spilling, leaking, pumping, emitting or emptying”. However, it does not apply to marine pollution directly resulting from offshore operations, for example, in connection with the use of oil-based drilling muds or leakage of oil during well testing.

Annex I of the MARPOL 73/78, which deals with pollution by oil, applies to machinery space drainage from drilling rigs and other platforms. As to offshore processing drainage, production water discharge and displacement discharge, there are currently no global
rules or standards applicable to these effluents. Such discharges are partly dealt with by regional conventional regimes and partly by national regulations, which often apply different standards.

Protection of the marine environment against pollution by garbage is governed by Annex V, which equally applies to vessels and offshore installations. It contains special provisions concerning fixed or floating platforms engaged in the exploration, exploitation and associated processing of seabed mineral resources.

Finally, Annex VI on air pollution sets limits on sulphur oxide and nitrogen oxide emissions from ship and platform exhausts and prohibits deliberate emissions of ozone-depleting substances.

While practically all regional conventions establish general provisions concerning pollution from, or in connection with, seabed activities, some have been supplemented by protocols and subordinate instruments which address the offshore E&P activities. Certain regional regimes, especially those in the maritime areas with significant hydrocarbon activities, current or potential, establish detailed regulations. These include the Baltic Sea, the north-east Atlantic, the Persian (Arabian) Gulf and the Mediterranean Sea.

In the 1992 Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention), the general obligation to take all measures to prevent pollution of the marine environment – resulting from exploration and exploitation of the seabed and the subsoil or from any associated activities – is elaborated in Annex VI, which constitutes an integral part of the Convention. It sets out relatively detailed procedures and measures to be realized by states with respect to offshore petroleum operations conducted in the areas under their jurisdiction. This procedure addresses a wide range of issues, including implementation of BAT and BEP, EIA and monitoring, discharges in the phases of exploration and exploitation, reporting and exchange of information, as well as contingency planning and abandonment. Annex VI contains a number of provisions regulating operational discharges from offshore platforms in both the exploration and exploitation phases which apply primarily to oil-containing discharges. Provisions of Annex IV, which deal with discharges of garbage and sewage, also apply to offshore platforms.

The 1992 Convention for the Protection of the Marine Environment of the north-east Atlantic (1992 OSPAR, OSlo PARiks Convention) has a special Annex III dealing with the prevention and elimination of pollution from offshore sources. However, compared to other similar regional instruments, it does not provide any technical requirements and standards, but rather relatively general rules and concepts, which, apparently, are to be further developed through the decisions and recommendations of the OSPAR Commission, entrusted with development of programmes and measures for the elimination and reduction of marine pollution. The regulations adopted by the OSPAR Commission cover most of the important aspects of direct operational pollution: production of oily waters and drilling muds and drilling cuttings. Much of the regulatory work of the OSPAR Commission, with regard to the reduction of discharges of oil from offshore installations, has been conducted by the Offshore Industry Committee.

Annex III of the 1992 OSPAR Convention prohibits any dumping of wastes or other matter from offshore installations, which does not apply, however, to discharges and emissions. It is provided instead, that the use in offshore sources, or the discharge or emission from them, of substances – which may reach and affect the maritime area – must be strictly subject to the authorization or regulation by the competent authorities of state parties. It is evident that the OSPAR Commission will continue to play the most important role in developing appropriate standards and regulations related to offshore activities.

The 1976 Kuwait Regional Convention for Cooperation in the Protection of the Marine Environment (1976 Kuwait Convention) has some general provisions on pollution resulting from exploration and exploitation of the continental shelf, and a special protocol concerning marine pollution resulting from exploration and exploitation of the continental shelf (1989 Protocol). The latter requires that measures against marine pollution from offshore operations be taken on the basis of “the best available and economically feasible technology”. The Protocol contains a broad range of pollution-prevention measures, from the licensing system and EIA, to specific regulations of discharges of oil and oily waters, oil-based drilling fluids, water-based drilling muds, chemical substances, garbage and sewage.

The 1994 Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil is the most elaborate document of its kind. The 1994 Protocol sets out detailed provisions regarding authorization of offshore exploration and exploitation operations, regulation of operational pollution, safety measures and emergency situations, removal of installations, specially protected areas, and so forth.

To summarize, despite the importance of offshore hydrocarbon reserves and the growing attention being given to the environmental impacts of offshore E&P...
activities – particularly as regards waste management – there is presently no global regime regulating the entire spectrum of operational pollution from offshore oil and gas E&P activities. Instead, a combination of general instruments, both in the form of hard law and soft law, as well as technical regulations and standards, supplemented by more specific regional instruments, represents a constantly evolving legal framework for controlling and abating this type of marine pollution.

**Accidental pollution by oil**

Legal instruments which govern accidental pollution response and cooperation do not, as a rule, distinguish between various types of potentially hazardous activities and emergency situations. The term *emergency* is generally used to define any situation which causes, or poses, a imminent threat of seriously harming the environment or other legitimate interests of other states or areas beyond national jurisdiction. Substantial international legal practice has developed over the last decades to deal with accidental pollution. The main objective of most of the relevant international instruments is to harmonize national oil pollution response policies and procedures, primarily through unification of state contingency planning and improving preparedness to emergency situations.

The 1982 UNCLOS addresses the accidental pollution connected with offshore activities in a very general manner. The states are required to take measures in order to minimize – to the fullest extent possible – pollution from offshore installations, with particular emphasis being accorded to measures “for preventing accidents and dealing with emergencies”. In the area affected by imminent or actual damage, they should cooperate in eliminating the effects of pollution and preventing, or minimizing, the damage through the promotion and joint development of Contingency Plans (CPs). This is seen as the most effective means to tackle this type of pollution.

Adopted under the auspices of the International Maritime Organization (IMO), the 1990 International Convention on Oil pollution Preparedness, Response and Cooperation (OPRC), is the only global international instrument of this kind. Its overall objective was to create a basis for international cooperation in responding to pollution emergencies as well as to enhance existing national, regional and global capabilities concerning pollution preparedness and response, to facilitate mutual assistance, and to develop and maintain adequate organizational and technical infrastructures. The Convention deals exclusively with emergencies involving pollution by petroleum in any form, including crude oil, fuel oil, sludge, oil refuse and refined products. Offshore petroleum platforms are covered by the conventional regime, in addition to ships and other oil-related facilities.

Under the convention, states – subject to their capabilities and availability of relevant resources – are required to cooperate and to render assistance to parties that request such assistance in cases of pollution incidents. The Convention requires that parties establish national systems for responding to oil pollution incidents, including, as a basic minimum: a national CP; designated national authorities; and operational contact points in charge of oil pollution response. Parties – either individually or through cooperation with other states and, as appropriate, other relevant entities, including the oil industry – are required to establish:

- A minimum level of pre-positioned oil spill combating equipment, proportionate to the risk involved, and programmes for its use.
- Programme of exercises for oil pollution response organizations and training of relevant personnel.
- Detailed plans and communication capabilities for responding to oil pollution incidents.
- A mechanism or arrangement to coordinate the response to oil pollution incidents with, if appropriate, the capabilities to mobilize the resources.

In addition, the Convention requires that operators of offshore units have oil pollution emergency plans, which are coordinated with the national system for preparedness and response, and approved in accordance with established procedures. Those in charge of offshore installations are to report without delay about any event on their unit or any event at sea involving a discharge of oil or the presence of oil to the coastal state to whose jurisdiction this unit is subject.

A special role under the OPRC Convention is assigned to the IMO. The IMO provides general guidance for states, and oil and shipping industries, assisting them in creating an organizational framework and preparing CPs at the local, national and international levels. The most important condition for the establishment and sustainable functioning of an effective oil pollution response system is close cooperation between the oil and shipping industries and governments. This interrelationship is reflected in two planning approaches that currently co-exist in the international arena: the international industry’s concept of a tiered response; and governmental arrangements at the local, national and international levels.

Tiered response has been accepted as an operational concept that provides a convenient categorization of response levels, corresponding to the severity of the spill, and a practical basis for planning.
Governmental measures regarding preparedness and response are grouped as well. Group 1 normally encompasses the entire national response system with the national CP as the basic document that defines the national response policy. Group 2 consists of bilateral or multilateral response plans or agreements with other countries as well as with competent regional bodies. Such multilateral arrangements have already been developed for the Baltic and North seas as well as for some maritime regions covered by the UNEP Regional Seas Programme. Finally, group 3 is the network of inter-regional plans or agreements. This includes the operation of the IMO Oil Pollution Coordination Centre and relationships, both formal and informal, among the various regional bodies worldwide.

The importance of effective regional arrangements and response systems with respect to accidental pollution is evident, as usually more than one coastal state suffers from accidental pollution. No country, regardless of its individual capability, can sustain the level of equipment and personnel necessary in the worst-case spill. These arrangements are similar in many respects. The North Sea and north-east Atlantic contingency agreements, the contingency measures with respect to the Baltic Sea and the UNEP regional seas framework conventions and supplementary protocols are particularly instructive in this respect.

The 1983 Bonn Agreement for Cooperation in dealing with Pollution of the North Sea by Oil and Other Harmful Substances – which replaced an earlier 1969 Bonn Agreement – covers accidental pollution from offshore installations presenting a grave and imminent danger to the coast or related interests. It promotes an active cooperation through a two-dimensional approach, which combines preparatory and organizational cooperation as well as cooperation following the casualty. It was the first agreement to introduce the principle of allocation of zones of responsibility, which was eventually incorporated into other analogous agreements. The pollution emergency preparedness and response measures applicable to the Baltic Sea area are very similar to those related to the North Sea with one exception: they constitute an integral part of a comprehensive anti-pollution instrument – the 1992 Helsinki Convention on the Protection of the Marine Environment. The numerous conventions adopted within the scope of the UNEP Regional Seas Programme are almost identical in their approach to pollution emergencies.

Supplemental protocols dealing with pollution emergencies are very similar, both in terms of their structure and the substantive content of their provisions. They define procedures of information exchange and reporting in cases of emergency pollution as well as providing guidelines for respective reports. In addition, they call for the maintenance and promotion of national and, if necessary, regional and sub-regional plans, providing for mutual assistance of parties and, in certain cases, determine how and on what conditions such assistance should be conducted. Finally, the protocols establish certain institutional arrangements, including the creation of special regional mechanisms charged with emergency communications and collecting and disseminating information, coordinating of national response activities, and in some cases, initiating clean-up operations at the regional level.

Finally, two regional protocols on seabed activities add considerably to the body of international law dealing with pollution emergency – the 1989 Kuwait Protocol and the 1994 Mediterranean Protocol. Among other provisions, the Protocols contain regulations specifically tailored to pollution-emergency prevention and response involving offshore installations. The state parties are required, inter alia, to ensure that every offshore installation which is to be used within their jurisdiction is properly certified for safety, in order to guarantee that it will not cause accidental damage to the marine environment. No offshore operations may begin without a CP approved by a competent national authority and coordinated with existing national or local CPs. The respective roles and powers of the industry and the authorities should be fully understood before any oil spill emergency arises and explicitly allocated in the operator’s CP as well as in any local and national CP. Offshore operators are required at all times to have available, and in good working order, “equipment and devices to minimize the risk of accidental pollution and to facilitate prompt response to a pollution emergency, in accordance with good oilfield practice”.

Along with global and regional contingency arrangements, some maritime areas are covered by bilateral CPs, based on agreements between the two coastal states concerned, such as between the United States and Canada of 1974 and 1977, and between the US and Mexico of 1980. The number of bilateral arrangements is relatively small, and they are applied predominantly to sensitive areas, such as the Arctic, or to areas intensively used for international navigation or offshore petroleum production. Not surprisingly, such CPs are more comprehensive and detailed than their regional analogies as it is easier to achieve an effective degree of coordination on a bilateral, rather than multilateral, level.

Such bilateral CPs include, inter alia, NorBritPlan between the United Kingdom and Norway with respect to the North Sea, DenGer between Denmark and
The question of abandonment/removal of decommissioned offshore installations has turned into a problem of practical concern with the aging of some early offshore petroleum production areas. How this problem is to be resolved will be determined in many respects by the applicable international legal framework, based on a number of global and regional agreements, soft law instruments and relevant state practice.

The 1958 Geneva Convention on the Continental Shelf was the first international instrument which addressed the issue of abandonment. It requires generally that the exploration and exploitation of the continental shelf must not result in any “unjustifiable interference” with other activities in the sea. Whereas the construction and exploitation of installations are subject to this general provision, the issue of abandonment is specifically addressed in art. 5.5, which provides that “[a]ny installations which are abandoned or disused must be entirely removed”.

The 1982 UNCLOS contains substantially differing provisions on the same matter in art. 60.3. Under the new formula, the requirement of a complete removal is not absolute. In certain cases, partial removal is permitted, provided that appropriate publicity is given to the depth, position and dimensions of the remains. The criteria relevant to determining the extent of this partial removal include the obligation to ensure safety of navigation and due regard to fishing, the protection of the marine environment, and the rights and duties of other states.

As to the possible conflict of legal obligations stemming from art. 60.3 of the UNCLOS vis-à-vis the complete removal requirement of the 1958 Geneva Convention, the issue must be considered depending on the ‘participating’ status of states concerned. For those states which are party to the UNCLOS, the latter prevails, as between states parties, over the 1958 Geneva Conventions on the Law of the Sea. Given that the overwhelming majority of states are now party to the 1982 UNCLOS, provisions of the 1958 Continental Shelf Convention should be seen as redundant. The post-Geneva development of international law in the field indicates a major shift in the state practice, from the requirement of absolute removal towards a more flexible approach regarding abandonment.

This conclusion is supported by the IMO 1989 Guidelines and Standards on the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone (EEZ). Although the IMO guidelines and standards are not binding, their authority makes them more than mere recommendations. The IMO Guidelines reiterate the partial removal approach embodied in the UNCLOS. The states are requested to entirely remove all disused installations and structures, except where non- or partial removal is consistent with the guidelines and standards. The removal operation should be performed as soon as is reasonably practicable after abandonment or permanent disuse, and the IMO should be notified of any installations or structures not entirely removed.

A case-by-case approach is promoted in order to determine such special circumstances which may allow an offshore installation or part of it to remain in situ. Evaluation of the following factors is particularly important:

- Any potential effect on the safety of surface or sub-surface navigation, or other uses of the sea.
- The rate of deterioration of the material and its present and possible future effect on the marine environment.
- The potential effect on the marine environment, including living resources.
- The risk that the material will shift from its position at some future time.
- The costs, technical feasibility, and risks of injury to personnel associated with removal of the installation or structure.
- The determination of a new use or other reasonable justification for allowing the installation or structure or parts thereof to remain on the seabed.

The IMO Guidelines provide for the entire removal of all abandoned or disused installations standing in less than 75 metres of water and weighing less than 4,000 tons in air, excluding deck and superstructure. The same requirement applies to all installations and structures placed on the seabed on or after 1 January 1998 standing in less than 1,000 metres of water and weighing less than 4,000 tons.

The complete removal requirement is qualified by two exception clauses, based on certain factors. The first allows a coastal state not to remove disused installations when they will serve a new use if permitted to remain wholly or partially in place on the seabed. The second gives a coastal state a right to determine whether a complete removal of a platform is technically feasible, extremely costly or likely to

1 Emphasis added by the Author.
create an unacceptable risk to personnel or the marine environment. In addition, existing platforms in water depths of greater than 75 metres or weighing more than 4,000 tons can be wholly or partially left in place where it is determined by the coastal state that they do not cause unjustifiable interference with other uses of the sea. Importantly, the IMO Guidelines require that no installations should be placed on the continental shelf or in the EEZ after 1 January 1998 unless the design and construction of such an installation permits its entire removal.

Other requirements of the IMO recommendations include:

- Adequate maintenance of abandoned or disused installations or their parts, projecting above the surface of the sea, in order to prevent their structural failure.
- Provision of an unobstructed water column (no less than 55 m) sufficient to ensure safety of navigation above any partially removed installation that does not project above the surface of the sea.
- Complete removal (without any exceptions) of any installations located in approaches to or in straits or routes used for international navigation.
- Indication of abandoned parts on nautical charts and their proper marking, where necessary, with aids to navigation.

Finally, states must ensure that legal title to installations which have not been entirely removed is unambiguous and that responsibility for maintenance and the financial ability to assume liability for future damages are clearly established.

From a technical point of view, the IMO Guidelines constitute a well-balanced document reflecting the best solutions of the problem of abandonment currently available. From the legal point of view, however, they do not have the status of international norms creating obligations for states. Obviously, nothing can preclude states from adopting and implementing the IMO Guidelines in their domestic practice and legislation. However, they cannot prevail over existing treaty obligations, unless they are transformed into law through proper legal procedures or accepted as a rule of general international law by state practice.

Parallel to these global conventional regimes, the issue of abandonment has been addressed on a regional level, particularly in oil-rich maritime regions. Among numerous conventional regimes, those related to the north-east Atlantic, the Mediterranean and the Persian/Arab Gulf regions are of particular interest in this respect. Additional protocols on offshore E&P activities, such as the 1994 Mediterranean Sea Protocol, along with other matters, address the issue of abandonment.

The 1994 Protocol does not request the complete removal of abandoned or disused offshore installations and pipelines. While the operator is in principle required to remove any installation which is abandoned or disused, this is qualified by the reference to the guidelines and standards adopted by the competent international organization such as IMO. Provisions regarding disused pipelines are even less stringent: they can be left in place – abandoned or buried – under the condition that they neither cause pollution, nor interfere with other legitimate uses of the sea.

The 1989 Kuwait Protocol only obliges the parties to empower their competent national authorities with the right to require the operator of an offshore installation (platform or other seabed apparatus and structures) to remove the installation in whole or in part to ensure the safety of navigation and in the interests of fishing. In the case of pipelines, the operators may be requested to flush and remove any residual pollutants from the pipeline, and to bury the pipeline, or remove part and bury the remaining parts. The Protocol calls for the states parties to adopt a common policy on the removal, but only when they have a common interest in fishing grounds in the conventional area. It further requires states, while determining whether or not installations should be removed, to take into account any guidelines issued by their regional organization.

### Regulation of the disposal of offshore installations as a form of dumping

Parallel to the removal regimes, there is a body of international norms and standards governing disposal of offshore installations as a form of dumping at sea. “It is to these rules rather than those on removal that reference must be made in assessing the legality of such operations as the disposal of concrete platforms by towing them to a deep-water dumping site, or the on-site ‘felling’ of steel platforms in such a way that no part of them would remain at a height above the seabed of more than that prescribed by international standards” (Brown, 1992).

The 1982 UNCLOS deals with the issue of offshore disposal in a very general manner. It obliges states to adopt global and regional rules, standards and recommended practices and procedures as well as national laws and regulations to prevent, reduce and control pollution of the marine environment by dumping and to take other necessary measures in this respect. Dumping is not to be carried out without the permission of the competent authorities of states. The express prior approval of the coastal state is required, if the dumping is to be carried out within the territorial sea, EEZ, or onto the continental shelf of the latter. Dumping includes, among other things,
any deliberate disposal of platforms or other man-made structures at sea.

The 1972 London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972 LDC) is another global instrument directly related to the issue of abandonment. It is applicable to all marine areas except the internal waters of a coastal state. The 1972 LDC permits dumping to be carried out provided certain conditions are met. The severity of these conditions varies according to the danger to the environment presented by the materials themselves and there is a ‘black list’ containing materials which may not be dumped at all.

Although the Convention does not apply to the dumping of wastes or other matter from offshore installations, the abandonment of installations at sea, either total or partial, is clearly covered. Disposal of the platform requires a prior special permit. This permit may be issued only after careful consideration of all relevant factors, including the characteristics of the dumping site, possible effects of the dumping on amenities, marine life and other uses of the sea, and the practical availability of alternative land-based methods of disposal.

The 1996 London Dumping Protocol, which upon its entry into force (in March 2006) has replaced the 1972 LDC, represents a major change of approach to the question of how to regulate the use of the sea as a depository for waste materials. One of the most important innovations is the introduction of the precautionary approach. The 1996 Protocol is much more restrictive than the 1972 LDC, prohibiting in principle all dumping. There are a few exceptions to this which include platforms or other man-made structures at sea. The contracting parties are required to designate an appropriate authority or authorities to issue permits in accordance with the Protocol. The Protocol recognizes the importance of implementation and detail compliance procedures.

Among several regional conventions particularly relevant in this respect is the 1992 Convention for the Protection of the Marine Environment of the north-east Atlantic (1992 OSPAR Convention) which replaced an earlier 1972 Oslo Dumping Convention. The 1992 OSPAR Convention does not prohibit dumping, but obliges parties to take all possible steps to prevent and eliminate pollution by dumping, which also applies to dumping of offshore installations and offshore pipelines. However, dumping does not include the leaving in place – wholly or partly – of a disused offshore installation or disused offshore pipeline, provided that any such operation takes place in accordance with any relevant provision of the Convention and with other relevant international law. Annex II, which deals specifically with dumping and incineration, does not apply to any deliberate disposal in the maritime area of offshore installations and offshore pipelines, referring this matter to Annex III. The central provision of the latter is art. 5 which provides inter alia:

- No disused offshore installation or disused offshore pipeline shall be dumped and no disused offshore installation shall be left wholly or partly in place in the maritime area without a permit issued by the competent authority of the relevant contracting party on a case-by-case basis.
- No such permit shall be issued if the disused offshore installation or disused offshore pipeline contains hazardous substances which may result in harm to living resources and marine ecosystems, damage to amenities or interference with other legitimate uses of the sea.
- Any contracting party which intends to take the decision to issue a permit for the dumping of a disused offshore installation or a disused offshore pipeline placed in the maritime area after 1 January 1998 shall, through the medium of the Commission, inform other contracting parties of its reasons for accepting such dumping, in order to make consultation possible.

Thus, the OSPAR Convention distinguishes between the disposal in situ or elsewhere at sea – considered as dumping – and leaving the installation in place. However, notwithstanding the fact that it is defined as a case of dumping, disposal at sea is excluded from the scope of the Dumping Annex and is subjected to the same regime as leaving in place. This is a symptomatic departure from traditional and somewhat confusing dualistic approach to abandonment – complete or partial removal vis-à-vis dumping – towards an all-inclusive model, evidently designed to avoid the potential for conflicting regulations.

The OSPAR Convention adopts the same case-by-case approach in determining admissibility of such a disposal as was introduced in the IMO Guidelines. Other regional dumping agreements also apply to the disposal of platforms and other man-made structures at sea and their equipment, which is not entirely prohibited but requires a prior authorization by a special national body in charge of these matters. Issuance of such permits is dependent upon consideration of relevant factors, including characteristics of the matter, of dumping site and disposal method, as well as possible effects of disposal on amenities, marine life and other uses of the sea.

**Protection of the global atmosphere**

One of the negative environmental impacts of the petroleum industry is pollution of the atmosphere as a
result of normal E&P operations and more generally as a consequence of the combustion of fossil fuels and vehicle exhaust emissions. A number of international treaties, both global and regional, dealing with these problems are of concern to the O&G industry. The major risk to the global atmosphere comes from the so-called GreenHouse Gases (GHG), namely carbon dioxide and methane, one of the principal sources of which is burning of fossil fuels, including petroleum. The 1992 UN Framework Convention on Climate Change (FCCC) has as its primary objective to stabilize concentrations of GHG in the atmosphere. The Convention sets out a series of general principles on the protection of the Earth’s atmosphere, such as the requirement of precautionary measures to be taken to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. The FCCC obliges all parties to develop national inventories of anthropogenic emissions by sources of GHG. Similarly, parties are to implement national programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources. Although the FCCC does not provide for specific requirements applicable to atmospheric emissions from petroleum activities, it has prompted a process of review and rule-making regarding GHG emissions, for example, from gas flaring. Some countries have introduced carbon taxes to curb energy use and emissions from oil and gas installations.

An additional 1997 Kyoto Protocol to the FCCC establishes stronger and more concrete measures, especially for developed countries, which include quantified objectives for GHG emissions limitation and removal by sinks within a specific timescale. These are intended to ensure that overall emissions from industrialized nations are reduced to at least 5% below 1990 levels within the period 2008 to 2012.

The 1985 Vienna Convention for the Protection of the Ozone Layer and its 1987 Montreal Protocol is another global regime effectively addressing production and as a consequence, the releasing into the atmosphere of ozone-depleting substances. Its ultimate objective is to significantly reduce and eventually eliminate production and consumption of controlled substances by setting firm targets, timetables for their phase-out and other measures, such as technical and financial incentives.

At the regional level, protection of the atmosphere has been dealt with in the context of prevention and reduction of transboundary air pollution. The 1979 UNECE Convention on Long-Range Transboundary Air Pollution and its eight Protocols have created the essential framework for controlling and reducing the damage to human health and the environment caused by emissions of a range of air pollutants. Both the Convention and some of the Protocols are quite important from the petroleum industry perspective. The 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone sets emission ceilings for four pollutants for 2010: sulphur, NOx, VOCs and ammonia. The Protocol also sets tight limit values for specific emission sources, including combustion plants, and requires BAT to be used to keep emissions down. The 1998 Protocol on Persistent Organic Pollutants (POPs) focuses on a list of 16 substances that have been singled out according to agreed risk criteria. The ultimate objective is to eliminate any discharges, emissions and losses of POPs by prohibiting the production and use of some products outright and scheduled elimination of the others at a later stage. The Protocol includes provisions for dealing with the wastes of products that will be banned. The 1994 Protocol on Further Reduction of Sulphur Emissions uses an effects-based approach, the critical-load concept, energy savings and the application of BAT and economic instruments. Finally, the 1991 Protocol on the Control of Emissions of Volatile Organic Compounds (VOCs, i.e. hydrocarbons) or Their Transboundary Fluxes, aims at reducing emissions of the second major air pollutant responsible for the formation of ground-level ozone.

Obviously, the legal regime for climate change established by the FCCC and its Kyoto Protocol is of particular relevance for the petroleum industry in the context of atmospheric GHG emissions, mainly as a result of gas flaring. It may require specific programmes and measures to be adopted to address this aspect of petroleum operations. But it may also have much broader implications for the industry by increasing pressure to develop sources of energy other than fossil fuels.

**Protection of biological diversity**

Similar to the climate change regime, a comprehensive global legal framework aimed at protecting biological diversity, natural habitats and wildlife species may have significant impact on the petroleum industry by limiting the availability of areas for exploration and production. Of particular interest in this respect are the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, the 1971 Ramsar Convention on Wetlands of International Importance, and especially the 1992 UN Convention on Biological Diversity (CBD).

The primary objectives of the latter are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Parties to the Convention must
establish national conservation plans, including components of biological diversity important for its conservation and sustainable use. Those activities which have, or are likely to have, significant adverse impacts on the conservation and sustainable use of biological diversity, require proper monitoring. The CBD promotes in situ conservation through the establishment of protected areas, regulation or management of biological resources important for the conservation of biodiversity and rehabilitation and restoration of degraded ecosystems. The contracting parties are required to take measures to implement environmental impact assessment requirements and thereby minimize adverse impacts. The Biodiversity Convention is primarily of contextual relevance to petroleum E&P operations. It has no operational provisions. However, it is likely to add to pressures to ban or, at least, to subject E&P to more stringent conditions in sensitive areas.

There are also a number of regional nature conservation regimes in different parts of the world likely to influence the conduct of petroleum operations. In the European context, the following EC directives are of particular importance: Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment and Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna (the Habitat Directive).

10.3.4 Soft law relevant to the petroleum industry

Alongside global regulatory instruments (hard law), soft law plays an increasingly important role in regulating the oil and gas activities. Soft law consists of non-binding instruments, such as international declarations, recommendations and government and industry guidelines that may potentially evolve into binding legal standards. From this perspective, soft law is a valuable addition to hard law, particularly as it can capture emerging notions of international public order thus helping to extend the realm of legitimate international concern to matters of previously exclusive national jurisdiction.

The soft law type instruments include the 1992 Rio Declaration on Environment and Development. Soft law instruments of relevance to petroleum activities embrace a relatively numerous group of guidelines and recommendations issued by competent international organizations. These include IMO and UNEP international financial institutions such as the World Bank and a variety of non-governmental organizations such as the International Association of Oil and Gas Producers (OGP – formerly the Oil Industry International E&P Forum) and the World Conservation Union (IUCN, International Union for the Conservation of Nature and natural resources).

One example is the 1982 UNEP Guidelines related to offshore mining and drilling – a non-binding instrument which sets out general directives to be adhered to by states in their national legislation or international arrangements. Along with some general provisions, the Guidelines contain specific recommendations concerning the authorization of offshore operations, environmental assessment and monitoring systems, possible transfrontier environmental impact and procedures for information and consultation, safety measures, contingency planning and implementation measures, as well as liability and compensation.

The World Bank has prepared detailed EIA requirements and criteria (in the form of Environmental Assessment Sourcebook) for environmental protection in specific industrial sectors, as well as offshore E&P activities. The World Bank’s Pollution prevention and abatement handbook 1998 provides guidelines (Oil and gas development – Onshore) for onshore oil and gas operations (World Bank, 1998). They establish maximum levels for liquid effluents, air emissions and noise levels; describe industry practices and processes used to reduce and control pollution; and make recommendations for monitoring and reporting.

In addition to the recommendations of UNEP and the World Bank, the E&P industry itself provides guidance to its members. Foremost among the various oil industry groupings at international level is OGP, the recommendations of which are particularly influential. The organization represents the international O&G industry on technical and regulatory issues, and has been promoting measures to improve the environmental record of the industry. As part of its mandate, OGP disseminates information on good practice through the development of industry guidelines, codes of practice, checklists and so forth. Some of these have been prepared jointly with the World Conservation Union and UNEP.

To date, guidelines have been prepared on a wide range of topics such as operations in tropical rainforests, waste management, decommissioning, operations in mangrove areas and disposal of wastes and produced water. OGP has published guidance on methods for estimating atmospheric emissions from E&P activities and from operations in Arctic onshore and offshore areas. These recommendations aim to establish and disseminate internationally acceptable standards, practices and procedures on environmental protection in petroleum E&P activities. To this end,
they set out requirements for environmental management systems and planning, and identify potential impacts and environmental control measures. For example, they call for the performance of an EIA prior to commencement of activities. Similarly, OGP has produced a number of reports and guidelines on the safety aspects of offshore platform decommissioning options. It has also issued Health, Safety and Environmental Management Systems (HSE-MS) guidelines, which are consistent with the International Standard Organization (ISO) 14000 Environmental Management System (EMS) series. These too, have proved popular with the international E&P industry.

ISO 14000 is a series of international standards on environmental management. It provides a framework for the development of an environmental management system and the supporting audit programme. The main thrust for its development came as a result of the Rio Conference on the Environment Development held in 1992. ISO 14001 is the cornerstone standard of the ISO 14000 series. It specifies a framework of control for an EMS against which an organization can be certified by a third party. The ISO 14000 series does not set binding environmental standards. Rather, it is designed as a tool to ensure compliance with legal requirements.

The International Association of oil Geophysical Contractors (IAGC) has issued environmental guidelines, which touch upon offshore operations.

Some national oil industry organizations are also active in promoting best environmental management practices by adopting their own codes and guidelines. These include but are not limited to, the following: American Petroleum Institute (API); American National Standards Institute (ANSI); American Society of Mechanical Engineers (ASME); British Standards Institute (BSI); Catalogue of European Standards (CEN); Deutsche Institut für Normung (DIN); (the British) Institute of Petroleum (IP).

For example, the API, through its Environmental Stewardship Programme, developed Environmental and Safety Mission and Guiding Principles, which are binding for all API members. Equally important is the 1995 API Guideline for Onshore O&G Production Practices for Protection of the Environment.

There is no one single set of internationally accepted technical standards or norms applicable to environmental protection in the petroleum industry. Most of the existing standards and recommended practices and procedures are usually established and applied at the domestic level. Although international practice in this field remains inconsistent, there is a growing uniformity in terms of the content and application of environmental standards by the global O&G industry and individual governments.

Notwithstanding the fact that the soft law instruments are largely recommendations and qualitative in nature, the various guidelines, especially those issued by organizations such as UNEP, the World Bank, OGP and IUCN, are increasingly influential. While often not compulsory for individual operators, these instruments are of growing importance worldwide and, with time, evolve into legally binding standards through national practice or international standard-setting. Certain commonly used standards can be acceptable to, or adopted by, parties to international agreements or project-specific arrangements. Some countries, especially developing, which as yet lack industry-specific standards and regulations, provide for the application of relevant international standards in their domestic legislation.

10.3.5 National legal frameworks

Environmental norms and standards applicable to O&G activities are contained in a variety of national laws. On the one hand, practically all countries have general environment protection acts which provide a broad legal foundation for more specific legislation dealing with such matters as EIA, planning, pollution, quality of air and water resources, protection of the marine environment, conservation of biodiversity, protected areas, and so forth. These legal acts are without doubt relevant to petroleum activities and often impose on such operations – directly or indirectly – specific conditions, requirements and constraints. On the other hand, a number of states have enacted more specific petroleum-related legislation, often containing provisions addressing environmental matters and concerns. Although such petroleum acts rarely contain concrete environmental standards, they provide a basis for subordinate normative regulations.

In terms of environmental regulation of O&G activities, three major prevailing regulatory models have been identified: the statutory approach; the contractual approach; and the integrated legislative approach (Gao, 1998).

The first, represented primarily by US and UK legislation, is characterized by a multitude of statutes and other normative acts containing relevant environmental regulations, norms and standards. The US legal framework for O&G activities, where the 1990 Oil Pollution Act is perhaps the most significant piece of legislation, is fragmented and does not constitute a uniform body of environmental regulatory rules.

The contractual approach is a mode of environmental regulation through provisions in petroleum contracts, which is typical primarily for
developing countries where there is a lack of comprehensive environmental and petroleum legislation or where the legal infrastructure is incomplete. One example where such an approach has been successfully employed is the 1994 Agreement on the Joint Development and Production Sharing between the state oil company of Azerbaijan and a consortium of international oil companies, which was subsequently approved by the Parliament of Azerbaijan and acquired the status of national law. Environmental provisions of this Agreement are very specific and in effect have an overriding force over relevant national legislation. They cover the entire range of environmental aspects of E&P operations, from the requirements related to the conduct of operations, emergencies, monitoring, environmental damage to concrete environmental standards and practices, including guidelines regarding discharges of effluents, air emissions, drilling cuttings and fluids, waste, etc. It can be concluded that with environmental requirement established through contractual obligations, such agreements may bear a heavier responsibility for environmental protection than national legislation.

Another model, described as an integrated or comprehensive legislative approach (Gao, 1998), has emerged as a result of the adoption of framework type legislation specifically for petroleum activities. Legislation of some Latin American countries provides the best illustrations of this model. In a few of them, this legislation complements general environment protection acts and national environmental action plans. This new generation of petroleum-specific legislation includes, for example, Argentina’s 1992 Resolution on the Protection of the Environment during Exploration and Exploitation of Hydrocarbons, the 1993 Regulation on Environmental Protection in Hydrocarbons Activities of Peru, the 1995 Presidential Decree on Environmental Regulation Concerning Hydrocarbon Activities of Ecuador, and the 1996 Environmental Regulation for the Hydrocarbons’ Sector of Bolivia.

The common feature of the industry-specific regulations is that they set out detailed operational requirements for the various phases of E&P activities. This new generation of environmental regulations represents the beginning of what appears to be a growing trend towards the creation of an integrated, industry-specific legislative framework for the oil and gas E&P sector (Wagner, 1998).

Notwithstanding evident variations in structuring petroleum-related environmental legal frameworks in different countries, they have many common characteristics in terms of both the content of applicable standards and regulatory and management tools employed. These will be briefly discussed further.

### 10.3.6 Environmental management tools

While in the recent past the environment-related provisions of national legislation and contractual arrangements mainly relied on traditional concepts such as good oil field practice, due diligence, or sound technical and engineering principles, these have been increasingly replaced by a new generation of environmental management and control mechanisms. The new management tools include standards setting and command control as well as operational procedures and practices.

Those applicable to the petroleum industry are usually divided into several categories of technical and environmental requirements. The first group generally includes standards dealing with equipment and product, such as construction requirements for onshore and offshore platforms, storage tanks, pipelines and other industrial facilities. The second group deals with various environmental impacts such as limits on discharges and emissions, methods of waste disposal, management of chemicals used in E&P operations, and so forth. Finally, there are standards and procedures adopted to assist the petroleum operators in improving their environmental performance. These include various environmental management procedures and systems, such as EIA, EMS, Environmental Performance Evaluation (EPE), Environmental Management Plans and programmes (EMP), Environmental Monitoring and Evaluation (EM&E), environmental auditing and environmental reporting, some of which will be considered below.

**Environmental impact assessment**: This is generally described as a systematic process of detailed appraisal of the environmental consequences of the proposed activities and their alternatives to be used in guiding decision-making. Increasingly, the EIA procedure is combined with the assessment of socio-economic consequences of the planned activity – the so-called Social Impact Assessment (SIA). The principal elements of EIA usually include baseline environmental study, impact prediction, mitigation measures, Environmental Impact Statement (EIS) or IEA (International Energy Agency) report, public participation and review, decision and post-project analysis. The EIA requirements are contained in numerous global and regional agreements, such as the 1991 UNECE Convention on Environmental Impact Assessment in a Transboundary Context, as well as recommended by the World Bank in its Environmental...
Assessment Sourcebook and petroleum industry organizations (e.g. the OGP Principles for Impact Assessment: The Environmental and Social Dimension).

Environmental management plan. This is another important instrument, which is usually based on EIA. Among other things, it identifies the company’s environmental policy and objectives, provides detailed information about the operator’s capability and experience in environmental management. EMP also specifies environmental personnel, their responsibilities, training and awareness, emergency planning, procedures and equipment, incident reporting and investigation, and review of environmental performance.

Environmental management system. This is defined as a means of ensuring effective implementation of an environmental management plan or procedures and compliance with environmental policy objectives and targets. As a management tool, EMS enables an organization to identify, monitor and control its environmental aspects. In essence, it is part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.

The model HSE-MS in the petroleum E&P sector, as outlined by the OGP, consists of the following key elements:

- Leadership and commitment (addressing top-down commitment and company culture, essential to the success of the system).
- Policy and strategic objectives (addressing corporate intentions, principles of action and aspirations with respect to health, safety and environment).
- Organization, resources and documentation (personnel, resources and documentation for sound HSE performance).
- Evaluation and risk management (identification and evaluation of HSE risks, for activities, products and services, and development of risk reduction measures, including EIA).
- Planning (addressing planning and conduct of work activities, including planning for changes and emergency response).
- Implementation and monitoring (addressing performance and monitoring of activities, and how corrective action is to be taken when necessary).
- Auditing and reviewing (periodic assessment of system performance, effectiveness and fundamental suitability).
- Review (addressing senior management review of HSE-MS).

The HSE-MS model is compatible with the requirements of the ISO 14000 series, a global reference point for environmental management systems, which enables companies to approach the subject in a systematic and efficient manner. Of significant relevance in the European context is the EC 1993 Eco-Management and Audit Regulation, which established the Eco-Management and Audit Scheme (EMAS).

Environmental performance evaluation. This is another management tool, which has the aim of facilitating management control of practices that may have an impact on the environment. It has been used globally to improve environmental performance, provide a basis for performance benchmarking, demonstrate compliance to regulations and increase operational efficiency. The ISO standard 14031 (1999) Environmental Management – Environmental Performance Evaluation provides guidance in how to conduct EPE. The essential aspect of EPE is the selection of meaningful indicators, which may include Operating Performance Indicator (OPI), Management Performance Indicator (MPI) and Environmental Condition Indicator (ECI).

Environmental monitoring and evaluation. This is used to provide continuous observation and assessment of effects of development projects and activities on environmental resources and values in order to ensure effective protection from the unforeseen effects of such activities, guide changes of policy or activity or to detect improvements as a result of actions taken. EM&E plays an important part in the development and implementation of pollution control strategies, and in determining their effectiveness; and also in the provision of ‘baseline’ information against which the environmental impacts of certain activities are gauged. Being applied throughout the life of the project, it ensures compliance with environmental regulations and requirements imposed on the project on the basis of EIA.

Environmental auditing. This is an integral part of environmental management. It is defined as a process of systematic, periodical evaluation of a company’s environmental organization, conduct and systems against predetermined standards (Wawryk, 2002). While an important component of an EMS, its role is not limited only to verifying conformity with management systems standards. There is a distinction between an EMS audit and an audit of compliance with applicable legal regulations. The ISO 14000 series contain standards for environmental auditing.

10.3.7 Conclusions

The rapidly expanding web of environmental regulations poses a new challenge for the petroleum
industry. The growing body of international and national norms and standards has already affected the O&G activities in various ways.

The industry has been under continuous and growing legal pressure to address environmental imperatives by improving its performance. The introduction of increasingly strict environmental requirements has led to changes in investment conditions and capital and operating costs. Corporate liability for environmental damage has a tendency to evolve towards greater stringency and higher ceiling of compensation. Surging environmental fines and taxes further augment financial burden on the oil and gas operators.

Environmental considerations affect corporate structure and operational practices which have to adjust by introducing environmental management systems, special personnel and new pollution abatement and control procedures. Management of environmental, and associated legal risks, has become an integral part of corporate strategies. With the further anticipated expansion of O&G operations into environmentally sensitive areas, such as deep-water offshore zones and the Arctic and Sub-Arctic regions, or to traditional territories of indigenous peoples, these risks will only increase.

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