



PROTECTING THE ENVIRONMENT FROM FOSSIL FUEL POLLUTION

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Abstract:

The topic of traditional, non-renewable energy represented by fossil fuels and their negative impacts on the environment on planet Earth is one of the most critical topics of our era, if not the most critical. This is especially true given the conflicting interests among world nations between developed countries on one hand and developing countries on the other as well as between environmental advocates striving to curb the greed of capital owners for the sake of preserving the environment, and economic stakeholders seeking profit by any means, even if it means destroying entire ecosystems. This has led to significant difficulty in finding effective solutions that satisfy all parties, particularly with the frequent changes in politicians, presidents, and state rulers, coupled with social and economic pressures from populations seeking prosperity. Additionally, it has caused a division within the scientific community in general, and the legal community in particular, regarding the effects of pollution caused by fossil fuels and how to protect the environment from this pollution and its consequences. There is also debate on how to achieve this through binding legal texts and their practical implementation on the ground.

Therefore, this article presents a study addressing this sensitive and complex issue simultaneously, exploring the legal tools for protecting the environment from pollution caused by fossil fuels.

Keywords : Fossil energy, Carbon pollution, Environmental protection efforts, Obstacles to environmental protection.

Introduction:

Energy is one of the main pillars of civilized societies, and it is needed by all sectors of society in addition to the essential need for it in daily life. It is used to operate factories, power various means of

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transportation, run household appliances, and other purposes. Every movement a human makes requires the consumption of some form of energy. Humans derive their energy to perform manual and mental tasks from the diverse food they consume daily, as the food is burned in the body's cells and converted into energy. Energy can be defined as the capacity to produce a tangible effect. It comes in several types, including wind energy, flowing water energy and waterfalls, or it can be stored in a substance like conventional fuel (oil, coal, gas). The most important energy sources currently used are:

- **Fossil Fuel:** Represented by coal, oil, and natural gas. This fuel stores (chemical energy) that can be utilized when burned. Fossil fuel is the main energy source, contributing over 90% of the energy used today. Because it is an exhaustible source and due to environmental pollution problems, there is intense research to provide and develop other energy sources.
- **Mechanical Sources:** These are waterfalls, dams, tidal movement, and wind energy. Therefore, power plants are built at dams, waterfalls, high-tide areas, and regions with strong winds to utilize the mechanical thrust force to operate turbines.
- **Solar Energy:** Utilized through direct heating in water heating, space heating, and cooking processes. It can also be directly converted into electrical energy via solar cells.
- **Geothermal Energy:** Utilizing the high temperature within the Earth's interior. In some areas, this geothermal energy is close to the Earth's surface, hence the existence of hot springs. For example, in Iceland, these springs are widespread and are used for heating and warming purposes.
- **Biomass:** These are biological wastes, which are fermented in special pits to release methane gas, which is a flammable gas.
- **Hydrogen Gas:** Represents an important type of fuel and is a candidate to play a major role in securing energy in the future. Cars powered by hydrogen gas have emerged, and its most prominent applications are in fuel cells, which are cells promising wide applications in the future. Electricity is generated inside them directly by passing hydrogen and air through them, and through the combination of hydrogen and oxygen, we obtain electrical energy.

The only byproduct of this process is water, meaning fuel cells do not contribute to environmental pollution.

- **Nuclear Energy:** Produced from nuclear fission in nuclear reactors. It is used to power ships and submarines and generate electrical energy. Its most prominent drawbacks are the resulting radioactive waste, the problem of its disposal, and the high safety standards necessary to prevent reactor explosions or radiation leaks.

There is a classification of energy and its sources based on the possibility of renewing that energy, its sustainability, and the possibility of its continuous replacement.

- **Conventional or Non-Renewable Energy:** Includes coal, petroleum, minerals, natural gas, and chemical materials. They are non-renewable because they cannot be remade or replaced again in a short time.
- **Renewable, Clean, or Alternative Energy:** Includes wind and air energy, solar energy, water or wave energy, subterranean geothermal energy, and biomass energy. These are inexhaustible energies.

The topic of this article revolves around the first type of energy, which is non-renewable energy represented by fossil fuel, its harm to the environment, and efforts aimed at reducing this harm, through the following problem:

What is the extent of the damage caused by fossil fuel energy to the environment? And what are the efforts and obstacles to combating fossil fuel pollution?

To address this topic, the analytical descriptive method was adopted, focusing on the most important, then the important, then the less important, in terms of damage, impact, risk, comprehensiveness, and globality. A binary division was adopted through two sections: the first section on the concept and effects of pollution resulting from fossil fuel energy, and the second section on efforts and obstacles to combating pollution resulting from fossil fuel energy.

Section One: Concept and Effects of Pollution Resulting from Fossil Fuel Energy

Fossil fuel is fuel used to produce fossil energy. Fossil fuel is extracted from fossil materials such as coal, tar sands or oil sands (Wikipedia, 2016), natural gas, and petroleum. These traditional



sources, in addition to shale gas, are extracted from within the Earth and burned in the air to produce heat used in all fields.

The composition of fossil fuel is based on the carbon cycle in nature, thus storing (solar) energy over ancient ages for this energy to be used today. According to global estimates for 2005, fossil sources will cover about 90% of the global energy need in 2030, and they currently cover 81%.

Fossil combustion materials rely on compounds of the carbon element. When carbon burns with oxygen gas, energy is emitted in the form of heat in addition to the emission of carbon dioxide gas and other chemicals such as nitrogen oxide, soot, and quantities of particles.

Composition of Fossil Fuel and Harmful Elements in it

The main components of oil and additives:

1. Paraffinic compounds such as (methane, propane, butane).
2. Cyclic compounds divided into:
 - a) Naphthenes such as cyclopentane (5 carbon atoms) and cyclohexane (6 carbon atoms).
 - b) Olefinic compounds such as ethylene, propylene, butylene.
3. Other compounds like atoms of oxygen, nitrogen, or sulfur elements, usually not exceeding 5% of the crude weight.
4. Heavy metals such as nickel and vanadium.
5. Tetraethyl lead, which is added during refining to improve gasoline quality and produces lead, which is a toxic metal and a dangerous pollutant.

Fossil Fuel as Defined by Treaties and Agreements Legally:

Fuels in the 1969 Convention (El Fiqi, 2000, p. 44):

Article 1, paragraph 5 of the 1969 Convention stipulated that fuels mean "all persistent oils, particularly crude oil, fuel oil, heavy diesel oil, lubricating oil, and whale oil, whether carried on board a ship as cargo or in the bunkers of such a ship."

It is clear from the article's text that it defined oil based on two foundations: the first is the characteristic of oil, and the second is its use in the ship.

1. **Characteristic of Fuels:** By stipulating only persistent oils, the convention excluded all other harmful substances capable of causing pollution from its scope of application. Although the

convention limited its scope to persistent oils only, it did not leave the door open for everything that can carry this characteristic to be included. Therefore, it seems natural to inquire about the different types of fuels covered by the convention. The answer was explicit in Article 1, paragraph 5, which stated "all persistent oils, particularly crude oil, fuel oil, heavy diesel oil, lubricating oil, and whale oil..." Thus, only persistent or fixed oils are subject to the convention. The word "particularly" in the text indicates that the mentioned oils are for illustration, not exhaustive. Thus, as it appears from the convention's text, it made a distinction between what is commonly called black products and white products, which include refined petroleum products, and subjected the former without the latter to its provisions (El Fiqi, 2000, p. 46).

2. **Function of Fuels:** Having concluded that the 1969 Liability Convention limited its scope of application to persistent oils only, it remains to know the function this category of fuels performs on the ship for the convention's provisions to apply. This function was clearly defined in the second part of Article 1, paragraph 5: "...whether carried on board the ship as cargo or in the bunkers of such a ship." This shows that the convention rightly equated oil and fuels carried on the tanker either as cargo or as fuel for its operation, considering that a tanker or any other ship may need huge quantities of fuels for its operation, which can exceed 50,000 tons (Kassem, 2011, p. 77), quantities sufficient alone to cause pollution damage comparable to that resulting from the leakage of oil carried as cargo, as happened in the case of the Liberian tanker *Olympic Bravery* (occurred on March 13, 1976).

Fuels in the 1992 Protocol:

Exclusion of Whale Oil: The 1984 conference, which resulted in the Protocol amending the 1969 Convention, was an occasion for the problem of non-persistent oils to reappear on the negotiation table. Some delegations supported extending the convention to these oils due to their harm and toxicity. However, the majority of delegations did not see a reason for this extension, for the following reasons: First: Extension leads to unnecessary complications not sufficiently justified by the limited probability of damage occurring due to these oils.



Second: Leakage of non-persistent oils does not raise serious pollution problems, and the damages caused by them are adequately covered by the London Convention of 1976 on the Limitation of Liability for Maritime Claims.

Third: If the convention is extended to these oils, the nature of the damages and the types of ships causing them would be different, leading to complexity in managing the International Compensation Fund (El Fiqi, n.d., p. 50).

At the end of the conference, the application of the convention remained limited to persistent oils only. Article 2/2 of the 1992 Protocol stated that oil means "any persistent hydrocarbon mineral oil such as crude oil, fuel oil, heavy diesel oil, and lubricating oil, whether carried on board a ship as cargo or in the bunkers of such a ship." This text does not differ from the 1969 Convention text except in limiting the oils covered by the Protocol to those of mineral origin, which leads to the exclusion of whale oil. The incident of the tanker *Maritza Sayalero* is one of the incidents to which the concept of oil according to the 1992 Protocol did not apply, as during the submission of compensation claims, the International Compensation Fund argued that the provisions of the 1992 Protocol could not be applied to the incident because the spilled oil did not contain 95% hydrocarbon materials (Krouat, 2016, p. 20).

After addressing the definition of fossil fuel energy, it is necessary to know the types of pollution resulting from it, which vary according to the environment: air, marine, and terrestrial pollution.

1. Air Pollution

Since the 18th century, rich countries have grown their economies by generating energy from burning fossil fuels to power engines and machines. As a result of this industrialization, humans have released about 2,000 billion tons of carbon dioxide in the past few centuries, and these emissions are still increasing every year. Our annual carbon dioxide emissions currently nearly reach a record of about 40 billion tons each year. The level of carbon dioxide in the atmosphere has become the highest recorded in at least the last 650,000 years. Due to these growing greenhouse gases, the world's temperature is rising. According to scientists, 2014 was the hottest year since modern temperature monitoring began around 1850.

Fourteen of the 15 hottest years belong to the 21st century (Danish Council for Technology, 2015, p. 10).

The combustion of fossil fuels is considered the primary source of greenhouse gas emissions, which may result in the greenhouse effect. Due to climatic conditions and intensive development programs, the world has witnessed a sharp increase in its energy consumption. However, there are indications that this percentage will decrease in the future as oil companies adopt environmental policies that embrace standards completely avoiding greenhouse gas emissions through optimal utilization of associated natural gas extracted with oil. Furthermore, the widespread use of natural gas in power plants and desalination plants, preferring it over petroleum products as fuel, will lead to a reduction in greenhouse gas emissions (Zaghloul, n.d., p. 1).

The impacts of climate change on the Arab region have not been studied and identified adequately. However, these impacts are likely to lead to an increase in the severity and scale of natural disasters, which include, in addition to drought and food shortages, floods, hurricanes, and the spread of epidemics. A comprehensive approach is required to mitigate the negative effects of climate change, prepare for and address them, including providing compensation to affected Arab countries – including oil-producing countries, in accordance with the Marrakech Agreement (Comprehensive University and School Research Forum, n.d., p. 3).

2. Marine Pollution

First: Wars and Armed Conflicts

The first Gulf War and the burning of Kuwaiti oil wells are the best example. The Iraqi army deliberately pumped oil into the waters of the Arabian Gulf starting from the second half of January 1991 following the escalation of allied airstrikes. Pumping began from five oil tankers anchored off the Al-Ahmadi port and from some wells close to the Gulf, estimated at six million barrels. On January 25, 1991, the oil pumping valves at the Al-Ahmadi port were opened, increasing the severity of oil pollution. The rate of oil pumping into the Gulf waters was estimated at approximately 6,000 barrels per day.

Second: Economic Activities

Problems related to oil have appeared since its discovery and extended through all stages of production, transportation, refining,



manufacturing, storage, marketing, and even the disposal of used products. The continuous increase in each of these activities has led to the emergence of increasing quantities of oil pollutants in the waters of coasts, seas, and oceans. It has been proven that seas and oceans are exposed to pollution by several million tons of oil every year, especially since most factories and refineries are established adjacent to coasts, which threatens and warns of serious environmental problems that may affect the ecological balance in both sea and land. Controlling marine pollution or preventing its spread is difficult as it is a floating and moving danger controlled by wind direction, tidal factors, and wave intensity (Wikipedia, 2015). Worse yet is knowing that pollution of sea and ocean waters resulting from oil spills due to tanker accidents or oil pipelines represents less than 5% of the causes of sea water pollution, as mentioned in research conducted by NASA, which indicates that pollution of seas and oceans caused by ship maintenance operations is four times the rate of oil pollution, and that what is dumped into the seas from engine oils and used oils may reach more than ten times what is caused by oil spills.

3. Terrestrial Pollution

Terrestrial environmental pollution comes from human activities on a global scale, including pollutants from combustion, construction, mining, agriculture, war, in addition to an increasing role in the equation of air pollution. Vehicle emissions are one of the main causes of air pollution. China, the United States, Russia, Mexico, and Japan are world leaders in air pollution and emissions. Main pollution point sources include chemical plants, coal-fired power plants, oil refineries, plastic factories, and other heavy industries (Wikipedia, 2016). The most important terrestrial environmental pollutants are:

Wars and Armed Conflicts:

Wars are among the most important pollutants of the terrestrial environment due to the pollution they cause from the destruction of industrial and oil facilities. The first and second Gulf Wars and the occupation of Iraq are the best examples, where thousands of bombs and explosives of various destructive sizes were dropped, industrial and oil facilities were destroyed, thousands of tons of petroleum products, acids, and pesticides leaked, with the disruption of electric

power sources, all of which directly affected the environment (Al-Sharad, n.d., p. 6).

Acid Rain (DiCaprio, 2016):

Research conducted on rain and ice under normal conditions during the first half of the 20th century showed that they have slight acidity, attributed to the reaction of water with carbon dioxide gas forming weak carbonic acid with a pH of no less than 6.5. However, during the second half of the last century to the present day, it has been shown that the acidity of rain is gradually increasing (a drop in pH value), and this increase was due to strong acids such as sulfuric acid, nitric acid, and hydrochloric acid. The first two acids are formed in the atmosphere from the reaction of sulfur dioxide and nitrogen oxide with oxygen and water. When acid rain appeared in the 1960s, it was considered an undesirable environmental problem, with the emergence of dead lakes and weakened and damaged forests in various countries. This was one of the first environmental problems linked internationally.

Ecosystems:

Since ancient times, humans have eradicated entire ecosystems and caused the extinction of many animals like the dodo, the passenger pigeon (which was the most abundant bird on Earth), the Tasmanian tiger, the great auk, the quagga, the moa. The difference now is that we do this consciously and on a wider scale (Brune, 2016), especially what is caused by oil exploration in so-called tar sands, which is the most destructive in fossil fuel production, consuming vast forests and water. Rivers and streams have become poisoned (A Canadian province is the center of oil sands extraction operations near Fort McMurray). In general, extracting oil sand requires the elimination of vast areas of trees and the biological environment on the Earth's surface, including soil and organisms. Although there is a law in Alberta (Al-Asadi, 2008, p. 48) requiring land reclamation in every oil sand exploration contract, accordingly, investing companies confirm reforestation of used areas in the long term.

Chemical Fertilizers and Pesticides:

Pollution of the terrestrial environment, particularly soil pollution, is considered a consequence of using fossil energy directly



or indirectly. Perhaps the clearest examples of indirect methods are pollution by chemical fertilizers and pesticides, and waste, especially plastic, which is a petroleum product. Conversely, fertilizers are products of natural gas; ammonia is the main source of nitrogen fertilizers and is mostly manufactured by combining nitrogen from the air with hydrogen from natural gas.

After addressing the types of pollution resulting from fossil fuel energy, it is appropriate to touch upon the effects of this pollution, which also vary according to the environment: effects of pollution on the atmosphere (the most important), and on the sea and land (less apparent and impactful).

Climate Change:

The greenhouse effect phenomenon represents a real concern on a global scale. Many official and scientific bodies believe that if decisive measures are not taken to limit the emission of gases harmful to the environment, this will inevitably lead to the exacerbation of that phenomenon and a rapid move towards climate change, whose main feature is the rise in the Earth's temperature and the consequent other repercussions on nature.

It seems that the trend towards these changes is occurring at a faster rate than predicted by known climate data, as recent scientific estimates indicate that temperatures in different parts of the globe will rise by twice what climate studies had anticipated (Al-Asadi, 2008, p. 41).

Depletion of the Ozone Layer:

The ozone layer has become a global issue, as the concern of peoples in various countries of the world focuses on it, and there has been much talk about it and its holes – not just one hole – and the dangers of these holes for three or four decades, and talk about it – ozone – and about it – the ozone layer – and its holes will continue in the future due to the risks it entails and warns for various living beings on Earth, including humans, plants, and animals.

Since the ozone layer is part of the atmosphere surrounding the globe, this layer, like any natural thing, depends for its effectiveness on the healthy balance of chemicals. But in the face of human ambitions that reach the point of destruction, it has produced among

these chemicals a substance that helps to damage and even destroy the ozone layer (Biology Club, 2011).

Ozone exists in a region of the atmosphere unique to it, and this region is the ozone layer, located in the stratosphere (upper layers). This high-level ozone is the beneficial ozone that acts as a protective shield for the Earth from cosmic radiation, X-rays, ultraviolet rays, meteors, and shooting stars.

The ozone layer is located at an altitude of about 15 km above sea level and extends from this altitude to reach a thickness of about 50 km, meaning it disappears at an altitude of about 60 km from sea level.

Ozone also exists in the gaseous atmosphere near the Earth, which is tropospheric ozone, but in a very small proportion ranging between 0.2- 0.7 parts per million. It is produced from car and factory exhaust and is considered one of the main components of smog; it is the harmful ozone. It does not rise to reach the beneficial upper ozone layer; rather, due to its high reactivity, it undergoes several harmful reactions, such as combining with nitrogen and forming toxic nitrogen oxides that pollute the atmospheric air.

The ozone layer works to absorb ultraviolet rays and other shorter-wavelength rays. Oxygen and nitrogen in the air help absorb rays up to 250 nanometers, and this also reduces the dangerous rays reaching Earth (O'Rourke & Connolly, 2003, p. 594).

Effects of Marine Environmental Pollution:

The petroleum industry is characterized by great complexity in the technical relationships linking its factors, and consequently, companies bear high costs for oil exploration and drilling. Errors committed in any of its stages are very costly, especially in their environmental impacts. Therefore, oil companies and countries dealing with them seek to provide continuous monitoring and follow-up on the process of the extraction operation, transportation. In this subsection, I will address the environmental impacts of both oil extraction and transportation processes on the environment.

Environmental impacts of the oil exploration and extraction process: The process of oil exploration and extraction significantly affects the ecosystem, human health, and agricultural activities. Oil companies work to search for oil using very advanced means and



technology, and when they identify areas of its presence, these companies build platforms and pumps and conduct tests on its quality. The environmental impact of the oil exploration and extraction process comes from oil spill accidents. The greatest environmental impacts are represented in deforestation, destruction of the ecosystem, environmental and water pollution, long-term impact on animal life (especially birds and marine organisms), impact on the health of communities and workers in the oil industry, and contribution to the displacement of living organisms. The oil industry requires the transportation of very large equipment (weighing over 2 million pounds) to a remote environment, and thus the process of clearing land of trees and building platforms contributes to deforestation and erosion. The process of oil exploration and extraction contributes to the use of significant quantities of water, which are polluted and dumped into nature, resulting in chemical pollution of the environment and water (Danish Council for Technology, 2015, p. 11).

Effects of Terrestrial Environmental Pollution:

The effects of terrestrial environmental pollution vary according to the sources of pollution and affect three basic aspects: humans, animals, and plants. Perhaps the most prominent effects on the terrestrial environment are what result from climate change due to the connection of land elements to climate and air pollution, whose impact has reached all entities on planet Earth due to the inability to control it and its long-range spread. It is certain that climate change and global warming are primarily caused by the emissions left by fossil fuels.

Below are just a few examples of changes that are already occurring worldwide, which scientists believe may be caused by human greenhouse gas emissions. Also listed below are more effects expected to occur if humans fail to reduce greenhouse gas emissions.

Africa (Danish Council for Technology, 2015, p. 11):

- Effects already happening: Less water in West African rivers, decline of coral reefs in tropical waters, decline in fruit production in the Sahel region, spread of malaria in the highlands of Kenya, decrease in fish production in the Great Lakes.

- Effects expected this century: Poor crops due to heat and drought severity.

Europe (Danish Council for Technology, 2015, p. 11):

- Effects already happening: Retreat of glaciers, early spring, increasing invasion of alien plant species, northward movement of fish and seabirds.
- Effects expected this century: More river floods, decreased water availability in Southern Europe, health impacts from frequent severe heatwaves.

Asia (Danish Council for Technology, 2015, p. 11):

- Effects already happening: Retreat of glaciers, decreased water availability in northern China, northward movement of many plant and animal species.
- Effects expected this century: More river floods and coastal flooding; increased cases of food shortages and malnutrition resulting from drought.

Australia (Danish Council for Technology, 2015, p. 11):

- Effects already happening: Southward movement of many marine species near Australia, increased coral bleaching in the Great Barrier Reef.
- Effects expected this century: Increased frequency of floods, risks to low-lying coastal infrastructure from sea-level rise in Australia and New Zealand.

North America (Danish Council for Technology, 2015, p. 11):

- Effects already happening: Retreat of glaciers, increased frequency of forest fires, increased tree mortality due to drought, northward movement of Atlantic fish species.
- Effects expected this century: Increased heat-related deaths, increased heavy rainfall and severe hurricanes, increased intensity of forest fires.

Central and South America (Danish Council for Technology, 2015, p. 11):



- Effects already happening: Increased forest fires in the Amazon, water scarcity for farmers in Bolivia, increased agricultural crops in southern South America.
- Effects expected this century: Worsening reduction in water availability, increased floods and landslides, decreased food production.

Polar Regions (United Nations Environment Programme, 2001, p. 2):

- Effects already happening: Melting of permafrost and Arctic sea ice, increased shrub cover in the Arctic tundra, increased coastal erosion across the Arctic, decline in seal numbers and seabirds in the Southern Ocean.
- Effects expected this century: Increased damage to infrastructure due to thawing ice.

Small Islands (Hawwa, n.d., p. 2):

- Effects already happening: Decline in fisheries as a result of coral bleaching, seawater intrusion into groundwater resources.
- Effects expected this century: Low-lying coastal areas threatened by sea-level rise and severe hurricanes, leading to loss of livelihoods and coastal settlements.

After addressing the clarification of the problem, its types, and effects, we move on to the efforts made to combat these effects, including international and regional efforts.

Section Two: Efforts and Obstacles to Combating Pollution Resulting from Fossil Fuel Energy

International Agreements:

Estimates indicate that there are more than 500 international treaties and other agreements related to the environment, 323 of which are regional in nature. Sixty percent of them, or 302 treaties and agreements, date back to the period from 1972 – the year the Stockholm Conference was held – to the present time.

The period from 1972 to the present witnessed an accelerated increase in multilateral environmental agreements. Of the 302 agreements negotiated, 197 of them, or about 70%, were regional in scope. This trend was contributed to by the emergence of regional integration bodies concerned with the environment in regions such as Europe and Central America. Regional agreements are in many cases closely

related to global agreements. The emergence of 17 regional, multisectoral seas action plans, comprising within their framework 46 conventions, protocols, amendments, and related agreements, had the greatest impact. The largest group of multilateral environmental agreements is closely related to the marine environment, representing more than 40% of the total of those agreements, most notably the United Nations Convention on the Law of the Sea (1982), the new International Maritime Organization conventions and protocols on marine pollution, and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (1995) (Fouad, 1983, p. 71).

In contrast to the period before 1972, two important new groups of agreements emerged that are primarily global in nature: agreements related to chemicals and hazardous waste, and secondly, agreements related to weather/energy. Many of the first group are International Labour Organization conventions addressing occupational hazards in the workplace. Foremost among the agreements related to weather/energy are the Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol (1987), and the United Nations Framework Convention on Climate Change (1992) (Ministry of Land-Use Planning and Environment, 2003, p. 309).

International Conferences:

International conferences have contributed, through the principles and recommendations issued by them, to the protection of the human environment in its various sectors. These conferences helped establish many legal rules that formed the first building block in the edifice of international environmental law. I will address the international ones without the regional ones due to their importance, comprehensiveness, and their concern with global dangers threatening the Earth and its inhabitants, as well as the possibility of limiting them or limiting the important ones related to the negative effects of fossil energy, the subject of this study. Among the most important are the following:

Biosphere Conference (1968) (Abou El-Souf, 2014, p. 1):

Held in the French capital, Paris, the "International Conference for the Rational Use and Protection of the Biosphere," under the



auspices of UNESCO. The conference witnessed the first discussions related to the concept of environmentally sustainable development.

World Climate Conference (1979):

The conference, held in Geneva, Switzerland, under the auspices of the World Meteorological Organization (WMO), concluded that "global warming" due to the increasing accumulation of carbon dioxide gas in the atmosphere requires urgent international action.

United Nations Conferences on Environment and Sustainable Development:

The most important ones:

- United Nations Conference on the Human Environment – Stockholm Conference (1972)
- United Nations Conference on Environment and Development – Nairobi Conference (1982)
- United Nations Conference on Environment and Sustainable Development – Earth Summit Rio (1992)
- United Nations Conference on Environment and Sustainable Development – Rio+20 Summit (2012)

Conference of the Parties (COP) to the UN Framework Convention on Climate Change:

This is the supreme body of this Convention, entrusted with the regular review of the implementation of this Convention and any other related legal instruments adopted by the Conference to enhance the effective implementation of the Convention. The Conference of the Parties meets once a year according to Article 7 of the Convention. Among the most important conferences are: Berlin COP1 (1995), Kyoto COP3 (1997), The Hague COP6 (2000), Bali COP13 (2007), Copenhagen COP15 (2009), Paris COP21 (2015).

Algeria's Efforts to Combat Pollution Resulting from Fossil Fuel Energy:

Algeria, like other countries, did not delay since independence in ratifying many international agreements concerning the protection of the marine environment from oil pollution, as marine oil pollution was the most concerning issue for world countries at that time, being the most visible pollution. It ratified agreements, whether those it participated in preparing or those it did not participate in. Below, I present the most important agreements that Algeria ratified in the field

of protecting the environment from pollution resulting from fossil fuel. I will address multilateral agreements then bilateral agreements according to their chronological sequence in terms of Algeria's accession or ratification, then national laws and legislation.

International Multilateral Agreements:

- London Convention regarding the Prevention of Pollution of the Sea by Oil
- International Convention on Civil Liability for Oil Pollution Damage
- International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage
- Barcelona Convention for the Protection of the Mediterranean Sea against Pollution
- International Convention for the Prevention of Pollution from Ships signed in London in 1973 and its 1978 Protocol (MARPOL)
- United Nations Framework Convention on Climate Change and its Protocols
- United Nations Convention on the Law of the Sea of 1982
- Convention of the African Energy Commission
- International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties

Bilateral Cooperation Agreements:

In the field of bilateral cooperation, Algeria has enacted several legislations and concluded several agreements in the field of energy aimed at reducing fossil fuel and replacing it with alternative energies, including:

- Agreement in the field of developing new and renewable energies between Algeria and Belgium
- Memorandum of Understanding for cooperation in the fields of oil, gas, and sources of new and renewable energies between Algeria and Kuwait
- Memorandum of Understanding in the fields of energy control and renewable energies between Algeria and Tunisia
- Memorandum of Understanding in the field of energy between Algeria and Spain

Bodies and Mechanisms:



Achieving what the administration in charge of managing environmental affairs aspires to requires the existence of institutions of the highest degree of competence, as legal texts alone are insufficient if not supported by effective devices that ensure the implementation of these laws.

In Algeria, there are many administrative bodies concerned with environmental protection, mostly central, dealing with environmental issues of a national dimension. The central administration consists of a coherent structure in a hierarchical pyramid shape, with the lower categories of state employees occupying its lower base, then these categories rise until they reach the top of the pyramid (Abou El-Souf, 2014, p. 1).

In Algeria, the Ministry of Land Use Planning and Environment occupies the top of this pyramid. Implementing the multiple tasks assigned to the Ministry of Land Use Planning and Environment on the ground, over a national territory extending over thousands of kilometers, is extremely difficult. It was necessary to establish public utility institutions and regional and provincial structures under the supervision of the ministry to take care of these tasks, preserving and promoting natural spaces such as coastal, mountain, steppe, southern, and border areas. These deconcentrated services of the supervising ministry provide an observatory for collecting data and information related to the environment and are considered a means for coordination and consultation in a way that allows the appropriate application of national strategies for land use planning and the environment. Coordination and consultation between central bodies and their external (deconcentrated) services help in specialization and division of labor.

Structures affiliated with the Ministry of Environment: Algeria, within the framework of functional deconcentration, has established public structures and bodies affiliated with the Ministry of Land Use Planning and Environment under various names (Observatory, Center, Agency, Directorate, Park, Institute, National Authority), which oversee the management and organization of specific environmental fields. These bodies are the executive tool tasked with promoting and implementing according to the decisions issued by state authorities. They carry out effective and influential

actions and measures through practical applications and scientific practices within programs and projects called for by the environmental policy formulated by the supervising ministry.

These intermediary structures form a scientific and technical extension of the central administration, their mission being to implement general environmental policies. There are several bodies that have become operational and practice their activity in reality, most notably (Kassem, 1999, pp. 64–65):

- National Observatory for Environment and Sustainable Development.
- National Institute for Environmental Training.
- National Waste Agency.
- Center for the Development of Biological Resources.
- National Center for Cleaner Production Technologies.
- National Observatory for the Promotion of Renewable Energies.
- National Agency for Climate Change.
- National Agency for Nature Conservation.
- National Agency for Earth Sciences.
- National Parks.
- The Designated National Authority within the framework of the Clean Development Mechanism.

Despite all the international and national efforts mentioned, this does not mean the absence of any obstacles, including:

Scientific and Political Obstacles:

Scientific obstacles have emerged since the beginning of the 21st century, with increasing pressure on the fossil fuel industry to limit carbon dioxide emissions, calling for mitigating the impact of climate change.

Some environmental scientists believe that the potential environmental damage, and the collateral economic damages that may result from it, will become uncontrollable if global temperatures rise in the long term by two degrees Celsius above pre-industrial revolution levels (Helmy, 1991, p. 41).

In this regard, a group of recently published studies confirmed the state of uncertainty within the scientific community about the long-term effects of human activity on climate change. On the other



hand, another group of studies, including one recently (Abdel Hafez, 2014, p. 190) issued by the Intergovernmental Panel on Climate Change (IPCC), also reiterated that climate change poses a threat to the planet (Abdel Hafez, 2014, p. 191).

These studies add that the potential damage to the planet from rising temperatures will be difficult to measure, with a wide range of potential variables making it very difficult to accurately predict its potential effects. These studies, in turn, opened the debate on how to formulate a response to rising carbon dioxide emissions and how energy use, especially fossil fuels, should be mitigated.

Political obstacles appear in that environmental problems by nature represent a conflict of interests. The urgent needs of today threaten the well-being of future generations, and in most cases, the powerful harm the weak in the process of making environmental decisions. Therefore, there is an urgent need for strong political management to overcome the constraints imposed by entrenched interests (Agamiya & Nassif, 2003, p. 82). Developing countries have reservations in the field of not achieving justice between them and developed countries. Also, developed countries use economic pressures to pressure developing countries to establish factories and use natural resources within their territories and control them completely, not allowing developing countries to intervene (Zahari, 1991, p. 189).

The impact of political considerations is more clearly found when concluding international or regional agreements to protect the environment, leading to compromises that do not align with environmental problems, or through non-ratification of international agreements, which reduces their effectiveness at the international level, or lack of monitoring of their implementation at the national level (Abdel Hafez, 2014, p. 192).

The Stockholm Conference showed sharp discussion and conflict between defenders of development and defenders of the environment. A clash between groups appeared, and the attempt to reconcile different opinions resulted in a weak international agreement that the conference later approved. Article 21 of the Stockholm Declaration stated that "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to

exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction" (Helmy, 1991, p. 37).

Social and Economic Obstacles:

Social obstacles have become one of the most important factors preventing a clean and protected environment. Social problems have acquired a global dimension that affects humans without discrimination and negatively impacts the environment with the successive repercussions they produce at the international level.

Poverty, as a state of life constrained by malnutrition, illiteracy, disease, and an unclean environment, is one of the most dangerous obstacles facing the advancement of a sound and clean environment and is one of the most important problems facing third world countries. It negatively reflects on the environment and is a cause for its demise. Poverty is a cause of state collapse and their economies, threatening the sustainability of their environment. This was a motive for the poorest peoples in the world to demand the adjustment of the international economy, which increased the intensity of misery in these societies and pushed the people of these countries to increase the rates of exploitation of natural resources to the point of depletion to secure their survival in the short term. Economic growth without a long-term strategy leads to the depletion of natural resources and their non-availability for the benefit of future generations and will inevitably lead to a gradual decline in economic growth rates, resulting in an increase in poverty rates (Mukhaimer, 2000, p. 417). It must be known that preserving the environment passes through sustainable development and reliance on renewable, non-depletable energies, and meeting the needs of the present without compromising the ability of future generations to meet their needs. It is imperative for state policies, based on participatory action, to achieve economic growth by directing development towards addressing the problem of poverty and protecting the poor who are forced to increase pressure on the environment (Mukhaimer, 2000, p. 417).



Economic obstacles appear in many pollution problems because pollution control methods are expensive. Protecting the environment requires conducting many studies, research, and experiments that cost a lot of expenses, and it may be difficult for a country alone to undertake them (Mukhaimer, 2000, p. 417). Adequate financial support for environmental research to obtain the necessary information for these researches reflects a real economic problem, especially since industrial companies wish to retain their information to maintain their competitiveness with others. At the same time, the international system has not developed to the extent sufficient to impose a price for pollution as a cost of production. Many countries of the world are interested in increasing production, creating job opportunities, and encouraging land use, even if this leads to the emergence of some negative aspects on the environment. The United Nations has taken note of this fact, holding the World Conference on Environment in Rio in 1992 under the title "Environment and Development" on the basis that sound and sustainable development is that which achieves environmental protection and the preservation of natural resources that preserve for humans their physical, mental, and psychological health. This was expressed by the then Prime Minister of India, Indira Gandhi, when she asked at the Stockholm Environment Conference, "Aren't poverty and need the most important pollutants? How can we speak to those who live in villages and huts about the necessity of preserving the air and rivers if their lives are polluted at their source? Improving the environment cannot be achieved under conditions of poverty".

Conclusion:

The heated discussions neglect a fundamental issue, which is the issue of spending more effort and money on scientific research. Some of this research is directed towards innovations in the field of clean energy and improving the combustion of petroleum derivatives. Others also help in inventing advanced technological means that reduce the volume of emissions for the same amount of consumption, or achieve successes in ideas such as concentrating the emitted gases and finding ways to destroy or bury them without causing actual environmental damage, which is known as "carbon capture," although it is a high-cost process compared to protecting forests and even

increasing their area. Also, increasing the efficiency of solar and wind energy depends on advanced scientific research in areas such as their use locations, the ability to store energy, and others.

All these solutions need studies, engineers, software developers, along with opinion leaders and ordinary citizens working together to develop diverse strategies to achieve the desired goal.

Many circles tend to consider the preservation of forests, their protection, and the increase of their area as one of the most important outcomes of the conferences, and they believe that the disputing parties agreed at least on this goal. Although some campaigns may consider that the leaders, through the agreement, "took shelter under the tree" from the criticisms they face. But the truth says that attention to forests and what is called the "carbon sink" can play a decisive role in mitigating the greenhouse effect. "Forest-friendly" groups say that deforestation is responsible for 20% of greenhouse gas emissions, and therefore stopping this is an effective and inexpensive way to limit the phenomenon.

On the other hand, environmental groups have succeeded in influencing forest exploitation companies to limit this depletion. In general, successive campaigns to protect forests have had a tangible impact in this vital direction.

While the debate rages between countries, major companies, and environmental protection movements, and disagreements intensify, commercial and industrial institutions of varying sizes undertake private initiatives to limit emissions in their premises and workshops, through special programs that monitor the consumption of electrical energy, air conditioning, heating, and others. They rely on software developers who help organize this consumption, limit it, and restrict it to times of real need. Also, many companies had started monitoring energy consumption for the purpose of saving, but this approach became established and more effective with the spread of the demand to reduce the resulting emissions. Today, compatibility with environmental trends has become an integral part of the company's social image, so they put it on their products and boast about it in their advertising publications. Even if their commitment is not complete and many multinational companies rely on evasion in it for purposes that do not go beyond increasing their profits, this phenomenon has



spread even among individuals who have made protecting the environment and reducing consumption that emits carbon dioxide a lifestyle and a kind of belonging to contemporary life and its clean values.

Endnotes

1. Oil sands, oil-bearing sands, tar sands, or extra-heavy oil: is a type of bitumen deposit. It is a natural mixture of sand or clay, water, and a dense, viscous type of oil known as bitumen. It is found in various places around the world, but it exists in huge commercial quantities in Canada and Venezuela. Oil sands are known as non-conventional or "bitumen" crude to differentiate them from natural crude oil extracted from oil wells. It has recently become counted among the world's oil reserves due to rising oil prices and the low cost of extracting and refining it using new technologies, which has made it commercially profitable. Many countries around the world have huge oil sands reserves such as the United States, Russia, and many Middle Eastern countries. But the largest reserves are found in two countries: Canada and Venezuela. Their combined reserves equal all of the world's crude oil reserves. In 2007, Canada's oil sands production rate rose to 44% of the total crude oil output, while crude oil production decreased to 38%. Because of this rise, Canada became the main source for the United States, surpassing Saudi Arabia and Mexico. Venezuelan production is also high, but there is no documented information about it. Oil sands can be estimated at about two-thirds of the world's oil reserves. Canada's Athabasca oil reserve is estimated at about 1700 billion barrels or $\$270 \times 10^9$ cubic meters, and Venezuela's heavy oil at about 235 billion barrels, or $\$37 \times 10^9$ cubic meters. Together, the reserve becomes 3.6 trillion barrels, while the natural crude oil reserve is 1.75 trillion barrels, mostly in the Middle East, especially in Saudi Arabia. (Wikipedia, 2016).
2. (El Fiqi, 2000, p. 44).
3. (El Fiqi, 2000, p. 46).
4. (Kassem, 2011, p. 77).
5. The Liberian tanker accident: occurred on March 13, 1976, when the tanker was sailing empty when the comprehensive safety system activated, stopping all propulsion and steering devices, and despite the intervention of the tanker's crew, its speed did not slow down, causing it to deviate from its course towards the coast, where it ran aground due to the severe disturbance of the waves and coastal rocks, and after a full month, a storm blew, leading to the destruction of the ship and its engine rooms, which contained 1200 tons of diesel fuel that leaked into the sea. (Note: This is descriptive content; no source citation provided).
6. (El Fiqi, n.d., p. 50).
7. (Krouat, 2016, p. 20).
8. (Danish Council for Technology, 2015, p. 10).
9. (Zaghloul, n.d., p. 1).
10. (Comprehensive University and School Research Forum, n.d., p. 3).
11. (Wikipedia, 2015).
12. (Wikipedia, 2016).

13. (Al-Sharad, n.d., p. 6).
14. (DiCaprio, 2016).
15. (Brune, 2016).
16. A Canadian province is the center of oil sands extraction operations near Fort McMurray. (Note: This is descriptive content; no source citation provided).
17. (Al-Asadi, 2008, p. 48).
18. (Al-Asadi, 2008, p. 41).
19. (Biology Club, 2011).
20. (O'Rourke & Connolly, 2003, p. 594).
21. (Danish Council for Technology, 2015, p. 11).
22. (Danish Council for Technology, 2015, p. 11).
23. (Danish Council for Technology, 2015, p. 11).
24. (Danish Council for Technology, 2015, p. 11).
25. (Danish Council for Technology, 2015, p. 11).
26. (Danish Council for Technology, 2015, p. 11).
27. (Danish Council for Technology, 2015, p. 11).
28. (United Nations Environment Programme, 2001, p. 2).
29. (Hawwa, n.d., p. 2).
30. (Fouad, 1983, p. 71).
31. (Ministry of Land-Use Planning and Environment, 2003, p. 309).
32. (Abou El-Souf, 2014, p. 1).
33. (Abou El-Souf, 2014, p. 1).
34. (Kassem, 1999, pp. 64–65).
35. (Helmy, 1991, p. 41).
36. (Abdel Hafez, 2014, p. 190).
37. (Abdel Hafez, 2014, p. 191).
38. (Agamiya & Nassif, 2003, p. 82).
39. (Zahari, 1991, p. 189).
40. (Abdel Hafez, 2014, p. 192).
41. (Helmy, 1991, p. 37).
42. (Mukhaimer, 2000, p. 417).

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