

## International convention to decrease conflict between energy supply and environmental protection

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The relationship between economic development, energy consumption and the environmental issues is complex. However, energy law is based on reciprocal benefits for governments while environmental law is based on common interests and erga omnes. Studies have shown that despite the implementation of several energy and environmental conventions at international levels, the situation of global environmental conditions is critical. Different concepts and conflicting interests between the energy supply system and environmental protection have led to poor implementation of some conventions. The present study examined some existing rules and regulations on energy and the environment and identified the strengths and weaknesses of the descriptive-analytic method. The purpose of investigating these conventions is to decrease the weaknesses and increase the strengths. The strengths can then be used for environmental concerns and international obligations of states under the rules of erga omnes to protect the environment and sovereignty of states for jurisdictional and energy management within national boundaries. The investigations revealed the characteristics of an international convention to decrease conflicts of interest between the energy supply system and environmental protection. In addition, two facilitator mechanisms are proposed for effective implementation of the international convention on energy and the environment.

**Key words:** energy; environment; sustainable development

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### Introduction

Energy (oil and gas, namely) plays a vital role in development (General Assembly, 2012). The most important goal of government economic policies is to maximize GDP and increase per capita income (Rees, 2010). Economic growth and the improving the welfare of communities depend on access to fossil fuel energy; however, energy resources are limited and securing them requires enormous cost. This urgency and energy resource constraints leads to economic, political, social, and military consequences at the international level. Governments seek projects and programs to further exploit energy resources or create monopolies for energy production and consumption nationally and internationally. If the current energy policies of governments do not change, the demand for energy will continue to increase. Energy production, transmission and consumption create negative environmental effects, the most important of which are climate change, acid rain, ozone depletion, development of drought and desertification, marine oil pollution, soil degradation, loss of habitats, urban air pollution and the threat to public health at the national, regional and international levels (Bradbrook, 1999; UNEP, 2010).

The regulation of energy and environmental law in the international community was gradual. The obvious relationship between energy consumption and the rights of nature has been largely ignored for years. The focus of energy law is a reliable supply of energy at affordable prices while the focus of environmental law is conservation of nature (Wildermuth, 2011); there is no clear demarcation between energy and environmental law. The earliest relationship between energy and environmental law was indirect. The perspective of decreasing in energy consumption and improvement of energy efficiency dates back to the oil crises of 1973 and 1979 when oil prices increased sharply in response to events in the Middle East. After that, consumers of oil and its derivatives began to change their behavior and explored alternative sources to energy and identified other methods of decreasing energy consumption (Bosselman, 2011; Friedman, 2008).

Binding and non-binding documents at the national, regional and international levels on energy and the environment have been developed. For example, in Europe, the Convention on Long-Range Transboundary Air Pollution (CLRTAP; 1979) and eight protocols were developed to control acid rain. To curb oil pollution at sea, the International Convention for the Prevention of Pollution from Ships (MARPOL Convention; 1973/78), and the United Nations Convention on the Law of the Sea (UNCLOS; 1982) were drafted. The destruction of the ozone layer was addressed by the Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol regarding Substances that Deplete the Ozone Layer. A regime for climate change through the

United Nations Framework Convention on Climate Change (UNFCCC) was introduced in 1992 and strengthened in 1997 by the Kyoto Protocol (UNEP, 2012a). The Energy Charter Treaty (ECT; 1994) is a multilateral international document addressing the decrease of energy consumption and improvement of energy efficiency.

Despite the efforts in regulation and implementation of regional and international conventions, formal statistics indicate that environmental conditions remain critical (Bölük and Mert, 2014; UNEP, 2012a). For example, the concentration of carbon dioxide in the atmosphere has increased over the past centuries; its reached 394 ppm in 2012, an increase from 280 to 390 ppm from industrial revolution in the eighteenth century. This is an increase of 40% and an average growth of 2 ppm per year over the past decade. Conventional models suggest that the release of greenhouse gases (GHGs) in the next 50 years will double and the global temperature will increase 3°C. Population growth, technological progress and the increasing of energy demands are the most important factors of environmental issues. (IEA, 2013; UNEP, 2012a; 2012b).

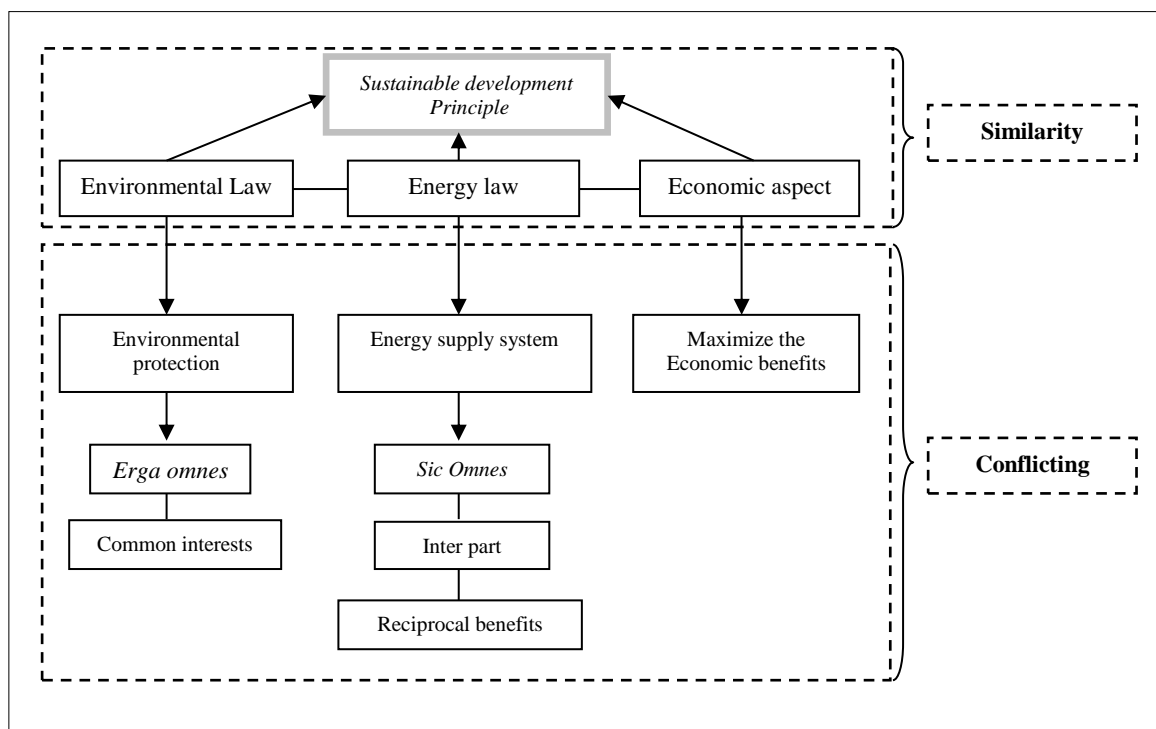
Sustainable development of countries is required to comply with environmental considerations.

The General Assembly of the UN declared 2012 to be the International Year of Sustainable Energy for All; their efforts are directed at ensuring energy access for all and protecting the environment through: sustainable use of traditional energy resources; increased use of renewable energy sources and other low-emission technologies; more efficient use of energy and greater reliance on advanced energy technologies" (General Assembly, 2012). These require a comprehensive international convention to decrease the conflict between energy consumption and environmental protection. The present study reviews and analyzes the existing conventions on energy and the environment. A complete evaluation reveals that no existing conventions cover environmental issues including global warming, air, water and soil pollution in a comprehensive and integrated manner for the destructive environmental effects of the different levels of energy supply chain. Some of them are recommended and not obligatory. Since energy law is based on reciprocal benefits and environmental law is based on common human interests, the common heritage of mankind, the rights of future generations and *erga omnes* obligations (erga omnes rules assert that all member states of the international community, regardless of their acceptance by governments, are obligatory for the international community) the regulation of an integrated convention is a challenge (see Fig. 1).

The requirements of an *erga omnes* international convention for energy and the environment include environmental rules and international obligations to protect the environment, the sovereignty of states for jurisdiction and energy management within national boundaries. An international convention is proposed for energy - environment interaction to achieve a comprehensive framework.

In addition to protecting the air, soil, water and overall environment of the global community against the negative effects of production, processing, transmission, and consumption of fossil fuel, the convention should immediately put forth rules and regulations for the use of fossil fuel to protect the environment and achieved sustainable development. Four main characteristics and structure exist to developing an international convention on energy and environment:

1. Employment of a framework-convention system;
  2. Comprehensive and integrated;
  3. An international and official perspective;
  4. A facilitator that respects the sovereignty of nations and the design of facilitating mechanisms;
- Technology Transfer Chain Package (TTCP) and super energy service companies (SESCO) are proposed for implementation of the energy and environment convention by all members, including developed and developing countries.

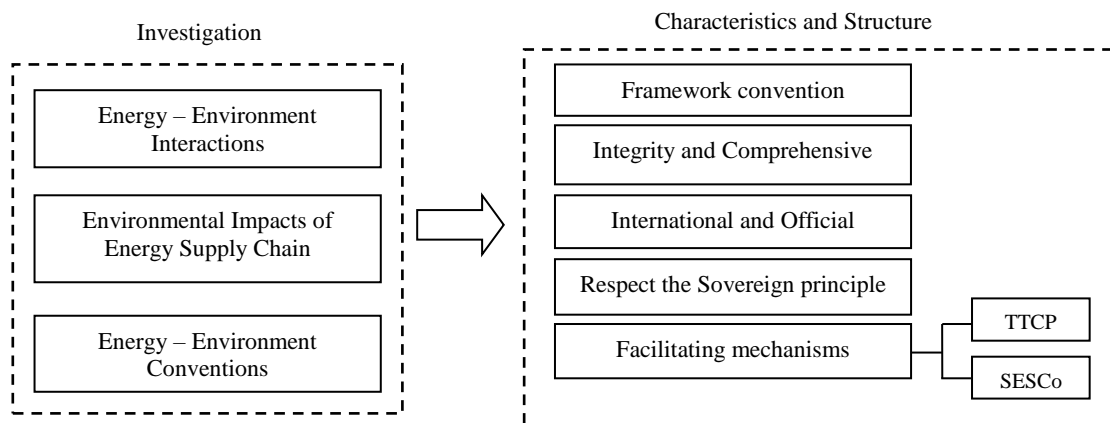


**Figure 1.** Conflicting interests among energy law, environmental law and economic aspects

## Methods

This research was based on the descriptive-analytic method and is divided into six sections:

1. Studying the actual condition of energy and the environment using international documents;
2. Identifying the environmental effect of different levels of fossil fuel supply chain by studying oil and gas life cycle assessments;
3. Analyzing the non-binding declarations and principles and legal regulation of some existing energy and environmental conventions;
4. Identifying the pros and cons of existing energy and environmental conventions;
5. Introducing the main characteristics and structure of a comprehensive international convention on energy and environment;
6. Proposing two facilitator mechanisms (TTCP and SESCO) for implementation of energy and environment convention (see Fig 2).



**Figure 2.** Research methodology

## Environmental impacts of energy systems

Fossil fuels are non-renewable, limited and disposable. They are converted into another form of energy by combustion and are considered to be the main source of environmental degradation. They are nevertheless in high demand by most countries in all climates from the arctic to the desert, tropical rain forests to temperate woodlands and the seas. Different levels of fossil fuel supply chain (exploration, extraction, exploitation, transmission, conversion, processing, distribution and consumption) have negative effects on environment, but differ in the types and amounts of pollutants released. Hydrocarbon reservoirs are explored and extracted using different methods. Exploration and extraction involve multiple steps, each having an environmental influence on the air, water, and soil at regional and international levels.

The first level is exploration of energy sources (oil and gas wells); often the emissions at this level are effective in short time and are mainly related to the activities of the camp or tanks used. Exploration of wells begins with the activities of extraction and installation teams. Environmental emissions are greater during extraction and have a longer effect. The most important effects of extraction are from emissions from ventilation, cleaning and burning of excess gases, combustion from diesel engines and gas turbines, volatile gases from loading operations, storage or loss of equipment, particulate emissions from soil disruption during construction and movement of vehicles, discharge of drilling mud, waste disposal of incinerators, leakage of oil and gas facilities, and oil and gas bubbling up from wells.

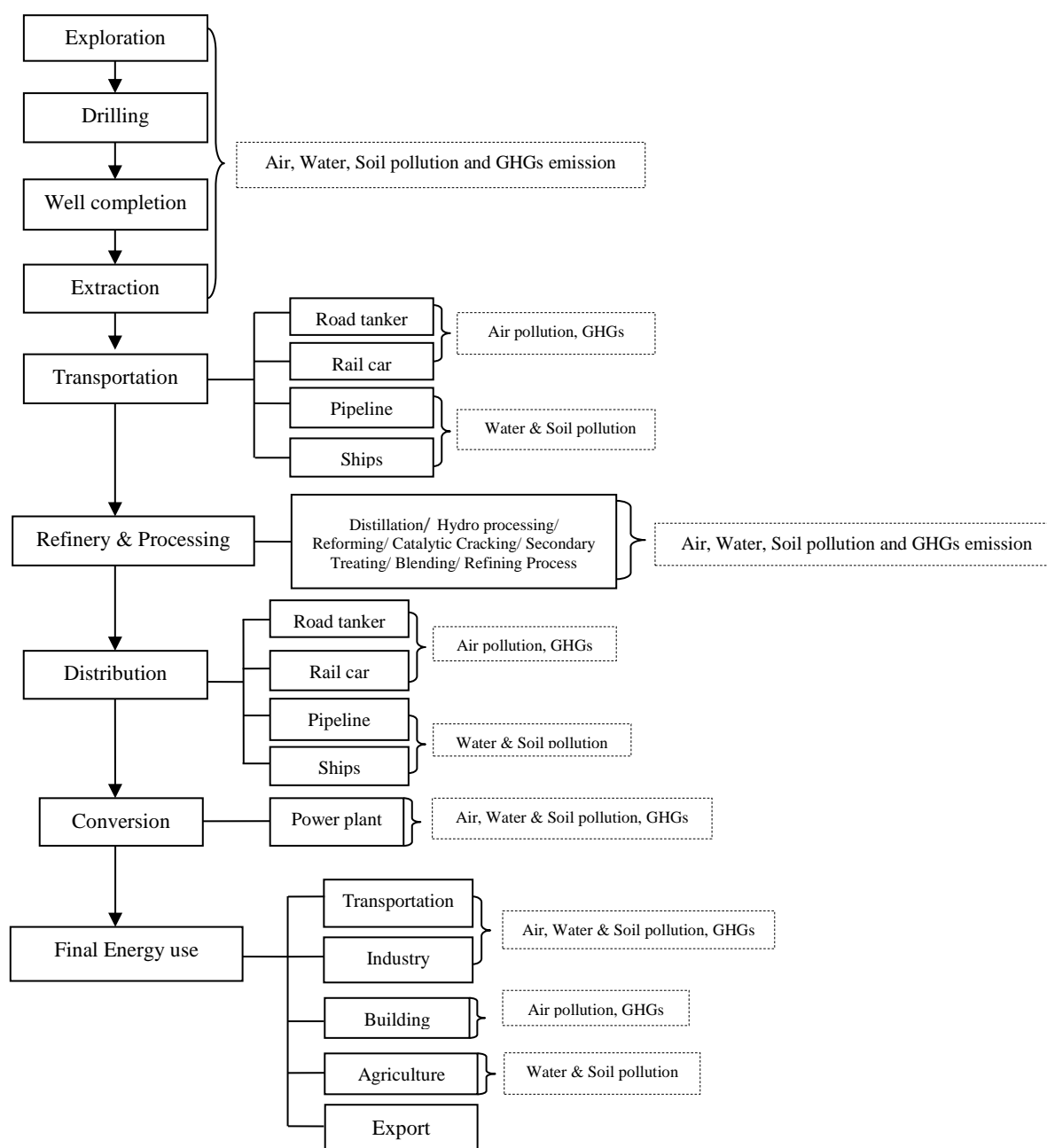
Major emissions released in the exploration level are suspended particles, carbon dioxide, carbon monoxide, methane, volatile organic carbons, nitrogen oxides, sulfur oxides, hydrogen sulfide and hydrocarbons (Jafarzadeh 2004). The water produced by wells, drilling fluids, chemicals and during preparation of dug wells, site sanitary sewage, shed and chemical spills, water used as a coolant, disturbance of physical property of soil from improper construction, road construction, overflow and spillage of oil, gas, chemicals and hazardous and solid waste disposal are major sources of water and soil pollution. Unexpected events can be major sources of environmental degradation. One example is the implosion of the Deep Water Horizon oil platform in the Gulf of Mexico on 20 April 2010 that spilled 2.6 million gallons of oil into the gulf (Alvarez et al., 2014). It took 84 days for British Petroleum to block the spill (Sammarco et al. 2014). During that time, the spilled oil contaminated the shores of five US states.

The next level is transportation of oil and gas by pipelines, railway, tankers or trucks to distillation and refinery units or terminals for export (BP, 2013). Leakage from pipes, particularly in the seabed, pollutes the marine environment. The slightest collision with pipes causes leakage into the water and soil and is mainly the result of deterioration of pipelines. The American Academy of Sciences (2002) found out that an average of 3.1 million tons of oil enters global waters annually; half of this is oil spilling from pipes. Traffic from tankers and barges, collisions, periodic flushing of tankers, engine wash water, sewage and illegal discharge of ship ballast contribute to degradation of the marine environment. About 71% of oil pollution at sea derives from

ships (Kurukulasuriya and Robinson, 2006). The next level is conversion and energy consumption. Building sectors (residential and commercial), industry, transportation (aircrafts, cars and ships) and power plants that generate electricity convert fossil fuels to electricity or propulsion. The main emissions are unburned hydrocarbons, dioxide carbon, carbon monoxide, nitrogen oxide, sulfur dioxide, polycyclic aromatic hydrocarbons (PAH) and suspended particles, which contribute to climate change, half of which is municipal GHGs (Van Staden and Musco, 2010). In the industrial and power generation sectors, sulfur dioxide and nitrogen oxide emissions, chemical use, wastewater discharge and other waste cause air, water and soil pollution. A strong and integral relationship exists between energy use and carbon dioxide emissions (see Table 1). The largest and most harmful oil pollution emissions occur during wartime. For example, the largest oil spill on record occurred during the invasion of Kuwait by Iraq. Kuwaiti oil production facilities were destroyed and 127 of 1000 oil wells were blown up. This produced a spill of 240 million gallons (about 800,000 tons) of crude oil into the Persian Gulf (<http://oils.gpa.unep.org/facts/oilspills.htm#intelligence/>). It should be noted that during oil fires, carbon dioxide, particles, toxic gases such as sulfur dioxide, nitrogen dioxide, and carbon monoxide and PAHs enter the environment and cause air pollution, climate change and marine pollution. Environmental impacts of different levels of fossil fuel based on LCA method are shown in Fig. 3.

**Table 1.** The relationship between energy consumption and carbon dioxide emissions (Bilgen, 2014)

Year	2010	2020	2040
Global energy consumption (quadrillion Btu)	524	630	820
Emission of carbon dioxide (billion metric tons)	31.2	36.4	45.5



**Figure 3.** Environmental impacts of different levels of fossil fuel supply chain

## Energy and environmental rules and regulations

There are many binding agreements and non-binding declarations at the regional and international levels about energy and the environment. Analysis of these documents may be useful for providing an international convention for energy and the environment. Several energy and environmental conventions were identified during this study. The pros and cons were summarized for use in the proposal of characteristics and structure of an international convention for energy and the environment.

### Non-binding declarations

International energy law puts hard law into effect, the bilateral and multilateral agreements that are directly enforceable, where in international environmental law the importance of soft law is more than hard law and has noticeable effects. The turning point in international environmental law is the 1972 Stockholm Declaration, that is soft law and non-binding and its impact has been greater than many other conventions (Arghand et al., 2015). Although Stockholm Declaration makes no mention of energy supply system, but there has been useful to recognition of the environmental effects of energy supply system in international level (Lyster and Bradbrook, 2006).

Sustainable development was raised in UNCED at the first time. The Rio Declaration, Agenda 21 and the Johannesburg Plan of Implementation referred to sustainable development principle. It is instructive to refer to those aspects of the instruments that relate to a sustainable energy law framework. Millennium Development Goals, established in the United Nations' General Assembly Millennium Declaration 2000, are disappointing in that there is no mention of the need to provide universal access to energy services or to tackle any of the issues surrounding energy and sustainable development. Following the Rio Conference, climate change and energy were once again addressed by the international community at the 2002 World Summit on Sustainable Development. The most non-binding declarations promoting sustainable energy development is the G8 Gleneagles 2005 Plan of Action, 'Climate Change, Clean Energy and Sustainable Development'. In this regard, the G8 members undertook to take action in the key areas of transforming the way we use energy, powering a cleaner future, promoting energy research and development and financing the transition to cleaner energy. What is quite clear is that since the 1992 UNCED conference, energy policy and supporting legislation must be developed within the broader context of ecologically sustainable development and a carbon-constrained economy. The international environmental soft law, discussed above, contains a number of important messages for energy policy development. "They are that: energy use should be ecologically sustainable; renewable energy technologies should be promoted and adequately represented in the energy fuel mix; national energy efficiency programs should be pursued; market distortions and perverse subsidies, which impede a sustainable energy market, should be removed; national energy markets should function in a way that promotes sustainable development; and that grid extensions are not necessarily the preferred method of increasing access to electricity, particularly in developing countries " (Lyster and Bradbrook, 2006).

### Binding Agreements

#### *United Nations Framework Convention on Climate Change and Kyoto Protocol*

Increasing emissions of GHGs (water vapor, carbon dioxide, nitrous oxide, methane, surface ozone, chlorofluorocarbons, hydro fluorocarbons and per fluorocarbons) led to the adoption of the UNFCCC in 1992. The convention does not include binding commitments to reduce GHGs, but is an action framework aimed at stabilizing GHGs below a level that is hazardous to the climate. Major industrial countries agreed on a non-binding target for voluntary measures to decrease GHG emissions to 1990 levels by 2000. This Convention had two effective and helpful approaches; establishment of a framework-convention system and common but differentiated responsibilities principle.

In December 1997, the Kyoto Protocol was adopted to strengthen implementation of the Convention. Since the global warming is a global problem, the Kyoto Protocol can be adjusted to a global solution. One aspect of the Kyoto Protocol is the clean development mechanism (CDM) that assists industrialized countries (Annex I Parties) in decreasing emissions with lower abatement costs to developing countries. Many developed countries expressed interest in assisting in this project in developing countries. The result is that investment by developed country creates technology transfer and job opportunities as it improves environmental conditions in developing countries. In addition, developing countries derive income from the sale of certified emission reductions (CERs) and decrease costs for fuel and raw materials.

CDM projects are win-win. CDM is flexible and depends on the market and can decrease GHG emission in developed countries and developing countries. Over 2500 such projects in countries like India (300) and China (500) attract foreign investment and generate income (Partovi, 2005). The transfer of environmentally sound technologies is the most important benefit of CDM projects for developing countries (Schneider et al., 2008). Technology transfer means the transfer of skills, knowledge and technology, manufacturing methods and equipment. Studies have shown that 53% of projects involve the transfer of technology and knowledge of equipment, 32% is the import of equipment and only 15% involves transfer of knowledge (Seres et al., 2009). Therefore, the process of technology transfer in CDM has disadvantages and this process requires change. Unfortunately, technology transfer to decrease emissions in three major host countries (China, India and Brazil) has declined (Seres et al., 2009).

#### *Vienna Convention for Protection of the Ozone Layer and Montreal Protocol*

Stratospheric ozone prevents UVB radiation from reaching the surface of the earth and controls the climate. Scientists have observed signs of ozone layer depletion since 1970. The discovery of the Antarctic hole in the ozone layer in 1985 made ozone-depleting substances (ODS) a global concern (Hofmann and Müller, 2015). The Vienna Convention for Protection of the Ozone Layer was adopted in 1985. This convention obligates members to take appropriate legal and implementation measures to protect the ozone layer. It refers to the cooperation principle for scientific research and assessment, development and exchange of information, technology transfer, and multilateral fund to invest in decreasing the use of ODS in developing countries (Norman et al., 2008).



The precautionary and common but differentiated responsibility principles underlie this convention. The Montreal Protocol on substances that deplete the ozone layer was adopted in 1987. The protocol is designed to decrease the production and consumption of ODS. Since developing countries have less effect on ozone layer depletion, the protocol proposes a 10-year delay for phasing out the production and use of this material. The Montreal Protocol is one of the most advanced and efficient international environmental regulations; UNEP reports indicate a sharp reduction in ODS use worldwide since 1986 (Ozone Secretariat, 2005). "It is estimated that implementation of the Protocol will result in 22 million fewer cases of cataracts in people born between 1985 and 2100 and 6.3 million fewer skin cancer deaths by mid-century in the United States alone. While further expansion of the Antarctic ozone hole has been halted, full recovery is not expected until mid-century or later" (UNEP, 2012b). The Montreal Protocol and the Kyoto Protocol are closely related. The Montreal protocol came into force before the Kyoto Protocol; it decreased ozone layer depletion and also decreased the global warming from GHGs (Steinbacher, 2008). Both measures help prevent climate change (Karstensen et al., 2014). Both legal developments have been good at the international level.

#### *Geneva Convention on Long-Range Transboundary Air Pollution*

Sulfur dioxide and nitrogen oxide emissions from petroleum-fueled factories and power plants and mobile sources such as cars, ships and planes cause air pollution. When it reacts with water, oxygen and other chemicals, it forms acid rain that acidifies the water and soil. Air pollutants can travel several thousand miles.

The Convention on Long-range Transboundary Air Pollution (CLRTAP) was adopted in Geneva in 1979 and came into force in 1983. The purpose of this convention was to protect the environment and human health from air pollution. This convention recommends research, information exchange, and the monitoring of air pollution and its effects to develop strategies to reduce emissions of pollutants.

It has eight protocols, but formal regulation to monitor and enforce compliance of the Protocol does not exist. The executive body was established to monitor compliance in 1997, but they required consensus for implementation with weak sanctions and no enforcement (Kurukulasuriya and Robinson, 2006). Formal statistics shows that there are nine international agreements on air pollution, but there has been little or no progress on the prevention and decrease in indoor air pollutants (UNEP, 2012 b).

The convention has been effective for transboundary air pollution, especially sulfur dioxide emissions in Europe (Kurukulasuriya and Robinson, 2006).

#### *International Convention for Prevention of Pollution from Ships*

Combating oil pollution after it has shipped is a challenge. The International Convention for the Prevention of Pollution from Ships (MARPOL Convention) was adopted in 1973 to prevent pollution from ships. The articles of this convention include the various sources of pollution from ships; its main purpose is to prevent pollution of the marine environment. This includes intentional pollution of the marine environment by oil and other harmful substances and decrease discharge of substances intentionally or unintentionally by enforcement of rules and regulations on ships, platforms and fixed and floating ports (IMO, 2002).

The core of the convention is six annexes, one on each of the major sources of pollution from ships. The first two annexes are mandatory regulations to prevent oil pollution (annex I) and to control pollution from noxious liquid substances (annex II). The other four annexes include provisions to prevent pollution by harmful substances in packaged form (annex III), pollution from sewage (annex IV), pollution from garbage (annex V) and air pollution from ships (annex VI) are optional (Knapp and Franses, 2009). The rules and regulations of the MARPOL convention are global and regulations with specific rules for a country or regulations for criminal law have been avoided. The enforcement of these rules is left to coastal states according to their specific requirements. "The present convention does not apply to warships, naval auxiliary or other ships owned or operated by a state and used only for government non-commercial service (Article 3, paragraph 3, MARPOL Convention)".

In the past two decades, the MARPOL convention has been modified several times. Implementation requires trained personnel and inspectors familiar with up-to-date methods for inspection. Promotion of personnel training levels and marine environment protection experts to control and monitor the ships for implementation of this convention is necessary. Studies show that the prevention of marine pollution by oil from ships by the MARPOL convention has decreased marine pollution from ships, but there are gaps in implementation (UNEP, 2012 b).

#### *United Nations Convention on the Law of the Sea*

Adoption the Convention on the Law of the Sea (UNCLOS) in 1982 was a focal point in the governance of the oceans and has provided a framework for all marine activities. "This convention is a legal order for sovereign states and a facilitator of international relationships to increase the peaceful use of the seas, equitable and efficient use of natural resources, and protection of the marine environment (Preamble of the Convention on the Law of the Sea)". More than 30 years have passed since adoption of UNCLOS. Despite the successful achievement of marine laws, a goal including protection of the marine environment and biodiversity in areas beyond national jurisdiction (ABNJ) has not occurred (Gjerede, 2012).

Over the past decade, destructive human activity and environmental destruction have had a direct effect on degradation of the marine environment. The types of pollution include oil pollution, waste, and noise pollution. Indirect effects have cumulative effects climate change and ocean acidification and are a threat to the deep oceans (Ramirez-Llodra et al., 2011; Census of marine life, 2011).

In the UN Conference on Sustainable Development in 2012, states agreed to develop a new international instrument by the end of the 69th session of the UN General Assembly in August 2015 (Druel and Gjerede, 2014). A UNCLOS agreement for implementation is required to apply for protection, long-term sustainable development of marine biodiversity, access and equitable sharing of resources. Many regional and international organizations have adopted a mandate for maritime activities

(Ban et al. 2014). There are many regional and international conventions concerning pollution of the seas and oceans, but there are gaps, such as the lack of standards, procedures and guidelines for marine technology transfer in ABNJs (Druel and Gjerede, 2014).

### **International civil liability regime for compensation for oil pollution damage**

Given the importance of combating oil pollution, the International Maritime Organization (IMO) has developed international legal regimes to create a balance between compensation for oil pollution damage and the oil industry. It includes the Civil Liability Convention and the Fund Convention that were drafted in 1992. A supplementary fund protocol to the Fund Convention was adopted in 2003.

The International Convention on Civil Liability for Oil Pollution Damage covers legal issues on oil pollution, such as getting compensation for accidents and marine oil pollution, oil tanker insurance, court matters related to oil pollution and to determine jurisdiction and financial guarantees for compensation by insurance companies (Nooramini and Harrati Mokhtari, 2009). It appears that legal responses are inappropriate for protection of the marine environment and cannot fully address such events (Gouritin, 2011).

One point discussed in this convention is occurrence of a damage caused by an accident between two or more ships or caused by an accident. Owners of all ships concerned are jointly and individually responsible for all damage that cannot reasonably be separated. The accident must occur between ships that carrying oil. For example, if a collision occurs between a tanker and passenger ship, the convention does not apply. Pollution sources must be only from the ships; if the oil pollution is caused by a pipe leaking from the ship to the port, the convention is not valid (Saeedi and Alaei, 2013). There are six key liability limitations to the international oil pollution liability regime. "These are:

- The burden of proof used;
- The timeframe for assessing claims and awarding payments;
- The definition of damage;
- The awarding of compensation
- The channeling of liability; and
- Exceptions to the liability rules" (Gouritin, 2011).

There are many conventions related to marine pollution by oil, but there is no real relationship between conventions. Each operates independently and there is no comprehensive and coherent structure and integrity (Jacquet et al. 2011).

Of the 30 environmental objectives about water, only access to clean drinking water has shown progress. Access to clean drinking water is of crisis proportions in Africa and the Pacific. Increased use of nitrates in fertilizers, persistent organic substances, and heavy pollute fresh water and soil. Forecasts suggest that more than 600 million people will have no access to clean drinking water in 2015. Climate change and population growth lead to decrease water in many regions. Water withdrawals in global level have tripled in the last 50 years and the groundwater crisis has increased since 2000. Since soil pollution is directly related to water pollution, it is evident that the soil pollution is also unsatisfactory. Pollution by chemicals and waste and pollution of fresh water show data gaps in some countries (UNEP, 2012 b).

### *Energy Charter Treaty, Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects*

Energy efficiency in international law is rooted in the Energy Charter Treaty (ECT) and its protocol on efficiency and related environmental aspects. The ECT is based on the European Energy Charter Treaty adopted in 1994 and is the world's first multilateral treaty specializing in energy issues.

This treaty is innovative in areas including energy trade, investment, energy efficiency improvement and the environment. The ECT is the first international agreement that focuses specifically on energy efficiency in international environmental law. Other binding and non-binding documents like the UNFCCC, Agenda 21 and the Montreal Protocol is implicitly designed to reverse the effects of energy use, but the ECT and its protocol focuses on energy resources and the destruction of the environment. The environment and improving energy efficiency is discussed in article 19 in a separate chapter. Article 19 states that each contracting party shall strive to minimize in an economically efficient manner the harmful effects on the environment (Energy Charter Secretariat, 2004). It covers sustainable development, intergenerational equity, precautionary and the polluter-pays pollution principles.

Given the important role of the ECT and its protocol on the development of international environmental law, the principles in article 19 is a non-binding commitment and the obligations are optional and incentive based. Environmental obligations are secondary and economic considerations are a priority. Article 6 concerns financing and financial incentives, but financing investment in energy efficiency in developing countries has failed (Bradbrook, 1999).

## **Discussion**

### **Requirements for an energy and environment convention**

The proposed international convention on energy and environment is a model designed to protect the environment from the use of fossil fuel while respecting the sovereignty of nations and the rights of future generations. It should include suitable enforcement options and be more efficient for implementation of rules and regulations to protect the environment and achieve sustainable development. The model employs a framework-convention system and is comprehensive and integrated from an international and official perspective. It respects the sovereignty of nations and contains two win-win mechanisms base on cooperation principle for all members.

The framework-convention is a unique feature of international environmental conventions. States tend to provide general principles and total commitment in a legal context under the convention and leave the details for future agreement and the form of protocol to be provided at a future date. The protocol is codified primarily in environmental law and less in public international law. The lack of agreement between countries at the beginning of cooperation occurs because environment and energy issues change over time and states cannot develop a single document that agree on all aspects of the issue. This leads to development of an original document known as the framework-convention on the general issue and later development of subsequent documents called protocols to agree upon the details (Poorhashemi and Arghand, 2013).

#### *Comprehensive and Integrated*

Fossil fuel energy resources are limited and non-renewable and are a major source of environmental degradation at present. The different levels of fossil fuel supply chain (exploration, extraction, processing, transport and utilization and consumption) contribute separately to the degradation of the environment and climate change. This requires a comprehensive and integrated examination of the different levels and their effect on the environment. The analysis shows that existing conventions cover environmental issues such as air, water, soil pollution and global warming. They fail to achieve a comprehensive and integrated view of destruction of the environment arising from the different levels of fossil fuel supply chain. Existing conventions focus on one or several subjects, but tend not to address environmental factors individually or their interactive effects. An isolated approach is not appropriate for overall environmental protection. As the matter of fact, the relationship between conventions like the Kyoto Protocol and Montreal Protocol has been shown to be useful and successful.

One requirement of the proposed energy and environment convention is that the legal document include the effects of fossil fuel supply chain at all levels. It requires a comprehensive and integrated approach.

#### *International and Official Perspective*

Current economic, social, political and environmental policies continuously evolve and influence each other so that it is impossible to deal with them separately. Delineation between communities is obsolete in this context. The geopolitics is intertwined, making the interests one country dependent upon the actions of the others. It may have been possible in the past for countries solve their problems in isolation, but this is not the case today. Environmental issues have been at the forefront, because their complexity involves all aspects of geopolitics (Bernstein, 2004).

Environmental issues are transboundary and adversely affect human activity in response to the global environment. Often, more than one state or even the world community is involved in issues affecting the environment. Developing nations also benefit from an internationally-coordinated regulatory response. One requirement of such a convention is international cooperation and interaction between states. Another requirement is legal enforcement by all signatory states and authorities. A formal, harmonized approach should be possible and address new risks or problems requiring an official response. An official process is needed to provide assurances of its safety and regulatory capacity to instill confidence in the public. Although non-governmental organizations (NGOs) cooperate more thoroughly on environmental protection, energy and environment issues containing political aspects require serious cooperation between governments, the private sectors and NGOs under the control of an independent oversight organization.

#### *Respect for Sovereignty Principle*

Respect for sovereignty principle ensures that activities within the jurisdiction of a state do not damage the environments of other states (Article 21, Stockholm Declaration, 1972 and article 2, Rio declaration, 1992). Sovereign jurisdiction is important to international law. The convention on energy and the environment must take account the principle of sovereignty and respect it.

#### **Facilitating Mechanisms**

International convention on energy and the environment requires facilitating mechanisms for implementation. The convention is designed with two mechanisms for implementation by all members, including developed and developing countries. These mechanisms are the Technology Transfer Chain Package (TTCP) and Super Energy Service Companies (SESCO).

#### *Technology Transfer Chain Package*

Sound environmental technologies can play a vital role to reduce the environmental impacts of fossil fuel supply chain (especially in developing countries). Therefore, Technology transfer as a facilitating mechanism can be used in international convention on energy and the environment.

Technology transfer is proposed by the United Nations Framework Convention on Climate Change. It recommends the transfer and access of environmentally sound technologies and know-how developed countries to developing countries (Article 4.5).

The aim of technology transfer is to provide skills, knowledge, technology, manufacturing methods and equipment. However, studies have shown that 53% of CDM projects involve transfer of technology and knowledge about equipment, 32% involves imports of equipment and only 15% involves transfer of knowledge (Seres et al., 2009).

Successful technology transfer needs to extensive view of technology including skills, know-how, abilities, manufacturing methods, equipment and goods, organizational and operational measures. In this regard, skills and know-how is the most important factor in energy and environment convention.

Technology Transfer Chain Package (TTCP) is proposed in international convention on energy and the environment. It provides the improvement in areas such as energy efficiency, renewable energy, alternatives to fossil fuels and emissions reduction. TTCP is a mechanism of transferring sound environmental technology (all levels) from a developed country to a developing country and further transfer from the developing country to another developing or less developed country. The technology received must be implemented and localized in the receiving country and avoid incorrect sale. The receiving country may then transfer that technology to another developing or less-developed country and so on. Other benefits of this mechanism are



international cooperation between countries for global environmental protection and access to the global market, the sale of and investment in new and innovative technologies, receipt of the latest technologies and entrepreneurship.

#### *Super Energy Service Companies*

Energy Service Company (ESCOs) offer energy conservation services to customers and guarantee the energy saving. Implementation of ESCOs projects decrease energy costs (industrial, municipal, commercial, and residential) and increase environmental protection, including reduction of CO<sub>2</sub> emissions (Ren et al., 2011). Studies have shown that ESCOs activities to the reduction in CO<sub>2</sub> emissions more than the Kyoto Protocol (Fang and Miller, 2012), but ESCOs have the drawbacks and opportunities in developing countries that must be considered (Vine, 2005):

1. The activities of ESCO are extensive because energy is used in diverse agricultural, residential, commercial, municipal, industrial, and transport sectors. Each sector has its own properties and technologies. ESCO require skill and knowledge in several fields but small ESCO with little financial capital and inexperienced staff as start-ups in a developing countries lack these requirements. The solution for this problem is cooperation and integration of small ESCO into Super Energy Service Companies (SESCO). These partnerships allow work on larger projects, make available more financial capital and access to larger financial institutions, improve the environment and inspire confidence (trust). Another advantage of SESCO is the increase in their fields of activity from production and transmission to energy consumption.

2. Since technology continues to advance, university research and commercialization of technology is needed. SESCO should cooperate with universities as knowledge-based firms.

3. The ESCO, customers, suppliers, industry, banks and financial sector to not provide information on energy efficient opportunities in some developing countries. This becomes available with the establishment of SESCO networking. The task of this network is to spread information. Thus, networking enables ESCOs to concentrate on the issue requiring information about energy efficiency projects to improve ESCO activities (Bertoldi, 2007; Roshandel, 2014). The convention can be a facilitator in this regard by regulating aspects of the issue. Networking should aim to access serious information (Roshandel, 2014) and energy and the environment convention will help establish a database of information.

Governments are the main players in international law (Arghand, 2015); thus, the energy and the environment convention is obliged to governments to facilitate ESCOs networking in their own countries. This means that governments must make the necessary policy shift towards ESCOs networking. The duty of governments vis-a-vis the energy-environment convention is to shape the information system. For development of an appropriate information system, governments should monitor ESCOs activities. In fact, networking is the duty of a government having an integrated and comprehensive information system.

4. SESCO must be assessed by higher institutions like the CDM in the Kyoto Protocol. Such an institution should be developed under the auspices of the UN.

The implementation of SESCO is another proposed facilitating mechanism for an international convention on energy and the environment. This mechanism introduces improvements and changes in the role and operation of ESCO to SESCO that can be useful for implementation and promotion of the convention (see Table 2).

**Table 2.** Improvements and changes in the role and operation of ESCO to SESCO

ESCO	SESCO
Small scale	Small/ Medium/ Large scale
National and International cooperation	International cooperation
Technology and Equipment Transfer	Skill, abilities, technology, manufacturing methods and equipment transfer
Economy and Environmental issues	Economy and Environmental issues
A market between ESCo & End user	A market between developed countries and developing countries
Reduction SO <sub>x</sub> , NO <sub>x</sub> , CO <sub>2</sub>	Reduction air/water and soil pollution
Failure to report to international organizations	Report to international organizations
NOT Commitment	Commitment for countries
The lack of central organization or institution	Trusted Companies under convention

## Conclusions

Population growth, technological progress and the increasing of energy demands are the most important factors of environmental issues such as air, water, soil pollution and climate change. There are many binding agreements and non-binding instruments at the regional and international levels on energy supply and the environmental protection.

The analysis shows that each convention tends to focus to a specific topic of energy and the environment. There has been no integration of the control of different levels of energy and environmental protection in the form of an international convention. Energy conventions regarding unsustainable use of fossil fuel production are implicitly linked to other environmental factors. Environmental conventions focus on environmental damage caused by the production or consumption of fossil fuel. Unfortunately, the rules and regulations in this area are inadequate. Energy and environmental law are developed separately with distinct goals. There is no comprehensive approach to environmental factors (air, water and soil) and different levels of

fossil fuel supply chain (exploration, extraction, processing, transmission, distribution and consumption). All existing international rules and regulations are specific to one aspect and lack integration with one another. Despite the number of regional and international conventions on energy and the environment, formal statistics indicate that environmental conditions are critical.

Analysis shows a lack of international conventions on energy and the environment. The comprehensive approach to some conventions has led their failure. The articles examined in this study show the strengths and weaknesses of existing conventions. It can be seen that the requirements of international conventions on energy and environment provide a necessary incentive for countries to decrease the conflict of interest between the energy supply system and environmental protection. The requirements of an international convention on energy and environment include a convention-framework, comprehensive and integrated nature, international and official standing and respect for the principle of sovereignty. The design introduces facilitator mechanisms and innovative solutions of TTCP and SESCO for effective implementation.

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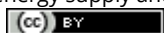
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