

THE IMPACT OF ENERGY POLICIES FOR G7 COUNTRIES ON THE FINAL PRICE OF OIL

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ABSTRACT

The study and analysis of the global oil market in isolation from the role of the policies of international oil organizations, especially the International Energy Agency (IEA), is tainted by a lack of analysis of the influencing factors and consequently the final results for them, as the impact of these policies is often greater and with different durations of time than other market factors. Therefore, it is important to analyze the policies of the oil organizations and the extent of their impact on the oil markets in the short, medium and long term, for a more accurate and broader analysis of the global energy balance, and the supply and demand for oil at the present and future, in order to predict the path of global oil markets to find out the factors supporting market stability, especially oil prices that It is a reference to other energy prices and their future plans, and in light of the fundamental developments that the markets have witnessed during the past three decades, as the trends of supply and demand for oil were characterized by the inability to continue in the future in the current form from the economic, social and environmental perspective, this on the one hand, and on the other hand economic growth depends To the world on the extent of its success in securing energy sources that meet future needs, in light of the challenges of the safety of energy supplies, especially oil ones, and the development of energy alternatives and their gradual replacement, and here emerges the role of the International Energy Agency on the global oil market.

KEYWORDS

International
Energy Agency, oil
market, Energy
Policies.

Introduction:

It created a need for the oil-producing countries before the middle of the last century to establish a grouping (OPEC), which essentially aims to take care of their interests by maintaining the stability of global oil markets and reaching a fair price for oil. This action by the oil-producing countries was met with a reaction from Consumer countries, as the International Energy Agency was established, which aims to take care of the interests of oil-consuming countries in return, and to confront OPEC and prevent it from controlling global oil markets, by reducing dependence on oil from OPEC countries, through a set of policies with different deadlines aimed at short The long-term includes increasing oil production outside OPEC countries, while the long-term includes increasing the efficiency of energy use and increasing the use of gas and coal, as well as increasing the use of alternative energies of various types under the pretext of reducing environmental pollution. Therefore, a situation of undeclared competition prevailed between international oil organizations to control global oil markets, which negatively affected the stability of global oil markets and the fluctuation of its prices and thus the revenues of oil-producing countries and the stability of the global economy.

Research problem:

The main goal of establishing the International Energy Agency is to protect the interests of oil-consuming countries and confront OPEC and promise to extend its control over global oil markets. However, the policies followed have begun to negatively affect the stability of oil markets and the fluctuation of its prices through the policies of member states, especially industrialized countries.

Search goal:

Explaining the most important factors facing the stability of the global oil market by presenting the International Energy Agency's policies with different time periods aimed at controlling energy markets instead of preserving them.

Research hypothesis:

The research hypothesis is based on the existence of a negative relationship between the policies of the International Energy Agency and the stability of oil markets and prices

Research Methodology:

The researchers used the descriptive analytical method to identify the role of energy policy in achieving instability in the global oil market.

Search structure:

The research was divided into three sections. The first section dealt with the origins, objectives, and most important policies of the International Energy Agency. The second section dealt with the carbon tax policy and its impact on global oil markets. The third section dealt with the policy of moving towards alternative energy sources of oil (renewable and non-renewable) and its impact on the global oil market. The fourth section is the policy of strategic oil storage and its impact on global oil markets, and finally reaching conclusions and recommendations.

The first section: The origins, objectives, and most important policies of the International Energy Agency

First: Origin and objectives:

It is an organization for oil-consuming industrialized countries, founded in 1973-1974, under the leadership of the United States, through which energy policies, especially oil, are drawn up with the aim of: securing permanent oil supplies to the countries of the organization, and contributing to the development of energy alternatives. There are several reasons that prompted the OECD countries to establish the International Energy Agency, including the October War of 1973, the rise in oil prices, and the decline of the role of the oil cartel for major oil companies after the nationalization movements in many oil countries (Al-Aqeel, 2003: 39). Its objectives were defined in the seventies of the last century as follows: (ECB,1999:3-7).

- 1- Creating a strategic reserve of crude oil in the member states of the Agency that covers their needs for a period of 90 days, which rose to 180 days. The goal of building the strategic reserve is to avoid any interruption of oil supplies to which the member states are exposed, in the event of any oil crisis that threatens the safety of supplies. In addition, the storage will be used as a pressure tool on the level of oil prices, and the process of managing and organizing this storage will be carried out according to the agreed upon conditions.
- 2- Increasing investments in the field of exploration and drilling for oil and gas, by conducting extensive surveys in new areas, especially outside OPEC countries.
- 3- Developing alternative energy sources to oil, and rationalizing oil consumption in all economic sectors.
- 4- Diversifying oil supplies from outside OPEC to reduce OPEC's role and limit its control of the global oil market.
- 5- Imposing taxes on petroleum products, to reduce oil consumption and reduce oil imports, with the aim of paying attention to environmental safety (Al-Naimi, 2007: 141). Reducing dependence on imported oil.

Second: International Energy Agency policies

The International Energy Agency has followed a set of policies to achieve its goals through multiple strategies, including:

1- Carbon tax policy: Carbon taxes

They are taxes and fees imposed by the state on the taxpayer who causes pollution, to compensate for the damage resulting from burning fossil fuels. Arthur Pigou is considered the first to call for carbon taxes, and they are also among the economic tools that contribute to protecting the environment. They were presented at a conference Kyoto by the European Union, and it is considered one of the most successful and efficient contemporary means of protecting the air from polluting gases, and most countries in the world have agreed to adopt a green tax policy to reduce air pollution (Raziq, 2007: 99-101). The International Monetary Fund emphasizes that carbon tax policies should be characterized by the following (Tamirza, 2008: 22).

A- Long-term and credible.

B- All countries, whether developed or developing, must begin pricing their emissions.

T- Establishing a unified global price for emissions.

D- Allowing international trading in emissions permits under a plan that imposes upper limits on pricing.

C- Prices must be flexible enough to accommodate periodic economic fluctuations.

H- Distributing carbon tax prices fairly among countries.

2- The policy of moving towards developing alternative energy sources (renewable and non-renewable).

A - The policy of increasing production from renewable energy sources: The use of fossil fuels in industrial and consumer processes is a major source of pollution in all its forms, not to mention the economic effects resulting from it. In order to reduce air polluting emissions, industrial societies have relied on other sources of energy. Other than fossil fuels, and since they are the countries that most use air-polluting technology, steps and policies must be taken to reduce greenhouse gas emissions. The International Energy Agency countries followed within their policy increased reliance on renewable sources of energy, and since five decades ago, interest in environmentally friendly renewable energy sources and the use of technology has increased. Renewable energy is available over wide ranges in a way that makes it occupy a good position in the global energy balance despite the modernity of these sources (Ezzat, 2012: 201.)

B- The policy of increasing the production of unconventional oil (shale, sand, shale gas).

The United States of America, the largest oil consumer in the world, has recently moved to use a new type of unconventional fossil fuel (shale oil, sand oil, shale gas), which is more expensive and pollutes the environment than traditional oil, and can be addressed through the following:

1- Shale oil: Shale oil is a term given to sedimentary rocks that contain organic materials, consisting of organic carbon, nitrogen, and oxygen, which are collectively called kerogen. This material is capable of being distilled and burned, and then shale oil is produced from it. Due to intense pressure and heat (N.E. Altun and others, 2006:214). Shale oil is characterized by large global reserves estimated at about (5) trillion barrels that can be extracted according to available technology and capabilities, and these reserves are still increasing as a result of research, exploration, and the development of technology. The shale oil resource is concentrated in six main countries: Russia, the United States, China, Argentina, Libya and Venezuela, and the reserves of these countries represent about three-quarters of the world's reserves (David, May 2012, www.ceres.org).

2- Sands oil: It is accumulations of sand and clay saturated with bitumen, which is oil in a solid state. It requires unconventional methods of production. It is processed and converted into manufactured crude oil. The Alberta region in Canada is the largest concentration of sands oil and extends over an area Oil sands cover (4.3) million hectares of forest, and consume large amounts of energy, as well as using large amounts of water (Alberta, 2008,: 2-4). There is great opposition from environmental protection associations to the production of oil sands due to the significant environmental and social damage it causes (Stockman and Wykes, 2012: 6). Oil sands production in Canada increased from about one million barrels per day in 2003 to reach about 3.5 m/b/d in 2019 (eia.org.com).

3- Shale Gas: The first well for shale gas was drilled in the United States of America in 1821 in the state of New York. Shale gas is considered one of the promising new energy sources, for which

huge amounts of reserves were discovered, especially in North America. There are approximately 142 basins. Sedimentary rocks called (shale), which is one of the types of sedimentary rocks that contain shale gas, but the basic structure is available in only 32 basins, and the rest has not yet been exploited (WEC, 2013:3-8). It requires huge investments in order to produce economically, and geological survey studies have estimated that the reserve of shale gas is estimated at approximately (456) trillion cubic meters (16,110 trillion cubic feet) compared to 187 trillion cubic meters of conventional gas, and about (40%) of Shale gas reserves are economically viable at the level of prevailing prices, and the largest percentage of this gas is located in the United States of America, where the size of the economically viable resource base for the United States is estimated at about (32.7) t/s/m, and shale gas production has increased over the past decades due to... The rise in energy prices, and it is likely that gas prices in the near future will be lower than coal prices, as the costs of carbon reduction are taken into account, which increases demand for it globally, and this will lead to changes in energy supplies in the long term (Al-Araji and Al-Zubaidi, 2015: 8).

4- Strategic and commercial oil storage: The strategic storage policy began as a response to the energy crisis in 1973, in what is known as the energy policy and conservation plan by the countries of the International Energy Agency, and the importance of the role of storage emerged during the eighties. and the nineties of the last century in influencing global oil markets (Abdel-Wahab, 2017: 88). The movement of strategic reserves is directly linked to OPEC production and consumption by industrialized countries. The factors affecting storage do not differ from the factors affecting oil, in addition to OPEC's production policies. Storage is considered a pressure card used to influence oil markets and use it for speculative purposes depending on expectations of demand and prices and OPEC's production decisions. (Al-Bassam, 2005: 157).

The second topic: carbon tax policy and its impact on global oil markets

The global demand for oil has recently been linked to the issue of climate change, which is an extremely complex issue. After the interest of industrialized countries, led by the European Union and Japan, increased, they took the phenomenon of global warming as a justification for achieving economic goals at the expense of the interests of other countries, so the issue of carbon taxes emerged as one of the most important policies. Which is imposed on oil and its derivatives in order to preserve the environment, but it has a direct impact on the volume of global demand (Heinberg, 2006: 26).

After the OCED organization classified the economic tools for protecting the environment into five categories, one of which is (carbon taxes), which are imposed by many countries, especially the European Union, to reinforce the principle (the polluter pays) to create an incentive for producers and consumers to change activities that negatively affect the environment, and therefore this was taken The principle for collecting taxes, which in OCD countries has been estimated at (6%-7%) of total tax revenues or (2%-2.5%) of the gross domestic product (Ahmadi, 2009:). Only oil and its products are exposed to the carbon tax by industrialized countries, under the pretext of protecting the environment, at a time when support continues by industrialized countries for alternative energy sources that pollute the environment, such as coal, shale oil, and shale gas, as the use of coal results in (1.05) tons of carbon. For each barrel of oil equivalent, compared to (0.82) tons of carbon in the case of oil and 0.63 tons of

carbon in the case of gas (Juma, 2005: 12). The impact of carbon taxes on global oil demand can be explained as follows (Hassan, 2008: 106-107:(

- 1- Impact on energy consumption by imposing high taxes, while industrialized countries still provide support for coal, which pollutes the environment more than oil.
- 2- Limiting the increase in oil consumption, as the carbon taxes imposed on oil derivatives represent a barrier between the global oil price and the oil price paid by the final consumer, and thus the prices of oil derivatives remain high even with the decline in global oil prices.

Table (1) percentage % Carbon taxes on a barrel of oil in industrialized countries and the OECD for the period (2003 - 2019)

2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Country
42.3	40.1	48.3	58.3	48.6	24.4	22.4	20.4	20	26.8	35	21.4	29.5	33.3	33.0	43.7	57	USA
77.1	69.1	87.0	101.7	85.6	55.4	53.2	53.2	51.6	61.4	67	42.7	60.7	64.3	72.0	85.1	99	Canada
112	99	127	164	116	69	63	71	78	99	118	61	78	86	107	156	176	Japan
231	219.5	247.6	283.8	225.9	140.7	128.1	120.2	128.4	162.7	211	150.0	185.5	185.1	218.9	297	336	France
203	194.9	234.8	283.5	233.4	152.7	141.5	134.3	145.8	187.8	245	169.9	209.3	205.1	243.2	340.0	396	Germany
243	236.4	295.1	355.5	298.3	196.2	175.6	164.5	148.5	177.4	235	162.6	203.2	207.6	246.9	333.4	376	Italy
241	225	282	356	337	202	175	173	170	213	249	180	252	253	296	414	466	UK
166	157	191	232	194	121	110	106	107	133	167	112	147	149	176	239	273	Average countries
163	155	191	228	189	120	109	104	109	139	168	115	142	145	167	228	262	Countries oecd

sources : OPEC , Annual statistical bulletin ,Vienna, 2009, 2005 , p.91, p73

OPEC , Annual statistical bulletin ,Vienna, 2015 , p.90

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Table (1) shows the tax rate imposed on a barrel of oil. It is noted that in some countries taxes have risen to record rates, especially in European countries, as they reached their highest rates in the United Kingdom and Germany (466%, 396%) respectively, as well as in the rest of the industrialized countries. The seven and other OECD countries, that is, more than four times the price of one barrel, and this policy would lead to the following- :

- 1- The prices of petroleum products rise at such high rates that any decline in global oil prices prevents an increase in domestic consumption.
- 2- Increasing financial revenues as a result of imposing taxes at rates higher than the revenues of oil-producing countries, and the possibility of redirecting these revenues into renewable energy production projects and development projects.

3- Low prices of alternative energies compared to oil. The reason for this is not due to the costs of production or their global prices, but rather to the taxes imposed on oil, which increases the production of alternative energy.

4- Variation in tax rates between industrialized countries, resulting from the amount of oil consumption and caution against the tax curbing economic growth rates.

The economies of the countries in Table (1) were able to deal with these high rates of taxes and achieve economic growth rates. Table (2) shows the final prices of oil reaching the consumer in the seven major industrial countries and OECD countries for the period (2003 - 2019), which represents: (price Oil, oil taxes and manufacturing margin).

Table (2) The final price of a barrel of oil in the seven industrialized countries and OECD countries for the period (2003- 2019) dollars

2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Country/year
																	USA
115.1	120.1	104.0	92.45	105.1	147.8	153.4	157.9	152.0	119.1	100.5	142.7	118.6	108.8	95.93	76.68	64.40	The final price
56.31	59.21	48.12	37.94	45.81	89.43	97.26	101.6	102.3	76.02	58.83	94.97	66.77	59.17	48.82	35.86	27.66	Oil price
23.84	23.80	23.26	22.16	22.29	21.88	21.81	20.65	20.56	20.39	20.36	20.34	19.75	19.74	16.12	15.70	15.75	Tax price
35.77	37.60	33.32	32.36	37.71	36.37	34.27	35.28	29.42	22.80	21.16	27.56	31.74	29.97	30.99	25.12	20.99	Manufacturing margin
																	Canada
144.2	156.7	138.3	123.7	134.1	184.8	196.5	202.4	197.3	158.6	129.0	169.8	147.7	133.2	118.8	94.63	79.24	The final price
63.12	70.88	54.30	43.60	53.48	98.60	108.0	110.1	110.0	79.14	60.29	101.1	70.04	64.33	52.37	38.13	29.53	Oil price
48.71	48.99	47.28	44.37	45.82	54.70	57.79	58.88	57.20	48.64	40.32	43.34	42.55	41.41	37.72	32.45	29.40	Tax price
32.19	36.70	37.24	35.60	35.61	30.88	30.06	32.85	29.43	30.78	28.69	25.23	35.08	28.09	28.09	24.05	20.32	Manufacturing margin
																	Japan
192.7	192.9	166.9	152.4	158.2	216.4	222.7	251.2	254.7	208.3	175.2	213.2	159.4	157.6	145.1	132.0	115.1	The final price
66.78	72.85	54.42	41.79	54.20	104.1	110.6	114.7	109.3	79.43	61.29	100.8	70.09	64.03	51.57	36.59	29.26	Oil price
74.63	72.11	69.20	68.80	62.77	71.72	70.22	82.03	85.72	78.91	72.29	61.61	55.31	55.57	55.19	57.28	51.54	Tax price
50.66	47.63	43.28	42.15	41.85	40.67	41.64	54.84	59.05	50.00	42.34	50.53	34.23	37.46	38.85	38.14	34.30	Manufacturing margin
																	France
254.2	267.6	221.2	196.1	205.3	273.5	285.0	283.4	293.2	241.0	220.9	289.1	236.1	212.0	198.4	174.2	145.8	The final price
64.98	71.59	54.47	43.48	53.14	99.40	109.5	112.0	111.7	79.78	61.64	97.63	72.22	63.69	52.74	37.61	28.87	Oil price
150.0	157.2	134.9	123.4	120.0	139.9	140.4	134.6	143.5	129.8	130.3	146.4	131.1	117.9	115.5	111.8	97.11	Tax price
39.18	38.87	31.86	29.19	32.10	34.25	35.09	36.71	37.83	31.43	28.97	44.99	32.76	30.40	30.22	24.71	19.87	Manufacturing margin
																	Germany
236.2	251.5	218.4	199.9	214.7	290.7	303.9	304.9	313.1	261.3	245.5	300.9	255.6	223.8	209.9	188.4	164.1	The final price
64.43	70.50	54.02	42.80	52.65	99.76	109.6	112.2	110.6	78.49	61.18	96.70	71.60	63.29	52.30	36.65	28.44	Oil price
130.8	137.4	126.8	121.3	122.9	152.4	155.1	150.7	161.3	147.4	149.9	164.3	149.9	129.8	127.2	124.6	112.7	Tax price
40.90	43.59	37.56	35.82	39.14	38.58	39.21	41.97	41.19	35.44	34.39	39.92	34.12	30.72	30.42	27.19	22.92	Manufacturing margin
																	Italy
264.0	280.4	250.3	229.1	249.5	341.1	349.3	346.0	323.7	263.2	246.1	309.6	259.5	235.9	222.7	195.5	165.9	The final price
64.70	70.88	53.17	42.33	52.06	99.09	109.9	112.1	110.2	79.29	60.69	96.67	70.20	62.50	51.33	36.60	28.58	Oil price
157.5	167.5	156.9	150.5	155.3	194.4	193.1	184.5	163.7	140.6	142.5	157.2	142.6	129.7	126.7	122.0	107.4	Tax price
41.76	41.97	40.19	36.29	42.16	47.59	46.24	49.32	49.77	43.29	42.92	55.70	46.69	43.66	44.64	36.85	29.90	Manufacturing margin
																	UK
258.2	267.1	239.4	230.8	270.5	336.8	334.4	341.0	334.2	278.5	239.2	311.6	288.8	257.5	240.2	218.1	184.7	The final price
65.58	72.65	54.69	44.62	53.81	100.0	110.2	112.6	113.5	80.60	62.39	99.34	73.80	65.00	53.79	37.75	29.13	Oil price
158.0	163.6	154.7	158.9	181.5	201.9	193.3	194.9	193.5	172.1	155.7	178.9	186.0	164.7	159.1	156.3	135.9	Tax price
34.53	30.83	30.20	27.06	35.08	34.61	30.76	33.79	27.68	25.57	21.67	33.49	28.91	27.79	27.37	24.16	19.28	Manufacturing margin
																	Average of the seven countries
209.2	219.5	191.4	174.9	191.3	255.7	263.5	269.5	266.9	218.6	194.0	248.2	209.3	189.8	175.8	154.2	131.3	The final price
63.70	69.79	53.31	42.37	52.16	98.64	107.9	110.7	109.8	78.96	60.90	98.24	70.67	63.14	51.85	37.03	28.78	Oil price
106.2	110.1	101.8	98.50	101.5	119.5	118.8	118.0	117.9	105.4	101.6	110.3	103.9	94.15	91.10	88.61	78.57	Tax price
39.28	39.60	36.24	34.07	37.66	37.57	36.75	40.68	39.20	34.19	31.45	39.63	34.79	32.58	32.94	28.60	23.94	Manufacturing margin
																	OECD countries
214.4	225.5	199.8	180.9	197.4	263.4	264.7	263.9	269.0	224.9	198.5	249.4	209.5	190.3	174.4	154.4	131.3	The final price
64.61	70.89	53.68	42.73	52.48	99.68	108.9	111.6	110.5	79.39	61.68	97.38	71.09	63.29	52.30	37.22	28.88	Oil price
105.26	109.91	102.50	97.40	99.58	119.53	119.29	115.93	120.90	110.4	103.6	111.9	101.3	91.68	87.25	84.95	75.62	Tax price
44.56	44.70	43.64	40.86	45.41	44.24	36.60	36.38	37.60	35.15	33.26	40.14	37.13	35.38	34.88	32.25	26.80	Manufacturing margin

Sources: OPEC, Annual statistical bulletin, Vienna, 2005, P128, 2010, P120, 2015, P90, 2020, p.73

From the data in Table (2), the following can be observed:

- 1- High taxes in general, especially in the European Union countries, as the tax exceeded more than four times the price of a barrel, while it decreased in the United States of America, and the reason for this is its large consumption of oil, and in order not to reduce economic growth rates, which is linked to a direct and direct relationship to energy consumption. In general and oil in particular.
- 2- Increasing the financial revenues of countries, and oil tax revenues have become an indispensable source, especially linking these revenues to investment projects, research and development of alternative energy sources (renewable and non-renewable), as well as mitigating the environmental impacts resulting from the consumption of fossil fuels.
- 3- Reducing pollution rates within the Earth Summit agreements, under which countries were able to trade their share of carbon emitted.
- 4- Reducing dependence on imported oil, especially from OPEC countries, by increasing energy consumption efficiency and turning to alternative energy, as well as increasing supplies from outside OPEC.
- 5- Despite the increase in taxes at high rates in OECD countries, there is an increase in energy consumption from more polluting sources such as coal, especially in countries that have large reserves of coal and other sources (Emmanuel, 2010: 5).
- 6- A continuous cycle between the agency's policies that begins with taxation, obtaining revenues, and financing alternative energy projects as well as strategic storage. That is, the first cycle of the agency's policies is carbon taxes, followed by directing financial returns to the following cycles (alternative energy, strategic storage). This means that any of The agency's energy policies did not bear large financial burdens as a result of their implementation. On the contrary, they achieved gains in the long term.

The carbon tax rate may rise or fall in these countries depending on the state of the economy that the country is going through, whether it is a state of recession or a state of recovery. It has become a financial tool used to mitigate or stimulate the effects of the economic cycle.

The third topic: The policy of moving towards alternative energy sources of oil (renewable and non-renewable) and its impact on the global oil market

Alternative energy to oil is divided into two types, and we will discuss the new ones: renewable energy sources, which are divided into many types such as solar energy, wind energy...etc., and non-renewable energy sources, which are represented by non-conventional fossil fuels such as shale oil, shale gas, and sand oil, as it affects the increase in the production of these Sources on global oil demand and reduces the share of oil in the global energy balance. To clarify this, this requirement has been divided into the following- :

First: Policies towards renewable energy sources and their impact on oil demand

The International Energy Agency countries are moving towards renewable energy sources and increasing their investments within the agency's energy strategy. Therefore, in the 1970s, the International Energy Agency laid the foundation for achieving two basic goals. The first is the development of energy alternatives other than oil, especially renewable energy sources. The second is the development of energy consumed. Which is directly linked to economic activity, so any decline in the global economy will be followed by a decline in energy consumption and thus will impact oil markets (Batter, 2013: 286). The production of renewable sources has increased over the past two decades, and the reason for this is due to: (Ezzat, 2012: 206:)

A- The high costs of producing renewable energy sources have become acceptable as a result of the rise in oil prices.

B - Many environmental conferences were held during this period that aimed to reduce greenhouse gas emissions and move towards clean energy sources.

T- Increasing investments directed towards renewable energy sources, which in turn reduced production costs.

Table (3) shows the evolution of the consumption of renewable energy sources in the agency countries for the period (2003-2019).

Table (3) Development of renewable energy production in OECD countries and the world for the period (2003-2019) million barrels equivalent *

2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	Country/year
307.5	283.5	262.2	230.6	198.2	186.3	167.1	143.3	126.7	109.0	94.0	82.3	68.6	63.2	57.3	54.5	52.2	USA
30.9	29.5	28.8	28.6	25.0	15.5	14.8	14.5	13.1	12.1	9.8	7.4	7.5	7.1	6.7	6.7	6.3	Canada
76.0	60.7	51.3	42.7	42.8	32.7	25.8	21.4	19.4	18.6	16.8	16.8	17.1	16.1	15.8	13.0	12.3	Japan
34.4	29.4	26.0	23.3	21.9	18.1	16.4	15.2	12.3	9.7	7.9	6.3	5.2	3.7	3.1	2.7	2.5	France
140.6	129.8	123.1	106.1	106.6	89.7	81.2	76.1	66.7	52.8	47.8	45.7	42.1	32.4	26.9	23.1	17.5	Germany
42.4	41.2	42.5	41.1	39.7	39.0	37.1	31.6	23.3	16.2	12.6	10.3	9.3	8.5	7.7	7.2	6.4	Italy
71.1	65.6	58.3	48.7	48.3	36.8	30.4	22.5	18.5	14.1	12.5	10.5	9.1	8.5	7.5	5.8	4.6	UKM
459.7	399.5	315.1	231.9	175.2	144.1	115.3	85.8	65.5	47.0	30.6	17.6	9.7	6.8	4.6	2.4	2.2	China
525.2	474.8	449.9	400.8	392.5	343.5	318.1	181.6	238.2	196.8	169.7	149.9	131.2	109.8	94.9	80.8	64.6	Europe
1015	905.5	838.3	743.0	692.4	606.4	551.3	484.3	419.0	355.9	308.0	272.7	239.7	208.9	187.2	165.8	144.7	OECD
1761	1549.3	1362.8	1155	1021.2	882.2	777.7	666.9	567.8	477.1	399.7	344.5	297.1	257.5	227.7	203	177.7	the world
	322	351	263	340	288	239	249	279	226	168	171	146	100	64	39	-	Global investment \$

Source: BP, Statistical Review of World Energy June 2020. www.bp.com/statisticalreview

: REN21, 10YEARS OF RENWABLE ENERGY PROGRESS, PARIS, 2014, 2020, P.15, P13

From Table (3) it is noted that:

- 1- Increasing the production of renewable energy in all countries of the world in varying proportions, as the compound growth of world production reached about (13.2%) during the period as a result of the increase in the number and size of investment projects in renewable sources.
- 2- There is a direct relationship between the rise in oil prices and the increase in the volume of production of renewable energy. This is due to the high cost of producing renewable energy compared to fossil energy, and its production becomes economically feasible.
- 3- Despite the increase in production from renewable energy sources, its percentage in the global energy balance is low (BP, 2020: 60).
- 4- There is a global trend to increase the participation of renewable energy, especially after the global climate conferences, and the increase in support provided by international energy and environmental organizations and developed countries to developing countries in the financial, technical and technological fields, to reduce dependence on imported energy, especially oil.
- 5- The volume of investments directed to renewable energy sources increased by large proportions, as it increased from (39) billion dollars in 2004 to (322) billion dollars in 2018, and the compound growth of global investment reached (45.6%), but it amounts to about half compared to the volume of investments in renewable energy sources. Fossil energy, amounting to \$933 billion in 2019 (IRENA, 2020: 32).

Second: The policy of turning to non-conventional fossil energy sources and its impact on global oil demand

After the global economy recovered from the financial crisis that occurred in 2008, global oil prices increased, which were determined by many factors, including economic growth, supply, demand, the dollar exchange rate, and global stock prices. Global oil demand increased in sync with many geopolitical factors, such as what happened in Nigeria, and the spring The Arab League in Libya, the sanctions imposed on Iran, the problems that Iraq is suffering from, the stability of Saudi production and the decline in low strategic reserves, led to a rise in global oil prices after 2003. This rise in prices prompted the United States and its companies to develop the non-conventional fossil fuel oil industry (shale, sand, and shale gas) and directing large investments towards this source. The United States of America and Canada are unique, despite the presence of large reserves of these sources in other countries. Table (4) shows the volume of global production of these sources for the period 2003-2020.

Table (4) Evolution of non-conventional fossil fuel production quantities in the world (2003-2020)

Shale gas (billion cubic meters/d)	Oil sand m/b/d	Shale oil m/b/d	the year
2.89	0.90	0.30	2003
2.95	1.11	0.40	2004
3.01	1.12	0.40	2005
3.35	1.23	0.51	2006
3.59	1.32	0.62	2007
5.87	1.31	0.65	2008
8.63	1.49	0.82	2009
14.82	1.62	0.75	2010
22.20	1.74	1.31	2011
28.80	1.93	2.15	2012
31.70	2.09	3.35	2013
3735	2.28	4.30	2014
42.25	2.41	4.99	2015
47.31	2.66	4.72	2016
51.63	2.82	5.27	2017
61.26	2.91	6.65	2018
70.98	3.70	8.22	2019
-	3.81	7.84	2020
%18.3	%4.0	%9.2	production to % * Conventional oil

source: iea.org/data-and-statistics/charts/us-shale-oil-prospects-2010-2024

-Alberta.ca/oil-production-limit.aspx

-https://www.eia.gov/dnav/ng/ng_prod_shalegas_s1_a.htm

-Ahmed bin Muhammad Al-Sari, An overview of the most important non-traditional sources, working paper, Saudi Arabian Monetary Agency, July 2015, pp. 4, 6, published on the website. <http://www.sama.gov.sa/ar-sa/EconomicResearch/WorkingPapers>

*It represents the ratio of non-traditional sources to the world's traditional sources

1- Increasing shale oil production to record rates, especially since (90%) of production is in the United States of America, and the same is true for sand oil, as production is concentrated in Canada. This is a result of two factors: first, the rise in global oil prices, and the development of the use of technologies that contributed to reducing production costs and making shale oil production economically feasible* Second.

2- There is a direct relationship between oil prices and increased production from non-traditional sources, as well as increased global demand.

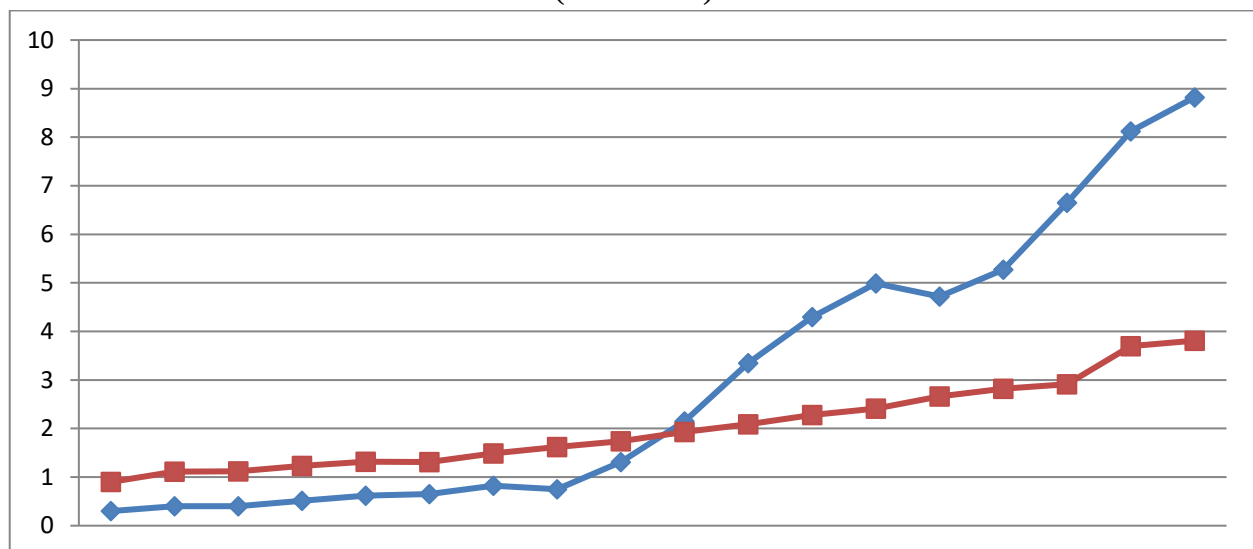
3- The increase in shale gas production was accompanied by an increase in shale oil, due to the participation of exporters in the production processes.

4- Government support provided to companies producing shale oil in the form of tax exemptions, financial facilities, etc., while some governments carry out production operations, such as the government of the Canadian state of Alberta, which enhances production increases from these sources.

5- Although there are large reserves of these sources that are distributed globally, production is concentrated in North America only.

6- The table above shows the percentage of participation of these sources in the global energy balance. These percentages are relatively high compared to the past ten years, and they have had an impact on global oil markets.

Figure (1) Evolution of production from non-conventional oil sources in the world for the period (2003-2020)



Fourth topic: Strategic oil storage policy and its impact on global oil markets:-

The International Energy Organization has obligated member states to maintain a strategic oil reserve equivalent to each country's daily consumption for a period of 90 days, in order to provide flexibility in the ability of these countries to deal with any geopolitical events or other events that disrupt the security of oil supplies. The United States has about (727) m/b in salt tanks, or what are known as (salt caves), in six locations, four of which are located on the coast of Texas City, and two in Louisiana City. These tanks are distinguished from ground tanks by their ease of storage and high degree of safety, availability and low cost. The American authorities used this reserve to confront large fluctuations in oil prices more than once, in what the oil-producing countries considered a new challenge added to the challenges surrounding the oil industry (www.energy.gov/fe/strategic-petroleum-reserve).

China is the second largest oil consumer in the world, so its strategic reservoirs were established to face a set of challenges related to the energy sector. However, it does not provide any documented data on its petroleum reservoirs. The Chinese reservoir is estimated at approximately (1.15) billion barrels, while China says that its reservoirs amount to (385) billion barrels. One million barrels, and whatever the stored quantity is, it does not pose a threat or any significant impact on the oil markets because no quantities of it are publicly offered in the markets, unlike the United States of America, which from time to time puts quantities for sale to influence prices (www.bayancenter.org/2020/05/6012). Table (5) shows the size of the strategic reserve of the United States of America and the reserve's interventions to influence the markets for the period (2003-2020).

Table (5) US strategic reserves and their impact on oil markets for the period (2003-2020) M/B

The reason for the stock movements	Moves Storage M/B	Commercial operational storage	Mandatory strategic storage	Total storage m/b	the year
Clouds (climatic conditions: tornado)	0.98	948.8	619.5	1568.3	2003
(Withdrawal) Weather conditions: Hurricane Ivan	5.4	969.2	675.6	1644.8	2004
:(Withdrawal and sale) Weather conditions Hurricane Katrina	20.8	997.0	684.5	1681.5	2005
(Withdrawal) An accident at the port of two oil companies' refineries	1.51	1014.4	688.6	1703.0	2006
-	-	950.6	696.9	1647.6	2007
Sold to several oil companies due to Hurricane Gustav and Ike	5.389	1017.3	701.8	1719.1	2008
-	-	1031.7	726.6	1758.3	2009
-	-	1046.2	726.5	1769.6	2010
,Mandatory sale due to severe supply shortages Libyan oil outages, and a collective action by the IEA	30.64	1031.6	695.9	1719.5	2011
Sold to Marathon Company due to Hurricane Isaac	1.0	1084.8	695.2	1774.9	2012
-	-	1035.5	695.9	1724.3	2013
Trial sale of markets to evaluate procedures for withdrawing from strategic storage	5.0	1136.0	690.9	1821.7	2014
-	-	1289.4	695.1	1979.0	2015
-	-	1334.5	695.1	2024.8	2016
Mandatory sale and inventory update	16.28	1231.7	662.8	1892.0	2017
Mandatory sale and stock upgrading	18.85	1264.1	649.1	0 . 1908	2018
Mandatory sale and stock upgrading	15.70	1289.2	634.9	1916.8	2019
Mandatory sale	9.85	1344.3	638.1	1982.4	2020

SOURCE: EIA, Energy Information Administration,
https://www.eia.gov/dnav/pet/TblDefs/pet_stoc_typ_tbldef2.asp

From Table (5) it can be noted that:

- 1- The reservoir is divided into two types: the mandatory government strategic reserve within the International Energy Agency agreement, and the commercial operational reserve for oil companies. The first is managed by the US Energy Agency to achieve several goals, including: stabilizing oil markets, confronting emergencies and others for the sake of safety of oil supplies, and maximum withdrawal capacity. It is (4.4) m/b/d, and the average price of strategic storage is (29.7) dollars per barrel. As for the second type, it is considered operational storage for companies, and its quantity is about twice the first type, due to the large size of oil companies (SPR, 2021) .
- 2- Despite the stability of the strategic reserve, the few changes occurring in it affect the global oil markets, and this can be observed during the period due to its large size and thus its impact on the markets, as well as on the commercial operational storage.
- 3- The size of the strategic reserve exceeded the International Energy Agency's requirement of 90 days, while the American reserve is sufficient for 1,069 days in the event of an interruption in oil supplies.
- 4- The increase and decrease in the volume of strategic storage during the period is due to the obligatory withdrawals and sales of storage within the agency's procedures, some of which were in emergency situations such as weather conditions and accidents, and others were direct sales operations, especially after the year 2014, as the operations of selling strategic storage stabilized in quantities that affect Structure of global markets.

So on Countries The producer For oil that You are aware completely size Challenges The big one that facing the industry Oil From 1973 until Our day this, Lost changed a lot of rules This is amazing Industry, and that the changes Main may be I got Especially after revolution Oil rocky and sandy, And tanks The strategy, And energy Renewable that Seeking to her Countries Industrial For considerations a lot, No Bad from Adaptation with all This is amazing Intersections To preserve on Importance this sector Vital energy, especially global oil markets, can be influenced by the aim of weakening the position of oil-producing countries.

The quantitative aspect of economic research and interpretation

$$EPo = a + b_1x_1 + b_2x_2 + b_3x_3 \dots + u_i$$

Through the estimated function of the economic model for the final oil price according to the ARDL model, there is a direct relationship between all the independent variables and the dependent variable within the equation, and it turns out that the effect of the independent variables on the dependent variable under study was as follows- :

$$EPo = 72.27 + 0.47RE + 0.98SRS + 0.70TC + e_i$$

That is, the final, independent oil price without the influence of any direct variables, inside or outside the equation, is (\$72), without taking into account any indirect effects, such as environmental, social, or political effects. In other words, if we excluded these direct and indirect variables from the model, it would be The price of oil is (\$72) based on the interaction of supply and demand, holding other factors constant.

As for renewable energies, $b_1RE=0.47$

This indicates that changing renewable energies by one unit leads to a change in (EPo) by (0.47), meaning that the greater the production of renewable energies, the higher the final oil prices, contrary

to what is expected from the relationship between them by most oil market analysts, as it is believed that there is an inverse relationship. Between final oil prices and the production of renewable energies, while this is also the case for primary, not final, oil prices. Which will be explained later through the estimated equation. This effect between renewable energies and final oil prices can be explained from several aspects, but we are satisfied with explaining the value of similar commodities that depend on each other in determining their prices, as the price difference between final and primary oil made renewable energies alternatives to crude oil, and this is the result of the policies followed by Industrialized countries.

The effect of the price of the strategic storage level (SRS) according to the estimated equation is close to the correct one. This result can be accepted statistically, but it cannot be accepted economically at first glance because the relationship between the price of crude oil and strategic storage is an inverse relationship. Whenever strategic storage is used, the price of crude oil will decrease. . But in this equation, there is no relationship between strategic storage and the price of crude oil, as the relationship in this equation is between strategic storage and the final oil price (which, in addition to the price of crude oil, includes the manufacturing margin and carbon taxes), and this is what explains to us the direct relationship between (SRS) And between EPo and its proximity to the correct one, that is, changing the level of storage (SRS) by one unit leads to a change in the final oil price (EPo). As for carbon taxes (CT), there is a direct relationship between the final oil price and carbon taxes, as it reaches 300% in In some industrialized countries, such as Germany, the final price of a barrel reaches three times, and this indicates that the profits of these countries from oil are much higher than the producing countries themselves, in addition to the production processes and economic growth in this sector as a result of transporting, refining and distributing oil in addition to the cost of preventing and reducing the damage that These countries followed it, first and foremost. Other results of the economic model were as follows:

$$R^2= 0.99 , R^2 s= 0.65 , DW=1.87 , F=184.10 , F prop=0.003$$

Long-term relationship Long Run Coefficients

Through the estimated function (EPo) in the long run, it is shown that the statistical parameter is not significant

$$EPoLRC= a^+b1RE+b2SRS - b3CT$$

$$EPoLRC=325.03+0.013RE+0.04SRS-0.96CT$$

The economic impact of economic variables varies according to time periods. Since the estimated function is not significant in the long run for the variable independent of other variables, or (a^+) and carbon taxes (CT), and in an inverse relationship with the price, that is, the more (CT) increases in the long run, the lower (EPoLRC), and this shows the effect of (CT) on The final price in the global market, especially the European one. As for the error correction vector (cointegrating form) in the short term and for a single lag period, i.e. a single time lag due to the short time series, it was as follows:

$$\text{Coint Eq}(-1)=-0.222, \text{PROP}=0.000$$

Estimated function for the short run

$$D(EPo)(-1)0.35=0.14 RE+0.19 SRS+0.14 CT$$

All variables in the short term are not significant except for the error correction vector (0.222) and the dependent variable (EPO) (0.35), (SRS) is at a point close to significance and at a value of (0.19). This

shows the effect of the variables on the model in the short term and the direction of the error correction distribution. The data are in the squares of their normal distribution for the significant variables, which are SRS and EPO, at one lag period, which is the period we are obligated to choose due to the absence of others for some variables. As for the statistical tests only, the function estimated according to or according to the ARDL model passed all statistical tests

1- Normality

Normal distribution

The residuals are normally distributed, $j = 2.17$

$\text{prop} = 0.32$

2- LM test

The estimated model does not suffer from an autocorrelation problem, that is, it is not significant

$F = 1.93$ $\text{Prop} = 0.15$

-3ARCH test

The model does not suffer from the problem of heterogeneity of variance

$F = 2.7$, $\text{Prop} = 0.105$

Conclusions:

1- The direct and indirect policies of the International Energy Agency had an impact on the oil markets in particular and energy markets in general, contradicting its goals, especially the policy of strategic oil storage, which has a short-term impact on prices. This was confirmed by the movements of the strategic storage to influence the oil market and confront OPEC.

2- The long-term policy of the International Energy Agency, such as renewable and non-renewable energy alternatives, has an impact on reducing prices that is not in the interest of the agency's plans and programs, as the strategic vision for oil alternatives requires relatively high prices as well as stable markets to maintain the implementation of the agency's long-term strategy, and economic feasibility is considered. It is one of the most important factors for consumers to move between different energy sources, as well as gradual replacement, and often requires medium to long-term periods of time.

3- Despite the high costs of producing unconventional oil (shale and sand), there is an increase in production quantities during the period, and this is due to the rise in global oil prices and the support policies directed by the governments of these countries, with the aim of reducing dependence on imported oil first, and increasing oil supply. Global second.

4- There is an inverse relationship between the size of the US strategic oil storage and oil prices, in contrast to taxes. This indicates that oil prices are affected by the policy of the International Energy Agency, especially the strategic storage policy, and thus the instability of oil investments, which negatively affected the stability of global oil markets.

Recommendations:

1- The necessity of cooperation between the oil-producing countries (OPEC) not only to protect oil prices from fluctuations and price shocks, but also to adopt a policy to confront the factors that fuel price instability.

- 2- The necessity of adopting a minimum price for oil to encourage a trend towards alternative energy sources, especially renewable ones, as oil supplies continue to decline over the next five decades.
- 3- Monitoring global financial markets, especially oil purchases for the purpose of speculation, which has a role in increasing market instability.
- 4- Requesting the agency's member states to disclose the quantities of strategic oil reserves, as it can be used to influence oil prices.

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