Main trends of the world's fuel market: fossil fuels versus biofuels

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Abstract

This paper discusses current trends in global energy consumption by explaining the evolution of biofuels and renewable energy consumption, particularly biomass in a context in which fossil fuels retain the largest share in the global energy resources. This qualitative study focuses on biofuels as energy source. The research was based on experts' analyses contrasted with hypothesis and statistical data. Its prospective nature implies finding qualitative arguments to predict long-term trends. The evolution of energy production and consumption is contrasted with geopolitical events, consumer behaviour of new energy sources and environmental protection policies. Two main trends were found in the study: the prevalence of fossil fuels as a traditional energy source (including the use of fracking) and the strengthening of alternative energy sources, particularly biofuels, including biomass leading towards sustainable development (SD).

Key Words: sustainable development, renewable energy, biofuels, fossil fuels, trends.

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Humankind has utilized essential power sources so as to fulfil their needs and these, in a consistent way, have differed over time. Initially, coal was selected as the main source during and after the industrial revolution period. In fact, the last century has been named as the oil era (Coleman, 2012). In any case, the presence of a principle source does not infer that people are not aware of different choices for power sources (Apergis and Payne, 2012). Geographical, political and specially, efficiency reasons have made these sources necessary because of ecological concerns (biofuels) (Fransson, Niklas; Garling, 1999; Schultz, 2001; Poortinga, Steg, and Vlek, 2004; Ester, Vinken, and Simões, 2004; Nigam and Singh, 2011). These alternative sources are showed as options for low-income populations (like firewood).

Nowadays, the search for producing different power sources from petroleum products is an outcome of four worldwide patterns (Yam-Tang and Chan, 1998; Eisentraut and Brown, 2014; Creutzig et al., 2015; Dellink, Hwang, Lanzi, and Chateau, 2017): Firstly, the ascent of green, environmental, sustainable or natural commercialism. Secondly, the exhaustion of the traditional energy sources (fossil fuels). Third, the natural emergencies caused by the generation of ozone-depleting substances (gases), and finally, the constrained assets that help to generate expanded costs.

Even though measurable proof presently demonstrates that oil, gas and coal still record for the majority of essential power utilization (OPEC Organization of Petroleum Exporting Countries, 2017), and the rise of fracking as an unorthodox hydrocarbon generation method (Jackson et al., 2014), special interest has been brought on independent fuel sources and on building up the so-named "alternative sources" (International Renewable Energy Agency, 2017). Specifically, sustainable and less earth obtrusive sources have been tried and executed. Among those, we can make reference to atomic, wind, and sun-based sources and, more recently, biomass.

While petroleum derivatives keep on driving the market, there is proof that underpins changes in the mid and long haul, especially in growing the utilization of biofuels and electric power in transport and also extending the use of biomass around the world (Yusoff, 2006; Soliño, Vázquez, and Prada, 2009; Hatzopoulou and Miller, 2010; Selkimäki et al., 2010; Sikkema et al., 2011; Nayum, Klöckner, and Prugsamatz, 2013; Iskin, Taha, and Daim, 2013; Kraxner et al., 2013; Nybakk and Lunnan, 2013; Mohr et al., 2015; Alaswad, Dassisti, Prescott, and Olabi, 2015 Michelsen and Madlener, 2016; Lee and Huh, 2017). This sort of advancement has caused a critical increment in ecological writing (reports, whitepapers, articles…) and the ascent of different schools of thought supporting the verbalization of ecology and development. Similarly, ecological matters (useful, representative and experiential issues) are factors that could clarify the conduct of consumers of these sort of items and energy services

From the previous justification, this paper plans to cover two crucial patterns in worldwide power utilization by clarifying the evolution of petroleum derivatives (fossil fuels) and biofuels consumption. This dissertation intends to answer the primary research question: According to specialists, which are the current trends in energy consumption around the world? The planned idea of this examination infers finding subjective contentions to anticipate mid and long haul patterns; along these lines, the exploration depends on master investigations to endorse the patterns' potential towards the eventual fate of the world market of powers. The prospective nature of this study implies finding qualitative arguments to predict mid and long-term trends. This is why this research is based on expert analyses carrying out prospective techniques such as Reigner's abacus, contrasted against statistical data.

The information provided by different sources presents a dynamic situation resulting in the trends referred in the current article. The percentage of fossil fuels in international energy demand in 2016 was eighty-one percent. This figure has continued stable for over 3 decades despite robust growth of renewable sources renewables (International Energy Agency, 2016; International Renewable Energy Agency, 2017; OPEC Organization of Petroleum Exporting Countries, 2017).

Consequently, it is reliable then, to expect the value of oil in international markets to act as a measuring instrument to successfully determine the market's behaviour in terms of production and consumption. Nevertheless, the literature indicates that oil costs in numerous phases of the economic cycle do not correspond to actual (Shafiee & Topal, 2010; OPEC Organization of Petroleum Exporting Countries, 2017). Proof of this is the price record reached by oil since the last quarter of 2014. This, indeed, caused an economic slowdown (however, the drop is not proportional to global demand) (Krauss, 2014). Consequently, explanations beyond the present demand are required.

Notwithstanding that many years have gone since the identification of the need for wandering into proficient, clean and preferably sustainable power sources, the worldwide power balance keeps oil derivatives (gas, oil, coal) within a high demand of 80% (Mohr et al., 2015). Furthermore, the forecast for 2030s does not present major variations (IRENA - International Renewable Energy Agency, 2014). The current world's oil reserves (according to OPEC) indicate that planet is still prepared for supplying a growing demand (OPEC, 2017).

In contrast, and as reported by the United Nations Commission on Sustainable Development and the OECD, sustainable development has four columns: (1) social, (2) economic, (3) environmental and (4) institutional (Kühtz, 2007; OECD, 2008; IRENA, 2014). The International Renewable Energy Agency (IRENA), which is an intergovernmental organisation supporting countries in their transition to sustainable energy sources, says that the environmental changes occurring worldwide have made governments to reflect on their role and responsibility on this. In fact, sustainability issues related to the different types of environmental and eco-power goods and services, such as biomass play an important part. In this scenario, the Kyoto Protocol and the commitments the nations have signed leading to achieve this protocol's objectives have caused that multiple actions have been implemented aiming at mitigating the effects of climate change.

Amidst those actions implemented around the globe, technologies such as Aeolic, hydraulic, geothermal, solar, tidal and biomass lead the path toward the mitigation. Focusing on biomass, the European Technical Specification CEN / TS 14588 establishes it as "all material of biological origin excluding those that have been encompassed in geological formations undergoing a process of mineralization". Similarly, biofuels are the materials that produce bioenergy and one of trends found is that these, can replace fossil fuels (Nigam & Singh, 2011). Biodiesel, which is obtained from vegetable oils and animal fats and bioethanol, obtained from the fermentation and distillation of starch (sugars) have become popular among those nations seeking for achieving the Kyoto Protocol's goals.

This work is a qualitative research, as it is centred around the interpretive archetype. This is because of research object is to comprehend the world's fuel market behaviour. The authors intend to clarify the connection between oils derivatives and biofuels; the document also presents certain forthcoming components prompting change-factors examination.

As it can be deducted, the arbour is subjective, however, measurable proof for recording the advancement of fuels was utilized since auxiliary sources from global institutions, academic

sources and pertinent-related organizations, (for example, Shell and BP). The data collected from the interviews with experts on the field added strictness to the research. So as to build up this subjective methodology, some measurable information, the research from the specialists and the writings regarding the subject were triangulated.

From the data collected, a qualified and analytic assessment for the different hypothesis formulated was performed. These are the hypothesis:

Hypothesis 1. *Despite the growing concern on global warming, the global interest in renewable energy sources fluctuates around the evolution of oil and gas reserves. Consequently, the rise of fracking, as a technique that will increase the reserves of fossil fuels in the next decade will reduce the interest in developing alternative energy sources such as biomass.*

Hypothesis 2. *Despite of the fact that currently there has been a decrease in oil prices, in the mid and long term (10 to 15 years) fossil fuel prices will increase (based on Hubert's Bell) because of the beginning of a fall in the production, leading a gradual reduction of its reserves in the world.*

Hypothesis 3. *The intensification of global warming associated with GHG (greenhouse gases) emissions will cause environmental pressures and will make the socio-symbolic values of green consumers to encourage the use of renewable energy and the adoption of new technologies, which consequently will result in a resistance to the production and consumption of fossil fuels.*

Hypothesis 4. *Whereas bioenergy production does not have a competitive rate of return, governments will continue subsidizing crops to produce biofuels and supporting the development of new technologies, which also enables them to reduce their dependence on fuel.*

Hypothesis 5. *The biofuels that have consolidated in the market are first generation. This promotes food- reserve concerns since those biofuel-producing crops can also be used to produce food. Consequently, the pressure from consumer groups disagreeing with replacing food-producing crops with fuel-producing crops will stimulate the development of renewable energy sources of second and third generation, that is, sources that do not affect food production.*

Hypothesis 6. *Technologies for the use of fossil fuels are highly developed and have been massively adopted by consumers (economies of scale); therefore, the positioning of new technologies for fuels derived from renewable sources will require significant efforts to cut costs and achieve the necessary socio-cultural positioning that makes economically competitive.*

The main results in this research will be published in an international journal and the most relevant ones have been condensed in this document's conclusion section. They will also be presented at the International Marketing Trends Conference. The two basic patterns obtained were: 1) the predominance of oil derivatives as a conventional power source (the utilization of fracking included) and, 2) the reinforcing of alternative power sources, especially biofuels, including biomass leading to the accomplishment of the established sustainable development goals.

In fact, the trends found by this work can be summarised as follows:

a. Oil derivative fuels present an unexpected surge. This is mainly due to the fact that the industrialized countries continue to import these type of fuels. These are required to keep their industries operative (industrial reconversion). As a consequence, the oil producing economies

continue to export their fossil fuels. These nations are less receptive to environmental activities because their economic growth is closely linked to the foreign direct investment associated to the sector. Additionally, it cannot be ignored the fact that the emerging economies in the planet (the BRIC countries) are also importing these type of fuels or technologies such as Fracking.

b. The second condensed trend is related to the environmental view. In opposition to these previous, different specialists brought up that a dangerous atmospheric deviation has achieved the status of "irreversible", despite the growing implementation of clean energy sources. A few specialists even called attention to that another proof is the conceivable disengagement between the development of R&D in sustainable power sources and the petroleum product economy. Then again, the inquiry (asked to the specialists) related to the fact that in the midterm, the market will experience a downward curve as in the Hubert's Peak and oil prices will begin to move consistently upward, showed strong acceptance among them. In short: although the concern for the environment has been growing, people continue to weigh the value of individual or family well-being (savings of financial resources in energy consumption).

c. Finally, and among other trends, the study found that clean energy sources have established their principles through R&D+ i and the green marketing. A focal component of this pattern is the utilization of the a energy complementarity principle (Brown & Huntington, 2008). These authors state that by 2025, the consumption of fossils and renewable sources will be complementary. They have even anticipated that these would be co-generators. It is obvious that biofuels will be a vital piece of the market and, as referenced previously, they will consent to the complementarity standard. In spite of the fact that, this is as of now occurring, the thought is to embrace the technologies which represent less expenses and better costs for customers in ten years. Another pivot of this pattern will be the role to be played by marketing, especially the development of the consumer behaviour science. Green marketing will unite to invigorate and rouse the market towards new sustainable sources and social responsibility.

This multifaceted environment points out that the next three decades will be characterized by an intensification of the dichotomy: the quest for the environmental concerns and the needs for the economic growth. This pressure will evolve in favour of economic growth and the increase in energy consumption. However, the need for reducing the dependence on imports will mean that both, industrialized countries and the emerging markets will invest resources to stimulate greater efficiencies in consumption and to promote alternative sources of energy.

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