

The next steps in energy evolution

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Where is the world going with energy?

As the population grows, so does the demand for energy. World Meters Statistics estimates that by 2040, the population will grow by 0.7%, meaning 9,21 billion people [1]. Considering the economic growth, energy consumption will increase by 24% as a medium rate, while in the worst-case scenario increase will be 15% and in the best case 37% [2].

Unrenewable energy is the most common source of energy in the present, such as oil and gas industries. Together they make a vital business sector. Unfortunately, in the next few decades, these natural resources will be extinct. Deep sea drilling is a process of oil extraction under the sea surface, with the help of an offshore platform. Through technological evolution, new solutions for deep sea drilling are being found, but it remains the biggest pollution factor in the Northern Sea (28% out of all greenhouse emissions) [3]. The alternative would be renewable energy, such as solar, hydropower, wind or nuclear.

For our research, we chose three possible scenarios. When analysing these scenarios, we took into consideration political, economic, social-cultural, technological, environmental and legal criteria.

The first scenario: Economy is based only on unrenewable sources, and we use them for the deep-sea drilling process.

It involves investing in the future only in unrenewable energy. This would be an affordable business solution, but limited, with a short-term vision. One of the most profitable businesses is deep-sea drilling, which is using gas as a source of energy [18]. This method can cause high damage to the environment due to the high CO₂ emissions and oil spills that destroys the aquatic environment and life (Deepwater Horizon, Mexico Gulf)[4]. Human risks can also be involved, such as the case of Piper Alpha explosion in 1988, when 99 people died after gas escaping while the pipes were working [5]. At the moment, there are legislative barriers in order to diminish the negative effects, such as the Paris Agreement, adopted in 2015, which reduces the temperatures under 1.5° C [6]. Another example would be the Kyoto Protocol, adopted in 1997, which limits each country when it comes to CO₂ footprint [7]. Investing in such methods cannot be profitable on long-term, due to the close encounter with consuming all resources. This scenario can be critical, because we would invest all the money in an infrastructure that soon will not be helping useful anymore, in time needed to create new

solutions and lack of innovation, which is the key element in the world of business. Is this the right path?

The second scenario: We chose the production of energy using renewable resources, such as deep-sea oil extractions, with the help of wind, hydropower, or solar energy [14].

This case presents an approach situated somewhere between the other two cases. For example, hydropower was one of the first sources of energy used for electricity generation and is the largest renewable energy source [8]. Because the source is water, hydroelectric power plants are usually located on or near a water source. The volume of the water flow and the change in elevation (or fall) from one point to another determines the amount of available energy. Norway is a country well known for its high mountain, abundant and natural lakes, steep valleys and fjords. Its topography lends itself perfectly to hydropower development, and because of this cca.95% of total energy is based on it [9]. What can be used on the offshore platform is the energy generated by ocean currents.

Another example brings to our attention the use of wind and its power, by placing them on the offshore platform. In fact, in 2012 Norway produced 1.6 TWh wind power electricity, which was just a small fraction, but the advantages that it gave determined Government to invest 20 billion NOK in the next year, to triple the wind power capacity [9]. We must consider disadvantages of wind powered electricity. One that stands out is the danger for migratory birds, which are attracted directly into the Aeolian turbines, with consequence of a big massacre.

Another source is the solar energy, which is transformed into electricity through the photovoltaic devices (solar cells) [9]. If we use large enough power plants, we can replace the other sources of energy, covering big areas of consumption. Granted, we can identify at least one disadvantage here as well. The fact that the sunlight is not constant, depends on location, time of day, season of the year, and weather conditions, unknown and extremely variable challenges can be encountered [10]. Unfortunately, since the deep-sea drilling process needs a small platform, the size of the panels can be an inconvenient, also needing some other reserves.

So, if we were to forward a bit the process, we observe that to extract the deep-sea oils for example, we mostly need electricity and resources that are strongly related to creating new ones, but the main problem is the storage [11]. We already have an abundance of technologies that rely on electricity, such as the extraction of deep-sea oil, which is a main point in the sector. Could this mix of resourced work out for the future?

The third scenario: For a wide timespan, creating a sustainable energy production, based on renewable resources.

This means to reinvent the infrastructure [15] and create new methods and technologies based on endless resources, which are not polluting at a large scale. The main advantage is that we can benefit from these without the political pressure that can occur from being the only exporter and create a monopoly market. A social aspect, relevant in this situation, is involvement of Government in the process. The method needs support, to create regulations and also to educate the population which is familiar with the old-fashioned methods [17]. During first steps of implementation, many employees can lose their jobs since the new industries require new machines and new specializations. The main disadvantage of renewable energy is discontinuity of production. Example is the solar energy, dependent on the sunlight, with 0 (zero) production during night [16]. Due to this discontinuity, storage is essential, but hard to install and very expensive. Would it be a more beneficial solution?

Following our documentation, we can conclude that our world is facing an interesting phenomenon of continuous and fast changes in all domains, leaving us with uncertainty in the business field. Should we focus more on changing the way we do it, as going for renewable, or try to find new technologies and invest in the same fields as we are doing now? If we chose deep-sea drilling, we must invest a lot of money and time in changing the infrastructure either by electrifying the process or by using all necessary gas resources. If we chose the innovative and green method completely new technology must be created.

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