

# Innovative Ways In General Or For A State To Profit From Its Energy Resources: To Aspire To Sustainable Development

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## Abstract

*This research presents an article reflecting on the innovative ways in which, in general, or for a state, can take advantage of its energy resources, whether renewable or non-renewable, in order to aspire to sustainable development. The reflection was carried out using research and documentary analysis, some direct interviews and non-participant observation. After which, the article reveals some innovative ways that can allow, in general, or for a state to take advantage, wisely, of its energy wealth so that it can develop sustainably. Among these innovative ways are the taking of measures to reduce energy consumption and qualified human, material and financial investments in the energy sector. These innovative ways have not yet been highlighted by previous research and, moreover, they are less known ways in general as being able to help a state to develop sustainably thanks to its energy resources and help populations to make less financial expenditures related to energy. Finally, the article also demonstrates the importance of these innovative ways in the form of undeniable measures to be taken in order to take into account and be concerned about the energy future from general to particular depending on the case.*

**Keywords:** Energy resources, sustainable development, innovation, CO<sub>2</sub>, international cooperation

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## INTRODUCTION

An energy resource is a source of energy that humans use to generate electricity, heat their homes, run factories, or even power cars. These resources can be fossil or renewable [1].

Fossil fuels come from the decomposition of living beings (plants and animals) that lived millions of years ago and are stored underground. Examples include coal, a black rock burned to produce energy and widely used in power plants; oil, a black liquid refined to make gasoline, diesel, and other products; and natural gas, which is used to heat homes and generate electricity [1]. However, these energies are not infinite and are much more polluting by emitting CO<sub>2</sub>, a gas that warms the planet [1]. As for renewable energies, these are energy sources that regenerate naturally and do not run out, are also much less polluting and much more environmentally friendly [1].

For example, we can cite solar energy, which is captured from sunlight with panels to produce electricity; wind energy, which is produced by the wind, causing wind turbines to produce electricity; hydropower, which is obtained using dams using the force of water to produce energy; geothermal energy, which is a source of energy based on the heat of the earth to heat buildings or produce electricity; and finally biomass, which consists of burning organic matter (wood, plant waste) to produce energy [1].

Through these energy resources, primarily, a state can develop on several levels, namely economic or military, to name but a few. Indeed, from an economic perspective, energy resources boost the national economy by strengthening energy security and financial independence, thus reducing energy imports, or energy resources lead to savings on foreign exchange reserves and job creation [2]. From a military perspective, it is clear that one can move from raw uranium (a non-renewable energy) to a nuclear weapon [3]. This proves the importance of energy resources for a state and that this category of resources, which can enable development as well as sustainable development, deserves attention.

However, having all or part of these energy resources in general or for a state is not enough for a state to truly benefit from its energy resources in order to aspire to sustainable development. Indeed, several states may have or even have one or more energy resources, but are among the least developed States due to several factors often linked to the management or strategies for the proper use of these energy resources. This is the case of several States located in Africa, such as Niger, as a giant in the production of fossil or non-renewable energy (uranium) but among the least developed States on a global scale and not yet having either nuclear weapons or a nuclear power plant, as it appears that the Nigerien Minister of Mines, Commissioner-Colonel Abarchi Ousmane, announced the intention of his country, Niger being the 7th largest producer of uranium in the world, to build a 2000 megawatt power plant in partnership with Russia [4].

Thus, one might ask, what innovative ways can be used, generally speaking, or for a state, to leverage its energy resources to achieve sustainable development?

The article presented in this research highlights two (02) ways, among many others, that appear to be the most important. These are innovative ways, namely, taking measures to reduce energy consumption as well as qualified human, material, and financial investments in the energy sector. Furthermore, the article also aims to demonstrate the importance of these innovative ways in the form of undeniable measures to be taken in order to consider and care for the energy future, from the general to the specific, as the case may be.

## METHODOLOGY

Several research methodologies can be used when developing a scientific article, namely mixed research (which involves both qualitative and quantitative research), quantitative research, qualitative research, or one of these methodologies.

Regarding the research presented in this article, which reflects on innovative ways to enable, in general, or a state, to leverage its energy resources to achieve sustainable development, qualitative research served as the methodological basis, particularly through the use of the qualitative triangulation approach, as the triangulation approach has its advantages. Indeed, the triangulation approach represents a guarantee of scientific rigor, ensuring the validity of the results or allowing them to be enriched, and also allows for the borrowing of different methods that can be used within the same research paradigm. For example, questionnaires and interviews are all subject to qualitative analysis [5], which is the main justification for choosing a qualitative methodology and the qualitative triangulation approach for this article.

Aside from these initial reasons for choosing a qualitative methodology, this methodology was chosen to conduct the present reflection because it allows for the production of new knowledge and creates new forms that make it possible to understand phenomena, just as it also allows for the identification, selection, and analysis of sources that will serve as a basis for its studies. But also, with the help of qualitative analysis, a series of procedures and tools can be used that allow the constitution and analysis of data, such as documentary research and/or documentary analysis [6], and/or direct interviews with individuals, which was precisely the case for developing the reflection presented in this article.

As for quantitative research, although known to generalize results by measuring the opinions and responses of the sample population, it was not retained for several reasons. Among these reasons, we can note on the one hand, the main objective of quantitative research which is the quantification of data, that it is also a large-scale research and that the results resulting from quantitative research may not always accurately represent the reality of the facts [7], while the analysis on innovative means allowing a state, generally or specifically, to take advantage of its energy resources, in order to aspire to sustainable development may be part of a study determining exactly the processes to follow so that energy resources can be an advantage leading to sustainable development and that it is not a large-scale study either.

Finally, mixed methodology involves integrating qualitative and quantitative methods into a single assessment or research project. This so-called mixed methodology requires additional work to collect and analyze both words (sounds and images) and statistics, and to integrate qualitative and quantitative data and results [8]. This is why it was not used as a methodological basis throughout the research presented in this article, which reflects on innovative ways for a state or in general to take advantage of its energy resources in order to achieve sustainable development.

## RESULTS AND DISCUSSIONS

### **Taking steps to reduce energy consumption:**

Taking measures to reduce energy consumption in this context implies that individuals must generally take measures regarding their households, and that the state must take measures regarding energy consumption, particularly in the area of electricity. That is, first and foremost, individuals must take steps to reduce electricity consumption in their homes, private businesses, or domestic shops, and in their daily lives.

This can be achieved through a responsible habit of ensuring that all lights, fans, air conditioners or humidifiers, televisions or other electricity-consuming appliances and household appliances, and phone chargers, are turned off or unplugged before going to sleep, going out for errands, or closing the premises.

Indeed, saving electricity is crucial for a multitude of reasons, as there are environmental, economic, social, and many other benefits. Among the environmental benefits are the reduction of greenhouse gas emissions, as electricity production, especially from fossil fuels, releases significant amounts of greenhouse gases, contributing to climate change. Thus, by reducing electricity consumption, there is a significant reduction in carbon [9]. Another benefit is the conservation of natural resources, because electricity production relies on finite resources such as coal, oil, and natural gas (in certain circumstances). Thus, saving electricity will help conserve these resources for future generations. And finally, in relation to the environmental benefits, we can cite the protection

of ecosystems, as the use of power plants can pollute the air and water, harming ecosystems and wildlife, so reducing electricity demand would minimize these environmental impacts [9].

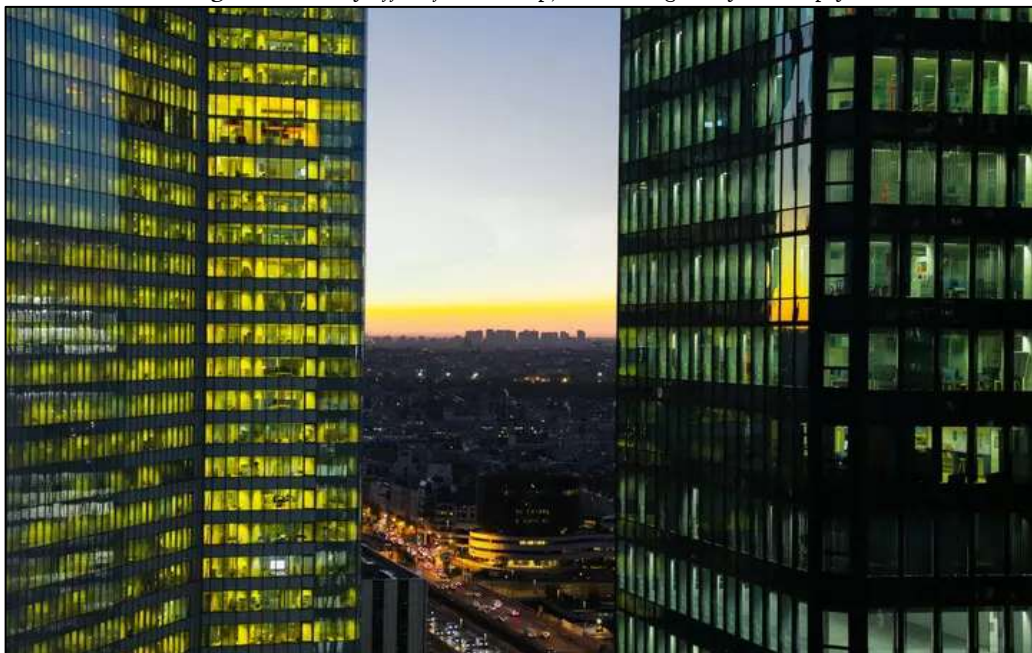
As for the economic benefits, we can consider lower costs or lower energy bills, in this sense saving electricity translates directly into lower energy bills, which has a tangible impact on household budgets [9].

Regarding social benefits, there is the improvement of public health, as air pollution from power plants can cause respiratory problems and other health issues. Therefore, reducing electricity consumption will improve air quality and public health [9].

Finally, among other benefits, we can highlight the increase in energy security, which means that saving electricity makes us less vulnerable to energy disruptions and price volatility. There is also the benefit of improved sustainability, which refers to energy efficiency, which is a key element of sustainable living and helps build a more sustainable future [9]. Returning to the state, state authorities must issue instructions to the competent authorities as well as to hierarchical superiors, as well as adopt additional laws relating to energy management within various national and even private factories and industries, within various public, ministerial, educational, and university institutions, public structures and public services of the state, concerning public roads equipped with streetlights or the lighting of public property, by all means of communication (notes, ministerial and government orders or decrees, awareness-raising, information campaigns, publication in official journals), non-compliance with which may be punishable.

These instructions and additional laws relating to energy management will consist of ensuring more judicious, more rational, and more economical energy consumption. Because first of all, it emerges from several direct interviews and non-participant observation that people during lunch breaks, during the service or work hours, or toilet, leave the light on, a charger plugged in without a device, or the air conditioning on and often even at home. Moreover, in France, more precisely in Paris, offices and stores tend to leave their lights on all day or all night, however, to remedy this, a draft decree adapting the lighting schedules of tertiary buildings to the reality of their activity to limit light pollution has been submitted for public consultation since November 20, 2023 [10]. In addition, Article 1 provides for the extinction of lights no later than one hour after the end of the activity and their initiation no earlier than one hour before the start of the activity. And by activity, the legislator means the presence of people in the office or store. However, exemptions are provided for buildings that have signed contracts providing for specific lighting arrangements (use as a supplement to public lighting, video surveillance, etc.) with the competent authorities [10]. The practice of wasting electricity is very common in many states, undoubtedly because the energy bill would be paid by the public (see Fig 1).

*Figure 1: Many office floors lit up, even though they are empty.*



Source: <https://reporterre.net/Pollution-lumineuse-bientot-la-fin-des-bureaux-allais-la-nuit>

It is therefore in this sense that public authorities, or the State itself, must take measures to reduce energy consumption, which may go as far as restricting the use of electric lighting in place of natural light and sunlight during the day, for example.

Thus, through these measures, a state could benefit from energy independence, as reducing dependence on imported energy fuels strengthens national energy security. There will also be an increase in energy equity to ensure affordable and reliable electricity for all citizens, which is essential for social justice and equality [9]. Moreover, this would prevent many clumsily started fires caused by exploding light bulbs, which could have been avoided, as many individuals are affected by these incidents each year, and these explosions can cause serious injuries and pose fire risks due to excessive overheating and vibration, thus highlighting the importance of electrical safety [11]. Through these measures, a state can generally aspire to sustainable development through energy resources.

There is also another innovative way, in general, for a state to take advantage of its energy resources to strive for sustainable development.

#### **Qualified human, material and financial investments in the energy sector**

These are investments in the energy sector, of an effective and efficient human, material and financial nature.

In this case more specifically, the state must undertake investments first by recruiting staff and deploying the right people starting with the Ministry of Energy, public structures and companies working in the energy sector so that they can make the most appropriate and suitable decisions due to their skills and knowledge in the field, in other words qualified engineers.

Indeed, in view of environmental challenges and the climate emergency, the role of engineers in the energy transition becomes essential because between technology, environment and economy, these engineers are mobilized to develop sustainable solutions, optimize energy consumption and integrate renewable energies into daily life [12].

Suitable personnel (engineers) are essential in the field of technologies, renewable energies and transition, in fact they have technological innovation to develop solutions adapted to renewable energies, data analysis skills to monitor energy consumption and anticipate needs, as well as mastery of predictive maintenance of equipment, essential to guarantee the sustainability of energy installations [12]. Hence the importance and usefulness of investing appropriate and specialized human capital in the energy field in order to make the most of energy resources to move towards sustainable development for a state or even in general where there are energy resources, with a view to using these resources in a valuable way.

Next, regarding financial and material investment, the state must seize the opportunities offered by energy resources. That is, it must prioritize both financial and material investment in what nature has predisposed as energy resources such as the sun, rivers, uranium, etc.

Thus, China has become one of the world leaders in the development and implementation of solar energy, playing a crucial role in the transition to a more sustainable future focused on renewable energies [13]. Indeed, China has experienced extraordinary growth in the solar energy sector, as it is a rapid development due to a combination of factors such as favorable government policies, technological advances, and growing awareness of the importance of environmental sustainability. In other words, the Chinese government has played a key role in the development of solar energy through a series of supportive policies, including subsidies for the installation of solar systems, guaranteed feed-in tariffs for solar energy produced, and ambitious targets for installed capacity [13].

In addition, China has also committed to reducing its carbon emissions and increasing its use of renewable energy as part of its efforts to combat climate change, which is yet another reason for China to continue investing in nuclear energy. Moreover, the country has even announced the construction of new nuclear power plants and investments in advanced nuclear technologies, such as next-generation reactors and nuclear fusion reactors [13], an approach that will undoubtedly require skilled personnel. This demonstrates that China is taking advantage of its energy resources, particularly the sun, and is moving towards perpetual sustainable development due to its investments (financial and material) and this can be the case for any state following in China's footsteps or investing seriously and consistently, thus moving towards sustainable development will be inevitable.

While a report shows that hundreds of millions of Africans still live without electricity, relying on oil, candles, and firewood [14]. Indeed, in Africa, even though some States have certain energy resources, due to a lack of financial and material investment, these states are unable to achieve sustainable development and thus positive results in terms of energy development.

We can take the example of the Democratic Republic of Congo, with its river having great energy potential thanks to what is called the *Big Inga, a hydroelectric dam*. It is estimated that, if built, it will be more than twice the size of the largest hydroelectric project in the world, the Three Gorges Dam in China. However, unfortunately, funding has not been secured, and the project's progress has stagnated [15]. Whereas if the dam were operational, it would allow the Congolese population to no longer be in constant cuts and would ensure the future of generations to come in terms of energy (electrification of schools, towns and villages, hospitals and clinics etc.)

and the Democratic Republic of Congo would experience, through the marketing of electricity to other states which need it and through energy self-sufficiency, sustainable development.

## CONCLUSION

To conclude this article's reflection, it should be noted that no research has previously been conducted demonstrating that these ways are innovative in general, or that a state can leverage its energy resources to achieve sustainable development, which was the primary goal of this reflection regarding the future of energy.

But also, as a secondary goal, the reflection also demonstrates the importance of these innovative ways in the form of undeniable measures to be taken to consider and care about the future of energy.

One of the first important points to emphasize is the idea of avoiding the waste of energy resources at all costs. Indeed, reducing waste would allow for better use of energy resources and reduce pollution, and this would be possible with a responsible attitude. Avoiding or reducing waste of energy resources is essential because resources are limited, and consumption also contributes to polluting the planet. It is also important to understand that reducing waste of energy resources is, for example, not consuming too much. It also means reusing, repairing or recycling as well as finding solutions that consume less for the same result [16].

Then the second point is the idea of investing qualified human capital and material and financial investment in the energy sector. First, regarding the investment of qualified human capital in the energy field is very important, in fact, experts make a significant contribution with their expertise in areas such as strategic management, advanced technology, regulation and legal issues. They can help make informed decisions and solve complex problems. In addition, experts or (qualified human capital) bring practical experience, in-depth knowledge and understanding of trends and developments that affect their sector of activity [17].

And regarding material and financial investment in the energy field is also very important and can be considered as strategic investments. And strategic investments being crucial to converge towards growth as well as sustainability, they have a broader scope and a longer time horizon as well as intended for projects aligned with long-term objectives [17], as is the case with energy which is a way of moving towards sustainable development. This demonstrates the importance of these innovative ways as undeniable measures to be taken to consider and care for the energy future, from the general to the specific, as appropriate.

There may be some shortcomings in this reflection, but the ethical rules related to research have nevertheless been followed. However, further research may be considered to address the shortcomings of this article.

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