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The impact of Covid-19 on energy consumption in Algeria - study and outlook

Mohammed Zighed*, Benamar Benotmane

Materials, Process and Environment Research Unit, Department of Process Engineering, Faculty of Technology, M'hamad Bougara University, Boumerdes 35000, Algeria, Tel. (+213) 796830750/(+213) 559932542; emails: m.zighed@univ-boumerdes.dz (M. Zighed), b.benotmane@univ-boumerdes.dz (B. Benotmane)

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ABSTRACT

Energy consumption is a major concern in the world, and even in Algeria, because of its economic and social impact on people's way of life. All aspects and activities of life, including energy consumption, have been influenced by the deep sanitary crisis related to the Covid-19 pandemic, which has affected the world from 2020 until today. This study examines the energy consumption in Algeria for 2020 during the coronavirus pandemic. It was reported that a huge decline of 13% was recorded in the national consumption of energy in 2020 (petroleum products and natural gas) compared to 2019, falling from 67 MTOE to 59 MTEO. Electricity consumption has also dropped at a rate of 4%. This trend was due to the lockdown and containment policies implying a set of measures serving as a non-clinical approach to mitigate the spread of the virus and better managing this sanitary crisis. Some of these measures could benefit the national energy-saving strategy outside of the Covid-19 crisis. However, more technical and behavioral measures are highly required to ensure more effective saving and rationalize the use of energy, the main drive of the economy.

Keywords: Algeria; Covid19; Energy consumption; Containment

1. Introduction

Nowadays, energy has a huge impact on social development; life quality and human well-being are strongly depending on its availability [1]. Algeria as a petroleum and fossil-based energy country is highly relying on fossil energy (natural gas and oil) not only to export and get foreign incomes but also to meet the needs of the population in terms of electricity generation and fuels for the transport sector [1].

In Algeria, 90% of the electricity is generated from natural gas power plants [1,2], and 40% of cars use gasoil, which is considered a real threat to public safety. Whereas the remaining part of cars consumes gasoline or liquefied petroleum gas (LGP).

The year 2020 was marked by the Covid-19 pandemic, which affected intensively the energy consumption and imposed a new consumption model with the containment measures, where the traffic movement was at a low level. Covid-19 appeared in December 2019 in China and the first case in Algeria was recorded on February 25, 2020 [3]. In the absence of effective clinical treatment, the Algerian public authorities have opted for preventive and non-clinical measures to mitigate the spread of the virus and break the transmission chain [3]. The implementation of these preventive measures have started progressively

* Corresponding author.

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on March 9, 2020, when the recorded cases reached 20 affected persons [4].

In this context, the containment and the lockdown were widely applied to restrict internal and external travel and thus paralyzing the transport sector; the internal road travel was restricted during the morning and prohibited during the night. Furthermore, the traffic movement between country departments was under control for a long time. Containment and lockdown measures have also imposed a large change in the electricity consumption pattern with a decrease in industrial use and a peak in indoor consumption.

In this paper, we are focusing on the energy consumption (electricity, natural gas and petroleum products) during the coronavirus pandemic period covering roughly the whole year of 2020. We also explore the amounts of energy consumed during 2020 and the impact of containment measures on the recorded consumption levels as well as the repercussions of these levels on the Algerian economy. We come up with recommendations for energy-saving by benefiting from some of the applied containment measures in order to contribute to shifting the ordinary energy consumption model towards a new model based on the energy sobriety approach.

2. Algerian vision for the energy transition

The Algerian government is aiming at rationalizing energy consumption. The ministry of energy transition and renewable energy has engaged in an ambitious program to ensure more energy-saving and changing the energy consumption model. Integration of renewable energy in electricity generation, promoting the import of electric cars to reduce fuel consumption, fighting against energy wastage and setting an effective energy mix are some of the substantial axes related to this program [5].

Public authorities throughout economical and technical studies are establishing suitable mechanisms to promote the replacement of dirty transportation fuels (gasoline and gasoil) by cleaner sources such as LGP and the introduction of electric cars in the national vehicles fleet. Meanwhile, the new Algerian strategy account to raise the renewable energy share in the national energy mix to 27% with the installation of 22,000 MW by 2030 [6].

In 2020, Algeria has imported 1.3 million tons of fuels to satisfy the national market compared to 2.5 million tons imported in 2019 [7]. However, the Algerian ministry of energy is engaging to fulfil the national market autosufficiency of gasoline and reduce gradually the import of gasoil by the end of 2021; so forth the reinforcement of local refineries production and the rationalization of fuel consumption through the implementation of a new consumption model are the key routes to reach this target.

In this regard, a new ministry in charge of energy transition was created recently to prepare this transition in a sustainable manner and to establish new energy consumption and efficiency policies in collaboration with the ministry of energy. Among the objectives of establishing such policies is to ensure energy security, which is the main pillar for economic growth and is considered also as a factor aiding the public authorities to fulfill their social responsibilities toward their citizens [8].

3. Data presentation-energy consumption in Algeria in 2020

3.1. Petroleum products consumption

The annual report of achievements 2020 of the Algerian Ministry of Energy published in January 2021 revealed the consumption of petroleum products over the last three years in Algeria, listed in Table 1 [7,9]. A sharp decline of 17% in the consumption of petroleum products in 2020 was recorded compared to the level of 2019. Obviously, travel and transport activities submitted to restrictions in the context of containment measures have led to a decrease in fuel consumption.

3.2. Electricity consumption

The coronavirus pandemic has similarly affected the demand for electricity supply, as mentioned in the report of the energy ministry related to 2020 annual achievements [7]. A decline of 4% in electricity demand was recorded in 2020 compared to the global demand in 2019. Indeed, annual electricity sales in 2020 were 63 TWh, compared with an estimated 65.5 TWh in the previous year. This reduction could be attributed to the combination of two different consumption models:

- the significant diminution in the industrial sector caused by the economic slowdown, especially in the first months of the pandemic where the majority of industrial plants have ensured only their minimum of activity; this decrease is estimated at about 6.5%;
- the high level of residential energy consumption related to the shift in consumption modes of energy by people during the lockdown and the containment periods; the evolution was around 2% compared to 2019.

3.3. Natural gas consumption

Natural gas consumption has also decreased from 47 billion m^3 in 2019 to 44 billion m^3 in 2020, corresponding to a reduction of 7% [7]. This decrease can be attributed to the aforementioned fact that 90% of the electricity in the national grid is provided by natural gas [1,2].

3.4. Data discussion

The data revealed that during 2020 significant reductions in consumption of energy including petroleum products, electricity, and natural gas were achieved. Based on these indications, it can be said that the entire decline in energy consumption has been quite considerable this year and that

Table 1
Petroleum products consumption

Year	Consumed petroleum products (KTEO)
2018	18,106
2019	18,991
2020	15,762.5

the resulting saving contributes to reducing the multidimensional economic repercussions of this pandemic. However, residential electricity consumption during the pandemic was high with an estimated increase of 2% compared to the previous year (2019), confirming the fact that the largest source of energy savings is the domestic sector (the residential sector), whereby, disregarding the slowdown in the industrial sector, electricity consumption is still maintained at a high level. Moreover, in 2019, the residential sector accounted for 36% of the total energy consumption [9].

Regarding petroleum products, the consumption has marked a drastic decline (–17% compared to 2019); particularly for fuels, which was attributed to the containment measures and the lockdown policy, that restricted the transport movement and suspended air flights. These measures have contributed largely to saving fuels and limiting useless road traffic movement, which was previously, highly promoted by the subsidized fuel prices.

3.5. Impact of energy consumption on the Algerian economy

The Algerian economy, despite the efforts made in small and medium-sized companies, remains intensively relying on natural resources (natural gas and oil). The abundance of these resources has pushed the government to adopt a subsidy policy regarding the price of energy (fuel, electricity). These prices are much lower than the world market values, involving large consumption with limited counterparts [10,11]. The Algerian energy consumption model is based on fossil petroleum resources (non-renewable energy), whereas renewable energy represents only 0.35% of the Algerian energy mix [6]. Furthermore, the blockade of aviation transportation following internal and external flights suspension has caused $0.8 billion revenue losses for the Algerian economy despite jet fuel (Kerosene) savings [12]. Likewise, the commuting limitation has also affected the trade sector; depending largely on the transportation system [13]. Therefore, the Covid-19 pandemic had a double impact on the national economy. Domestic energy consumption increased whereas activity in all sectors declined, resulting in lower economic indicators [14].

On the other hand, the reduced consumption of fuel, whose imports in 2020 were estimated at 1.3 million tons ($700 million) compared to 2.5 million tons in 2019, has resulted in a halving of fuel imports and savings [7]. Lowering the internal consumption of energy contributed to saving the public monetary reserves and preserved the fossil fuel potential, in order to meet the demands of future generations. In this context, according to forecasts, with the population growth and life standards requirements the energy demand for internal consumption is tending to increase to higher levels. The primary energy demand is estimated between 120 and 130 MTOE by 2030, this demand could be fallen to 110–110 MTEO if all saving measures take place [15], knowing that the total primary energy consumption in 2020 was roughly equivalent to 67 MTOE [7]. Regarding natural gas and electricity, the needs for internal consumption in 2030 would be 55 billion m^3 and 130 TWh, respectively [16]. Thus, saving energy and rationalization of energy use are substantial for the national economy and the national energy security.

3.6. Covid-19 pandemic fighting strategy and energy saving

Overall, the objective is to ensure better energy efficiency and energy savings through a set of behavioral and technical measures as well as rigorous energy policies [17]. The development of new alternatives to substitute fossil fuels either in the production of electricity by diversifying the electricity production channels with the integration of renewable energies in the national energy model or by adopting the importation of electric cars instead of traditional cars based on hydrocarbon fuels constitutes a big step toward effective energy transition. The behavioral and technical measures contribute largely to energy-saving and could economize the energy losses estimated at 20% [18]. Thereby, the replacement of the traditional pubic lighting by performant LED lights could achieve an energy gain of 18 GWh/y, it was also outlined that the industrialization of Algerian solar water heaters (3,000 in 2021) will economize a huge amount of natural gas (400 m^3/y) [5]. Moreover, Mesloub et al. [19] stated that using shading techniques in building reduce the energy bill by 33%. Prior works have outlined that daylight harvesting realizes an additional energy saving of 20% and the integration of wireless sensors in energy control performs 40% of light energy saving [20]. The vision of Algeria for 2030 is to produce 27% of electricity from renewable resources [18,21], which implies the saving of more than 60 million TOE (ton of oil equivalent) [21]. Therefore, some Covid-19 pandemic preventive actions related to containment strategy especially in the transportation sector could set the stage for contributing to energy-saving.

As a tactic to maintain the petroleum products consumption at the same level recorded during the Corona 19 pandemic period, promoting public transportation might be an attractive alternative with the restriction of private cars from moving in the most crowded road axes during the rush hours of the day. This approach could largely mitigate the fuel wastage in traffic jams especially if this concern will be regulated. Remote work could be also more generalized and extended in the ordinary periods; such an option reduces significantly the commuting of employees and thereby the fuel consumption. Many studies stated that regulations and prices enhance energy conservation [22–24]. It was also outlined that the energy-saving approach implies individual concessions to realize collective energy security [22].

The people's acceptability of measures aiming at saving energy is a key element because these measures are affecting the life standards of people and their comfort [25]. However, the review of energy prices which must be deeply studied implies a socio-economic compromise. Moreover, moralization could be also a fruitful instrument by convincing the citizens that the current challenges make energy-saving a must [22].

4. Conclusion

From this study, we deduce that the Algerian energy consumption in 2020 marked by the Covid-19 pandemic, has recorded a remarkable decrease. However, the sharpest decline in fuel and electricity demand was in the

first period of the virus spread (from March to July), which concurred with the total lockdown and massive industrial slowdown. The concept of travel restriction during the lockdown period could be extrapolated with the aim of conserving fuels from useless traffic movement. Moreover, the indoor household sector should be the subject of efficiency and conservation energy policies based on effective measures such as domestic insulation and marketing efficient utilities consuming less energy. These measures help to decrease energy consumption and thereby reduce the energy bill. Two approaches resulted from this analysis. First, behavioral control, which is an important segment of energy conservation, may lead to enormous amounts of saved energy. Second, technical solution based on energy efficiency is more fruitful than the individual attitude changes of the population to reduce unnecessary energy use. The combination of technical and behavioral measures remains the most efficient way to rationalize the use of energy.

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