Energy Consumption Trends for Industry Segments in Northern Africa

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Abstract – **This article analyzes trends of the total final energy consumption in sectors of building materials, residential, and transport industry in Algeria. The total final energy by sector and type of fuel is analyzed. The evolution of the total energy intensity and the impact of energy consumption on the environment are discussed. Consumption per capita in Algeria is 1,058.0 kg of oil equivalent per person, while in Morocco, the country with almost the same number of inhabitants it is 458 Kgoe and in Tunisia it is 843 Kgoe. The total emission of gases is equal to 46 million Tons of CO2, with an average of 3 TECO2 / TOE.**

Keywords – **Activity sector, Building materials, Energy consumption, Environment, Fuel type.**

I. INTRODUCTION

Energy in buildings is divided in two parts, the energy for the maintenance/servicing of a building during its life cycle, and energy needed for production of a building materials (embodied energy). Study of both the types of energy consumption is required for complete understanding of building energy needs. Embodied energy of buildings can vary over wide limits depending upon the choice of building materials and building techniques [1]. Reinforced concrete frames, slabs, and burnt clay bricks masonry, concrete block masonry, are the common building structure used in Algeria. Examples of buildings using alternative building technologies can be found [2]–[6].

The total final consumption (TFC) of energy in 2007 reached 20 million TOE for 34.4 million inhabitants within the area of 2 393 367 square km, and with Gross Domestic Product (GDP) equal to 9,389.70 million DA (Algerian Dinars). The consumption per capita in Algeria is 1,058.0 kilograms of oil equivalent (kgOE) per person, while for Morocco, which has nearly the same number of inhabitants, it is 458 (kgOE) and in Tunisia it is 843 (kgOE) (Earthtrends.wri.org 2012). The total gas emission is equal to 46 millions of tonnes of CO_2 with an average of 3 $TECO_2$/TOE. The GDP is equal to 3,232.2 million of DA.

This is firstly due to fuel prices in Algeria, and probably due to the level of average living standard and purchasing power, which is greater in Algeria than its neighboring countries. The percentage of population having access to electricity at the time of writing of this paper according to the World Bank was 99.3 % for Algeria and 97 % for Morocco, which has nearly the same number of inhabitants [7]. Thus,

the access of Algerian citizens to more electrical appliances such as air conditioning units, refrigerators, TVs and so on, and natural gas appliances, such as gas boilers for central heating and hot water, gas stoves, and gas cookers, is growing. The percentage of population connected to electric power is 99.5% in Tunisia, but consumption of natural gas in mega joules per capita for year 2006 was 17,287, while it was 33,353 for Algeria, and 776 for Morocco [8].
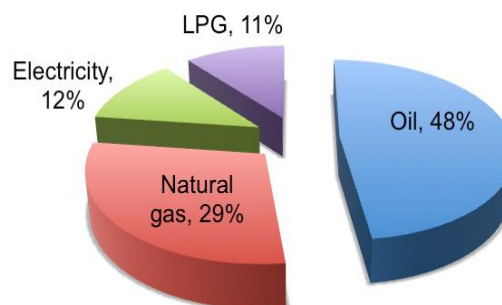

Fig. 1. Energy consumption by fuel type.

Total energy consumption distribution by fuel type shows that oil is the most consumed fuel, the shares are as follows: 48 % is oil products, 29 % –natural gas, 12 % –electricity, and 11 % LPG, GDP per inhabitant is equal to 93,959DA with an average consumption of 0.581 TOE per inhabitant. Meanwhile, the final gas emission is 1.83 $teCO_2$ and the primary emission is 2.222 $TECO_2$ per inhabitant. Sector shares in total energy consumption are 7 % for agriculture and hydraulics, 33 % for transportation, 19 % for industry (without hydrocarbons) and building construction, 41 % for residential and tertiary sector. The final energy consumption by type of fuel and by activity sector is shown in Table I. The percentage of CO2 emission in Algeria between 2009 and 2010 according to the global energy statistical yearbook [9] is 4.2 % of the global emissions, which is less than African emission percentage for the same period 5.8 %. The average annual growth rate in petroleum industry is 5.93 %, and in gas industry – 4.84 %. For this recorded rate, the average annual growth of agriculture and water resources, industry-building construction, residential – tertiary, and finally transport are given in Table I.

TABLE I

AVERAGE ANNUAL CONSUMPTION GROWTH IN PERCENTAGE

Agriculture and Water resources	Petrol industry	Gas industry	Industry and building construction	Residential and tertiary building	Transport
8.7 %	5.93 %	4.84 %	6.46 %	5.9 %	5.76 %

TABLE II

ENERGY CONSUMPTION BY TYPE OF FUEL AND BY SECTOR

kToe	Solids	Gasoline	Diesel	Heavy fuel	Light fuel	LPG	Natural gas	Electricity	Total
Industry and construction	477	0	669.63	0	0	74.28	2438	5,580.67	4,339.63
Residential	0	0	1,421.80	0	20.46	1,611.58	2,747.7	769.9	6,571.45
Tertiary	0	0	122.94	0	0	55.23	376.04	635.71	1,189.91
Transport	0	2,350.73	3,030.80	595.87	0	379.20	0	2.67	6,539.23

As it has been shown in Table I, the percentage of the average growth in the residential and tertiary sector is the same as in the petrol industry, transport has an average less than in the petrol industry, whereas both industry - building construction, and agriculture – water resources illustrate a percentage value more than that of the petrol industry. The total annual energy growth consumption counts for 27,665.6 TOE, thus producing the annual amount of 76.45 TCO2. In his paper, total energy consumption by activity and by type of fuel is analyzed, starting with the industrial sector, the transport sector, and finally the agriculture sector, drawing relevant conclusions.

II. MATERIALS AND METHODS
A. Total Energy Consumption by Activity and Fuel Type

For an average annual growth rate of 8.7 % in the agriculture and water resources sector, 6.46 % in industrial and construction sector, 5.9 % in residential and tertiary sector, and finally 5.76 % in transportation sector, the recorded average annual growth rate in the petroleum industry was 5.93 %, and 4.84 % in the gas industry. Energy industry sector consumption amounts to 5,680.4 TOE and the consumption of non-energy industry sector is equal to 1,994.24 TOE. The global consumption is equal to 27,665.6 TOE with a CO_2 emission of 76,446,653 $TECO_2$. The energy consumption by type of fuel and by sectors is represented in Table 2.

Consumption trend analysis by sector and product between years 2000 and 2007 shows that the final national energy consumption registered an annual average growth rate of about 6.32%. The final energy intensity in 2007 reached 6 TOE/MDA, which means 0.411 per 1000 dollars of GDP and twice that in the OECD countries. Thus, the economy consumes twice as much energy as required to create the same unit added value, with a primary energy intensity of 3.82TOE/ MDA (or 0.27 Toe/1000$). The evolution from 1971 to 2008 of the world total final consumption by fuel (MTOE) had doubled, it was in 1973, 4676 MTOE and it reached 8,428 MTOE in 2008 according to the key word energy statistics [10]. The fuel shares of total final consumption are 15.6 % for gas, 41.6 % for oil, 9.8 % for coal/peat, 17.2 % for electricity, 12.7 as combustible renewable and, finally, 3.1 % for others. Total energy consumption distribution by fuel type shows that oil is the most consumed combustible, this is due to the growing industry demand and transport. The consumption of natural gas for industrial purposes, such as electricity production by thermal stations using natural gas, comes in the second place because of the increasing demand in residential and tertiary, as well as in the energy industry, and non-energy industry. The increasing demand for electricity represents 12 %. Liquefied propane gas consumption is increasing and this due to the encouragement of the government for the use of this clean fuel for transport vehicles in private cars, by exempting them from pollution taxes, as well as installing more centrals for cities not served by natural gas.

III. RESULTS AND DISCUSSION
A. Total Energy Consumption Analysis in Residential Buildings

The final energy consumption in residential buildings has achieved the value of 6.5 million TOE in 2010 at almost 5.1 million housing units in urban areas, and 2.3 million housing units in rural areas, with an average number of occupancy of 4.5 persons per house. The household electrical equipment consumption accounts for 75% of the total electrical energy consumed in the dwellings, the remaining 25% are for the light. The average annual energy consumption of housing unit is 1.048TOE. The natural gas consumed in residential buildings represents 66%, petroleum products 22%, and electricity 12%. The power consumption of the residential sector reached 770 KTOE, which represents 33% of the total electricity consumption, and 436 KTOE in gas, which represents 70% of the total gaseous product. Fig. 3 illustrates the residential energy consumption by type of fuel from year 2008 to 2013.
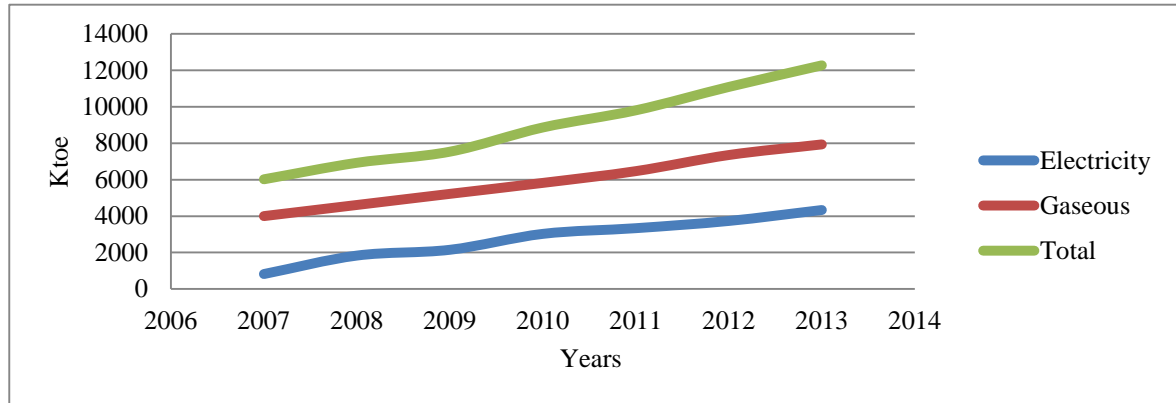
Fig. 2. Residential energy consumption evolution.

B. Total Energy Consumption Analysis in the Building Materials Sector

The final energy consumption in the sector of building materials has attained the value of 3480 KTOE. The building materials industry is the first energy consumer in the total industrial sector, with a share of 60 %; steel, metallurgy, mechanics, electrical and electronics (ISMME) industries take up 15 % of the final consumption, basic chemicals 3 %, food industry 9 %, manufacturing 11 %, and finally mines and quarries – 2 %.

Natural gas consumption in the sector of building materials exceeds 76 % of the energy in the industrial sector, 6 % is consumed as petroleum products and 17 % in the form of electricity. Steel industry, metallurgy,

Mechanics, Electrical and electronics represent a total budget of 46,705 MDA (million of Algerian dinars,

1 USD = 77.92 AD), building materials 64,304 MDA, basic chemicals 29,050 MDA, Food Industry 152,132 MDA. Industry manufactures 31,761 MDA, and various industries 44,779 MDA. The relationship between changes in energy consumption in the building material sector and the evolution of the added value (in constant dinars) shows a growth of 2.45 % per annum of the energy intensity sector, which recorded 12 KTOE per kDA, in 2007. However, the added value rose by 6 % while energy consumption grew by 6.2 %. The consumption of 3.2TOE per employee has declined by a rate of 4.3 % per year during the same period. Fig. 2 illustrates the consumption of energy in the building materials industry by type of fuel from 2007 to 2013, solid fuel consumption is not represented in the figure because it is very small compared to petroleum products, electricity products, or gaseous products.
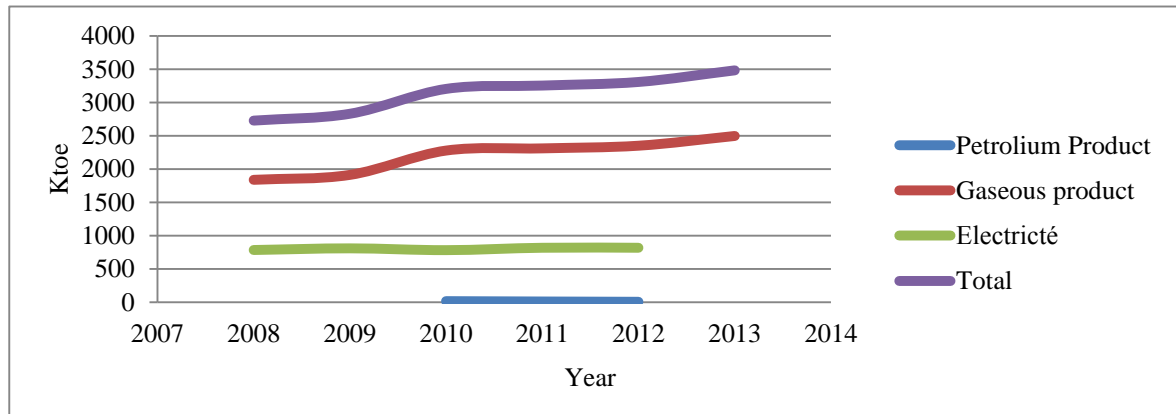

Fig. 3. Energy consumption in the building materials industrial sector.

C. Total Energy Consumption Analysis in the Transport Sector

The energy consumption in the transport sector reached 6.5 million TOE, 46 % of this energy is consumed in the form of diesel, and 48 % – in the form of gasoline, 6 % in the form of LPG (liquefied propane gas) and 0.04 % in form of electricity. The length of roads network is 109,452 km for the total number of 3.655 million vehicles, 45 % of these vehicles use diesel, 120,000 were converted to LPG, the railway length is equal to 4,200 km, the main fuel used is diesel, the rail park

consists of 220 locomotives and 460 cars. The maritime fleet has 38 vessels, with 10 commercial ports and 35 fishing ports. The air fleet consists of 55 aircrafts, with a total number of 35 airports. During the period 2000–2013, gasoline consumption registered a growth of 4 %, compared to that of diesel, which recorded a rate of growth of 7.3 %, while consumption of LPG recorded a growth rate of 9.6 %, which represents a consumption of 1.80 TOE / vehicle. Fig. 3 illustrates the transport energy consumption by type of fuel from year 2000 to 2013.
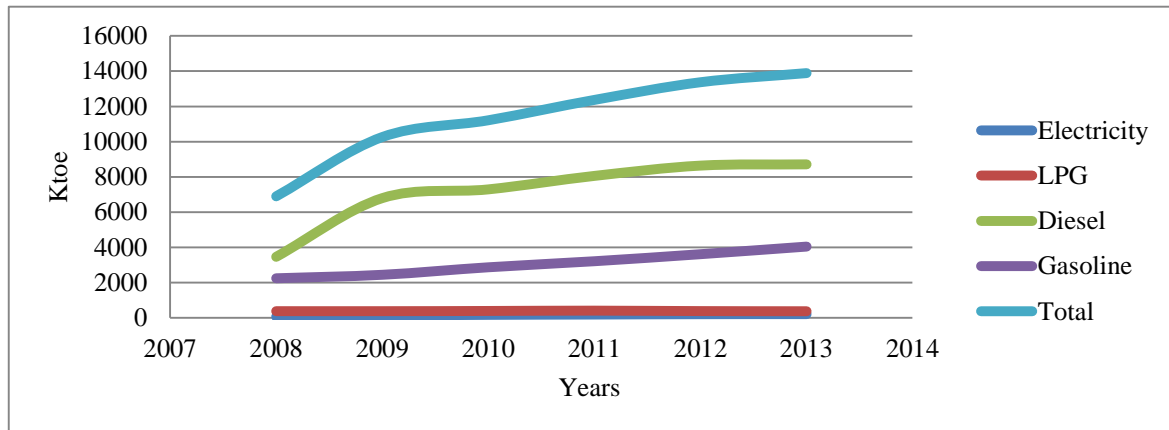
Fig. 4. Energy consumption in the transport sector.

Air Algérie is the national air transport company. In 2009, an international tender to purchase eleven aircraft (seven medium-haul Airbus A320 or Boeing 737, four regional turboprop ATR or Bombardier DASH-type) for a value of $ 111 million (agreement of the Algerian state) was organized. In July 2011, the official website of the company gave the number of 43 aircraft in operation, including 15 as cargo, all with an average age of 7 years. Air Algeria has a network of 96,400 km. The company transports more than three million passengers and conducts nearly 20,000 tons of freight operations each year. In 2010, Algeria Air carried 3.5 million passengers. With more than 3 million vehicles, according to the latest statistics available, Algeria has the largest park in North Africa and the second park in Africa. This is mainly due to the opening of car loans in 2001. Measures adopted in 2005, prohibition of import of the used vehicles and compulsory roadworthiness test have conditioned that the park has been considerably renewed. The average age remains high, 77 % are old vehicles with more than ten years of service and only 17 % – less than five years. Algerian Minister of Transport recently estimated the Algerian automobile park as amounting to up to 5.5 millions, with less than 10% of these vehicles running on LPG [11]

By 2014, the length of the national railway network will be 10,400 km. The Minister of Transport confirmed in Batna, where he inaugurated, with regard to the first link-propelled M'sila Ain Touta-Constantine that once all projects were finished, Algeria would be among the "greatest countries in Africa". With this length of the network Algeria, will be in the second place, behind South Africa with more than 20,000 km network [12].

The development program of railway transport in Algeria gave priority to the continued expansion and modernization of the network in terms of doubling rail (east-west) and the creation of new rail (north-south), signalling and electrification of the entire network and the acquisition and renewal of the rolling stock. Since 2009, the construction and the rehabilitation of 1,383 km of roads, the reactivation of 767 km, and the electrification of nearly 400 km of track have been realized. Between the lines reactivated (767 km, in whole during the year 2009) and the newly built lines (1,383 km

from the year 2009), the Algerian rail network totaled 3,919 km of the exploited rail track in the first quarter of 2011, against 1,769 km at the end of 2008. During the last few years, an expansion and modernization program of the rail network was launched. This was accompanied by the acquisition and commissioning of 64 electric driven trains for Algiers suburbs, which have already reached 100,000 passengers / day, 17 railcars serving the main northern lines of Algeria, and 30 diesel electric locomotives. 1,551.5 km of new lines are already realized and 5,900 km are planned for construction, and should be completed by the end of 2014 [13].

During the 1980s, Algeria had an enviable fleet, one of the largest in the third world. It was ranked among the top 50 worldwide. Algerian Fleet was then composed of more than 80 vessels of all types (bulk carriers, tankers, chemical tankers, gas carriers, tankers, Multipurpose, RORO, car ferries). The whole fleet was operated by CNAN (National maritime transport company). CALTRAM Algerian-Libyan Company operates four vessels during the 80/90. The CNAN ensured with its own capabilities a share of about 35 % of foreign trade of Algeria with a target of 50 %. Transportation demand has been increasing over the past 30 years; it had literally exploded in the last decade through the import of 19 million tons in 2001 to 37 million tons in 2011. The domestic supply of maritime transport of general cargo got reduced to its simplest expression; its evolution was inversely proportional to the increasing demand. The national fleet now consists of 16 units distributed among eight bulk carriers, four ships and two Multipurpose RO-RO vessels belonging to the CNAN and RO-RO and a bulk carrier owned by NOLIS, a subsidiary of CEVITAL (Algerian private company for food products). The average age of the fleet CNAN is 30 years (between 30 and 35), corresponding to the age of demolition. In fact, only five ships are operating between Europe (Marseille, Barcelona, Laspezia, Antwerp and Hamburg) and Algeria, covering insignificant general merchandise transport needs. Two private ships are used to cover the needs of the group CEVITAL transportation. We actually arrived at a stage where we can objectively consider that Algeria has more facilities for shipping general cargo [14].

D. Total Energy Consumption Analysis in Agriculture Sector

Energy consumption in agriculture sector reached 1.1 million TOE, 94 % of the energy consumed in agriculture sector is in the form of diesel, and 6 % is in the form in electricity. The total agriculture surface area is equal to 8,389,640 ha, only 0.0095 % is irrigated with a total surface of 803.871 ha. The number of pumps and motor pumps used for irrigation is equal to 161,772, the number of agriculture farm machines (all types) is equal to 226,724 units, and the number of drilling operations is 7,464 at a rate of 4242 HM3 of water flow. Diesel is the most used fuel, with a rate of consumption of 94 % of the energy balance in agriculture, and 17 % of the national balance sheet, while the consumption of electricity for irrigation represents 3 % of the national balance sheet. During the period of 2000 to 2007, the energy consumption in the sector increased by 9 % at an average of 8 % for diesel and 12 % for electricity. During the years before 2010, the energy consumption given in annual report by the ministry of energy and mining did not provide the results of agriculture energy consumption, but it presented the total of consumption for household and others, but from 2010, it started providing the data on consumption in detail (see Table III), and thus the relevant data can be found under the title household and others, residential, agriculture, and tertiary.

TABLE III

ENERGY CONSUMPTION BY TYPE OF FUEL IN 2010–2013, KTOE

Year	2010	2011	2012	2013
Diesel	25	27	20	20
Natural Gas	31	33	33	36
LPG	8	7	6	9
Electricity	256	284	315	183
Total	322	350	374	248

E. Total Energy Intensity Evolution

The final energy intensity in Algeria stabilized around $ 0.53 TOE/1000 between the years 2000 and 2003. It was improved by 2 % between 2003 and 2007, passing 0.41 TOE /1000 $, which indicates an elasticity of about 1.23. This performance is due to an optimization of the rate of capacity utilization (TUC) [15] of the production system. The energy intensity reflects the degree of dependence of an economy with respect to the energy factor. The higher is the energy intensity, the more vulnerable is the economy to the fluctuations in energy cost. Energy intensity is also a relevant indicator according to the obligations taken in the Protocol of Kyoto. Fig. 5 illustrates a comparison between energy intensity in Algeria, Africa, and in the rest of the world.
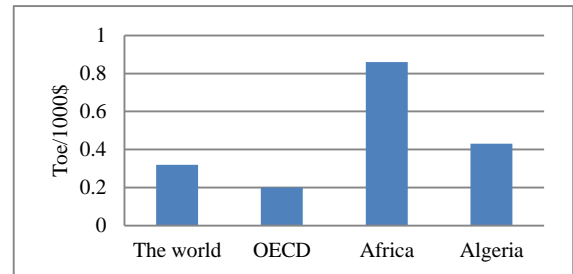

Fig. 5. Energy intensity.

The evolution of energy intensity in 2000–2007 is shown in Table IV for agriculture, industry, petroleum, gas industry, tertiary, and transport.

Agriculture is an important element of rural development in Algeria and is considered one of the major components of the national economy. Agriculture employs 25 % of the labor force and contributes approximately 10 % of the GDP [16]. However, Algeria's arable land (useful agricultural area) is limited to less than 3 % of its total area, approximately 8.7 million ha (cash crops, forest, pasture, rangelands, scrub and alfalfa land). As it can be seen in Table III, agriculture energy intensity was oscillating between 1.649 and 1.893 in the years 2000 and 2004, decreased during the year 2001, then increased in 2002, then it decreased again in 2003 and 2004. From 2005 it was increasing. This may be due to the national program launched in 2000 for the development of agriculture PNDA (National Agricultural Development Program). The PNDA evolved to include a rural dimension in 2002 and became the National Agricultural and Rural Development Program (PNDAR). This program included the development and modernization of farms, the intensification and expansion of irrigated areas, the development of agricultural production and productivity through substantial investments and the appropriate and sustainable use of natural resources.

TABLE IV

EVOLUTION OF ENERGY INTENSITY BY SECTORS

Energy intensity by sector TOE/MDA	2000	2001	2002	2003	2004	2005	2006	2007	TCAM%
Agriculture	1.774	1.671	1.893	1.677	1.649	1.774	1.792	1.992	1.15
Industry	8.842	8.759	8.683	8.814	9.517	9.924	10.646	10.477	2.45
Petroleum Industry	3.555	4.145	4.146	3.905	2.681	1.970	1.818	1.904	−8.53
Tertiary	1.116	1.058	1.071	1.109	1.068	1.040	1.042	1.020	−1.27
Transport	26.848	23.967	24.052	22.493	19.832	17.620	14.806	15.906	−7.21
Global TOE/MDA tax included	5.464	5.733	5.831	5.523	4.793	4.092	3.728	3.819	−5
Global TOE/MDA free of taxes	7.252	6.910	7.020	6.814	6.643	6.539	5.957	5.920	−3
Global TOE/1000$ taxes included	0.411	0.443	0.465	0.427	0.345	0.300	0.271	0.265	−6
Global TOE/1000$ free of taxes	0.546	0.534	0.559	0.527	0.479	0.480	0.433	0.411	−4

The PNDA was accompanied by supporting measures such as supervision; follow up, evaluation and technical guidance from extension services [17]. The PNDAR was designed to be a comprehensive and coherent response to the primary challenges and constraints of the natural, technical, organizational and institutional problems responsible for weakening the basics of national food security, degrading natural resources and reducing cohesion and social peace in rural areas, which are essential for Algerian society (Ministry of Agriculture and Rural Development, 2007). Under the Support Plan for Economic Recovery (PSRE), $1.7 billion during 2001–2004 and $7.1 billion (under the Complementary Plan for Economic Growth Support (PCSC)) during 2005–2009 were allocated to the agricultural sector. The PNDAR programs have yielded mixed results. Since the application of the PNDA, Algeria's agricultural sector has recorded significant growth of 6.5 % on average, whereas the growth rate between 1990 and 2000 was only 4 %. Equivalent program to support small and medium companies could be behind this energy intensity increase. The government has implemented different support programs to strengthen the investment, among these organizations supporting investment, we find the National Investment Council (CNI). The CNI is created with the Minister responsible for investment promotion, who provides the secretariat, and which is placed under the authority of the Head of Government who holds the presidency. The National Agency for Intermediation and Regulation (ANIREF) works to facilitate the emergence of a land market economy. The National Agency for Investment and Development (ANDI) has been established.

F. Energy and environment

Emissions of greenhouse gases due to the final energy consumption reached 46 million T CO_2. The structure of consumption emissions by sector is given in Table V.

TABLE V
CO2 GAS EMISSIONS BY ACTIVITY SECTOR AND FUEL TYPE

TCO_2/TOE	Electricity	Gaseous products	Petroleum products	Total products
Agriculture	0.133	10.369	2.826	13.329
Residential	0.269	1.526	0.658	2.454
Tertiary	1.229	0.834	0.310	2.372
Industrial	0.397	1.762	0.184	2.343
Petroleum industry	0.107	2.021	0.225	2.352
Transport	0.001	0.133	2.825	2.959
Total sectors	0.238	1.161	1.176	3.034

The total emissions balance sheet is 76 $MTCO_2$. 19 $MTCO_2$ is produced by transport and represents 25 % of the emission, 16 $MTCO_2$ is produced by industry and represents 21 % of the emission, whereas 15 $MTCO_2$ is the result of agriculture activities and it is about 19 % of the total emission. Oil industry has a share of 18 % with a production of 13.5 $MTCO_2$, and finally the tertiary participates with 10 % of total production of 7.6 $MTCO_2$.

According to the AIEA [18] report for the year 2000, the annual total emission of an Algerian inhabitant is less than 1 TCO_2/inhabitant/year, and African average is 3 TCO_2/habitant/year, 6 for the French, 9 for the European, and 20 for the American. Emissions from final energy consumption are 46 million TCO_2 with a 1.830 of TCO_2 per capita, 3.235 of TCO_2 emissions for one Ton oil equivalent consumed. For one thousand Algerian dinars consumed, only 0.020 ton of CO_2 emission is produced. Total emissions due to primary energy amount to 82.6 million TCO_2. 30% of this production is due to electricity generation, 35% is due to the gaseous products, and 35% due to petroleum products. The province of Setif which has a central position with six thousand five hundred and fifty square kilometres (6550 km^2), and with a population of one million and six hundred thousand inhabitants, consume more than 5.4 % of the national production, and participates with 4.70 % of national CO_2 emission.

IV. CONCLUSION

The percentage of the average growth in the residential and tertiary sector is almost the same as in the petrol industry, the transport has an average less than in the petrol industry, whereas both industries – building construction, and agriculture – water resources illustrate a percentage value more than that of the petrol industry. The total energy annual growth consumption counts amounts to 27,665.6 TOE, therefore producing annual amount of 76,446,653 TCO2.

For an average annual growth rate of 8.7 % in the agriculture and water resources sector, with an exception for the year 2013, when it decreased from 374 KTOE in 2012 to 248 KTOE, and this is may be due to the drought, 6.46 % growth in industrial and construction sector, 5.9 % in residential and tertiary sector, and finally 5.76 % in transportation sector, the recorded average annual growth rate in the petroleum industry was 5.93 %, and 4.84 % in the gas industry. Energy industry sector consumption amounts to 5680.4 TOE and the consumption of non-energy industry sector is equal to 1,994.24 TOE. The global consumption is equal to 27,665.6 TOE with a CO_2 emission of 76,446,653 TECO2.

Consumption trends analysis by sector and product between years 2000 and 2007 shows that the national final energy consumption registered an annual average growth rate of about 6.32 %. The final energy intensity in 2007 reached 6 TOE/MDA, which means 0.411 per 1000 dollars of GDP and twice that in the OECD countries. Thus, the economy consumes twice as much energy as required to create the same unit added value, with a primary energy intensity of 3.82 TOE / MDA (or 0.27 TOE/1000$).

The evolution of the world total final consumption by fuel (MTOE) doubled from 1971 to 2008; it was 4,676 MTOE in 1973, and it reached 8,428 MTOE in 2008. The fuel shares of total final consumption are 15.6 % for gas, 41.6 % for oil, 9.8 % for coal/peat, 17.2 % for electricity, 12.7 as combustible renewable and finally 3.1 % for others.

Total energy consumption distribution by fuel type shows that the oil is the most consumed combustible, this is due to the growing industry demand and transport. The consumption of natural gas for industrial purposes, such as electricity production by thermal stations using natural gas, comes in the second place because of the increasing demand in residential and tertiary, as well as in energy-industry, and non-energy industry. The increasing demand for electricity represents 12 %. Liquefied propane gas consumption is increasing, and this is due to the encouragement of the government for use of this clean fuel for transport vehicles and private cars, by exempting them from pollution taxes, as well as installing more centrals for cities not served by natural gas.

The relationship between changes in energy consumption in industrial sector and the evolution of the added value (in constant dinars) shows a growth of 2.45 % per annum of the energy intensity sector, which recorded 10 KTOE per kDA in 2007. However, the added value rose by 6 % while energy consumption grew by 6.2 %. The consumption of 3.2 TOE per employee declined by a rate of 4.3 % per year during the same period. Fig. 2 illustrates the industry energy consumption by type of fuel from year 2000 to 2007. The energy consumption in the transport sector reached 6.5 million TOE, 46 % of this energy is consumed in the form of diesel, and 48 % in the form of gasoline, 6 % in the form of LPG (liquefied propane gas) and 0.04 % in the form of electricity.

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