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Sustainable development in Algeria

H. Lagha, A. Bachi

Laboratoire des Droits et Nouvelles Technologies, Université Alger3, Algeria.

*Corresponding author: hassinalagha@yahoo.fr

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ABSTRACT/RESUME

Abstract : *Like the countries of the world in general and North Africa in particular, Algeria faces many ecological challenges. The National Report on the State and the environment, which served as a basis for the preparation of the National Action Plan for the Environment and Sustainable Development, reveals resources of constantly deteriorating soils, limited and low quality water resources, urbanization Uncontrolled industrialization, a poorly controlled industrialization generating industrial pollution causing serious public health problems.*

Algeria has gradually become aware of the need to adopt a sustainable development (SD) approach and has developed an institutional and regulatory framework in cohesion with the enactment of laws on the environment and land use planning.

Our objective in this communication is to show the development policy on which the national economy has been based since independence and the need to integrate the environmental dimension into its development process.

I. Introduction

Over the last century, the world has changed considerably, it has undergone political, economic, technological, social and, above all, ideological reforms and transformations, and the 20th century has witnessed magnificent progress and successes, but also confusion and Incomparable calamities [1].

Today, we all see that these changes have affected our urban lifestyle in these various structures; Distribution of work and functions, land use,
Modes of transport, industrial and agricultural production, modes of consumption and waste production.

Algeria has set targets for 2025 in the field of spatial planning in which it integrates the concept of sustainable development [2]. This new vision is based on economic growth, social equity and protection of the environment.

Development needs to be put into perspective through the indicators of sustainable development.

Having gradually become aware of the need to integrate the environmental dimension into the process of planning for the development and sustainable use of natural resources, in order to adopt a sustainable development (SD) approach, Algeria has developed a National Strategy for the Environment based on three axes: Restart economic growth on a restructured and enlarged basis, in order to reduce poverty and promote employment; Preserving fragile and limited natural resources (waters, soils, forests, biodiversity ...) for sustainable development ; Improve the public health of the citizen through better management of waste, sanitation and air releases [3].

II. The concept of sustainable development (SD)

Developed since the end of the 20th century. Considered on a global scale, this notion aims to take into account, besides the economy, the environmental and social aspects that are linked to long-term stakes. Sustainable development is, according to the definition proposed in 1987 by the World Commission on Environment and Development (Brundtland Commission): "Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Considered on a global scale, this notion aims to take into account, besides the economy, the environmental and social aspects that are linked to long-term stakes.

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Sustainable development must be both viable (to organize to end, to last), livable (where one can live) and equitable (sense of equity). It is therefore necessary to achieve the harmony of these three pillars, for equity, sustainability, sustainability and sustainability of the planet.

Some people prefer to talk about sustainable development, that is, what our environment can bear over the long term. However, the proponents of the term sustainable prefer to emphasize the notion of sustainability. It is the coherence between the needs and the global resources of the land over the long term, rather than the idea of looking for the limit to which The earth will be able to bear us without damage.

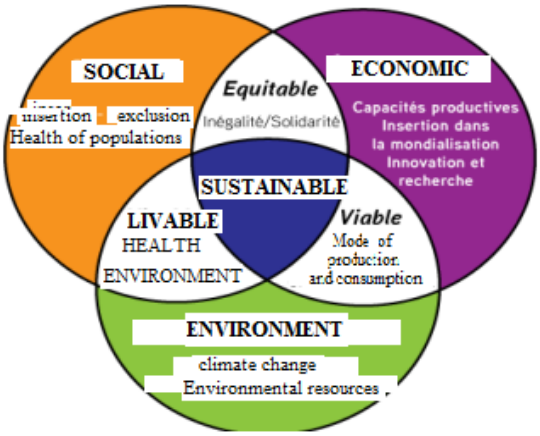

Diagram of sustainable development: a global approach to the confluence of three concerns, known as the three pillars of sustainable development.

II.1. The Fundamentals of SD

Engaging in SD involves adopting or improving our behavior by following certain principles to develop in agenda 21 (agenda that sets 21 SD rules to institutions Public authorities):
Precautionary principle: to prevent any risk; Principle of responsibility: adopt human and environmental responsibility for all activities and decisions; Transparency principle: increasing the dissemination of information; Principle of social and technological innovation: to participate in human and economic development; Principle of contribution to local, national and global issues.

III. Sustainable development in Algeria

Faced with the bottlenecks that had led to the previous economic organization, Algeria found it self at the beginning of the eighties in the face of the need to go beyond the myth of oil rents. The country uses from 1988 to the International Monetary Fund (IMF) who imposed structural adjustment [4], a comprehensive reform program has begun. The economic reforms undertaken in several stages have transformed the legal and institutional landscape Triple, economic, legal and social plan to ensure a transition from the planned economy to the market economy.

Since the liberalization of the economy and the will to stimulate economic growth in the country, sustainable development remains very little put forward by the public authorities [5]. The issue of environmental protection takes shape following the Rio Summits in 1992 and the Johannesburg in 2002, through the enactment of legislation and the introduction of environmental taxation.

The model of growth and development adopted by Algeria makes it vulnerable and therefore criticized is questioned. The need for Algeria to Approach and is prepared for this is more than obvious for several reasons that can be summarized in the following [6]:

III.1. The use of non-renewable resources as a vector for development

The limitations of development policies that emerged from the 1980s are related to recurring problems such as poverty, job insecurity, the crisis in the productive system, social inequalities and imbalances in urban and territorial policies [7] .

The structure of production has deformed in favor of hydrocarbons and at the expense of manufacturing industry which has continued to lose weight despite the massive investments made to equip Algeria with industrializing industries.

Today and after more than 50 years of independence, the Algerian economy is a rentier economy and accounts for about 98% of Algeria's foreign exchange earnings [8], this really raises the question of the sustainability of the choices made.

III.2. A pure economy of rent

A pure cash economy where hydrocarbons account for 35% of GDP and 60% of tax revenues. Any decline in demand or the price of hydrocarbons could rapidly degrade the trade surplus, such as 2013, with a trade surplus of $ 11.06 billion (USD bn), compared with 21.49 Bds usd in 2012, down 48.51%.

Algeria has not been cautious in the exploitation of its resources: "Not only has dependence on hydrocarbons increased from 70% in the 1970s to 98% today, current production estimated at 1.4 Million barrels/day, remains high " [9]. Hassi reserves Messaoud are dwindling and the new discoveries are only covering this weakness for a time. "With the continuation of its dependence on hydrocarbons, Algeria can wake up one day in a dangerous situation", One wonders the risk of exhaustion.

Reserves for the current generation and especially future.

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III.3. The Algerian State must no longer continue to believe in the exploitation and export of hydrocarbons as the economic model that will guarantee the future of the country.

Algeria is expected to have about 45 million inhabitants by 2030 according to the National Office of Statistics (ONS). If it is accepted that development will lead to consumption at 2 toe/ person/year, Algeria will require consumption of nearly 100 million toe/year; The aura-like?

III.4. Algeria is vulnerable to climate change

According to a study by the Climate Change Knowledge Network3: Algeria and the Maghreb countries will be very vulnerable to climate change. Since 1975, the Algerian territory has experienced a rise in temperature, as globally and on average, rainfall has decreased by 35%.

The region is semi-arid to arid. of the average annual temperatures, exceeding 20 ° C in the south. This is related to the high level of solar radiation reaching the region, and the frequent advections of hot air masses. These elements cause a high evapotranspiration of nearly 200 mm per year. These data also show a clear increase in the frequency of droughts and floods. Thus we have gone from a drought every ten years to the beginning of the century to five to six years of drought in ten years now.

III.5. A situation of water stress

In Algeria, several players can explain the situation of water stress: "The delays accumulated in the 1980s and 1990s to adjust supply to demand for water. The ratio of water resources per capita per year to 1 500 m^3 in 1962 was reduced to 720 m3 in 1990, 630 m3 in 1998 and 500 m^3 today; Physical constraints related to the relief and morphology of the country; The decline in rainfall over the last three decades; The phenomenon of desertification of soils, which accentuates the threat of drought, particularly in western Algeria and the growth of water demand (multiplied by four in forty years), especially in the north of the country and in urban areas " [10]. According to data from the Ministry of Water Resources, Algeria has 50 dams in operation, 11 are in progress and 50 other dams under study.

III.6. An agricultural sector dependent on climatic hazards (drought):

The agricultural potential of Algeria is limited, with only 20% of the area usable for agriculture, rangelands and forest. Production with inadequate infrastructure; Regular drought, and severe erosion with severe soil degradation; This leads to a reduction in agricultural production, a reduction in cereal yields of up to 50% for drought periods and a high dependence on Country of imports for its needs. Agricultural trade between France and Algeria has a large surplus in favor of France, close to € 2 billion in 2011. Algeria absorbs 10% of soft wheat and more than 30% of French durum [11].

III.7. A worrying pollution:

According to MATE, the main air pollutants in Algeria come mainly from emissions from aging industrial installations, thermal installations, domestic heating, waste incineration in the open space and human activity, in particular traffic road. Between 2001 and 2011, the fleet almost doubled, from 2,938,000 vehicles to more than 5 million vehicles in 2011. Since 2002, demand for diesel fuel has increased by more than 10% annually, a source of particulate matter (PM10)) That is harmful to human health. The pollution of the area is responsible for several diseases such as eye, skin and respiratory irritations, cardiovascular diseases, lungs.

III.8. Waste production is constantly increasing

In the study by the Ministry of Planning and the Environment (MATE), on the state of the environment in Algeria, it is stated that the production of waste per inhabitant in the urban environment has increased from 0 , From 76 kg / day in 1980 to 0.9 kg / day in 2002, reaching an average of 1.2 kg / day in 2005. The National Waste Agency (NDA) reported that 10.3 Millions of tons of domestic waste are generated annually at the national level, which is equivalent to 278 kg per year and per Algerian. Household waste accounts for 75% of the total volume of waste produced in Algeria [12]. Hospital waste amounts to 34,000 tons annually. More than 4,000 tons of expired drugs are still stored.

III.9. Threatened forest heritage

In recent years, due to climate change and the spread of the desert, there has been a decline in natural capital, a limited forest, which is experiencing unreasonable exploitation in the face of a lack of public authority, with a consequent loss of Forest reserves.

However, it should be pointed out that since the 1990s and in the fight against terrorism, which has hit the country to the full, there has been voluntary forest fires as well as forest rangers their profession.

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Table1. *Extrapolation of populations and deposits of waste "2014 - 2035"*

	Evolutions	2014	2015	2020	2025	2030	2035
Population	**Algérie**	38 580 168	39 131 865	42 010 966	45 101 896	48 420 239	51 982 726
	Batna	307 486	311 883	334 830	359 465	385 912	414 305
	Tlemcen	142 162	144 195	154 804	166 194	178 421	191 549
	Boumerdes	43 512	44 134	47 381	50 867	54 610	58 628
Waste	**0,7kg/hab/jour**	0,70	0,72	0,84	0,97	1,12	1,30
	Algérie	9 857 233,0	10 298 137,2	12 816 720,8	15 951 266,7	19 852 418,7	24 707 663,5
	Batna	78 562,7	82 076,7	102 149,9	127 132,4	158 224,8	196 921,4
	Tlemcen	36 322,5	37 947,1	47 227,7	58 778,1	73 153,2	91 044,1
	Boumerdes	11 117,3	11 614,6	14 455,1	17 990,4	22 390,2	27 866,1
	Algérie	**9 857 233**	**10 298 137**	**12 816 721**	**15 951 267**	**19 852 419**	**24 707 663**
12%	**plastics (12%)**	1 182 868	1 235 776	1 538 006	1 914 152	2 382 290	2 964 920
9,39%	**Paper and cardboard (9,39%)**	925 594	966 995	1 203 490	1 497 824	1 864 142	2 320 050
10,26%	**Textiles (10,26%)**	1 011 352	1 056 589	1 314 996	1 636 600	2 036 858	2 535 006
1,36%	**Mals (1,36%)**	134 058	140 055	174 307	216 937	269 993	336 024
1,57%	**Glass (1,57%)**	154 759	161 681	201 223	250 435	311 683	387 910
62,12%	**organic materials (62,12%)**	6 123 313	6 397 203	7 961 747	9 908 927	12 332 322	15 348 401
	Batna	**78 562,7**	**82 076,7**	**102 149,9**	**127 132,4**	**158 224,8**	**196 921,4**
12%	**plastics (12%)**	9 428	9 849	12 258	15 256	18 987	23 631
9,39%	**Paper and cardboard (9,39%)**	7 377	7 707	9 592	11 938	14 857	18 491
10,26%	**Textiles (10,26%)**	8 061	8 421	10 481	13 044	16 234	20 204
1,36%	**Mals (1,36%)**	1 068	1 116	1 389	1 729	2 152	2 678
1,57%	**Glass (1,57%)**	1 233	1 289	1 604	1 996	2 484	3 092
62,12%	**organic materials (62,12%)**	48 803	50 986	63 456	78 975	98 289	122 328
	Tlemcen	**36 322,5**	**37 947,1**	**47 227,7**	**58 778,1**	**73 153,2**	**91 044,1**
12%	**plastics (12%)**	4 359	4 554	5 667	7 053	8 778	10 925
9,39%	**Paper and cardboard (9,39%)**	3 411	3 563	4 435	5 519	6 869	8 549
10,26%	**Textiles (10,26%)**	3 727	3 893	4 846	6 031	7 506	9 341
1,36%	**Mals (1,36%)**	494	516	642	799	995	1 238
1,57%	**Glass (1,57%)**	570	596	741	923	1 149	1 429
62,12%	**organic materials (62,12%)**	22 564	23 573	29 338	36 513	45 443	56 557
	Boumerdes	**11 117,3**	**11 614,6**	**14 455,1**	**17 990,4**	**22 390,2**	**27 866,1**
12%	**plastics (12%)**	1 334	1 394	1 735	2 159	2 687	3 344
9,39%	**Paper and cardboard (9,39%)**	1 044	1 091	1 357	1 689	2 102	2 617
10,26%	**Textiles (10,26%)**	1 141	1 192	1 483	1 846	2 297	2 859
1,36%	**Mals (1,36%)**	151	158	197	245	305	379
1,57%	**Glass (1,57%)**	175	182	227	282	352	437
62,12%	**organic materials (62,12%)**	6 906	7 215	8 980	11 176	13 909	17 310

Given the proximity of the results obtained in 2010 at the national level and in 2014 at the Corso CET level, and to ensure a comparable basis for the 3 selected cities, we will retain the national composition of 2010 for medium and long extrapolations terms.

Table2. Composition of waste.

In tons per year	2015	2025	2035
DMA	11 615	17 990	27 866
plastics (12%)	1 394	2 159	3 344
Paper and cardboard (9,39%)	1 091	1 689	2 617
Textiles (10,26%)	1 192	1 846	2 859
Mals (1,36%)	158	245	379
Glass (1,57%)	182	282	437
organic materials (62,12%)	7 215	11 176	17 310

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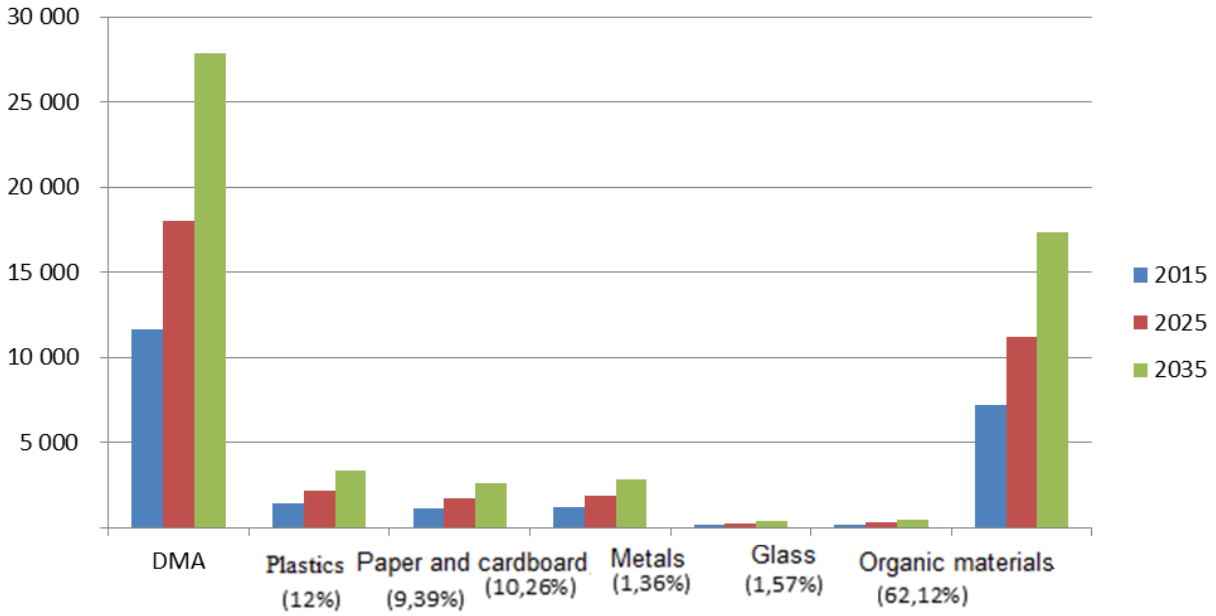

Figure 1. *Composition of wastes over the years.*

Given an estimated population of 43,512 inhabitants, a DMA deposit per inhabitant of 0.7 kg / day, an annual population increase of 1.43% and the withdrawals of flows recoverable by the informal collectors, we will not draw conclusions on the composition of the given flow By this last Given the low representativeness of the samples taken at the commune of Batna (590kg) in June

an annual increase in the waste deposit of 3%, the table and graph above give the tonnage available for recycling activities.

However, account must be taken of the share taken non-formally in the current method of collection. 2014 and the truncated nature of the results due to analysis. We will stick to the conclusions that can be drawn about the national composition given by the 2010 results as mentioned for Boumerdes.

For this reason too, we will retain the national composition for medium- and long-term extrapolations.

Table3. Composition of wastes over the years.

Ton/Year	**2015**	**2025**	**2035**
DMA	82 077	127 132	196 921
plastics (12%)	9 849	15 256	23 631
Paper and cardboard (9,39%)	7 707	11 938	18 491
Textiles (10,26%)	8 421	13 044	20 204
Mals (1,36%)	1 116	1 729	2 678
Glass (1,57%)	1 289	1 996	3 092
organic materials (62,12%)	50 986	78 975	122 328

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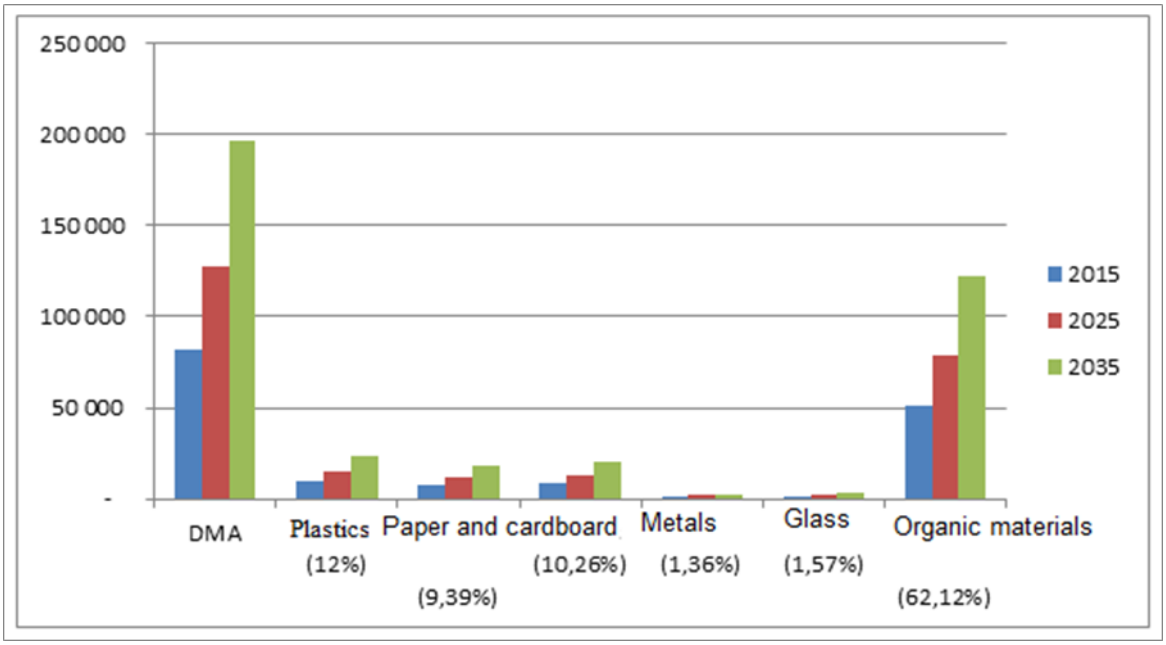

Figure 2. *Rate of waste composition over the years*

IV. Extrapolation of analysis at national level

Algeria has an estimated population of 38.5 million. On the basis of the reservoir of 0.7 kg / inhab. / Day, this gives a DMA deposit of around 9,600,000 tons per year.

The composition of the domestic waste stream analyzed at the national level in 2010 is confirmed by the results obtained by the analysis of the composition made at the Corso sorting center earlier this year. For the three characterization campaigns carried out in the selected cities, although their representativeness is very low, and given the timing of the various samplings which did not make it possible to avoid partial withdrawal of the recyclable fractions by the informal collectors, Proportions relatively comparable to the national composition measured in 2010.

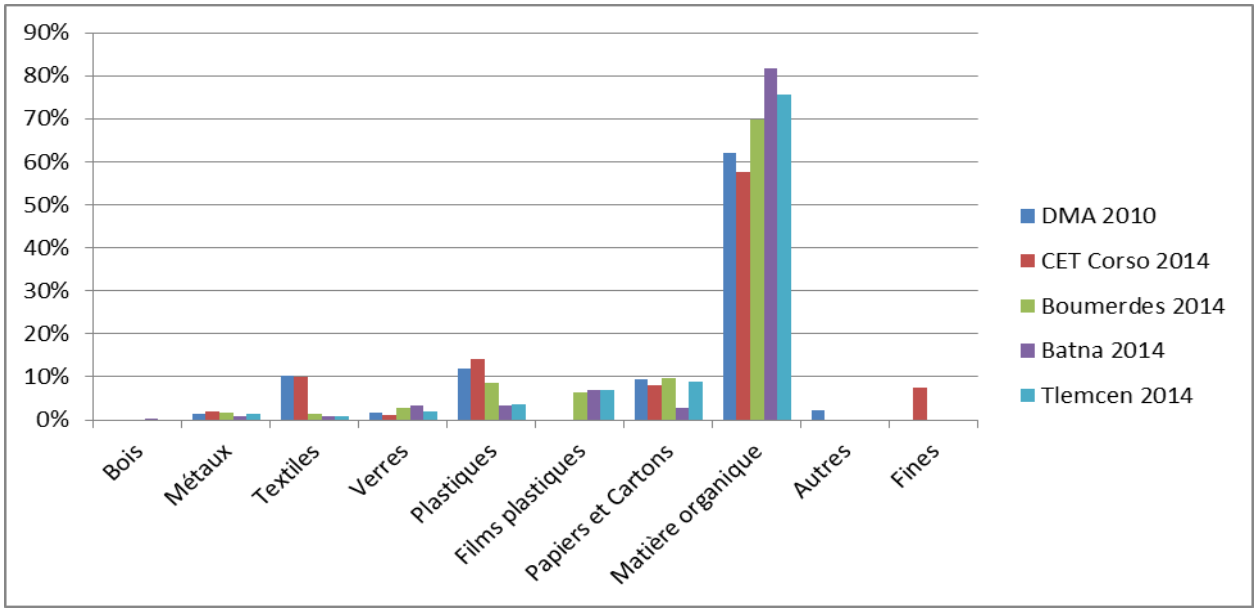

Figure 3. Composition of waste from different wilayas

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From these results, it can be seen that the material present in a greater proportion is Organic Matter which is above 60%. Then Plastics and Paper and Cardboard are around 10% and for which sampling and recycling channels exist. Let us note again the textiles found in the national analyzes but practically absent from the levies in the 3 cities.

In addition to the limited nature of the samples, it seems that only end-of-life textiles are disposed of, the textiles being usable being sold to continue to be worn or used.

Finally, we separated the plastic films separately when analyzing the samples. They accounted for 7% (a small percentage influenced by the moisture content of the films and the organic matter that could stick to it). However, due to their degree of dirt, humidity, size and heterogeneity, they are of very limited interest for recycling activities. Therefore, they are not collected at the level of the grouping points or at the level of the TECs.

Table 4. *Above show the tonnages available for medium- and long-term recycling activities*

Ton/Year	**2015**	**2025**	**2035**
DMA	10 298 137	15 951 267	24 707 663
plastics (12%)	1 235 776	1 914 152	2 964 920
Paper and cardboard (9,39%)	966 995	1 497 824	2 320 050
Textiles (10,26%)	1 056 589	1 636 600	2 535 006
Mals (1,36%)	140 055	216 937	336 024
Glass (1,57%)	161 681	250 435	387 910
organic materials (62,12%)	6 397 203	9 908 927	15 348 401

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Table 5. *Above show the tonnages available for medium- and long-term recycling activities*

Ton/Year	**2015**	**2025**	**2035**
DMA	10 298 137	15 951 267	24 707 663
plastics (12%)	1 235 776	1 914 152	2 964 920
Paper and cardboard (9,39%)	966 995	1 497 824	2 320 050
Textiles (10,26%)	1 056 589	1 636 600	2 535 006
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Glass (1,57%)	161 681	250 435	387 910
organic materials (62,12%)	6 397 203	9 908 927	15 348 401

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Table 6. *Above show the tonnages available for medium- and long-term recycling activities.*

Ton/Year	**2015**	**2025**	**2035**
DMA	10 298 137	15 951 267	24 707 663
plastics (12%)	1 235 776	1 914 152	2 964 920
Paper and cardboard (9,39%)	966 995	1 497 824	2 320 050
Textiles (10,26%)	1 056 589	1 636 600	2 535 006
Mals (1,36%)	140 055	216 937	336 024
Glass (1,57%)	161 681	250 435	387 910
organic materials (62,12%)	6 397 203	9 908 927	15 348 401

IV. Conclusion

From this work it follows that, despite the attempts observed, the question of development is limited in Algeria. Initiatives have so far focused on the promulgation of a legislative, institutional and the introduction of a low-tax environment.

"The externalities generated by economic activities result in a significant deterioration Of the environmental framework. This vision is justified by the extent of the country and the existence

An oil windfall that does not make sustainable development a place of conjuncture between Development, environment and preservation of natural resources ".

The need for a sustainable development approach in Algeria, in anticipation of drying up of fossil energy resources, motivates the willingness to move towards alternative resources

Clean and sustainable. Measures and actions remain and must be taken. The Strategy will be to put in place an energy model where Will produce what is needed without compromising the future. For this purpose, a policy of Protection of the environment:

- In order to improve their impact on economic development, public authorities Must impose the results policy on the organizations involved;
- Incorporate sustainable development training at all levels of education;
- Develop a communication strategy on climate change With messages that can reach the sensitivity of citizens, and this in Focusing on the worsening effects of these changes, the direct responsibility for And the urgency of involving it in mitigating these negative effects. The First responsible is not always and automatically the State;
- Investing in education and human capital; By organizing seminars on the Sustainable development;
- Strengthen the financing capacity through the creation of a bank specializing in the Financing of environmental projects;

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