



Ministry of Foreign Affairs

Business opportunities in waste management in Algeria

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*>> Sustainable. Agricultural. Innovative.
International.*

Business opportunities in waste management in Algeria



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BreAd B.V.

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0. Summary/Sommaire

From May 27th - 31st a team of two Dutch experts visited Algeria for a fact-finding mission on solid waste management. It showed that Algeria is a country with a good potential for the Dutch industry and consulting services. Legislation is in place, the basic infrastructure has already been developed and responsibilities are clear. Although the financial backbone of the SWM system is still very weak, all parties realise that waste treatment and its governance should go to the next level.

There are good opportunities for Dutch companies with regard to waste collection (expertise on separate collection, logistics and waste transfer, provision of sub-soil containers and improved collection equipment and vehicles), recycling (provision of separation technologies and composting, marketing of PET waste), wastewater and water management (expertise and provision of composting technologies) and remediation technologies (in situ and on site remediation)

The private sector is present and active. They are interested in more sophisticated suppliers with niche products and key parts of installations.

It is advised to consider a combined "aid-and-trade" program with G2G cooperation projects along with, and underpinning, a program to support Dutch companies entering the Algerian market. Cooperation with other EU countries like Germany and Belgium may be beneficial.

Du 27 au 31 mai, une équipe de deux experts Néerlandais s'est rendue en Algérie pour une mission d'enquête sur la gestion des déchets solides. La mission a montré que l'Algérie est un pays avec un bon potentiel pour l'industrie et les bureaux d'études Néerlandaises. La législation est en place, l'infrastructure de base est développée et les responsabilités sont claires. Malgré que la situation financière du système de la gestion des déchets soit encore très faible, toutes les parties se rendent compte que le traitement des déchets et sa gouvernance devraient passer au niveau supérieur.

Les entreprises Néerlandaises offrent de bonnes opportunités en matière de collecte des déchets (expertise en collecte sélective, logistique et transfert des déchets, fourniture de conteneurs et de matériel de collecte améliorés), recyclage (mise à disposition de technologies de séparation et de compostage, commercialisation des déchets PET), la gestion des eaux usées et de l'eau (expertise et mise à disposition de technologies de compostage) et les technologies d'assainissement du sol (réhabilitation à situ et sur le site).

Le secteur privé est présent et actif. Ils sont intéressés par des fournisseurs plus sophistiqués qui peuvent fournir des produits spéciaux et des parties clés des installations.

Il est conseillé d'envisager un programme combiné «d'aide et d'échange» avec des projets de coopération G2G avec un programme visant à soutenir les entreprises Néerlandaises entrant sur le marché Algérien. La coopération avec d'autres pays de l'UE comme l'Allemagne et la Belgique peut être bénéfique

1. Introduction

Algeria is going up the international ladder and draws more interest from international investors and exporters. There is economic growth and public services are being strengthened.

Ever since 1986 Algeria and The Netherlands have been working together in the so-called “commission mixte”. This commission leads and guards progress to be achieved on a portfolio of subject important to the cooperation between the countries. The last session was held in May this year. A Memorandum of Understanding is under construction in which (a.o.) the two countries agree to work together on the subject of the management of solid waste and wastewater.

As a result RVO and the Dutch Embassy decided to embark on a first fact finding mission that would map the present status of the Algerian market on this subject. From May 27th - 31st a team of two Dutch experts visited Algeria for this mission. Although the preparation period was short, the team managed, with the help of the Embassy, to have very fruitful meetings and visits during their mission.

This report summarises the main findings of the mission. The report intends:

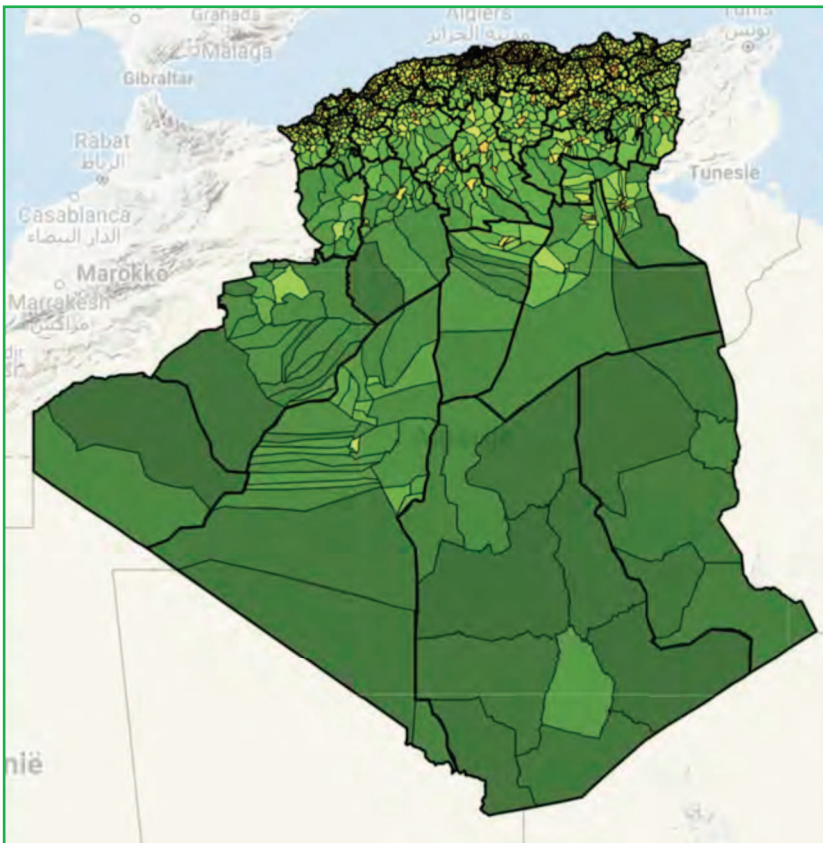
- to provide initial background information to all parties with interest in this subject
- to give some first guidance to Dutch companies that consider to enter this market
- to strengthen the support of the Dutch Embassy by improving its knowledge position.



2. A short introduction to Algeria

Algeria has it all. With almost 2.4 mln km² it is the 10th largest country of the world and the largest country of Africa. Algeria offers a huge diversity of climates and beautiful landscapes, an array of well kept historic places and an abundance of natural resources in oil, gas and phosphate. The country is located close to the European market and has a potential to serve as bridge between Europe, Africa and the Arab world.

The country's population has reached a number of 42 million inhabitants. Most of them live in the North along the almost 1.000 km Mediterranean coast and predominantly in the cities. Urbanisation has reached 72% and is still growing at a rate of 2% per year. Algerians are well educated and illiteracy is low. The participation of women in the Algerian workforce and economy is strong.



MAP 1. ALGERIA'S ORGANISATIONAL SET UP (SOURCE: WWW. CITYPOPULATION.DE)

Algeria is divided into 48 so called wilayas (or provinces), 553 daïras (districts) and 1.541 baladiyachs (municipalities). The capital Algiers is home to almost 4 mln inhabitants

The official languages are Arabic and Berber with French being used widely as lingua franca for (international) business. Surprisingly many professionals also master English very well. Contacts are in general easy and open.

The country has recovered from a period of civil war (1991-2001) and was able to cope with the challenges of the Arab spring. The stability of the country was in later years underpinned by Algeria's strong production of oil and gas and the high oil prices. It enabled the government to fund the country's wealth by investing in infrastructure and services and subsidising access to these services. Nowadays almost every household is connected to the water-, electricity and gas-grid. Lower oil prices and uncertainty about its development may however effect the countries outlook.

Algeria's economy is still mostly state-dominated and fuelled by its hydrocarbon reserves and exports. Oil and gas account for roughly 30% of the country's GDP and 60% of the national budget. During the periods of high oil prices the country was able to avoid national debt, subsidise the economy and consumption and build up vast financial reserves. The drop in oil-prices has revealed the weakness related to this oil and gas based economy and has challenged the government to take measures enhancing non-oil economic activity. Nevertheless, economic growth is still positive at around 2% and per capita GDP (ppp) has reached an \$15,100 in 2017.

The Algerian currency, the Dinar (DZD) is loosely linked to the US dollar. The exchange rate against the euro is presently at 135 DZD per 1 EUR. The inflation rate is around 6%.

Algeria's population has benefited from the influx of money. According to the Worldbank the country has reached a position of 83 out of 188 countries in Human Development Indicators placing Algeria in the cohort of highly developed countries. Poverty headcount (\$2/day ppp) has decreased sharply to as low as 0,5% of the population.

The table below is summarising a selection of world indices showing low scores with regard to corruption and ease of doing business but more positive scores when it comes to environmental performance and global competitiveness.

corruption perception index	112 of 180
ease of doing business	166 of 190
environmental performance index	88 of 180
global competitive index	86 if 137

TABLE 1. SUMMARY OF WORLD INDICES

Trade between the Netherlands and Algeria has reached an equilibrium in 2017 at a level of around € 1bln going both ways. The Netherlands ranks 6 as importer of Algerian goods where the Netherlands ranks 13 as Algeria's most important provider of goods. 20% of all Dutch exports to Algeria are related to machinery and transport equipment. 95% of Algerian exports to the Netherlands are related to hydrocarbons.

3. Current situation regarding waste management

3.1 Municipal waste production, growth and composition

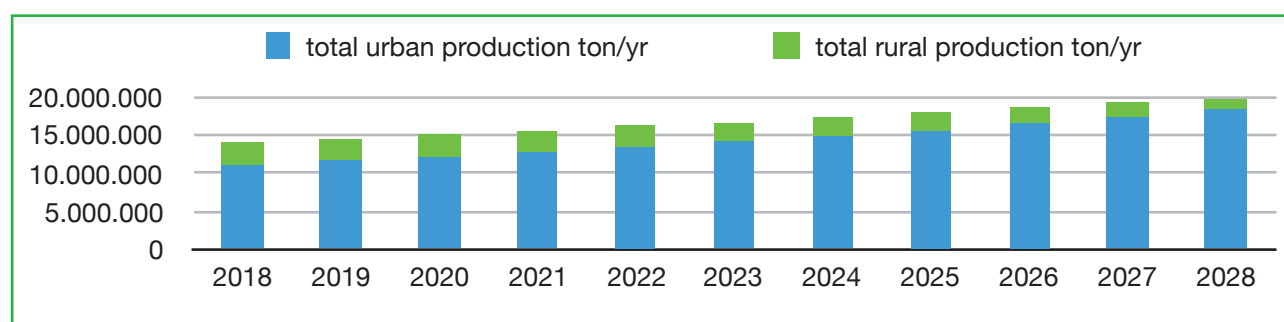
There are no overarching and recent figures on Algeria's waste production so we have to make our own calculations and will match them with those figures that are available.

Municipal waste production is generally related to a number of factors, the most important being population growth, economic growth and urban/rural origin. A simple model would take as assumptions:

population in 2018	42 mln
population growth	2%
urbanisation	72%
rate of urbanisation	2%
economic growth	2%
urban per capita waste production in 2018	1.0 kg/person.day
rural per capita waste production in 2018	0.6 kg/person.day
waste to population elasticity ratio	1
waste to economy elasticity ratio	0.5

TABLE 2. WASTE GROWTH MODEL PARAMETERS

These assumptions lead to the conclusion that today, Algeria's production of municipal solid waste must be around 14 mln tons/year. Due to urbanisation and growth of population and the economy, this figure grows towards 20 mln in 10 years with urbanisation reaching 88 % in 2028.



GRAPHIC 1. EXTRAPOLATION OF ALGERIA'S MUNICIPAL WASTE

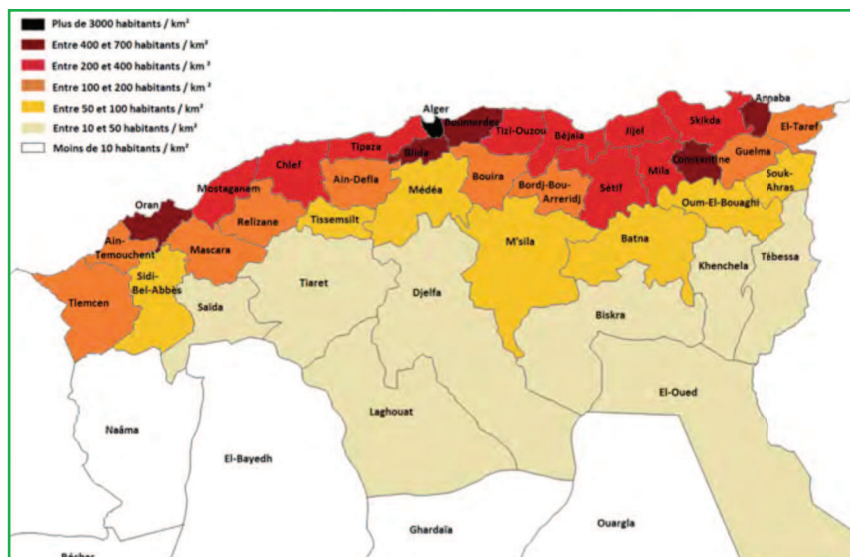
This growth will challenge the Algerian authorities to invest in collection, transport and treatment facilities and to move away from landfill-only scenario's.

An interesting fact is that the monthly production in the country is around 1 mln tons, whereas production in the month of Ramadan is said to be more than 30% higher. The extra waste mainly consists of organic food waste.



NEWSPAPER ARTICLE ON RAMADAN WASTE PRODUCTION

Algeria's population is mainly located in the coastal north. The map below shows the wilaya's in this region with colours representing their population density.



MAP 2. WILAYA'S WITH DENSITY OF POPULATIONS (WIKIPEDIA: DÉMOGRAPHIE DE L'ALGÉRIE)

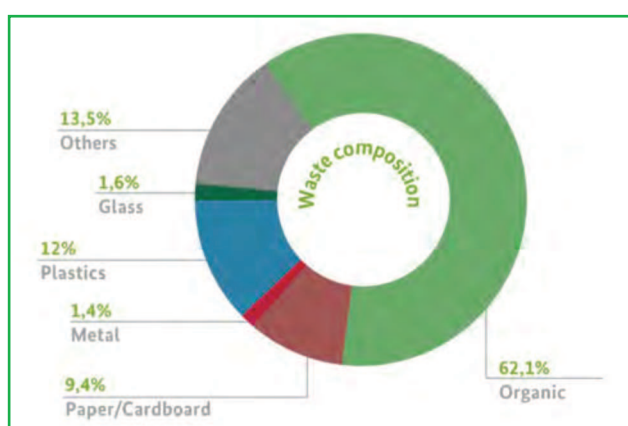
If we take the wilaya's with the highest density in population, their present and future waste productions can be extrapolated as summarised table 3.

	2016		2028	
	population (mln)	waste production (ton/year)	population (mln)	waste production (ton/year)
Algiers	3,600	1.314.000	5,542	2.256.821
Oran	1,752	639.480	2,697	1.098.320
Blida	1,208	440.920	1,860	757.289
Constantine	1,130	412.450	1,740	708.391
Boumerdès	0,966	352.590	1,487	605.580
Annaba	0,734	267.910	1,130	460.141
Total	9,390	3.427.350	14,455	5.886.543

TABLE 3. WASTE PRODUCTION IN 6 WILAYA'S WITH DENSEST POPULATIONS

It shows that these six departments together show an increase in population of 55% and in waste production of almost 75% in the upcoming 10 years.

GiZ of Germany has performed a lot of research on different aspects regarding municipal solid waste in Algeria¹. From this work the overall composition of municipal waste can be derived as given in graphic 2.



GRAPHIC 2. WASTE COMPOSITION (SOURCE: 1)

We see high contents of organics of up to 62% showing good opportunities for bio-treatment technologies as composting and digestion. Complementary information of GiZ showed that moisture content of the waste is as high as 70% leading to high loading weights.

Contents of recyclables add up to almost 25% (paper, plastics, glass and metals). If looked at from the point of view of RDF production the potential would be nearly 20% (paper and plastics).

¹Report on solid waste management in Algeria, D-waste, consultant for Sweep-Net in cooperation with GiZ, April 2014

Only 5 to 7% of the waste and a few percents of plastic waste are recycled².

3.2 Other waste streams

NON-HAZARDOUS AND HAZARDOUS INDUSTRIAL WASTE

Estimates on annual production add up to 2.550.000 tons of normal industrial waste and 330.000 tons of hazardous waste in 2007³. The origin of this waste is supposed to be as follows:

- 50% - Steel, metallurgical, mechanical and electrical industry
- 5% - Construction materials industry
- 2% - Chemical and plastics industry
- 29% - Food and tobacco industry
- 14% - Textiles, confection, leather, shoes and paper industry

Industrial hazardous waste is mostly produced in the eastern regions, within the wilaya's of Annaba and Skikda. These regions also show large quantities of hazardous waste in stock (>2mln tons), awaiting further treatment. Hazardous waste mainly originates from the petrochemical and metallurgical industry.

CONSTRUCTION AND DEMOLITION WASTE

Waste from construction and demolition projects around Algeria is generally found all around the country. GiZ provides an estimate of around 11 mln tons per year in 2012. This estimate may be somehow flattering as figures of other countries show that C&DW production is mostly a factor of 2 or 3 times higher than that of municipal waste. This leads to an estimate of more than 30 mln tons per year.

The composition of this waste is not known for Algeria but, in general, it can be said that it holds a huge promise for easy and cheap recycling.

GREEN WASTE AND BIOMASS

Green organic waste mainly comes from markets and agriculture. It has a potential for bio-treatment and is therefore of great interest with regard to its recycling potential. Statistics on its production are lacking. A GiZ estimate of little over 200.000 tons per year should raise some doubt. The World Energy Council provides a figure of around 5 mln tons per year which seems to be more accurate. Manure production is not included in this figure.

WWTP SLUDGE

Sludge from wastewater treatment plants is produced at a volume of 2 mln tons per year⁴. It has grown fast in recent years and will continue to grow as may be expected from the plans of the Ministry of water resources⁵.

² Projet description GiZ: "Renforcement des filières de recyclage et valorisation de déchets en Algérie".

³ Solid waste as renewable source of energy: current and future possibility in Algeria. Taqiy Eddine boukelia and Mecibah Med Salah. International journal of Energy and Environmental Engineering. January 2012

⁴ Characterization and valorisation of sludge of WWTPs into cement industry. D. Djafari et al. Journal of Materials and Environmental Sciences, 2017 vol. 8 issue 4

⁵ Communication during visit (annex 1)

OTHER WASTE STREAMS

Figures on the availability of separately collected or produced waste streams as sewage sludge, hospital waste, E-waste, spent tyres, plastics, paper, glass and metals are not available.

3.3 City cleaning, collection and transport

City cleaning seems to be pretty well organised in the city centers. When going to the outskirts and the poorer parts, and especially outside the urban areas, there seems to be only poor cleaning services in place. Small open spaces attract waste and are not regularly cleaned up so leaving an invitation to throw more. There are no statistics available about the overall situation in the country although we learned that there are differences in cleanliness between the cities.

There seems to be no good reason for this littering by the population as collection services seem to work pretty well and are in fact “free of charge” (see further in this paragraph). A general lack of interest in the advantages of clean living conditions may be more of a cause.

Lack of city cleaning is generally expected to be one of the main reasons for an unhealthy environment, blocking of sewerage systems (at the start of the rainy seasons) and wash-off plastics into open waters and the sea. Algeria could do much more on this subject with a program continuous clean up, law enforcement and awareness campaign (see chapter 7.4).



Waste collection seems to have a pretty good coverage of between 85 and 90% in the urban areas, where the service coverage in the rural areas does not reach more than 65 and 70%. Collection services are provided between 2 to 7 times per week, also here, depending on the wealth of the cities and parts of the cities. All types of collection are present: door to door by collection trucks, small and larger fixed container sites to bring waste to, small hand carts door to door collection and even donkey powered collection in the steep streets of the Algiers Casbah. Many larger cities do not permit daytime collection (or in general: truck transports) so most of the work has to be done in nocturnal shifts. We did not hear the exact reasons for this choice.

A 2014 report⁶ lists a number of 4.100 vehicles and 20.000 employees active in the field of waste collection nationwide. When compared to figures from Algiers and Annaba we can make the following summary.

⁶ Municipal waste management in the Algerian High Plateaus, Youb Okkacha et al, Energy Procedia 50 (2014) 662-669

	Algeria (2014)	Algiers (Waliya)	Annaba (city)
population	39.000.000	3.600.000	210.000
vehicles	4.100	900	28
employees	20.000	11500	?
population/vehicles	9.512	4.000	7.500
population/employees	1.950	313	

TABLE 4. EMPLOYEES AND VEHICLES INVOLVED IN COLLECTION

These figures seem to align well with the overall indication that smaller cities and rural areas are worse off when it comes to waste services. They also align with data from other countries in similar situations. Overall quality of collection services does not seem to be very high with some positive exceptions in, again, city and business centres.

The concept of transfer stations seems to be almost absent in Algerian cities. This leads to a general situation in which trucks in many cities can do only one trip per day which is extremely inefficient. Transfer stations in for example Algiers could easily raise the collection capacity of the existing vehicle fleet by a factor 2 to 3! When pointed at this opportunity it looked like the concept and importance of transfer stations is unknown.

3.4 Treatment and recycling

The organisation of the collection and treatment of MSW is completely in the hands of and managed by the state, municipalities and by publicly-owned companies. Besides this system there is an informal infrastructure for the collection of recyclable waste streams like PET bottles, metals, etc. Collection and treatment of industrial waste is mainly in private hands. Only 5 to 7% of the waste is recycled. Looking at the potential described in chapters above, this can be considered as extremely low.

Municipal solid waste

Treatment of MSW is organised on the local level. Each wilaya (department) is, depending on the number of inhabitants, equipped with at least one waste treatment centre or a CET, a Centre d'Enfouissement Technique. A CET is a reception and treatment (sorting and landfilling) centre for MSW. Since 2002, when a national law on waste management went into practice, 79 of such centres have been realised.

The set-up of a CET is as follows. The waste is weighed, registered and controlled. After this it is transported to a sorting line. Metals, PET and other recyclables are sorted out, mainly manually. The residue fraction, consisting for more than 60% of organic, wet waste is landfilled in a controlled landfill, with gas extraction and a treatment facility for leachate water.

There are some issues with the CET's:

- Many sites are often not constructed as described above. In many cases there is no sorting line, gas extraction and leachate treatment. In many cases a CET is no more than a simple version of landfill.
- The size of the CET/landfill is often not in correspondence with the amount of waste collected. Some municipalities open new sites every two years (according to the AND).

- The gatefee per ton of waste is too low to cover the costs, let alone to invest in recycling technologies.
- The composition of the waste, makes effective sorting difficult. It is very wet and sticky. The resulting PET fraction is dirty. Sorting out paper is not possible.
- There is no market for energy produced out of waste (gas or electricity). The national grid is too unstable to accept electricity from decentralised production facilities.
- The CET's are owned and run by public companies which are not seen as very innovative and dynamic. The quality of the service is often criticised.

The advantage of this system with CET's is that the waste is collected, received and registered at a central place. That is a good and essential first step.

The ministry of environment and the AND (Agence National pour les Déchets) have also identified the problems with the CET's. They are aiming at a next level for waste treatment. The goal is to reduce the amount of waste, and to recycle much more. According to the AND the focus should be on composting of the organic fraction. Anaerobic Digestion is not an option, because cheap energy is available, and the grid cannot except the electricity.

Commercial, industrial and special wastes

Collection and treatment of commercial and industrial waste are privatised. Like in the EU, companies themselves are responsible for the collection and disposal of their waste.

PET, plastic, packaging material

There is no official system for collecting and recycling packaging waste. The country is orientating itself on a program for producers responsibility. They are looking at the French system "Eco-emballage". Most of the collection of PET is done by the informal sector. Recycling is done by small companies that are located in the cities. The bottles are brought to recycling facilities, where they are sorted, washed and shredded into flakes. These flakes are sold to the polyester industry, where they are used as re-enforcement material. This market is limited. The export of flakes is not developed yet.

Larger industries are starting to develop. One company called "Recycling United" has set up its own system for sorting and recycling PET. They treat 4 to 5.000 tons per year. Big multinationals like Coca Cola, Heineken and Unilever are also looking at the possibilities to set up an industrial sorting and recycling line for PET.

The plastic recycling plants accept waste from the informal sector and respond to tenders from the CET's.

Potentially a vast volume of PET is available, of this at the moment, only a small percentage is recycled.



Green waste and biowaste

Green waste comes from pruning trees and cutting grass, bio waste is kitchen waste, market waste and restaurant waste. Both waste streams are collected by the cleaning services and brought to the CET's. For now there are no initiatives for separate collection and separate treatment like composting and anaerobic digestion.

WWTP sludge

Most of the sludge is brought to a CET, where it is dumped on the landfill site.

Hospital waste

A new law states that every hospital is responsible for the sanitation and incineration of their contaminated hospital waste. This means hospitals have to invest in small scale incinerators, or make a contract with a company that incinerates the waste in a centralised installation.

Kitchen oil

In the Algerian kitchen much vegetable oil is used. Part of this oil is collected and exported to Tunisia and some EU countries, where it is cleaned and used as bio diesel. Although Algeria is an oil producing country, it has to import diesel. Therefore there seems to be a market for installations that can transform kitchen oil into bio diesel. No details are available on the quantities that are collected and exported.

Construction and demolition waste

Separate collection and recycling of C and D waste does not take place. It is probably dumped on site and used as foundation material or brought to landfills for inert waste (Classe 3). Tipping fee is € 5 to € 10 per truck. The use of recycled aggregates in concrete or as road base material is not permitted by law.

Glass

There is no program for collection and recycling of glass. Glass bottles are often associated with alcohol. People don't want to be seen with these bottles in public. A system with road side glass containers or refund, would be to visible. There is one glass factory, that has recently decided not to accept bottles from alcoholic beverages anymore.

Paper

Although the country has three paper mills and also produces cardboard, there is no system for collecting and recycling paper.

Chemical waste, waste from the oil industry

Specialised companies that take care of chemical waste are active on the Algerian market. In most cases this waste is incinerated. Incineration takes place without energy recovery, because energy has little value. Waste that cannot be recycled, is exported to EU countries for treatment.

The role of the informal sector

Like other countries in the region, Algeria also has an active informal sector. The so-called "chiffonniers" collect recyclable waste out of waste bins and along the streets. This phenomena is accepted and even appreciated. People sometimes put their plastic bottles in bags and place them next to the bins, for the chiffonniers to collect.

3.5 Operational and closed landfills

Classification of the landfill sites is the same as in the EU:

- Class 1 Special and hazardous
- Class 2 Municipal waste

- Class 3 Inert waste

During the mission we only focused on class 2 landfills for MSW.

The operational landfills are connected to CET's. In most cases they accept MSW and similar industrial waste streams. The landfill standards are based on EU-legislation. The bottom cover is built up with two liners, one mineral lining and one HDPE-liner (this liner is now produced in Algeria) covered with a protective liner. The design also includes a leachate treatment facility. These facilities can be very modern, like in Alger, where they work with reversed osmoses and membrane bio reactors. Other facilities are more basic, like two or three retention basins and the residue water returning to the landfill, where it evaporates. During the operation no measures are taken to reduce the emissions of landfill gas.

When the site is full, it is closed according to European standards. Along the highway between the airport and Algiers, a good example can be seen. This landfill is covered and turned into a forest/park. Run off rainwater is collected in concrete waterways in order to avoid erosion. Landfill gas is captured and flared. No measures are taken to use the energy from landfill gas.

The landfills are designed by the authorities and constructed by local companies after a tender procedure. According to GiZ 125 new landfill sites are planned in the coming 5 years. When the program is finished, the country will have 300 controlled landfill sites. This should be enough to receive 75% of the MSW of the country.

The main problem of the landfills is their small capacity so they fill up too quickly. The amount of waste increases every year and recycling has not really started off yet. According to the AND, some CET's apply every two years for a new extension.

We were able to pay a visit to a CET. This CET consisted of an acceptance area, a landfill and a leachate water treatment area. Leachate water was captured and transported to three decantation basins. After this rudimentary treatment, the water was transported back to the landfill, to let it evaporate. Landfill gas was not captured and the waste was not covered on a daily basis. It was said this was done once a week. The HDPE bottom liner was at some places completely torn into pieces. Besides this the set-up of the site was rather orderly and we had the impression the people that work there knew what they were talking about.



3.6 Costs, fees, cashflows and subsidies

No systematic overviews are available of the costs and revenues of the basic solid waste management system. During our interviews we heard the following costs, fees and gate-fees.

Waste management fees households	€ 3,5 - 5 per hhy	per hhy = per household per year fees are established by the Waliya's
Percentage paid of invoiced fees	25%	Communication GiZ
Total costs of waste management	€ 20 - 40 per hhy	Communication Ministry of Environment
Gate-fees at the CET's	€ 2 - 6 per ton	Charged per full truck, recalculated to tons
Gate-fees for inert landfills	€ 1 per ton	Charged per full truck, recalculated to tons

TABLE 5. COST INDICATIONS FROM INTERVIEWS

The cost estimates provided by the Ministry of Environment range between € 1,60 and € 3,20 per per household per month (hhy). This seems a bit on the positive side because, if we make a short calculation for Algiers we can estimate that collection and transport in this city costs at least € 3 per hhy. If we add estimates for the costs of city cleaning (€ 0,5 per hhy), landfilling (€ 0,5 per hhy) and overhead, we would come to at least € 4 per hhy. Lower costs may only be expected in areas with lacking services.

If we take the above figures as being good “best guesses” we can draw some conclusions.

The **first** is that on a yearly basis some € 400 mln is running through the system. This figure is about to increase steeply in the upcoming years because:

- waste volumes will increase
- service coverage will increase
- service quality will increase
- landfill facilities and equipment will be extended and improved
- new waste treatment options will be introduced.

The actual increase will of course mainly depend on the firmness of government policies but in a good scenario the cashflow may reach 10 digits, maybe already in 5 years from now.

Table 6 provides us with a recalculation of costs, fees and payments per hhy.

Costs per hhy	Fee per hhy	Payed per hhy
€ 3	€ 0,35	€ 0,08

TABLE 6. COST AND FEE COVERAGE RATES

This brings us to the **second** conclusion: Household payments of € 0,35 per hhy are representing no more than 12% of actual costs and with a percentage of 25% of the invoices being payed, the overall coverage of costs by fees is only 3%. Compared to other countries this contribution of households to the costs of the system can be considered extremely low.

The **third** conclusion relates fees and payments to average and minimum family income. From graphic 3 we can derive that a minimum family income may well be DZD 40-45.000 or € 300 per month, assuming there is at least one income per household. The minimum income in Algeria is DZD 18000 or € 130 per month. If, hypothetically, we would have 100% cost coverage, an average household would pay 1% of its income on SWM. This is exactly the rule of thumb used internationally to indicate SWM services as “affordable”. Poorer families would in this hypothetical situation, have trouble to pay this fee but, this could be mitigated by a system of fee-differentiation.

The real situation at this moment is however that, in average, not even 0,03% of a family income is spent on this subject.

Cost and fee coverage are internationally seen as important indicators of the maturity of SWM services and because of their importance for the financial and organisational sustainability of the system. Good coverages:

- provides an independency from insecure availability of public money
- and a solid basis for quality operations and new investments
- and turns households from uninterested consumers into clients, claiming value for money.

This leads us to the **fourth** conclusion being that Algeria's top-down financing of the SWM system through national subsidies is, in the long term, very unhealthy.

3.7 Energy, sustainable energy

Algeria is an oil and natural gas producing country, contributing to more than 30% to the GDP. Fossil energy is cheap and subsidised. Gasoline only costs €0,20/l and diesel only €0,10. Although Algeria exports oil, it doesn't produce products by itself. Petrol and diesel are imported and subsidised. The grid for natural gas and electricity is vast. In the nineties the government has launched a program that every village should be connected to the gas and electricity grid.

Prices for gas and electricity are extremely low (about 3 cents per m³ and kWh electricity). Algeria has signed the Paris protocol on climatic change and the country works on sustainable energy such as solar and wind power. The challenge is to develop systems that can resist the rude climate in the desert. Biofuels and energy from waste do not attract much attention.

Small scale sustainable energy is hardly developed. One of the main issues is that the electricity grid is relatively old and it cannot cope with decentralised feed-in of electricity. The Ministry of the Interior and Local Authorities (MICL) has recently launched a program that includes energy saving and 48 schools (one in each wilaya) will be equipped with solar energy [www.nouara-algerie.com].

4. Policies, laws and regulations

Waste treatment and recycling are important issues in Algeria since 2001. In that year the ministry of environment was founded and the national programme Progdem (Programme national de gestion intégré des déchets ménagers) was launched. The aim of the program was to stop illegal dumping and to organise waste collection. Since that time substantial progress has been made. The country went from unregulated collection and dumping to a system in which the cities collect more than 85% of the waste and the rural area's between 65 to 70%.

Although progress is evident, the country still has a long way to go. Collection rates should go up, wild dumping must be stopped completely and the recycling rates need to go up.

- According to the law 01-19 on management, control and disposal of waste, two ministries are directly involved in the management of MSW and similar waste.
- The Ministry of Planning and Environment (MATE). The main instruments of the MATE are:
 - The AND (Agence National des Déchets, National Waste Agency)
 - The National Conservatory in Environmental training (CNFE)
 - The environmental directorates of the 48 wilayas
- The Ministry of the Interior and Local Authorities (MICL) give financial support to the wilaya's.

The MATE is responsible for implementation of the national program Progdem. The goals of this program are:

- safeguarding public health and cleanliness of the cities,
- improvement of the quality of life of the citizens and the protection of their health,
- achieving safe and environmentally sound waste disposal and recovery of recyclable waste and
- the creation of "green" jobs

The wilayas are responsible for the collection and treatment of MSW. Financing comes from the MICL. The AND has the status of a public company. They advise the wilaya's and play an important role in the implementation of pilot projects and demonstration projects.

The ministry of Health care is responsible for the policy concerning hospital waste.

A system of benchmarking, that compares the achievements of each wilaya is not available.

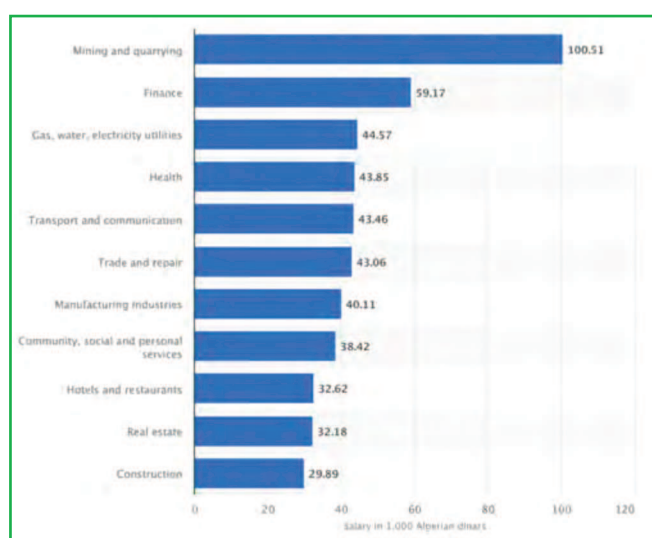
5. Markets, players and conditions

5.1 General market conditions

According to international research (see summary table 1), the country has a low score on the corruption index (112 to 180), and also the score on “Ease of doing business” is fairly low (position 166 out of 180). Other indices indicate that Algeria has a very competitive economy. The general impression of our visit is that people and businesses are open and willing to cooperate. Our overall impression of doing business in Algeria is positive.

The Algerian economic policy is rather protective. Importing and exporting goods to and from Algeria is regulated. In general it can be said that it is difficult to import goods that are already also made in Algeria. Exporting of goods is possible in case the Algerian economy does not need it for its own use. It is for example forbidden to export scrap steel. Importing second hand, or refurbished trucks, machines and installations is not allowed. The best strategy for Dutch companies to export to Algeria is to associate with an Algerian company. In that case the Dutch partner would assist with design and may deliver key components. Assembly, delivery and/or construction could be performed by Algerian partners.

The minimum wage in Algeria is 18000 DZD per month. The following graphic provides average wages in the most important industrial sectors.



GRAPHIC 3 AVERAGE WAGES PER INDUSTRY SECTOR⁷

5.2 Public sector operators and tenders

When government bodies want to order a service, a product or want to realise a project, they always have to follow a public tender procedure. The tenders can be limited to only Algerian parties, or be open to international suppliers. This is clearly indicated. All tenders are published in Arabic and in French. They are both published in national newspapers and on the internet. The public tenders are published on several sites like: www.dztenders.com/, www.made-in-algeria.com/data www.algeriatenders.com and www.bomop.dz.

⁷ www.statista.com

When there is a public tender, an Algerian company is allowed to be 25% more expensive than a foreign company and still win the order.

The Progdem is launching tenders for the construction and extension of CET's on a regular basis. According to the plans the country will have more than 300 class 2, technical landfills. 125 new sites are planned in the near future. This should be enough to receive 75% of the MSW of the country.

5.3 Private sector parties and their interests

Collection and treatment of MSW is the responsibility of the wilaya's. These services are mainly financed by the national government. Commercial waste and industrial waste are taken care of by private companies. Although we have not been able to contact many private companies, active in waste collection and treatment, we do have an idea of the sector. The companies we have visited are all active in different fields of recycling. They see opportunities in this sector and they are dynamic and professional and have a real entrepreneurial spirit. They are also more than willing to work with Dutch (European) companies in order to get access to new technologies.

The machinery they use mainly originates from China and Turkey. More sophisticated material, like NIR-installations (Near Infra Red, technology used to sort plastic) comes from Italy.

GREEN SKY

(www.greensky.dz)

This is a private company mainly active in treatment of chemical waste, medical waste and residues from the oil industry. One of their new activities is soil remediation. They employ 180 people and they want to expand. They are looking for the following technologies:

- Sorting lines for PET
- Wood recycling
- Incinerator for medical waste.
- On site and in-situ site remediation technologies

They already dispatch specific hazardous waste to the French company Suez.

AMENHYD

(www.amenhyd.com)

With 20 years of experience, this is the oldest company focusing on constructing waste treatment and wastewater treatment facilities in Algeria. They have 3.000 employees and a yearly turnover of € 114 mln. Their the market share is 50%. New technologies they want to introduce are composting, sustainable energy, sludge treatment and sorting.

RECYCLING UNITED

(www.recyclingunited-dz.com)

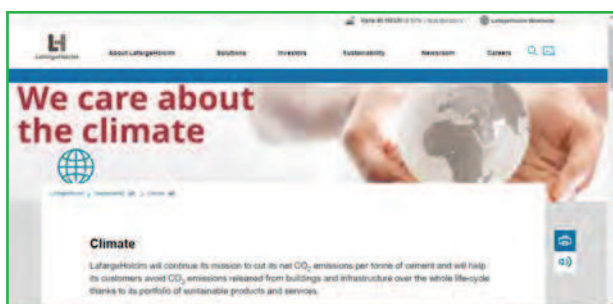
This is mainly an agricultural company. They have more than 20.000 ha of agricultural and horticultural land. Since 2 years they run the biggest PET sorting company of Algeria, sorting more than 4.500 tons of PET per year. At this moment they mainly produce flakes. They have bought machinery in Italy enabling them to produce PET packaging material that will be used in their agricultural activities.

THE CEMENT INDUSTRY

Algeria has an important cement industry. Lafarge has three production facilities (Msila, Oggaz and Cilas). The total annual production is more than 10 million ton per year [www.lafarge.dz]. The main source of energy for these plants is natural gas. Lafarge Holcim wants to reduce the consumption of fossil fuels. RDF and secondary fuels made from MSW and industrial waste would be alternatives that may replace natural gas and enhance recycling. An earlier research of the Netherlands based cement research bureau IC&C showed a good potential for replacing natural gas at the GICA plant in Meftah.⁸

⁸ Energy reduction and valorisation of alternative fuels and raw materials at the cement plants of GICA, IC&C B.V. report, December 12th, 2012

GREEN SKY



With Algeria being Francophone it is remarkable to observe that Veolia and Suez are not present in the country.

5.4 Hospital waste

The country counts 13 university hospitals, 173 regular hospitals, 21 specialised hospital facilities and more than 5.000 health care centers. In the period from 2005 until 2014 large sums have been spent on facilities for medical waste treatment. In 2014 178 incinerators were installed, of which 131 are operational. More than 70% of these incinerators are burners that do not apply to any standard. The total production of medical waste in the country is 30.000 ton/year.

The tendency is that bigger hospitals will install centralised incinerators, the smaller hospitals will sign a contract with a commercial incinerator.

Local commercial parties are orientating themselves on the construction and operation of incineration plants for hazardous waste and medical waste. The company Green Sky runs one with a capacity of 15 tons per hour and they are planning a second one. The company Insinero has built a large facility for an incinerator. The hall is ready, but the installation still needs to be ordered and installed.

New incinerators for hospital waste need to comply to EU-legislation with regard to emissions. The waste needs to be destructed completely.

The Belgian institute for international cooperation Enabel (formerly known as CTB) has assisted with the realisation of 7 decentralised incinerators.

5.5 Informal sector

The informal sector is like in most African countries substantial. According to an article of March 4, 2017 on the economic news site *Algerie Eco*, 45% of the PNB comes from the informal sector. Mr. Karim Ouamane, the general manager of the AND, states that more than 80% of the waste that is recycled, is collected by the informal sector. Potentially a vast volume of PET is available in Algeria, of this only a small percentage is yet collected and recycled.

PET recycling is mostly done by micro businesses with fewer than 5 employees. Sorting is done manually and the bottles are shredded and washed. These small size companies usually import their equipment from China and Turkey.

Clean flakes are sold on the Algerian market. In some cases CET's have sorting plants and bigger private companies are also starting to invest in sorting plants. The local market for PET-flakes in

Algeria seems to be saturated at the moment. Producers of flakes are looking for new markets outside the country. Exporting to China is no longer an option.

5.6 Specialties: soil remediation, waterways and wastewater treatment

Soil remediation

As a result of activities of the oil and chemical industry, contaminated soils are an issue in Algeria. These sites need to be cleaned up and Algerian companies are starting to be interested in this activity. Green Sky is one of these companies. A market of €200 mln per year is mentioned. There is special interest in in-situ and on-site technologies.

Waste water treatment

Algeria has, in the last few years, made large investments in water treatment plants. In total 146 installations have been built and 17 are under construction. 90% of the households are connected to the sewage system. The problem is that still no more than 40% of the sewage water is treated. Most existing plants are classical active sludge facilities.

In the future more plants will be constructed. The main focus is on design and construction of smaller decentralised plants and on sludge treatment. The ministry prefers sludge composting. Research has shown that the heavy metal content of the sludge is relatively low. There seems to be no problem to use sludge compost in agriculture.

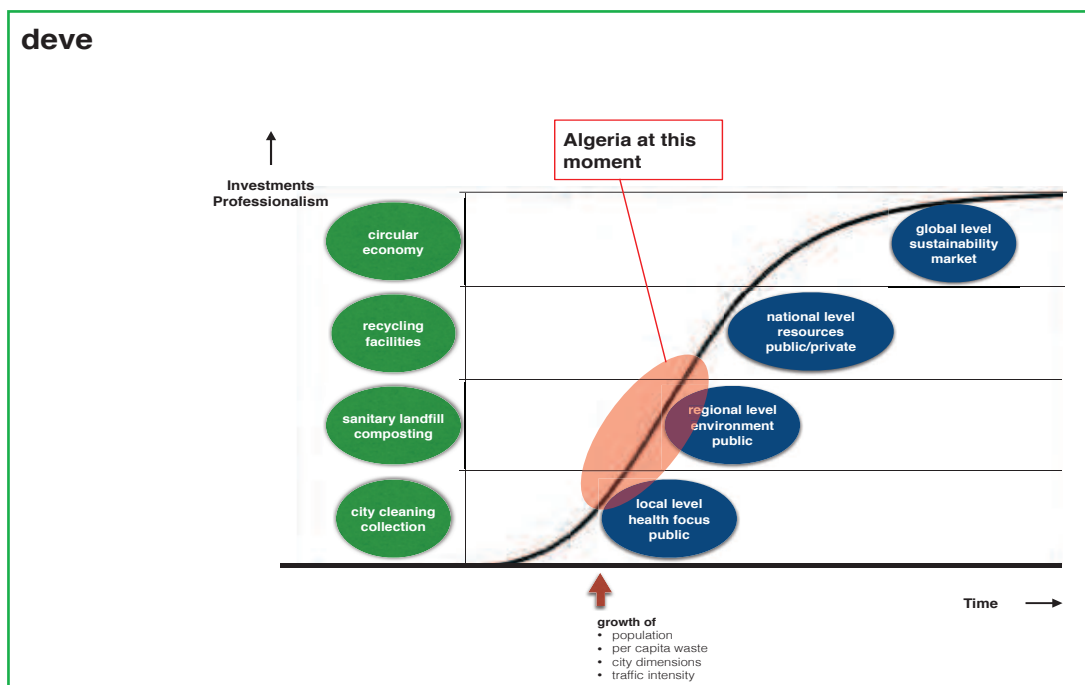
Waterways and dams

The ministry of water has identified a number of problems with the pollution of waterways and dams. The main problems are dealing with heavy rainfall, creating floods and erosion and the blockage of sewerage systems by littered waste in the streets. The ministry is looking for an integrated approach, to deal with all the water related problems. The idea is to set up a demonstration project in and around the village of Yakouren.

6. Business opportunities

6.1 Algeria's SWM status

From the above chapters we can draw the conclusion that Algeria is firmly on the way up with good coverage rates in SWM municipal services and the introduction of improved landfills. Still a lot can be done on improving the country's performance. When looked at from a development point of view we can draw up a sigmoid curve describing the different stage countries go through with regard to SWM. This is done below. On this curve we added a red area describing best the stage Algeria is in at this moment. The country still has to work on its basic city cleaning and collection but is also already working hard on sanitary landfills while having first tastes of recycling initiatives.



GRAPHIC 4 STATUS OF ALGERIA'S DEVELOPMENT ON SWM

6.2 SWOT analyses

The information of the above chapters gives us the input to make a SWOT analyses. Table 7 provides a diagram with the current strengths, weaknesses, opportunities and threats related to the waste management market of Algeria.

In general it can be concluded:

- There are good opportunities for the Dutch SWM industry.
- The focus should be on providing expertise, technology systems, equipment and vehicles.

- Starting up operational SWM activities in the market of municipal waste management is not advised.
- Starting up operational SWM activities in the market of commercial waste management can be an option but only in partnership with Algerian commercial operators.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Algeria enjoys a good economic growth. • The waste problem is growing fast and there is general consent that something needs to be done. • Management of municipal waste is firmly in the hands of the authorities thus providing more or less one-stop-shopping and a level playing field for service and knowledge providers. • Management of industrial waste is left over to the initiatives of private players • Investments by the authorities are firing up and will show a good growth in the next years. • Availability of good quality private businesses. • Cement industry is willing to use fuels derived from waste. 	<ul style="list-style-type: none"> • There is no earmarked cashflow, generated by a good fee collection system, making the systems finances vulnerable. • The preference for internal Algerian suppliers is high so teaming up with Algerian partners is a must. • Widespread lack of citizen's awareness on the importance of living in a clean city. • Weak knowledge levels when it comes to, for example, logistical and governance aspects of waste management. • The economic system of Algeria is protective.
Opportunities	Threats
<ul style="list-style-type: none"> • There may be a good market for providing knowledge, technology, systems and equipment by Dutch providers. • There is a great need for good expertise on this subject. Providing training programs may be a good tool to push Dutch expertise and knowledge. • Teaming up with Belgium and/or Germany may be worth considering. • Rising prices for oil and gas boost the economy 	<ul style="list-style-type: none"> • Starting up waste management operations (f.e. composting) in the field of municipal waste are not advised because of the poor sustainability of related cashflows • A number of other international players are already making their orientations on this market. • Other countries like Germany and Belgium already have shown their commitment to SWM in Algeria. • Low oil prices may threaten the economy

TABLE 7 SWOT ANALYSIS

6.3 Opportunities and quick wins

Table 8 gives a summary of the most important opportunities that we encountered during this fact-finding mission.

market opportunities		for
soil decontamination	A market of €200 mln per year with absolute lack of contractors and technologies. Private multinational clients with strong focus on social responsibilities are looking for providers. Green Sky is actively looking for partners on this topic.	Providers of in situ and on site technologies, knowledge and services
plastics separation	Private companies in Algeria are planning private investments in multiple plants for plastics sorting and separation	Providers of separation technologies. Traders in PET/PE/PP.
coalition for Africa/Magreb	Coalition with Amenhyd	Providers of technologies on wastewater treatment, control-room technology for wastewater plants, composting, separation technologies. Traders in PET/PE/PP.
composting or organic waste	Large interest in composting facilities. MSW consists for 70% of organic waste. The AND wants to go ahead with composting.	Suppliers of composting and MBT plants, technologies and knowledge.
composting of WWTP sludge	All sludge is dumped on CET's. The ministry of water resources wants composting as their technology of choice.	Suppliers of composting plants
treatment of oil/water/sludge residues	Green sky is looking for partners/providers on the treatment of oil/water/sludge residues from the oil industry and from port-activities	Suppliers of these treatment technologies
pilot project on integrated management of water, solid waste, wastewater and prevention of floods and inondations	The Ministry of water resources is anticipating to make a Masterplan for one or a few maliya's	Consulting bureaus on waste and water management.
cementindustry	Looking for alternatives for fossil fuels, like RDF, oil residues, granulated tyres etc.	Suppliers of expertise and installations that can make (certified) fuels from waste.
treatment technologies for spent kitchen oil. transfer stations and subsoil collection containers	Algeria imports diesel, bio diesel is seen as an alternative.	Suppliers of installations that can turn kitchen oil into diesel.
	City centres of big cities may be very interested in first experiences with transfer stations and subsoil collection systems	Suppliers of subsoil systems and expertise on waste logistics.
supply of thermoform technologies	Recycling United is actively looking for Dutch suppliers of thermoform extruder technologies for their PET output	Suppliers of thermoform technologies

TABLE 8 MOST IMPORTANT OPPORTUNITIES

7. International programs and Dutch support

7.1 International programs and players

The situation of waste treatment and the ambitions of the Algerian government have not stayed unnoticed. Several countries are setting up a corporation with Algerian public parties. In this chapter we mention some programs we have come across. This overview is far from complete.

Probably the biggest international player active in Algeria is China. Most large construction works, like a new football stadium and the Trans Saharan Highway, are constructed by Chinese companies. Whether they are also involved in waste and water treatment, is not clear.

South Korea, the UN and the EU also are active in environmental projects in Algeria. The details of their programs are not known to us. France has strong traditional ties with Algeria. The corporation seems to concentrate more on cultural projects. Further details are not available.

GiZ

This is the German international cooperation service that aims to help developing countries. GiZ's presence in Algeria is reaching a number of almost 100 employees. One of their activities is to assist the Algerian government with the development of a waste treatment strategy. They have several projects that are related to waste treatment and recycling. GiZ has indicated they are more than willing to work together with Dutch parties. Some of their projects are mentioned below.

- Creating job opportunities for the youth

Unemployment, especially of the youth, is a big issue in Algeria. More than 25% of the young people are without a job. The government has launched an agency (ANSEJ) that promotes the creation of new business. GiZ supports this program and aims especially at creating waste management jobs in municipalities.

- Promotion of waste valorisation and recycling

Every year the waste production increases and only 5 to 7% is recycled. GiZ has several projects to increase the recycling rates:

- The introduction of producers responsibility system (like Eco emballage)
- The development of MSW-sorting centres
- Collection and recycling of tyres.

- Improvement of waste treatment and the circular economy

The population is not happy with the waste treatment services provided by the government. The improvement of waste treatment could lead to so called "green jobs". GiZ has therefore three pilot projects in the Wilaya's Annaba, Sétif and Tlemcen, where they help the local government to improve the present waste collection system and to introduce separate collection. They also assist with the management of the CET. On a national level they advise the AND (Agence National de Déchets) on the national policy concerning these issues.

Divindus/Sherbrook

This corporation between a Canadian and an Algerian organisation is setting up a pilot plant in Constantine, a town near the Tunisian border. They want to implement a new type of high performance CET. 500 tons of MSW and 100 tons of chicken manure will be sorted and digested. The aim is to produce electricity and a compost fertiliser. Investment run up to €35 million, financed for 70% by the Algerian Government and for 30% by the Canadians.

AGID, Belgian – Algerian corporation on waste treatment

The Algerian and the Belgium government have signed in 2014 a corporation program on waste treatment and recycling. This program is known under the name of AGID (Appui à la Gestion

Intégrée des Déchets). The program ends on 30-06-2019 and has a total budget of € 11.000.000. Algeria adds € 9.260.000 to this budget.

The program coordinates with other programs that are launched by the EU, GiZ, PNUD and South Korea. AGID assists the AND and it supports three wilaya's in the western parts of the country (Mascara, Sidi Bel Abbes and Mostaganem). The program has three main focus points:

- Educating civil servants that work in the waste business.
- Communication.
- The realisation of sorting lines and collection points.

7.2 Opportunities for Holland branding

EXHIBITIONS

The site www.tradefairdates.com/fairs-Algeria gives an overview of the exhibitions in Algeria. Some interesting trade fairs are mentioned below:

- *ERA, Oran 17 – 09- 2018 and SEER, February 2019, Oran*

Trade fair on renewable energy and energy supply. Renewable energy is mainly focussed on wind and solar, but anaerobic digestion could be an interesting outsider.

- *Pollutec, Alger, March 2019*

This is an international exhibition on water equipment, technologies and services. Although it is not mentioned in the name, waste treatment, recycling, composting and anaerobic digestion are also present. This exhibition would be perfect for a combined stand in which Dutch entrepreneurs in the waste and consultancy business present themselves.



The main subjects that Holland could present are:

- Sorting of MSW
- Composting of bio waste and sewage sludge
- Landfill technologies
- Consultancy (design of installations, waste water plants, waste management policies, etc.)
- PET recycling and export
- MSW collection systems
- Production of RDF for the cement industry

SEMINARS AND TRAINING

It would be an option to organise a seminar. This could be in combination with the Pollutec. The main topic could be “Waste management, lessons learned in the Netherlands”. A multi-day training program for public and private professionals could be an interesting opportunity to showcase Dutch experiences and companies and to set up good relations with stakeholders from the Algerian waste market.

7.3 Dutch and other support for Dutch companies

A first port of call for Dutch companies with interest in the Algerian market is the Dutch Embassy in Algiers. It is an Embassy with a long and good history in Algeria and in introducing Dutch companies. The subject of waste management is new but there is a good perception of the role that Dutch players could perform in this market.

The Embassy is located at 23/27 Chemin Cheikh Bachir El-Ibrahimi in the El-Biar quarter of Algiers. The relevant members of the Embassy team in Algiers and RVO in The Hague are depicted below. The general email address of the Royal Dutch Embassy in Yango is alg@minbuza.nl.

CAAN is an association that is supported by the Dutch Embassy. This association serves as the connection between Algerian and Dutch parties. They organise trade missions, do partner search, supply business information, organise workshops and seminars, etc.



	<p>Mr. Robert van Embden Ambassador Tel.: +21321922828/29 Email: robert-van.embden@minbuza.nl</p>
	<p>Mr. Daniël Stork Chef de mission adjoint Tel.: +21321922828 Email: daniel.stork@minbuza.nl</p>
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	<p>Mrs. Feriel Yacoub Operations manager Conseil D'Affaires Algéro-Néerlandais (CAAN) Mobile: +213770763764 Email: f.yacoub@caan-dz.nl</p>
	<p>Mrs. Aafke Wortelboer Private sector development advisor at RVO Mobile: +31625083550 Email: aafke.wortelboer@rvo.nl</p>

TABLE 9 EMBASSY, CAAN AND RVO-TEAM

Other institutions that may be helpful in finding your way and finding partners in Algeria are:

- Le Chambre Algérienne de Commerce et d'Industrie (CACI) (www.caci.dz), the national chamber of commerce, offering an array of services and databases.
- Le Forum des chefs d'entreprise (FCE) (www.fce.dz), the national forum of private company owners working together on enhancing entrepreneurship and positioning Algerian companies as international partners.

The Dutch Agency RVO has several export stimulation programs (www.rvo.nl). One of these is the program “Partners for International Business”. It provides financial and institutional support to groups of companies that want to enter a foreign market. Such a program could also be considered for solid waste management in Algeria.

Another very useful instrument is the DHI-subsidy. This subsidy supports feasibility studies, demonstration projects and pre investment studies. The subsidy is only for small and medium size (MKB) businesses and the Dutch company needs to have a counterpart in Algeria that really wants to invest in the proposed project. This subsidy has a limited budget and follows a tender procedure. The Tender is open two times a year, in spring and autumn.

7.4 Recommendations for Algeria

Our observations with regard to the SWM situation in Algeria lead to the following recommendations for the Algerian authorities:

- Change and improve the cashflow of the SWM system. Make it less dependent on top-down funding.. Make plans to reach full cost coverage within 5 years by raising SWM fees. This plan must be underpinned by improving public services and raising public awareness.
- Accelerate programs on introducing ERP systems for a number of waste streams. This enables the authorities to divert costs from the public to the private sector and may give a boost to recycling.
- Introduce transfer station in the cities in order to reduce the costs of collection and improve public service levels.
- Make a national plan on Construction and Demolition waste. This waste has a vast potential for recycling.

7.5 Opportunities for Dutch-Algerian cooperation

Algeria has experience with pilot projects in an international cooperation context. One example is the CET in Constance that is constructed by a Canadian company, supported by the Canadian government. The AND has proposed a similar project for a CET near Algiers. The Dutch approach could be separate collection, sorting of MSW, composting the biowaste in combination with sewage sludge. Dry residue can be turned into RDF fit for the cement industry.

Other opportunities for cooperation may be in setting up a capacity building program on, for example, ERP systems, waste logistics, composting and landfill management.

8. Conclusions and recommendations

8.1 Conclusions

Algeria is a country with a good potential for the Dutch industry and consulting services. The basic infrastructure has been developed. This means that the bulk of the waste is collected and controlled. The legislation is in place, and the responsibilities are clear. The wilaya's and municipalities are responsible for MSW, the private sector for commercial and industrial waste. The financial backbone of the SWM system is still very weak because it relies almost fully on top-down funding by the National government. Nevertheless all parties we have spoken to realise that waste treatment and its governance should go to the next level.

As a first step the collection services should be improved. The service is not at the same quality level everywhere. Some area's are clean, in other area's (especially on the outskirts of cities and in rural areas) wild dumping is still an issue. This could be solved by evaluating the collection system and applying simple solutions, like introducing transfer stations. Dutch consulting bureaus could supply the necessary know how. In some densely populated area's sub-soil containers could improve the collection and the cleanliness of the streets.

The recycling rates are extremely low in Algeria. At the same time the potential is omnipresent. The biggest step can be made by the introduction of a simple system for separate collection, one bin for dry waste and one bin for wet waste. The wet organic waste can be composted. This would be a solution for more than 50% of the household waste. The AND is in favour of such a solution and would like to realise a pilot project in a medium size wilaya, together with Dutch parties and representatives of the Dutch international development sector.

The waste water system is more or less in the same situation as solid waste treatment. The main infrastructure is in place. New solutions must be found for remote area's and there is no solution for sewage sludge. The best option would be composting and using the compost in agriculture. This provides opportunities for suppliers of composting equipment. An other issue is the management of waterways. Climate change causes extreme rainfall which leads to flooding. This gets worse because of clogging of sewage systems and waterways by illegally dumped and littered solid waste. Here is a good potential work for Dutch consulting services. The ministry of water is looking for a pilot project, where all problems related to water management are integrated into one single plan of action.

The private sector is present and active. We have met several companies that are looking for technologies to help with recycling and waste treatment services. A lot of equipment is bought in countries with a low cost level like China and Turkey. More sophisticated equipment comes from Italy. Chances for Dutch suppliers are with niche products and key parts of installations.

Another market for Dutch companies is the market of PET flakes that can be exported to the EU. This market is still open in Algeria.

The conclusion is that there are many possibilities in the country. Other countries are already present in Algeria and it may be interesting to look for a corporation with other EU countries. In case a Dutch company wants to participate in public tenders, the best strategy would be to team up with an Algerian company. Otherwise importing goods may be difficult.

8.2 Recommendation

Our main recommendation is to set up a mixed “Aid and Trade” program on solid waste management for Algeria.

The trade part would be in supporting interested Dutch private player in entering the Algerian market, preferably through a PIB project. The project should concentrate on actual opportunities as described above and should make use of the opportunities provided by trade fairs such as the Pollutec.

The aid part could be in cooperating with the Algerian authorities on EPR systems, capacity building and pilot projects.

Annex. list of contacts and visits

Date	organisation	representative	activities
27 may	Bet Bounebab Environnement	Mr. M. S. Bounebab Director	Consultancy, studies and training in the environmental field
27 may	Plasticycle and CAAN	Mrs. Besma Belbedjaoui Mrs. Feriel Ayoub	Recycling of PET and PE in Constantine
27 may	Green Sky Environnement	Mr. Hanifi Walid	Collection and treatment services for industrial waste
27 may	Amenhyd	Mr. Abdelmalik Melboucy	Environmental construction company
28 may	Centre de Developpement d'energie renouvelables CDER	Mr. El Amin Kouadri Boudjelthia Mrs. Majole Azize Mrs. Sabah Abada Mrs. Meryem Saber	Research institution on renewable energy
28 may	BL Consult	Mr. Khaled Benchaalal	Consultancy, studies in topics related to agriculture and biomass
28 may	Blogs Nouara-Algerie.com	Mr. Karim Tedjani	Blogger on subjects related to environment, waste and ecotourism
29 may	Ministère de l'environnement	Mrs. Chenibet Hala Mrs. Benkhennouf Zahir Mr. Kaum Baba Mrs. Medani Sihem	Department of waste management
29 may	Agence Nationale des déchets, AND	Mr. Karim Ouamane, Directeur général	National organisation supporting the cities and departments on waste management with studies, pilots etc.
30 may	Ministère des ressources en Eau	Mrs. Hassina Hammouche Mr. Mohammed Ouadou	Department of wastewater
30 may	Heineken		
30 may	Ziekenhuis		
31 may	GiZ	Mr. Uwe Becker	German international cooperation organisation
31 may	Recycling United	Mr. Salim Lached Mr. Ali Bensaleh	Largest PET recycler in the country, located in Blida
31 may	Insinero	Mr. Nadjib Bouderbala	Start up for destruction of hospital waste, located in Aïn Defla
31 may	Centre d'enfouissement technique (CET)		Landfill and sorting facility



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