57. Tunisia

57.1 Regulatory framework for drinking water, wastewater discharge and reuse

57.1.1 Main government bodies

The following organisations play an important role in the regulation of drinking water, wastewater treatment and reuse.

Ministry of Public Health: Helps formulate standards that apply to drinking water and effluent discharge in the environment, with human health as its main focus.

Hygiene and Environmental Protection Directorate (DHMPE): A division of the ministry of public health which regularly tests drinking water and treated wastewater to ensure that they comply with drinking water and wastewater discharge standards.

Ministry of the Environment and Sustainable Development: Helps formulate regulation relating to environmental protection and the prevention of pollution, including effluent discharge standards and reuse standards.

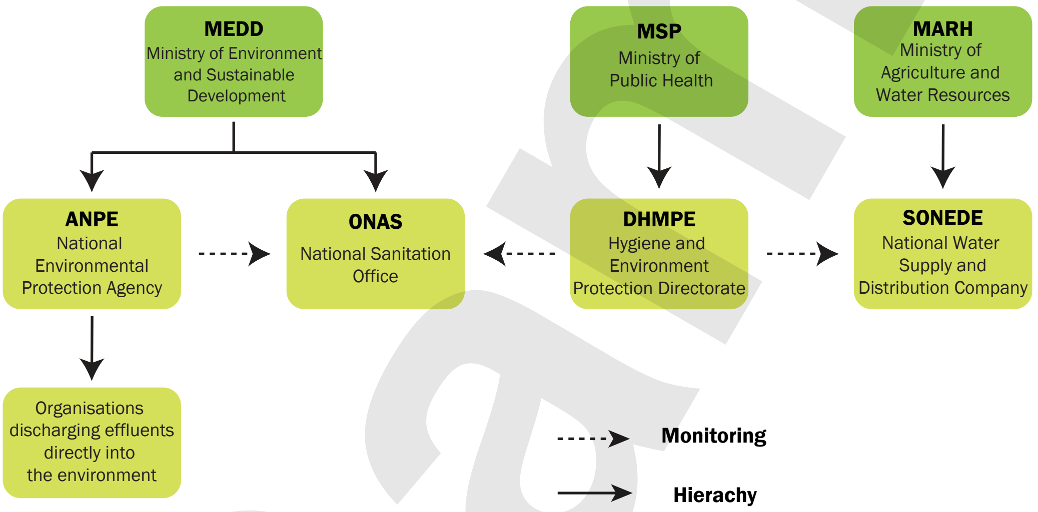
National Environmental Protection Agency (ANPE): Agency in charge of preventing and controlling pollution in Tunisia. It is the sole body controlling direct discharge of effluents in the environment.

National Sanitation Office (ONAS): Tunisia's wastewater body is responsible for the country's wastewater infrastructure. It collects, treats and discharges municipal (and some industrial) effluents and sells (heavily subsidised) treated wastewater for reuse.

Ministry of Agriculture and Water Resources: Helps formulate regulation that applies to water resources, including irrigation and water reuse for agricultural purposes.

National Water Supply and Distribution Company (SONEDE): Tunisia's bulk water supplier and main water utility. It serves all urban areas and about half the country's rural areas.

Figure 57.1 Government bodies: Drinking water, wastewater discharge and reuse regulation in Tunisia



Source: GWI

57.1.2 Relevant legislation

Tunisia's **Water Code (31 Mar 1975)** is the overarching legislation covering the water sector. It covers aspects such as the sector's organisation, rights to water, the protection of water resources and the penalties that should be applied should its principles be breached. All decrees and ordnances that apply to water and wastewater treatment reference the water code.

Figure 57.2 Laws affecting the responsibilities of stakeholders in drinking water and wastewater standards

Law	Description	Modification
Law No 68-22 (2 Jul 1968)	Creates National Water Supply and Distribution Company (SONEDE)	

Law	Description	Modification
Law No 74-73 (3 Aug 1974)	Creates National Wastewater Agency (ONAS)	Law No 93-41 broadens ONAS's remit from wastewater network operator to Tunisia's main body for the protection of water resources. Law No 2004-70 (2 Aug 2004) makes concessions in the wastewater sector possible and Law No 2007-35 (4 Jun 2007) spells out the rights and obligations of concessionaires.
Law No 88-91 (2 Aug 1988)	Creates National Environmental Protection Agency (ANPE)	Law No 92-115 (30 Nov 1992) broadened ANPE's remit, notably its roles in environmental protection enforcement and policy advisory.
Decree No 81-793 (9 Jun 1981)	Indicates that the DHMPE is responsible for the monitoring of drinking water quality, the protection of the environment, the prevention of pollution and must monitor the enforcements of the relevant standards	

Source: GWI

57.2 Drinking water quality regulations

Tunisia has two standards that apply to drinking water production: standard **NT09-13 (1983)** applies to surface water used for drinking water production; standard **NT09-14 (1983)** applies to drinking water.

57.2.1 Water used for drinking water production

Standard NT09-13 distinguishes three categories of water and the kind of treatment required to produce drinking water from each category. There are two values for each parameter: the desirable standard (G) and the compulsory standard (I). The standard only applies to surface water.

Figure 57.3 Standard used for the production of drinking water

Parameter	Unit	A1 (simple physical treatment, disinfection)		A2 (standard physical and chemical treatment, disinfection)		A3 (advanced physical and chemical treatment, filtering, disinfection)	
		G	I	G	I	G	I
Colour	Pt-Co						
Odour							
Temperature	°C						
pH	pH units						
Conductivity	µs/cm						
Chlorine	mg/l						
Sulphate	mg/l						
TSS	mg/l						
Dissolved oxygen	%						
BOD_5	mg/l						
COD	mg/l						
Boron	mg/l						
Ammonium	mg/l						
TKN	mg/l						
Nitrate	mg/l						
Phosphate	mg/l						
Barium	mg/l						
Copper	mg/l						
Zinc	mg/l						
Manganese	mg/l						
Dissolved iron	mg/l						
Fluorine	mg/l						
Dissolved hydrocarbons	mg/l						

Parameter	Unit	A1 (simple physical treatment, disinfection)		A2 (standard physical and chemical treatment, disinfection)		A3 (advanced physical and chemical treatment, filtering, disinfection)	
		G	I	G	I	G	I
Phenols	mg/l						
Lauryl sulphate	mg/l						
Chloroform extractable substances	mg/l						
Arsenic	mg/l						
Cadmium	mg/l						
Chromium	mg/l						
Lead	mg/l						
Mercury	mg/l						
Selenium	µg/l						
Cyanide	mg/l						
Total pesticides	mg/l						
Chlorinated PAH	mg/l						
Fecal coliforms	/100ml						
Total coliforms	/100ml						
Fecal streptococci	/100ml						
Salmonella							

Source: NT09-13

57.2.2 Drinking water quality standards

Tunisia's drinking water standard NT09-14 is somewhat out of date, being based on the WHO's 1972 drinking water standard and the 1980 European standard. As a result, the number and types of substances is less comprehensive than in neighbouring countries.

Figure 57.4 Maximum allowed concentrations of substances in drinking water

Parameter	Unit	Upper Limit
Arsenic	mg/l	
Cadmium	mg/l	
Cyanide	mg/l	
Mercury	mg/l	
Lead	mg/l	
Selenium	mg/l	
Silver	mg/l	
Antimony	mg/l	
Nitrate	mg/l	
Barium	mg/l	
Beryllium	mg/l	
Cobalt	mg/l	
Tin	mg/l	
Nitrilotriacetates	mg/l	
Thiocyanates	mg/l	
Uranium	mg/l	
Vanadium	mg/l	
Molybdenum	mg/l	
Fluoride	mg/l	
Fluoride	mg/l	
Fluoride	mg/l	
Fluoride	mg/l	
Fluoride	mg/l	
Fluoride	mg/l	

Parameter	Unit	Upper Limit
Fluoranthene	mg/l	
Benzo-3,4 fluoranthene	mg/l	
Benzo-11,12 fluoranthene	mg/l	
Benzo-3,4 pyrene	mg/l	
Benzo-1,12 perylene	mg/l	
Indeno(1,2,3-cd)pyrene	mg/l	
Alpha activity	Bq/l	
Beta activity	Bq/l	
Fecal coliforms	CFU/100 ml	
E. coli	CFU/100 ml	

Source: NT09-14

57.2.3 Implementation of regulations and compliance

Standard NT09-14 regulates how often drinking water must be tested. The controls are scheduled by DHMPE; inspectors from the division also carry out random samples, at least twice a year in each facility, to ensure compliance.

Figure 57.5 Drinking water quality sampling requirements from NT09-14

Population	Bacteriological monitoring frequency	Physical and chemical monitoring frequency
< 20,000	1 / month / 5,000 pop	2/yr
20,000-50,000	1 / month / 5,000 pop	2/yr
50,000-100,000	1 / month / 5,000 pop	4/yr
> 100,000	1 / month / 10,000 pop	4/yr

Source: NT09-14

SONEDE also has its own internal monitoring regime and sends the results of all its tests to DHMPE.

For SONEDE to be deemed compliant, 95% of samples over the course of a year must respect the values set out in NT09-14. In 2009, SONEDE's compliance, according to its own monitoring, was 99% and 99.2% in 2010 (SONEDE, 2011). DHMPE's results are around the 98% mark (DHMPE, 2011).

57.2.4 Future plans

The main problem Tunisia faces in terms of water quality is salinity. More than half the country's water supply has salinity levels above 1.5 g/l. The current standard sets a threshold of 2.5 g/l but SONEDE has thrived to produce water containing no more than 1.5 g/l.

This still isn't the case in a handful of locations so in 2007, SONEDE launched a national programme of water quality improvement. The programme includes 18 small and medium-sized brackish water desalination plants (total combined capacity 68,700 m^3/d), which will add to the 177,300 m^3/d already operating across the country (mostly in the south).

The water quality improvement programme is being launched in two phases: the contract to build Phase 1 (for areas with salinity above 2 g/l), which includes 10 plants split in four packages, was scheduled to be awarded over the second half of 2011. As for Phase 2, consultancy Pöyry Environment was awarded a EUR1.7 million contract to carry out feasibility studies in March 2011.

This quality programme is in line with Tunisia's desire to update its drinking water standards. The current standards date back to 1983 and haven't been revised since. The new standards will be inspired by current European, Canadian and WHO standards and should be in place in 2012.

Amongst the main changes, the new standard will include maximum concentrations of , an update on , a more detailed list of to measure and maximum values for each as well as a more comprehensive list of and parameters.

57.3 Municipal and industrial wastewater quality regulations

57.3.1 Wastewater quality regulations

57.3.1.1 Domestic effluents

According to **Decree No 79-768 (8 Sep 1979)**, modified by **Decree No 94-2050 (3 Oct 1994)** and **Decree 2001-1534 (25 Jun 2001)**, domestic effluents must be discharged into the public sewerage network, unless ONAS deems the connection not feasible, in which case the premise's owner will be advised on alternatives.

57.3.1.2 Non-domestic effluents

Non-domestic effluent discharge in ONAS's network is subject to an authorisation from ONAS's chief executive, as per **Decree No 94-1885 (12 Sep 1994)**. The authorisation will stipulate the volume and quality of effluents that can be discharged into the network. The default quality is set out in standard **NT106.02 (1989)** (see section 57.3.1.3 for further details), which contains quality requirements for discharge in the wastewater network. If effluents do not meet these criteria, they must be pre-treated before being discharged into the wastewater network, but ONAS can also decide to accept sub-standard quality if it feels its infrastructure can cope with additional levels of pollution. These arrangements, including the timeframe for which they are valid, are set out in the authorisation.

If an emitter is located outside of ONAS's intervention zone or ONAS refuses to accept its effluents, **Decree No 85-56 (2 Jan 1985)** says that it can discharge its effluents directly into the environment if they comply with standard NT106.02 and if it obtains an authorisation from the relevant ministry (i.e. the ministry that would supervise its activity). Authorisations are valid for three years and can be renewed.

57.3.1.3 Wastewater emission standards

Tunisian standard NT106.02 contains three categories. The standard for rivers and lakes apply to all effluents being discharged into the environment, whether directly by the emission source or by ONAS's WWTPs. It is up to the emitter to decide how it complies with the standard. The standard relating to the wastewater network applies to non-domestic effluents aiming to use the wastewater network.

Figure 57.6 Physical, chemical and biological specifications of treated effluents by discharge area, NT106.02

Parameter name	Symbol	Unit	Effluent standards according to discharge area		
			Ocean	Rivers, lakes, etc	Wastewater network
Temperature		°C			
pH					
TSS		mg/l			
TDS		ml/l			
COD		mg O_2/l			
BOD_5		mg O_2/l			
Chlorine	Cl	mg/l			
Free chlorine	Cl_2	mg/l			
Chlorine dioxide	ClO_2	mg/l			
Sulphate	SO_4^{2-}	mg/l			
Magnesium	Mg	mg/l			
Potassium	K	mg/l			
Sodium	Na	mg/l			
Calcium	Ca	mg/l			
Aluminium	Al	mg/l			
Boron	B	mg/l			
Iron	Fe	mg/l			
Copper	Cu	mg/l			
Tin	Sn	mg/l			
Manganese	Mn	mg/l			
Zinc	Zn	mg/l			
Molybdenum	Mo	mg/l			
Cobalt	Co	mg/l			
Bromine	Br_2	mg/l			
Barium	Ba	mg/l			
Silver	Ag	mg/l			

Parameter name	Symbol	Unit	Effluent standards according to discharge area		
			Ocean	Rivers, lakes, etc	Wastewater network
Arsenic	As	mg/l			
Beryllium	Be	mg/l			
Cadmium	Cd	mg/l			
Copernicium	Cn	mg/l			
Chromium VI	Cr^{6+}	mg/l			
Chromium III	Cr^{3+}	mg/l			
Antimony	Sb	mg/l			
Nickel	Ni	mg/l			
Selenium	Se	mg/l			
Mercury	Hg	mg/l			
Lead	Pb	mg/l			
Titanium	Ti	mg/l			
Pesticides and other related products (composites, organophosphorous, carbamates)		mg/l			
Fecal coliforms		CFU/100 ml			
Fecal streptococci		CFU/100 ml			
Salmonella		CFU/100 ml			
Cholera bacteria		CFU/100 ml			
Colour		Pt-Co			
Sulphur	S	mg/l			
Fluoride	F^-	mg/l			
Nitrate	NO_3^-	mg/l			
Nitrite	NO_2^-	mg/l			
Organic nitrogen and ammonia		mg/l			
Phosphate	PO_4^{3-}	mg/l			
Phenols & phenolic compounds		mg/l			
Foaming power		mg/l			
Aliphatic hydrocarbons		mg/l			
Chlorinated solvents		mg/l			
Anionic detergents (alkylbenzene sulfonate)		mg/l			

Source: NT106.02

57.3.1.4 Sludge reuse regulation

Tunisian standard NT106.20 (2002) regulates the use and application of sludge derived from wastewater treatment as a fertiliser.

The only sludge that can be used for agricultural purposes is that derived from urban WWTPs. Sludge from pre-treatment and sludge recovered from cleaning of wastewater infrastructure cannot be used as fertiliser. Sludge cannot be applied to land used for the cultivation of vegetables.

Figure 57.7 Sludge standard NT106.20 for agricultural use

Substance	Symbol	Unit	Value
Cadmium	Cd	mg/kg	
Chromium	Cr	mg/kg	
Copper	Cu	mg/kg	
Mercury	Hg	mg/kg	
Nickel	Ni	mg/kg	
Lead	Pb	mg/kg	
Zinc	Zn	mg/kg	
Fecal coliform		CFU/g	

Source: NT106.20

The minimum sampling requirement is once every six months. Samples are compliant if no substance exceeds the standard by more than 25% and no more than three values exceed the standard's value by less than 25%.

57.3.2 Implementation of regulations and compliance

57.3.2.1 ONAS

Industrial contamination has been an ongoing problem for ONAS as non-domestic effluents damage its WWTPs and reduce the quality of the output.

Industrials who contaminate ONAS's network by not pre-treating their effluents are liable to a fine of TND15-1,500 (USD11-1,100) and/or a jail sentence of six days to six months, as per Decree 94-1885 (1994) and Law No 93-41 (19 April 1993). In practice however, the obligation to pre-treat is rarely adhered to and the law infrequently enforced.

ONAS has struggled financially to maintain its WWTPs. Priority has been given to extending its infrastructure since 1974, many older plants are therefore showing signs of saturation (particularly in coastal areas and in summer when tourist numbers put a strain on resources) and ageing.

These two factors have contributed to varying levels of quality in treated effluents. Standard NT106.02 doesn't specify a compliance threshold but ONAS has reported the following figures for 2010:

- On average, ONAS's compliance rate with NT106.02 was 85%
- Compliance was 90% at ONAS's largest and most recent WWTPs (activated sludge) in the greater Tunis area which treat 40% of the country's wastewater
- Compliance was 89% at activated sludge WWTPs located inland (stricter standards for discharge in rivers and lakes than the ocean)
- Compliance was 81% in activated sludge WWTPs that suffered from saturation (tourism in coastal areas) or industrial contamination
- The figure is lower for natural lagoons

Section 57.3.5.1 details ONAS's plans to upgrade and extend its WWTP infrastructure in order to improve its compliance with regulatory standards and its project to overcome the industrial effluent problem.

57.3.2.2 Direct emitters

ANPE is in charge of monitoring compliance of direct emitters with NT106.02. The agency estimates that on average, only 40-45% of emission sources comply with the standard (ANPE, 2011). Offenders are reported to the Ministry of Environment and Sustainable Development and the industry's relevant ministry (industry, energy etc) and referred to the courts; they can be fined TND15-1,500 (USD11-1,100) and/or receive a jail sentence of six days to six months, as per Decree 94-1885 (1994) and Law No 93-41 (19 April 1993).

In practice however, enforcement is delicate since many of the worst polluters are state-owned companies (see section 57.5 for a case study).

57.3.3 Monitoring and sampling

As per Decree No 85-56, organisations that discharge their effluents directly in the environment must carry out regular controls of their effluents' quality and log them. ANPE also controls every emitter at least once a year and twice for the most polluting.

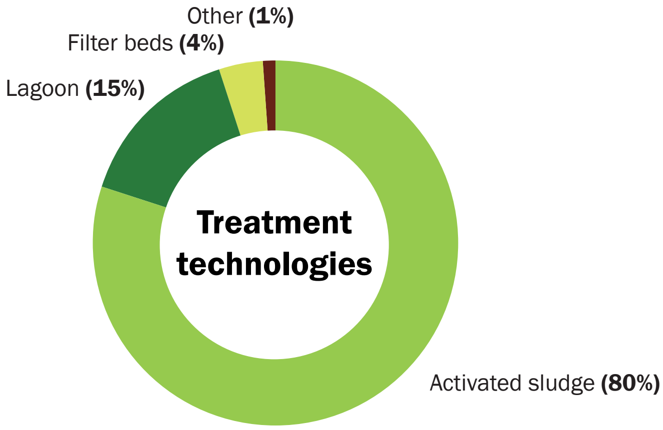
ONAS has its own monitoring unit and sampling regime. ANPE also checks WWTPs' discharge quality and if a sample (24-hour composite outflow at the discharge point) turns out not to comply with NT106.02, ANPE informs ONAS of the problem. The DHMPE operates a similar monitoring system, with a particular emphasis on substances and parameters likely to affect human health.

57.3.4 Wastewater treatment technology in Tunisia

Nearly 80% of Tunisia's WWTPs use secondary-level, activated sludge treatment.

ONAS has ambitious plans to upgrade its treatment technology; see sections 57.3.5.1 and 57.4.3.2 for further details.

Figure 57.8 Breakdown of WWTP technology in Tunisia, 2011



Source: ONAS, 2011

57.3.5 Future plans

It is interesting to note that although there is no compliance threshold for ONAS – which means that the existing regulation is very weak – ONAS has been very pro-active in improving the quality of its output, an impetus mainly driven by the need to produce good quality effluents that can be sold and reused.

57.3.5.1 Rehabilitation and extension programme

ONAS has launched a comprehensive programme to rehabilitate and extend 19 of its WWTPs in a bid to improve its compliance with standard NT106.02. As well as increasing the plants' capacity, the utility will retrofit them with fine bubble aeration systems and/or biogas co-generation facilities at a total cost of TND150-200 million (USD106-141 million).

All future wastewater treatment plants with capacities of more than 10,000 m^3/d will also be equipped with fine bubble aeration system and co-generation facilities.

The tender for the rehabilitation plant was expected before summer 2011, with the rest being staggered until 2016.

57.3.5.2 Industrial effluent programme

ONAS plans to collect and treat industrial effluents from 10 industrial zones separately from domestic effluents. The objective is to protect existing infrastructure from contamination and premature wear and to obtain a better output quality at ONAS's plants.

At the time of publication ONAS is in the midst of selecting a consultant to carry out a comprehensive technical feasibility study. The issues the study will address include the collection and delivery of industrial wastewater, as well as the technologies, capacities and procurement strategy for new treatment facilities. It is likely that the WWTP in each industrial zone will be tendered separately, given the cost and technological requirements of each project. The studies should start in 2012.

57.4 Water reuse regulations

Tunisia is determined to develop water reuse: its objective is to reuse 50% of treated wastewater by 2014 and 60% by 2016 (current reuse levels hover around 30%).

57.4.1 Current regulatory framework

Tunisia started experimenting with water reuse in 1965 in the citrus groves of La Soukra in greater Tunis. Treated effluents from the nearby Cherguia WWTP were used to supplement rainfall and conventional water sources.

The initiative was a success but it wasn't until the 1980s – as Tunisia's wastewater infrastructure expanded – that water reuse became more widely introduced. **Decree No 89-1047 (28 Jul 1989)** sets out the conditions for the reuse of treated effluents for agricultural purposes, whilst Tunisian standard **NT106.03 (1989)** spells out the physical, chemical and biological qualities required of the treated effluents to be used for agricultural purposes.

Figure 57.9 Physical, chemical and biological specifications of treated effluents for agricultural purposes, NT106.03

Parameter name	Symbol	Unit	Value
pH		pH units	

COD		mg/l	
BOD_5		mg/l	
TSS		mg/l	
Conductivity		µS/cm	
Chloride	Cl^-	mg/l	
Arsenic	As	mg/l	
Boron	B	mg/l	
Cadmium	Cd	mg/l	
Chromium	Cr	mg/l	
Cobalt	Co	mg/l	
Copper	Cu	mg/l	
Iron	Fe	mg/l	
Fluoride	F^-	mg/l	
Manganese	Mn	mg/l	
Mercury	Hg	mg/l	
Nickel	Ni	mg/l	
Lead	Pb	mg/l	
Selenium	Se	mg/l	
Zinc	Zn	mg/l	
Nematode eggs		/l	

Source: NT 106.03 (1989)

Treated wastewater is produced by ONAS and collected by regional representatives of the Ministry of Agriculture called Regional Rural Development Commissions (CRDA) for irrigation. CRDAs are responsible for transferring the treated effluents, storing it and pumping it to the end user.

According to Decree No 89-1047, CRDAs must test the quality of the treated effluents before using them, with regular controls from ANPE and DHMPE. The water must be tested for bacteriological load fortnightly. Tests for the water's pH, BOD_5, COD, TSS, chloride, sodium, ammonia, nitrogen and electrical conductivity must be carried out at least monthly. And tests for arsenic, boron, cadmium, chromium, cobalt, copper, iron, fluoride, manganese, mercury, nickel, organochlorine, selenium, lead and zinc must be carried out at least once every six months.

The **21 June 1994 ordnance from the Ministry of Agriculture and Water Resources** lists the crops that can be watered with treated effluents.

- Industrial crops such as cotton, tobacco, linen, jojoba and castor oil plant
- Cereal crops such as wheat, barley and oat
- Fodder such as maize and sorghum
- Fruit trees such as date palms, citrus trees and vines (provided they're not irrigated by spraying)
- Fodder bushes such as acacia
- Forest trees
- Flowers and herbs, including roses, iris, jasmine, marjoram and rosemary

Treated effluents cannot be used to irrigate fruit and vegetables that would be eaten raw (tomatoes, lettuces, carrots, berries etc).

57.4.2 Implementation of regulations and compliance

Decree No 89-1047 stipulates that failing to comply with standard NT106.03 should be sanctioned with a fine of TND60-1,000 (USD43-720) and/or a jail sentence of six days to nine months as defined by the Water Code. Theoretically, this would be overseen by ANPE, DHMPE, the relevant ministries and the courts, but in practice however, if treated effluents fail to comply with standard NT106.03, CRDAs simply notify ONAS and turn down the treated effluents.

If other water supplies are scarce (notably in summer) however, it is not unusual for CRDAs to accept below par treated effluents.

57.4.3 Future plans

57.4.3.1 New reuse standard

Tunisia is in the midst of revising its reuse standard to reflect the wider applications of reclaimed water. Aquifer recharge and landscaping (thanks to the boom of the tourism industry with its resorts and golf courses) present growing needs. The new text – which is being modelled on 13 international standards from the WHO, the State of California, European directives on reuse and others – will specify quality norms for each application (irrigation, landscaping, recharge, industrial etc.), a significant development from the universal standards in place since the 1990s.

The law was in draft form at the time of publication and is not expected to come into force until at 2012 or 2013 because of the recent political unrest. Proposed treatment standards are shown in the figure below, although they are still being debated by the various parties involved. The Ministry of Public Health is notably pushing for stricter standards on coliforms but ONAS has argued it is not economically viable.

Figure 57.10 Proposed treatment standards according to the effluents' use

Parameter name	Symbol	Unit	Current standard	Proposed standards		
				Category 1 (agriculture)	Category 2 (green areas)	Category 3 (recharge of aquifers)
Physical and chemical						
pH						
COD		mg/l				
BOD_5		mg/l				
TSS		mg/l				
Turbidity		NTU				
Total nitrogen		mg/l				
NH_4-N		mg/l				
NO_3-N		mg/l				
Sodium adsorption ratio						
Conductivity		µS/cm				
Chloride	Cl^-	mg/l				
Free chlorine	Cl_2	mg/l				
Aluminium	Al	mg/l				
Arsenic	As	mg/l				
Beryllium	Be	mg/l				
Boron	B	mg/l				
Cadmium	Cd	mg/l				
Chromium	Cr	mg/l				
Cobalt	Co	mg/l				
Copper	Cu	mg/l				
Iron	Fe	mg/l				
Fluoride	F^-	mg/l				
Lithium	Li	mg/l				
Manganese	Mn	mg/l				
Mercury	Hg	mg/l				
Molybdenum	Mo	mg/l				
Nickel	Ni	mg/l				
Lead	Pb	mg/l				
Selenium	Se	mg/l				
Zinc	Zn	mg/l				
Microbiological						
Nematode eggs		CFU/l				
Fecal coliform		CFU/100ml				

Source: ONAS, 2011

57.4.3.2 Tertiary treatment programme

In a bid to increase its compliance with standard NT106.03, ONAS has identified 48 WWTPs that it wants to equip with tertiary treatment facilities. The plants are located in areas with significant irrigation needs and the programme's objective is to produce 150 million m³ of effluents treated at tertiary level by 2014. The treated effluents will be used to irrigate 18,200 ha (16,700 ha of agricultural land and 1,500 ha of golf courses).

The treatments being considered are ozonation, UV treatment and sand filtration. The upgrade is expected to cost TND (USD). Studies should be finished by late 2011 and works start in 2012.

Figure 57.11 WWTPs earmarked for tertiary treatment upgrade

Treatment plants			Reuse of treated wastewater (Horizon 2014)	
Location	**Total plant capacity 2014 (m^3/d)**	**Tertiary treatment capacity (m^3/d)**	**Agricultural land (ha)**	**Golf courses (ha)**
Cherguia				
Choutrana II				
Sud méliane I				
Sud méliane II				
El Attar				
Bizerte				
Hammamet Sud				
Hammamet Nord				
Nabeul SE4				
Kélibia				
Tabarka				
Béja				
Medjez El Bab				
Teboursouk				
Le Kef				
Siliana				
Zaghouan				
El Fahs				
Sousse Nord				
Sousse Sud				
Msaken				
Sousse Hamdoun				
Nfidha				
Monastir Frina				
Sahline				
Ouardanine				
Sayada lamta				
Kairouan				
Bouhajla				
Hajeb Layoun				
Oueslatia				
Haffouz				
Kasserine				
Sbeitla				
Sfax Sud				
Sfax Nord				
El Hencha				
Medenine				
Jerba Aghir				
Jerba Sidi Mehrez				
Gafsa				
Tozeur				
Kébili				
Gabès				
El Hamma				
Matouia Ouethref				
Mareth Zarrat				
Tataouine				
Total				

Source: ONAS, 2011

The projects highlighted in section 57.3.5 will also have a positive impact on reuse by improving the quality of effluents and their compliance with reuse norms.

57.5 Water in industry: Phosphates

Tunisia is the world's fifth largest phosphate producer. The country has seven open pit mines and one underground mine, all located around Gafsa in the south of the country. They are operated by the **Gafsa Phosphate Company** (CPG). Annual production is about 8 million tonnes and Tunisia processes nearly 85% of it through the **Tunisian Chemical Group** (GCT), which has factories along the coast in Sfax, Gabès and Skhira. The companies, both state-owned, merged in 1996 and are generally referred to as GCT. They employ more than 10,000 people in the Gabès area.

57.5.1 Organisations that influence water policies

As the national agency in charge of environmental protection, ANPE, created in 1988, controls the quality of the effluents discharged directly into the environment, such as those of GCT.

The Ministry of Industry and Technology is the ministry overseeing the work of the GCT and therefore has considerable influence over the group's strategy.

57.5.2 Regulations in the phosphate industry

The main piece of legislation regulating the discharge of non-domestic effluents in the environment is Decree No 85-56 (1985). It applies to the phosphate industry, as does the wastewater standard NT106.02 published in 1989.

The phosphate industry however goes back to the 1970s when little wastewater discharge regulation existed. When legislation came through in the 1980s, it was deemed too expensive to implement it in the phosphate industry and the government turned a blind eye on phosphate pollution. The weight of the phosphate sector in Tunisia's economy also played a significant role in trumping environmental externalities.

As a result, GCT currently discharges 13,000 m^3/d of waste gypsum in the sea, and has done so for nearly four decades. As a consequence the Gulf of Gabès suffers from very high levels of pollution, which have affected the fishing industry and the local population's health (there are high levels of atmospheric pollutions too).

With the advent of the green agenda however (Tunisia is a signatory of the Barcelona Convention to prevent pollution in the Mediterranean Sea), the phosphate industry has come under pressure to comply with existing regulations.

ANPE has been working on a decontamination plan for the best part of a decade, but at TND1.2 billion (USD871 million), its cost remains prohibitive. Current plans would be to relocate the entire site 20 km inland with new, state-of-the-art treatment facilities and to rehabilitate the current site in Gabès for tourism purposes.

57.6 Future regulatory scenario and conclusions

Tunisia is the most advanced country in North Africa with regards to water and wastewater infrastructure, including regulation. It is a signatory of the Barcelona Convention to prevent pollution in the Mediterranean Sea and has taken its commitment seriously. Its ambitious investment plans in the wastewater and reuse sectors illustrate this commitment.

From a regulatory point of view, Tunisia is planning two major updates: its drinking water standard and its reuse standard. The update of the drinking water standard is more of an alignment with everyday practices and available technology than a desire to drive better quality standards (SONEDE already exceeds the demands of NT09.14 for many parameters).

The reuse standard is in a different league however. ONAS already struggles to meet the requirements of NT106.03 but the government sees reclaimed effluents as a vital water resource, hence the pressure for better quality. The work required is therefore as much in defining a new standard as in ensuring ONAS will be equipped to comply with it.

The same is true of wastewater: the government, via ONAS, is investing heavily in upgrades and new infrastructure, and tackling head on the problem of industrial effluents with plans for new industrial WWTPs and better enforcement of existing regulation amongst industries that do not use ONAS's network.

It is interesting to note that much of this drive seems to be motivated by the 'carrot' rather than the 'stick': as one official put it, government bodies (DHMPE, ANPE) can't really fine another government body (ONAS, SONEDE, CGT etc) so non-compliance often goes unpunished. The impact that poor water quality, environmental pollution and scarce water resources have on the economy and society however seem to be enough to keep the sector on its toes for now.

57.7 List of laws, standards and policies

Regulation	Name in original language	Source

Regulation	Name in original language	Source

57.8 Glossary

ANPE – National Environmental Protection Agency (Agence Nationale de Protection de l'Environnement)

DHMPE – Hygiene and Environmental Protection Directorate (Direction de l'Hygiène du Milieu et de la Protection de l'Environnement)

ONAS – National Sanitation Office (Office National de l'Assainissement)

SONEDE – National Water Supply and Distribution Company (Société Nationale d'Exploitation et de Distribution des Eaux)

GCT - Tunisian Chemical Group (Groupe Chimique Tunisien)