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Contribution by Egypt

to the CSTD 2022-2023 priority theme on “Ensuring safe water and sanitation for
all: a solution by science, technology and innovation”

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ملاحظات الشركة القارضة للمياه والصرف الصحي
على مشروع قرار " ضمان المياه الآمنة والصرف الصحي للجميع"
(مرفق 1)

Report on Egypt's water and sanitation sector challenges and efforts to address them through science, technology, and innovation solutions.

1- What are the concrete challenges that your country has encountered in managing water and sanitation and providing access for all to these services?

Challenges in Water & Sanitation Sector in Egypt

1. Physical and commercial water loss reduction, also known as non-revenue water (NRW)

In Egypt, NRW is a critical challenge in water management. Physical losses are mainly caused by aging of the distribution network, illegal connections & non-authorized consumption, and pipe leakage & breaks. Whereas commercial losses are relevant to the efficiency of meters and billing systems.

2. Adaptation to climate change (drought & rainstorms)
3. Increase the percentage of people who have access to safely managed sanitation services from 65 percent to 100 percent, (with a special focus on rural areas, where only 37.5 percent of people have access).
4. Treated wastewater reuse (as it is still limited in Egypt).
5. Sludge treatment and disposal.
6. Expand the private sector involvement in sanitation projects (make the industry more appealing to investors – beneficial by-products – low energy consuming).
7. Decrease the energy consumption (for WTPs & WWTPs & Desalination Plants).
8. Make the Wastewater industry environmentally friendly.
9. Desalination by-product brine disposal & management.

- 2- What projects/policies has your country implemented to use the above-mentioned range of technologies and innovations or other STI, including frontier technologies (e.g., AI and drones) to address these challenges? What are the main outcomes? What are the main difficulties confronted while trying to implement these projects/policies? Pls include the gender dimension.

NRW reduction

A multi-lateral approach has been used in the NRW reduction plan, in the technological domain some projects and measures are implemented as follows:

- DMA's Program "District Meter Area": 290 DMA's were applied across the country in 2020/2021 with (5187) km of networks were implemented using leakage detection instruments required such as; Ground Microphone-Pipe Locator-Cover Locator-Correlator-listening stick. The results were promising, where the estimate losses in this DMA's decreased from 38.92% to 22.91% with a total water saving of 33.5 million m³/day and a total cost of 44 M LE. The estimated annual income is 157 M LE.

Climate Change

Non-conventional water resources "seawater desalination", public awareness campaigns, water losses decrease, and current water resources protection & purification are the key main aspects for addressing such severe climate change. When it comes to the strategic desalination plan, it is important to note the collaboration with a variety of organizations including; universities, research centers, industry firms and charity organizations.

Increase the percentage of people who have access to safely managed sanitation services

Increasing the percentage of sanitation services challenge was addressed by a multi-level plan (national & sub-national) and complete coordination with all stakeholders this plan adopted; low cost & most advanced technologies in wastewater treatment .

Treated Wastewater Reuse

Increase treated wastewater reuse in Egypt required enhancing the treated wastewater quality and upgrading the WWTPs and implemented technologies, and that is what the country adopted in this regard the country implemented major projects to treat the most polluted main drains and reuse in agriculture field as follows:

- 1- Bahr El-Baqar WWTP with design capacity of 5.6 million m³/d
- 2- EL- Mahsama WWTP with a production capacity of one million m³/d contributes to irrigate about 100 feddans.

Sludge Management

Sludge management and energy production challenge was addressed by:

- 1- The collaboration with GIZ and HCWW in developing the national sludge management plan (2017-2019) & developing the concept study for sludge to energy(S2E) project (Al Berka WWTP 2019-2021) & development of contractual guidelines for S2E projects in Egypt (2019-2021) & Preparation of feasibility study & tender documents for Al Berka S2E project + Funding options (2021-2023) & Advisory services, bidding & contracting & Execution + Lessons learnt Execution & Upscaling & replication of S2E approach in Egypt.
- 2- The holding company for water & wastewater is preparing the feasibility Study for the Renewable Energy Production in WWTP "Teziment al-Sharqiya" in Beni Suef Governorate. The objective of this project is how to manage the sludge to achieve safe reuse and disposal in addition to biofuel production.

Energy Saving

Current and future targets were set out for addressing the challenge of energy reduction; the HCWW plan 2020-2021 includes several aspects to work on; the table below illustrates both targets and achievements.

Energy Saving Approach	Kwa
PF Penalties remove	12,034,311
Energy Audit	116,280,856
Energy Efficiency Equipment (led light)	13,998,621
Operation Control Optimization (DO & VSD)	9,921,592
Maintenance Optimization	1,673,251
Renewable Energy	4,914,725

- 3- Can your country provide examples of policies/projects/initiatives aimed at strengthening national STI capabilities in managing water and sanitation for ensuring their access by all population in your country? One example is what institutional and regulatory arrangements are in place to stimulate R & D and innovation in managing water and sanitation for access by all?

The HCWW training plan includes promoting the STI capabilities in the sector:

Many training programs, workshops, and conferences have been implemented with the cooperation with several national, international and regional organizations such as GIZ, TETRE TECH, AEE(Giz), IWSSTA, WES, The World Bank, and UNICEF as follows:

- Energy decision support system.
 - Capacity-building workshop for new energy auditors.
 - Decision support system of energy (DSSE).
 - Training to use laser shaft alignment tool & led stroboscope.
 - Certified energy manager training.
 - Outputs of the guideline for NRW reduction workshop.
- 4- Could you share case studies of regional and international cooperation that have helped your country in strengthening STI capacities? Can you provide success stories in this regard?
- a. Case study of the cooperation with the European Bank for Reconstruction and Development "EBRD"

Project Name: Fayoum Wastewater Expansion Program

Client: HCWW

Project Financing:

The European Bank for Reconstruction and Development (the "EBRD" or the "Bank") provided the loan of up to EUR 137 million to finance the expansion of wastewater treatment and sewerage network in Fayoum governorate (the "Project"). The Project will be co-financed by a European Investment Bank (EIB) sovereign loan of EUR 126 million and an EU Neighborhood Investment Facility (NIF) investment grant of EUR 37 million to the Government of Egypt ("GoE" or the "Borrower").

Project Objectives:

The main objective of Fayoum Wastewater Expansion Program is to increase access to sanitation in rural areas from 48 to 86 percent which will immediately improve social conditions and protect the environment. The project consists of 2 phases. The first phase (committed funding) of the project aims, by the end of 2023, to expand sewer services in approximately 57 unserved rural villages of Fayoum increasing access to sanitation to 70 per cent and benefiting around 700,000 people, in addition to construction, expansion, and rehabilitation of different WWTPs. The second phase (uncommitted funding) of the project will include a further 41 unserved villages, benefiting an additional 240,000 people increasing access to 86 per cent.

In addition to the above, the project aims to reduce the pollution in Lake Qarun due to the direct discharge of raw domestic wastewater into drains, where the lake is now used as a general reservoir for agricultural drainage, treated wastewater, and untreated sewage water from the unserved areas of Fayoum. The agriculture drainage with the wastewater discharge into the lake through two main drains, El-Wadi and El-Bats.

So that this project will contribute significantly to reducing the pollution of Lake Qarun which is the third largest lake in Egypt which will positively affect the health of the community and the main related economic opportunities in Fayoum, including fishing, fish farming and tourism related activities.

Thus, the project will improve wastewater operating systems and practices at the local level, the project will enhance operating efficiency and improve the capacity of the Fayoum Water and Wastewater Company while promoting decentralization in wastewater management.

Scope of Work:

The Fayoum sewage expansions program includes the expansion, rehabilitation and construction of new sewage treatment plants in various places in Fayoum Governorate and the establishment of the associated sewage network to collect sewage water from villages, as follows:

- Decommissioning and construction of 5 new sewage treatment plants.
- Expansion of 2 existing sewage treatment plants.
- Expansion and rehabilitation of 2 existing sewage treatment plants.

- Expansion of the existing sewage networks for 57 villages, in addition to 42 villages located on the eviction lines, with a total of about 558 km of networks and 146 km of force mains.
- Construction of nearly 62 new pump stations.
- Purchasing some scavenging trucks to serve small satellites with a population of less than 1,400 people.
- Assistance with Establishment of the Project Implementation Unit (PIU).
- This includes staffing and identification of PIU staff needs, development of a training plan and establishment of PIU operating procedures particular to the EBRD project.
- Procurement, Tendering and Contract Implementation.
- Including supporting FWWC in developing and integrating operation and maintenance plans for the project in their organization before taking-over constructed facilities.
- Assistance with Compliance & Reporting Obligations under the Financing Documents.
- Environmental and Social Implementation Support.

Technologies used in processing:

Waste water is treated using biological treatment in accordance with the environmental laws in the Arab Republic of Egypt. More than one treatment system has been used based on a technical and economic comparative study according to the conditions of each place. Among the treatment systems used are conventional activated sludge (CAS) as well as combined (IFAS) and activated sludge system using aerated lakes (AL with recycling). A dehydration and sludge disposal system was selected according to the available space in each station, and an advanced mechanical sludge dehydration system was presented in 6 WWTPs with the establishment of a central station to collect and stabilize the dried sludge.

b. Case study of the cooperation with the USAID, KfW, JICA, EU, GIZ

There are many District Metered Areas has been established where funded by USAID, KfW, JICA, EU, GIZ, ... etc as shown below.

Affiliated Company	No. of executed DMA	Networks Lengths Km	House Connections No.	Area Km ²	Loss %
Alex.	3	10	1510	1.3	18
Beherah	2	50	7652	13	31
Giza	7	43	6035	3.69	22
Cairo	4	195	6213	3.8	40
Sharqlah	12	112	14057	7	31
Bani Swief	3	73	8452	3.7	37
Luxor	1	4	854	0.2	34
Total	32	487	44773	20.99	30.4

c. Case study of the cooperation with Un Habitat & other funding agencies (River Bank Filtration for Drinking Water Supply)

To meet the increasing water demand and to provide safe drinking water in Egypt, the Holding Company for Water and Wastewater (HCWW) and its affiliated companies have started a program to develop riverbank filtration (RBF) sites in all Egyptian governorates. HCWW has been successfully implemented more than 160 RBF Units in Upper Egypt Governorates. The capacity of each unit is 3000 m³/day save drinking water, with only 20,000 USD.



**Arab Republic of Egypt
Ministry for Environment
Egyptian Environmental Affairs Agency**

**Report on
“Ensuring Safe Water & Sanitation for all : a solution
by Science, Technology and Innovation”**



July 2022

Introduction

The answers given below for the questions sent by “CSTD Secretariat” are within the responsibility of “The Egyptian Ministry for Environment”. Other competent ministries have their own contributions and provisions within their responsibilities.

Q 1: What are the concrete challenges that your country has encountered in managing water and sanitation and providing access for all to these services?

The main challenge is the great gap between the needs for these services and the available investments allocated annually to enlarge the coverage of these services up till being available for all citizens in Egypt. The government have increased the budget allocated for water and sanitation projects over the last few years.

Q 2: What projects / policies has your country implemented to use the above-mentioned range of technologies and innovations or other STI, including frontier technologies (e.g. AI and drones) to address these challenges?

What are the main difficulties confronted while trying to implement these projects/policies?

Egypt has several research bodies, centers and teams working in the field of “water and sanitation” from integrated points of view. In parallel to the ongoing infrastructure projects in the field of “Water & Sanitation”, these research bodies has set their research plans to support the national efforts to provide access for all the Egyptians all over the country. The main target of these plans is to increase the domestic capabilities to produce the relevant technologies, which will reduce the cost of the water and sanitation infrastructure projects.

The main bodies involved in these plans are :

- The National Research Center (NRC)
- The National Water Research Center (NWRC)

Besides, there are some industrial bodies that support these efforts to develop a national know how serving the water and sanitation projects. Among those bodies, “The Arab Organization for Industrialization” & “Military Production Sector” are the most important.

Q 3: Can your country give examples of policies/projects/initiatives aimed at strengthening national STI capabilities in managing water and sanitation

for ensuring their access by all population in your country? ?

- An important example for these researches is that one targeting to develop an Egyptian know how for “Membrane Technology” which is a main component in tertiary wastewater treatment plants. The National Research Center (NRC) is the main participant in this research project.
- Application of “Online Monitoring System” for wastewater discharge from the major polluting enterprises in terms of wastewater pollution load. That system is being enlarged annually to ensure a strict control over the main wastewater dischargers as a condition for maintaining the quality of ambient water in the main watersheds feeding the water treatment plants for easier safe water supply. “Inspection & Auditing” activities serve indirectly to achieve the same target of ensuring water supply for Egyptians who have nowadays access to water supply
- Competent authorities in Egypt perform regular programs for “Drinking Water Quality Monitoring” and for “Ambient Water Quality Monitoring”
- Competent Authorities in Egypt set ‘Crisis and Emergency Plans’ to manage the relevant incidents that could happen and influence the quality of watersheds
- Tertiary Wastewater Treatment Projects have been implemented to enhance the quality of the treated effluent and to enable its recycling as a part of the water consumption reduction policy. “Kima Treatment Plant” and “Elhajer Treatment Plant” in Aswan are two examples of these projects.
- Biofuels units are being installed nowadays within “Haya Karima Initiative” to ecofriendly utilization of the sludge of the wastewater treatment plants

Q 4: Could you share case of regional and international cooperation that have helped your country in strengthening STI capacities? Can you provide success stories in this regard?

No data thereof.