Optimization of Egyptian Wastewater Treatment Plants Workshop

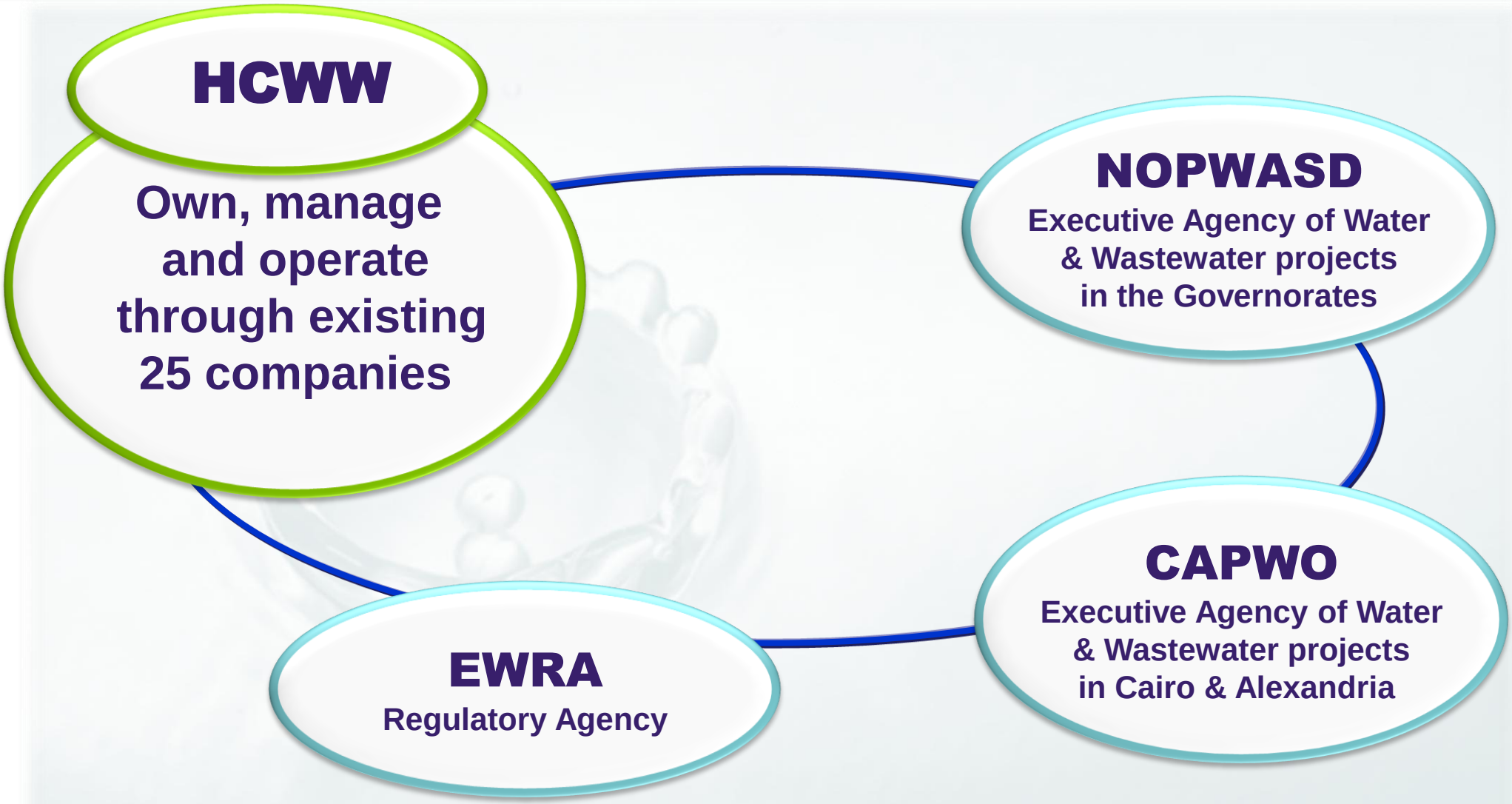
Water & Wastewater Status In Egypt

Presented by :- Dr. Ahmed Moawad
Vice Chairman

Contents :

Holding Company for Water and Wastewater

Stakeholders of the Water Sector



Current Status

According To CAPMASS 2017

94.8 million Egyptians live in:

253 Cities

4740 villages

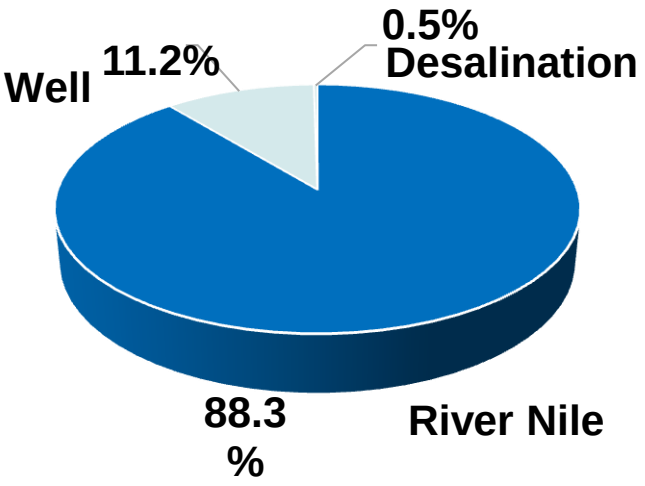
Current Pop.= **102.334** Million

Water & Wastewater Services

Water Production (Millions m3/day)	Egypt = 32.7 HCWW =25.9
Number of Water Treatment Plants	2742 1089 Filtration + 1576 Well Plants + 59 Desalination
Water Distribution Networks (km)	160,000
Number of Subscribers (Millions)	16.6

Coverage Percentage

98.7%



Water & Wastewater Services - cont.

Wastewater Capacity (Millions m3/day)	Egypt = 14.1 HCWW =12.2
Number of Wastewater Treatment Plants	504
Wastewater Networks (km)	50,000
Number of Subscribers (Millions)	8.7

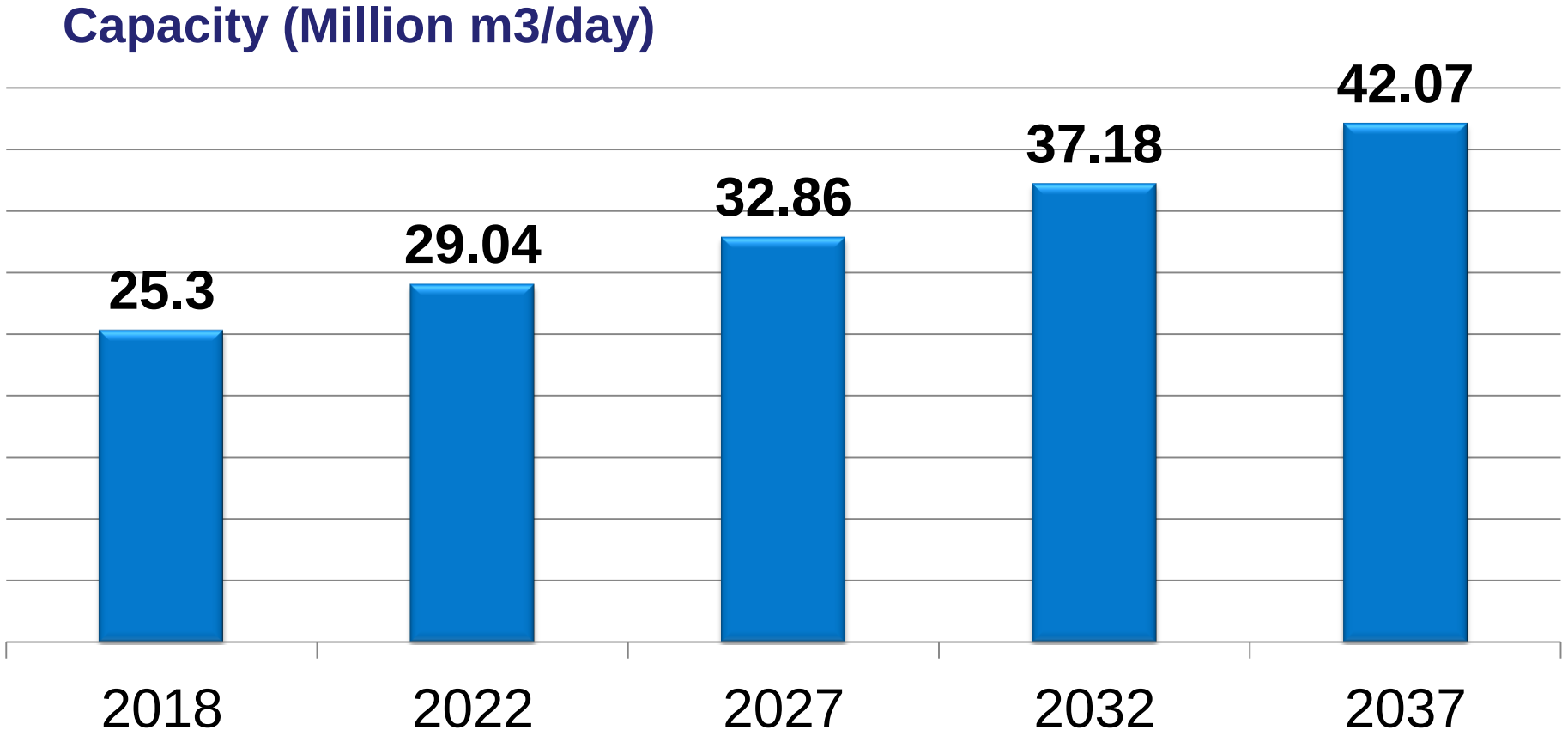
Coverage Percentage

65% (Population)

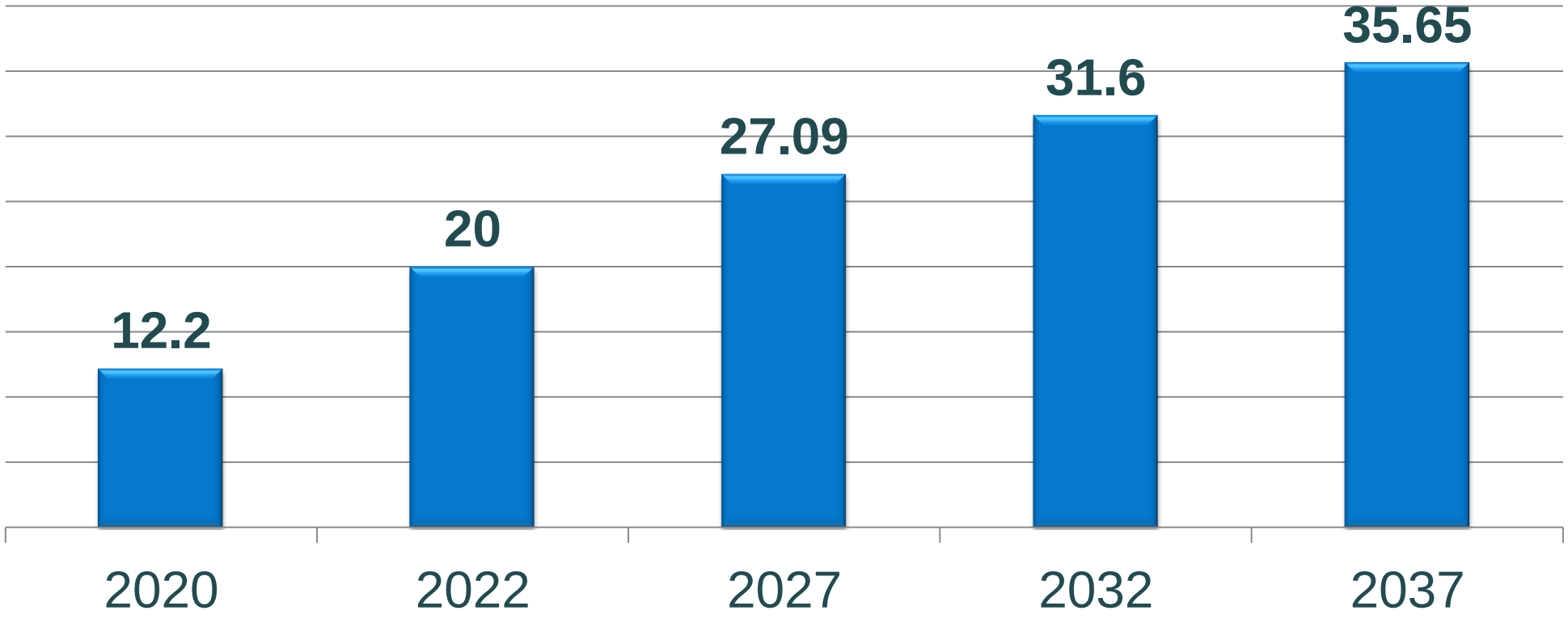
96% Urban (Population)

37.5% Rural (Population)

Total Water Capacities till 2037



Total wastewater capacities till 2037



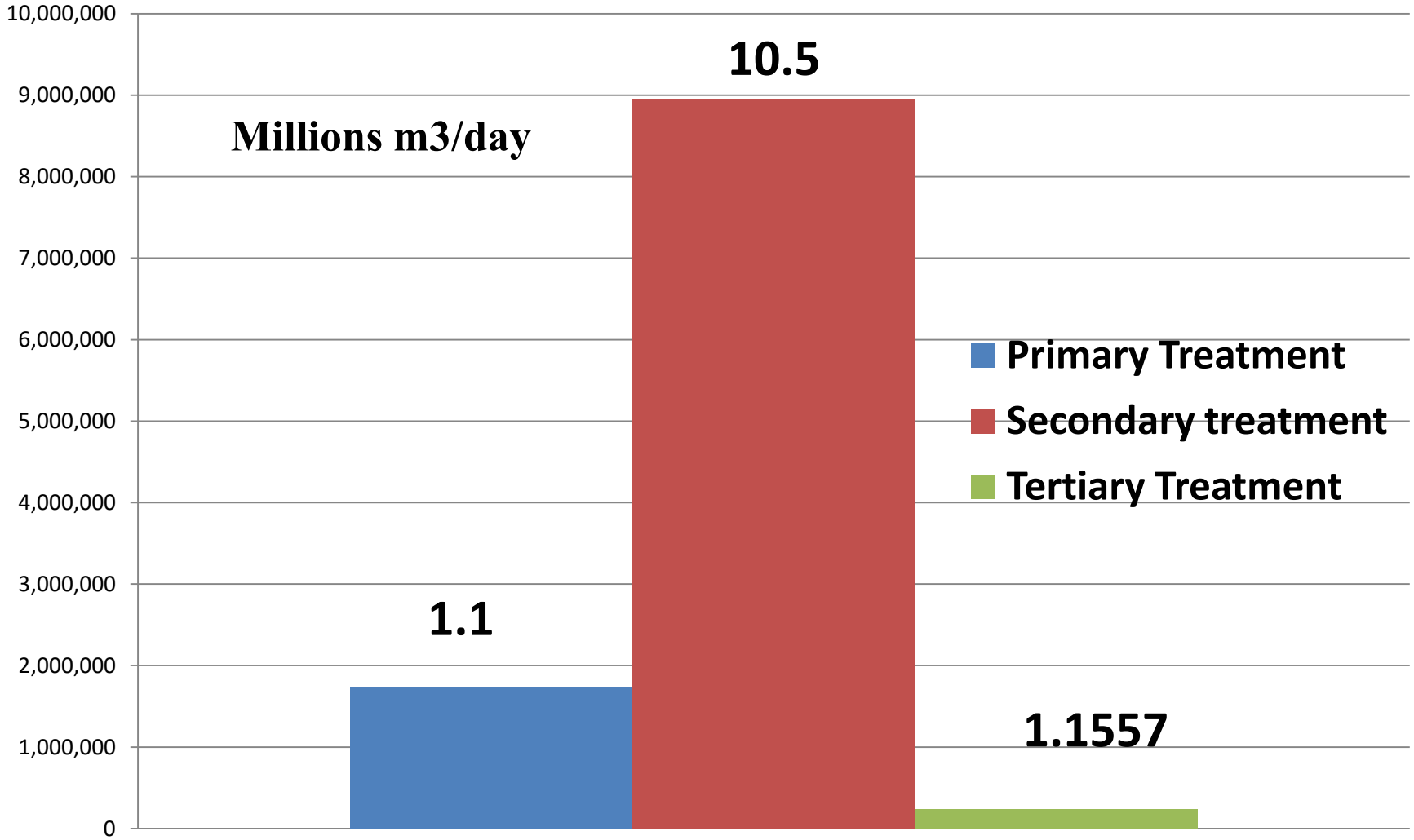
✓ *Expansion In Desalination Projects.*

Current and Planned Desalination Capacities (m^3)

Existing Cap.	Egypt =805,000 HCWW=276,000
Ongoing Cap.	478,000
2020-2050	6.4 M m^3/day

Total Capacity 2050
7.7 M m^3/day

Treatment Types (Actual)



WWTP Categorization According to Technologies

No.	Treatment Technology		No. of WWTP
1	Conventional Activated Sludge	CAS	107
2	Extended Aeration Activated Sludge	EAAS	141
3	UP-FLOW Sludge Blanket	UASB	5
4	Trickling Filter	T.F.	30
5	Rotating Biological Contactors	RBC	39
6	SBR / ASBR		31
7	Natural Oxidation Ponds	NOP	101
8	Aerobic Oxidation Ponds	AOP	8
9	Primary Treatment		2
10	Tertiary treatment		25
11	wet land		2
12	MBBR		3
13	Bio Lake Aerated Lagoon		8
14	Industrial (Chemical + Activated Sludge)		2
	Total		504

❑ The legal basis for controlling water pollution in Egypt

1. Law 48/1992 for the protection of the river Nile and other waterways from pollution.
2. Law 4/1994 on Environmental protection.

Standards and specifications Of wastewater & Industrial water before drainage on Non-fresh water bodies.

Item	Treated Wastewater
BOD	60
COD	80
DO	>4

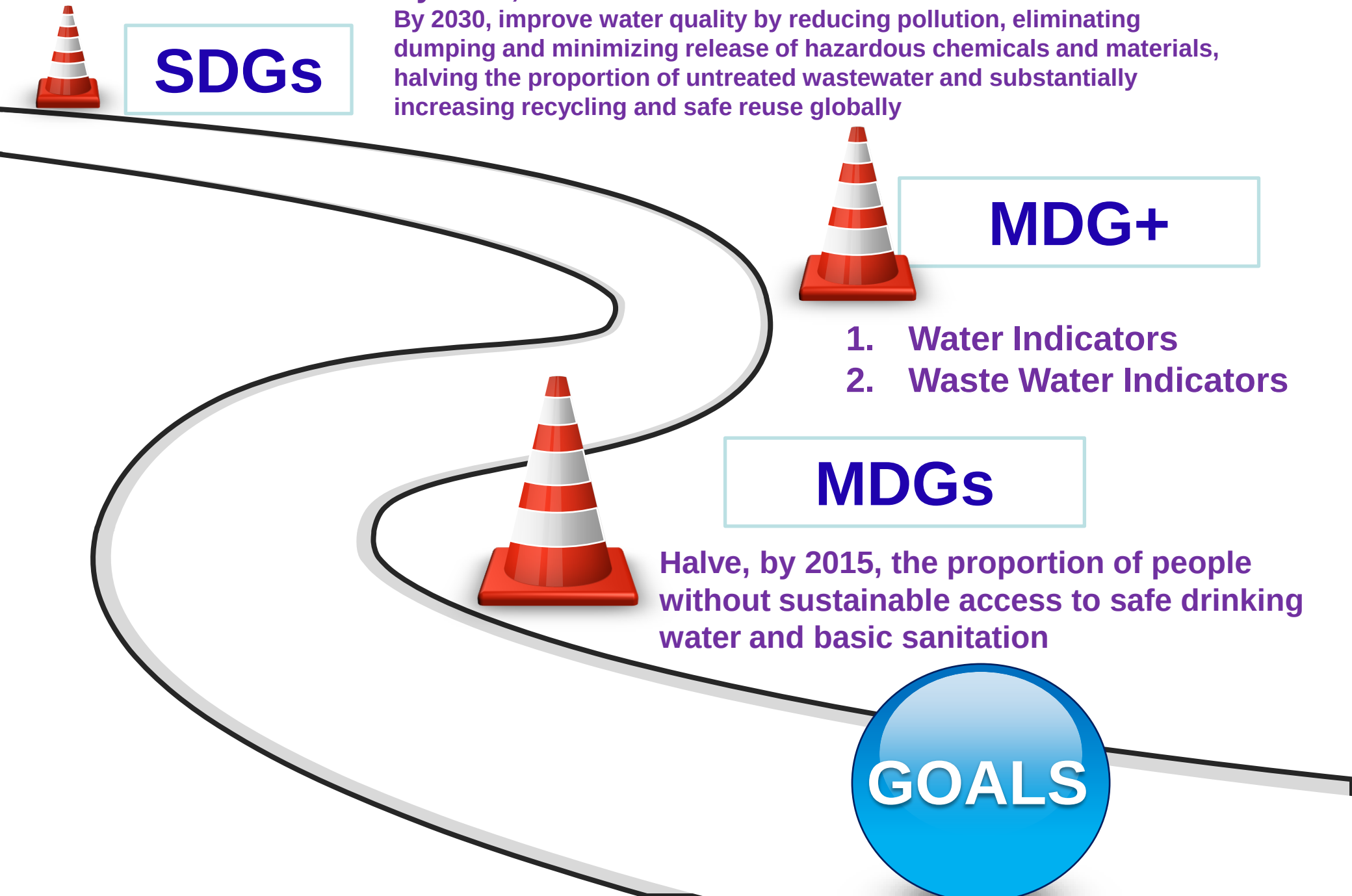
Standards and specifications treated wastewater before drainage on Fresh water bodies for agriculture purpose.

Item	Treated Wastewater
BOD	< 12
COD	< 50
DO	> 5
(TN)	20

Challenges Facing The Sanitation Sector

- ✓ *Expanding equal access to safely managed sanitation services to reach 100%.*
- ✓ *Water bodies & watersheds Contamination.*
- ✓ *Water scarcity & the need for Upgrading WWTPs For Water Reuse.*
- ✓ *Low Tariff & High CAPEX & OPEX(Optimizing Operation).*
- ✓ *High energy Consumption and increase in electricity Bill.*
- ✓ *Scattered Communities At Some Governorates (On Site Treatment).*
- ✓ *Solid Waste Management (collection, conveyance, treatment and disposal).*
- ✓ *Lack Of Land Availability.*

sustainable management Goals (SDGs)

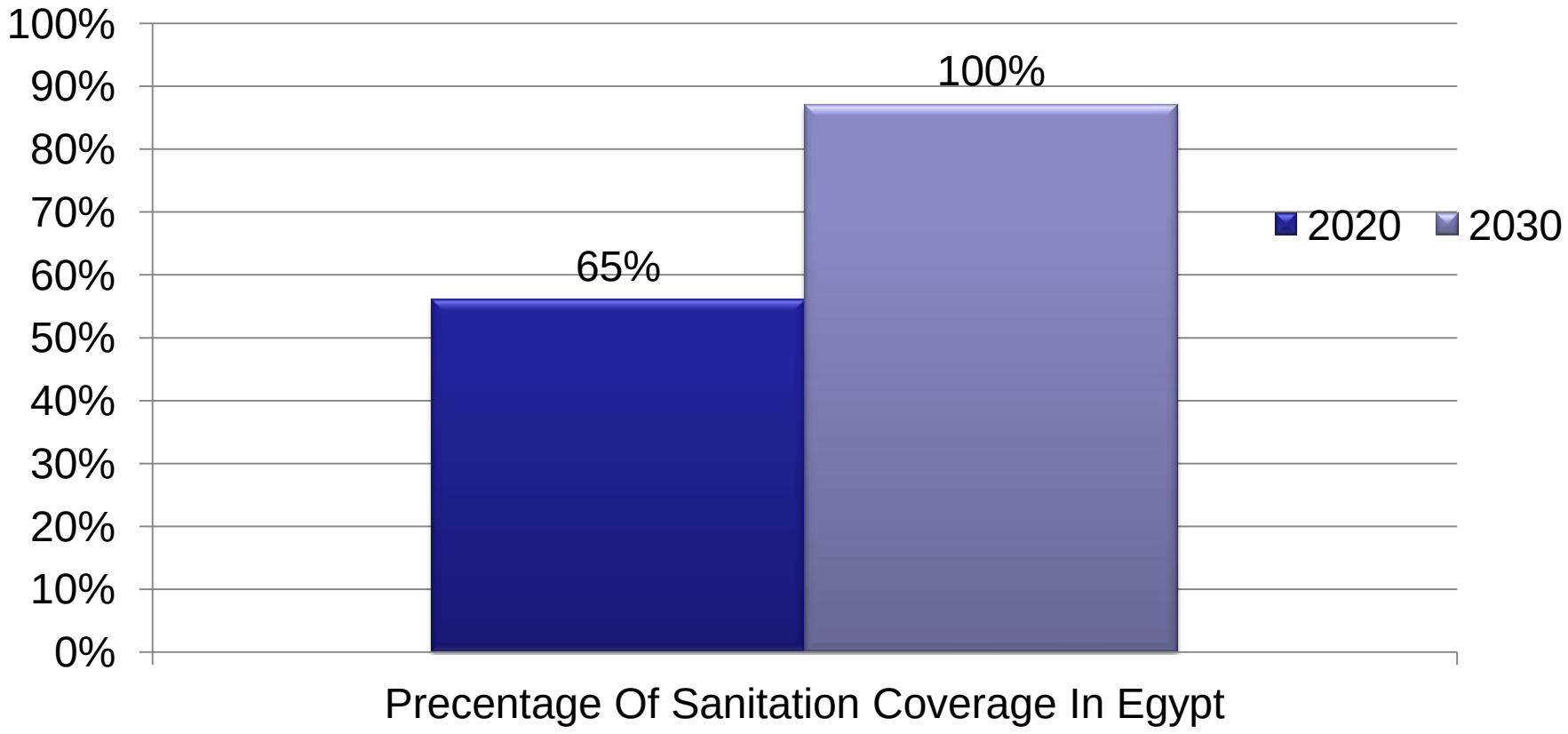

SDGs
By 2030,
By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
MDG+
1. Water Indicators
2. Waste Water Indicators
MDGs
Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation
GOALS

SDG6 Targets and Indicators

6.1 Universal, equitable, safe, affordable Drinking Water for all	• 6.1.1 Population using safely managed drinking water services
6.2 Adequate, equitable Sanitation & Hygiene for all	• 6.2.1 Population using safely managed sanitation services with soap & water
6.3 Improve water quality, wastewater treatment, recycling & safe reuse	• 6.3.1 Proportion of wastewater safely treated • 6.3.2 Proportion of water bodies with good ambient water quality
6.4 Increase water-use efficiency; address water scarcity; reduce number of people suffering from water scarcity	• 6.4.1 Change water-use efficiency • 6.4.2 Level of water stress
6.5 IWRM, including transboundary water cooperation	• 6.5.1 IWRM implementation level • 6.5.2 Portion of basin area with operational arrangement for water cooperation
6.6 Protect & restore water-related ecosystems	• 6.6.1 change in the extent of water-related ecosystems over time

SDG6.a and SDG6.b identify means of implementation for meetings these targets

6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.



National Rural Sanitation Strategy

Holding Company for Water and Wastewater

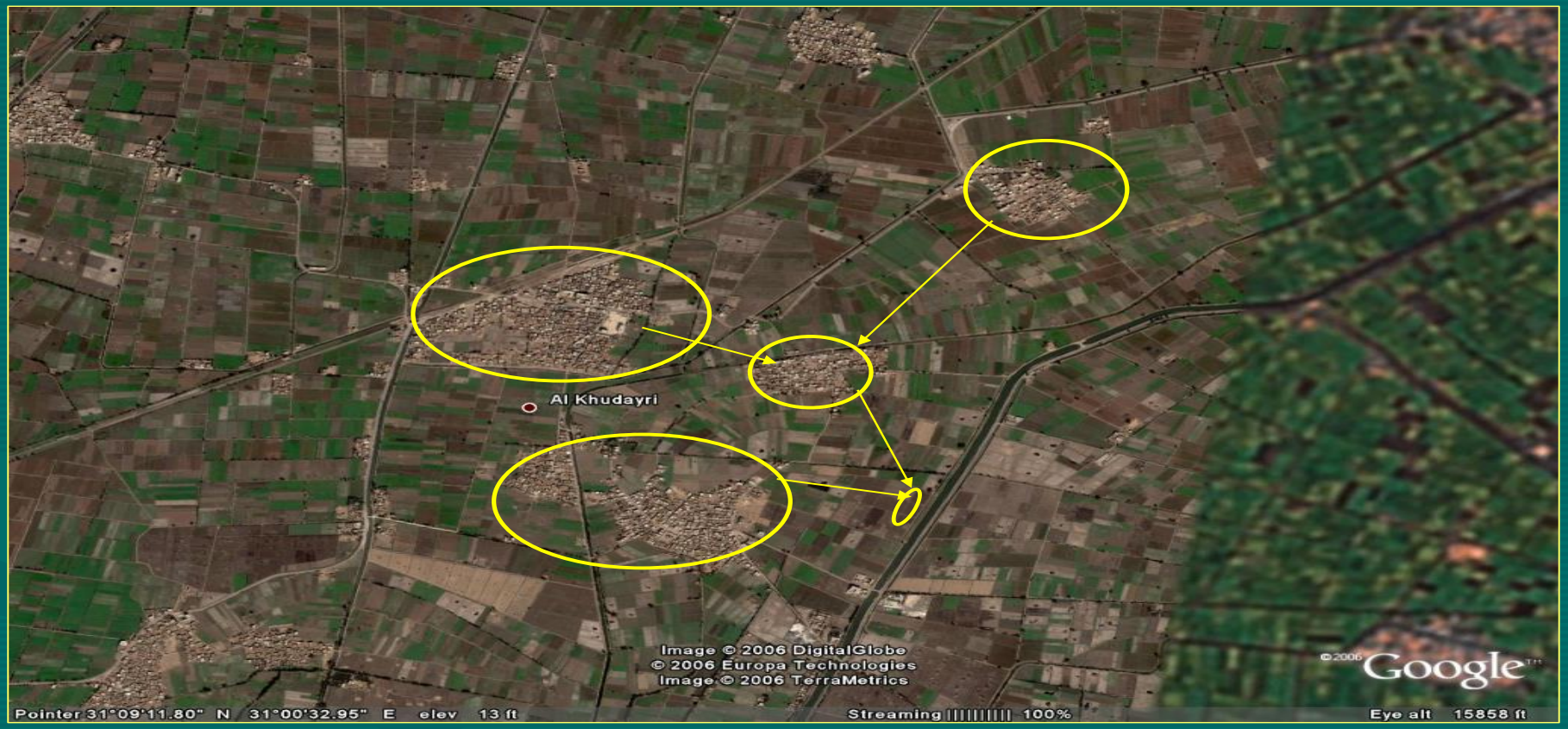
The National Rural Sanitation Strategy Consists of five Program:-

- **P 1** Developing the Institutional Framework for the Rural Sanitation Sector.
- **P 2** Scaling-up Second Rural Sanitation Infrastructure by Completing all ongoing Projects.
- **P 3** Increasing the Capacity of Existing assets to Expand Coverage and ensure access to Sanitation Services.
- **P 4** Expanding Coverage with Integrated rural Sanitation Services in all clusters Unallocated in the watershed of
- **P 5** Expanding Coverage with Integrated rural Sanitation Services in all clusters located within the watershed of main drains.

The Total Capital Investment of all NRSS Programs IS 187.4 (B EGP)

Sanitation Service Cluster

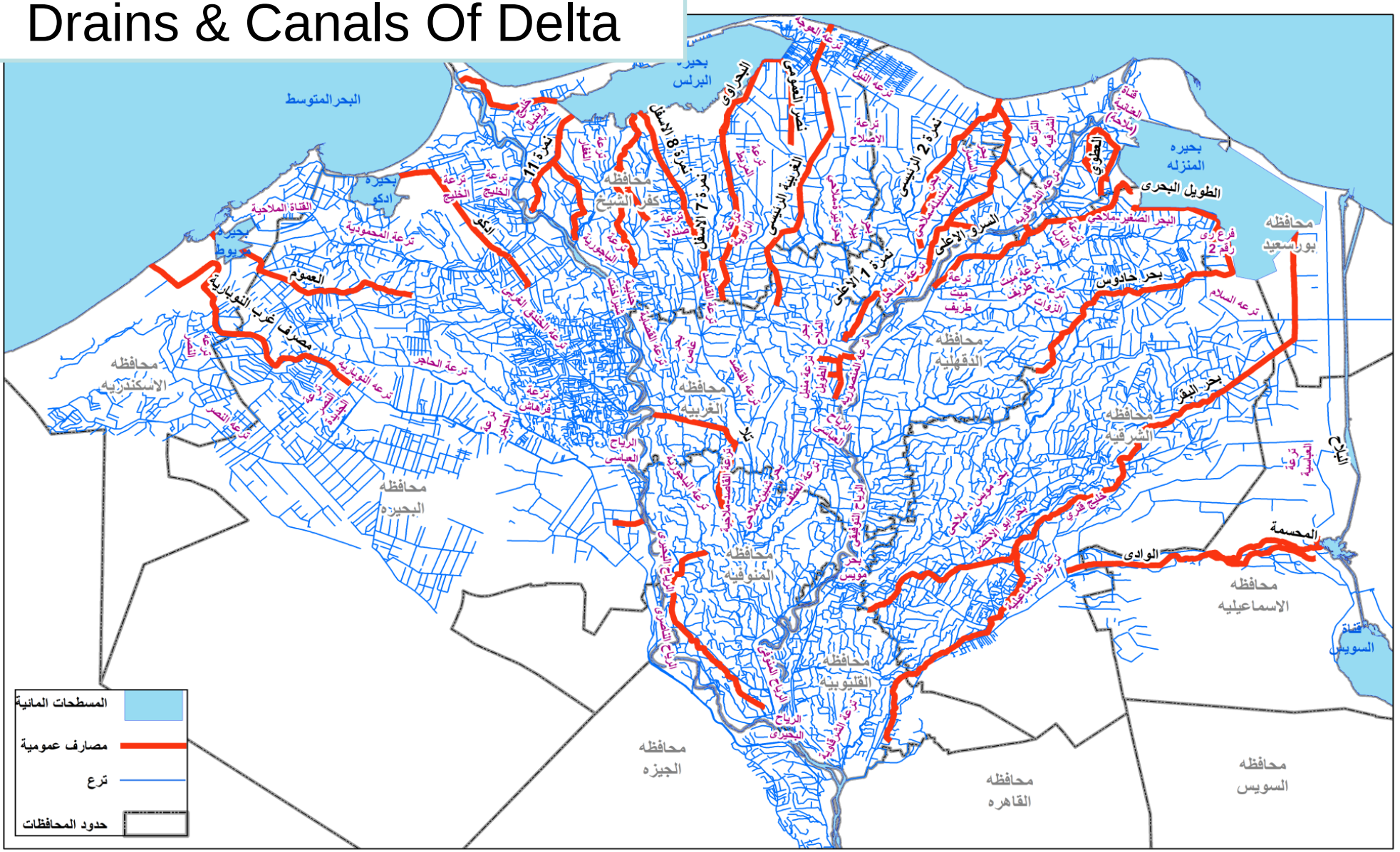
Aerial overview of a sanitation service cluster



Water Sheds

Water Sheds

Drains & Canals Of Delta



Water Sheds
Upper Egypt

Holding Company for Water and Wastewater

The Villages located in the watershed of main drains

Hados Drain (World Bank)
Dakahlia-Sharkia-Qalubia
303 villages

Elserw Drain (World Bank)
(Dakahlia-Damietta) 23 villages

Bahr Elbaar
(Arab Funds)
Sharkia-Qalubia 184 villages

Tala Drain (World Bank)
Gharbia-Monofia
78 villages

Elwady Drain(EBRD-EIB-EU)
Faiyum (118 Village+Ezba)

Mahsma Drain
(Arab Funds)
(Ismalia-Sharkia)
2villages

Sobol Drain
(World Bank)
Monofia 52 villages

Kitchener Drain(EIB-EU)
(Dakhlya-Gharbia-Kafrelshikh) 63 villages

Edko Drain
Behaira
268 villages

1,362 villages
Total population
(12,04) million

Elrahawy Drain
CAPOW
Giza-Banisouf 85 villages

West Elnobarya Drain
Behaira
43 villages

Elbats Drain(EBRD-EIB-EU)
Faiyum (118 Village+Ezba)

Elomom Drain -Behaira
25 villages

Omar Bek Drain
Gharbia-Qalubia-Monofia
51 villages

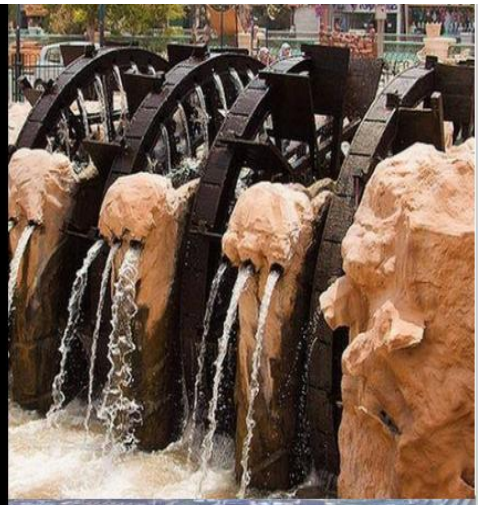
Fayoum Wastewater Expansion Program (EU-EIB-ERBD)

FAYOUM WASTEWATER EXPANSION PROGRAM

Project Implementation Support and Contract Supervision

Contract No: C43928/8119/43498

Reassessment Report

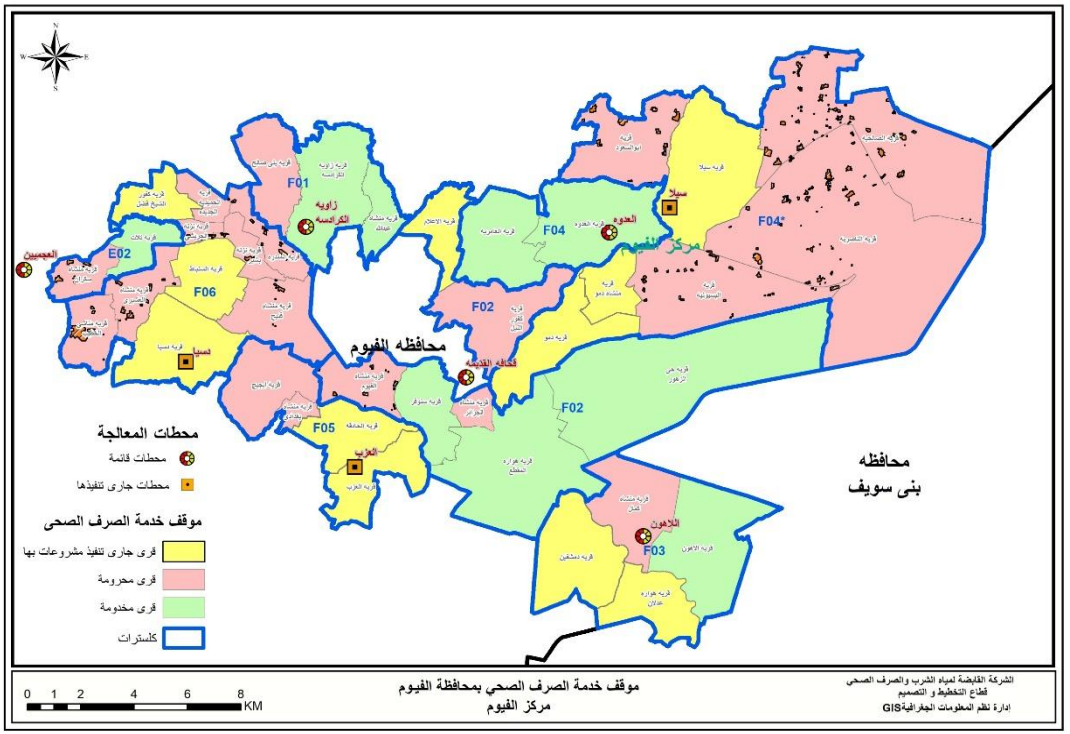


CLIENT

HOLDING COMPANY FOR WATER AND WASTEWATER (HCWW)

CONSULTANT

STANTEC IN CONSORTIUM WITH SUEZ, EGEC AND ERCC



118 (Villages + Ezba)

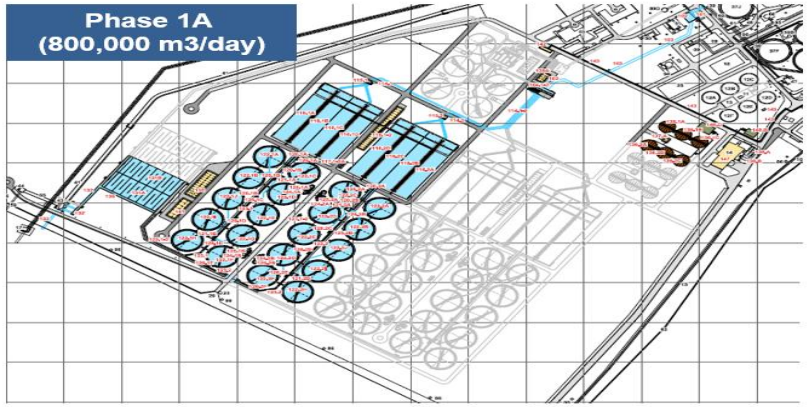
No.Of WWTPs =13

Capacities =141,000m^3/d

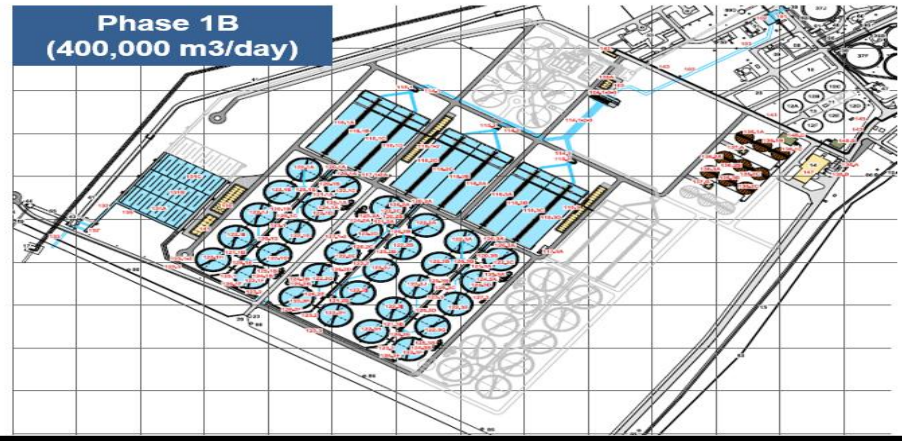
Abu Rawash Wastewater Treatment Plant
Phases 1A,1B& 2= 1.6 M m^3/d

Project Description: .I

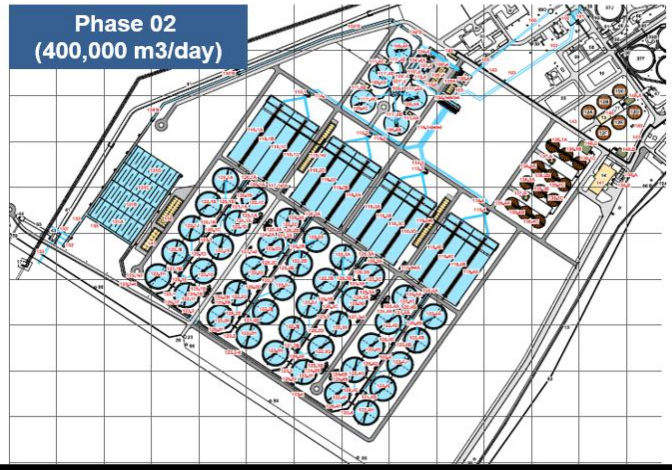
Project Phases:

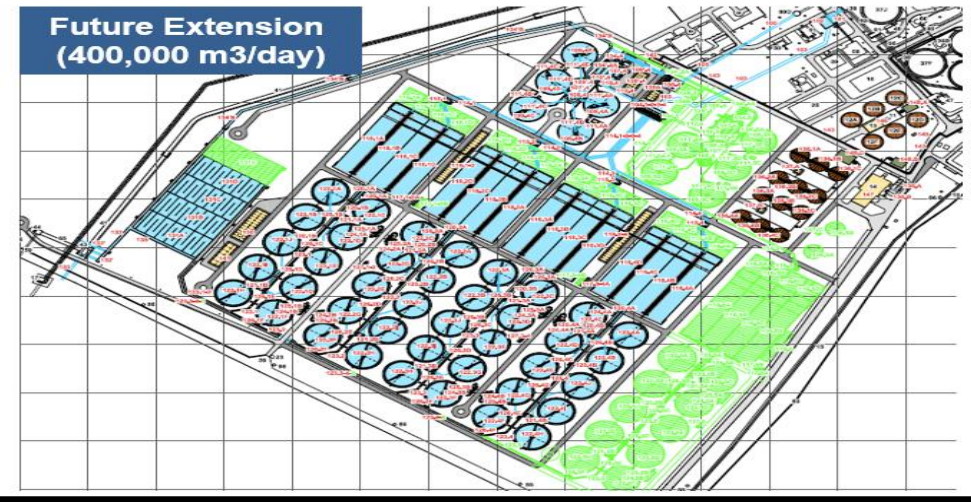


Project Phases:



Project Phases:

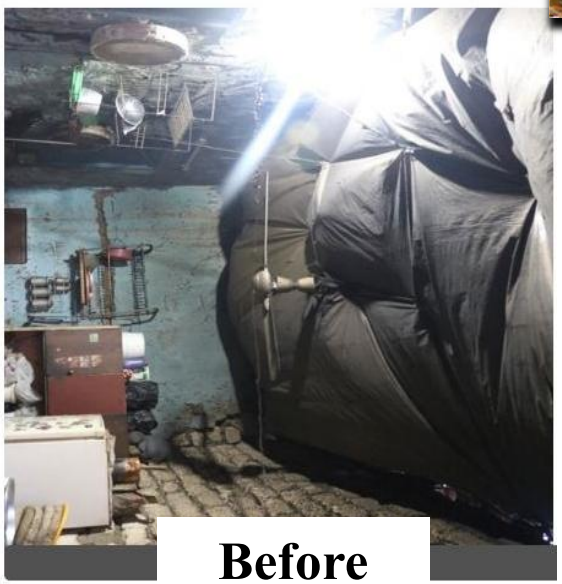




الشركة القابضة لمياه الشرب والصرف الصحى
HOLDING COMPANY FOR WATER & WASTE WATER

Presidential Initiative
Upgrading Rural Areas
(Hayah Kareema)


After


Before

Phase 1 = **27** Villages
Phase 2= **51** Districts,
1000 Villages,
56 WTPs
130 WWTPs
Total Pop=**19.635223** M
Non-Served =**12.495** M

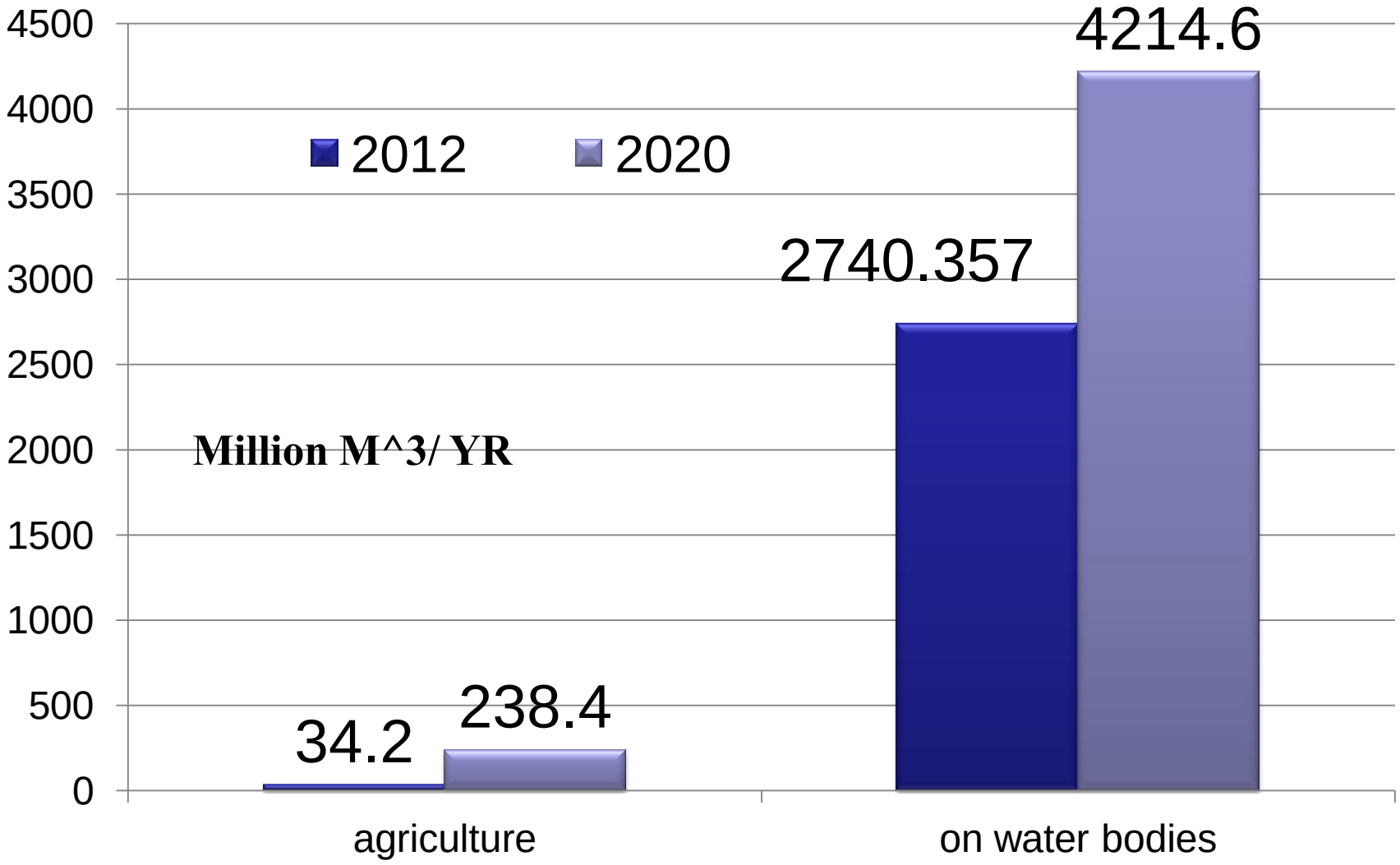
WWTPs Capacities =1.924 Million m3/d

❑ Wastewater Re-use

Agricultural Land	Quantity of treated WW	Forest area
	238.4 Million M^3/ YR	12300 fed

ON Water Bodies	4214.6 Million M^3/ YR

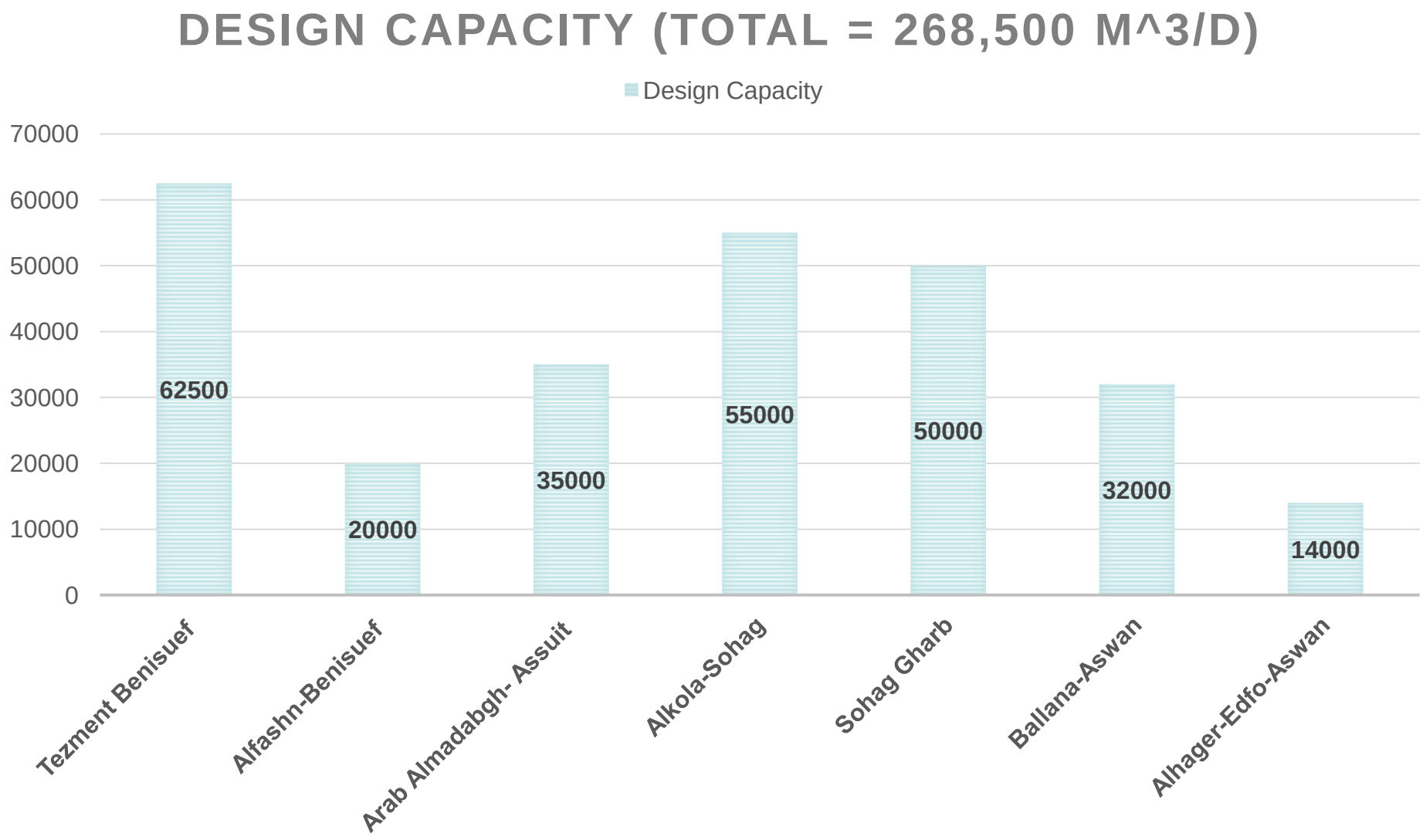
6.4 Substantially increase in water-reuse efficiency



Tertiary Waste Water Plants

49 WWTPs With Total Capacity 1450000m^3/d

Upgrading WWTPs to Tertiary Treatment



Al Mahsama Drain Treatment Plant

Capacity = 1 Million M^3/day
To irrigate 100,000 feddan
Area = 42000 m^2
Cost = 2.4 B.L.E

Bahr Albaqar Drain Treatment Plant

Capacity = 5.6 Million M^3/day
To irrigate 600,000 feddan
Area = 42000 m^2
Cost = 11 B.L.E

System Used To convey water from the drain to Treatment Plant

- ✓ ***Sludge Management** (collection, conveyance, treatment and disposal)*

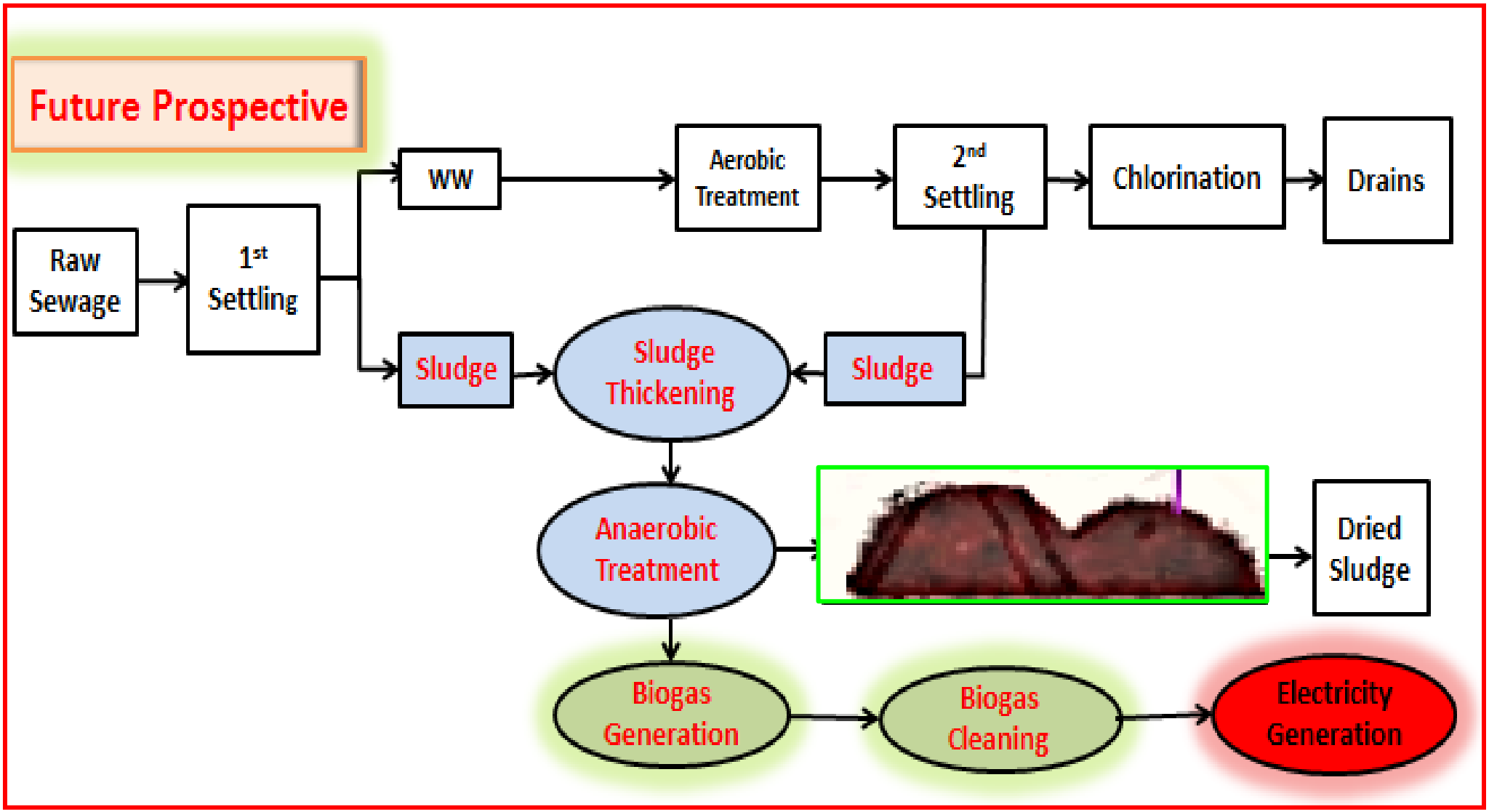
Law 48/1982 and decree 44/2000 limits for sludge reuse in agriculture

Item	Unit	Value
Zn	mg/Kg	2800
Cu	mg/Kg	1500
Ni	mg/Kg	420
Cd	mg/Kg	39
Pb	mg/Kg	300
Hg	mg/Kg	17
Cr	mg/Kg	1200
Mo	mg/Kg	18
Se	mg/Kg	36
AS	mg/Kg	41
F. Coliform	CFU/gm	1000
Salmonella	cell/100 mL [a]	3
Ascaris	cell/100 mL [b]	1

[a] at 4% solids content of sludge; [b] at 5% solids content of sludge

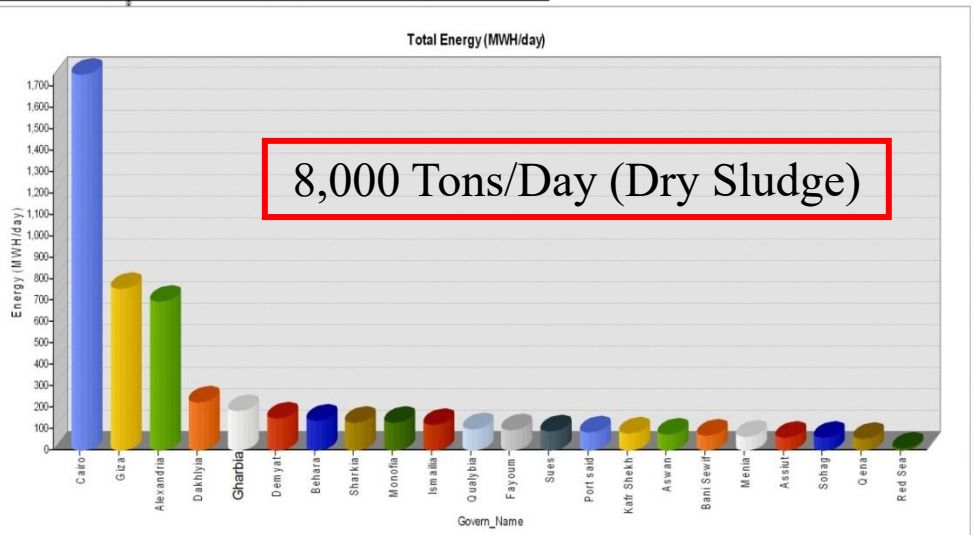
Holding Company for Water and Wastewater

Future Prospective

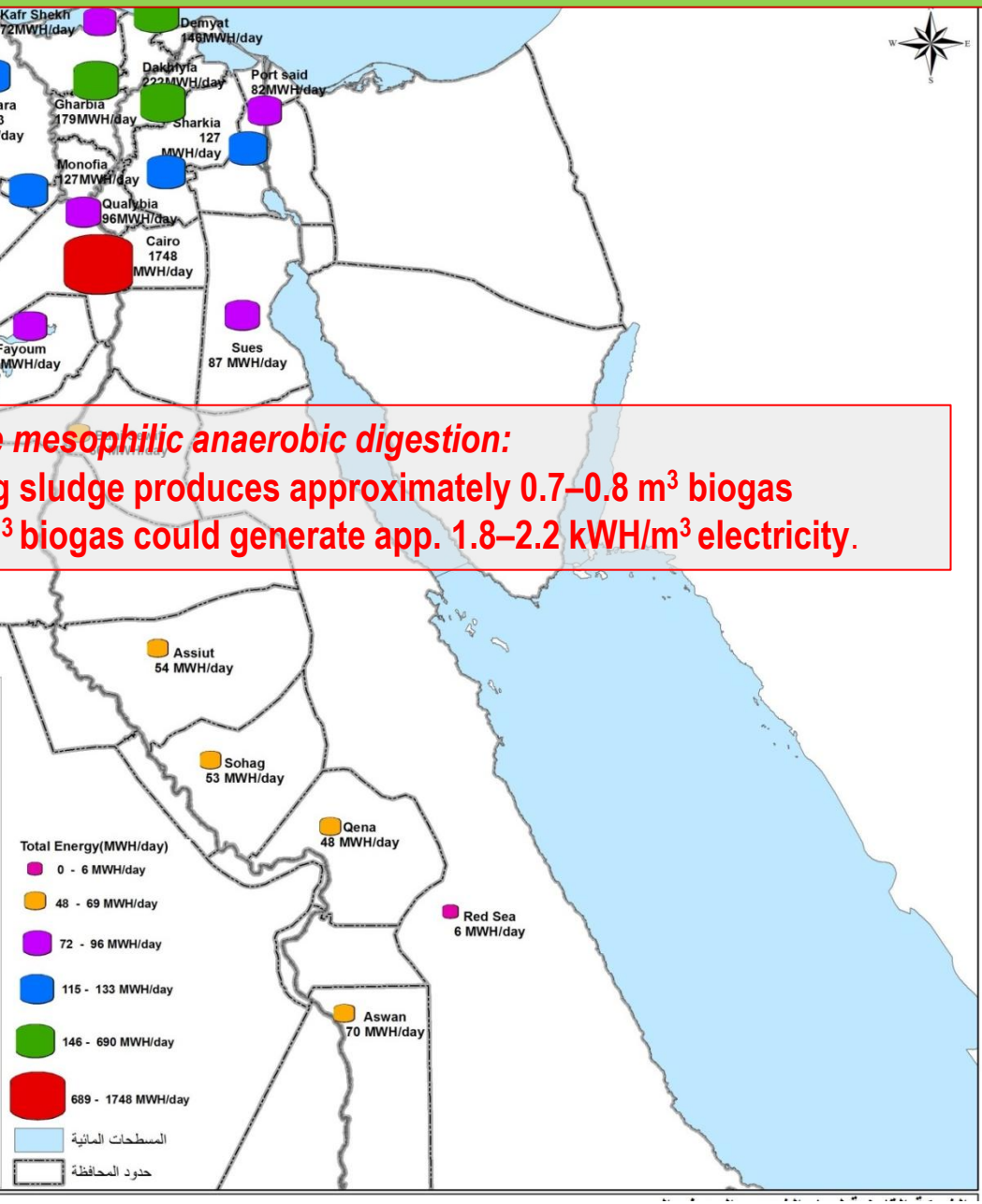


Sludge to Energy :"Green Energy Map" for Egyptian Governorates

No	Govern Name	Biogas(m3/day)	Energy (MWH/day)
1	Cairo	748860	1748.5
2	Alexandria	295316	689.5
3	Giza	328860	751.7
4	Gharbia	77028	179.8
5	Dakhlyia	95400	222.7
6	Demyat	62800	146.6
7	Behara	57204	133.5
8	Sharkia	54600	127.5
9	Monofia	54600	127.5
10	Ismailia	49392	115.1
11	Qualybia	41272	96.2
12	Fayoum	38080	88.8
13	Port said	35532	82.8
14	Kafr Shekh	31192	72.6
15	Aswan	29652	69.1
16	Bani Sewif	28280	65.8
17	Menia	2666	62.1
18	Assiut	23100	53.9
19	Sohag	22680	52.7
20	Qena	21000	48
21	Suez	37800	86.4
22	Red Sea	2520	5.8



8,000 Tons/Day (Dry Sludge)



From the mesophilic anaerobic digestion:

- 1 kg sludge produces approximately 0.7–0.8 m^3 biogas
- 1 m^3 biogas could generate app. 1.8–2.2 kWH/m^3 electricity.

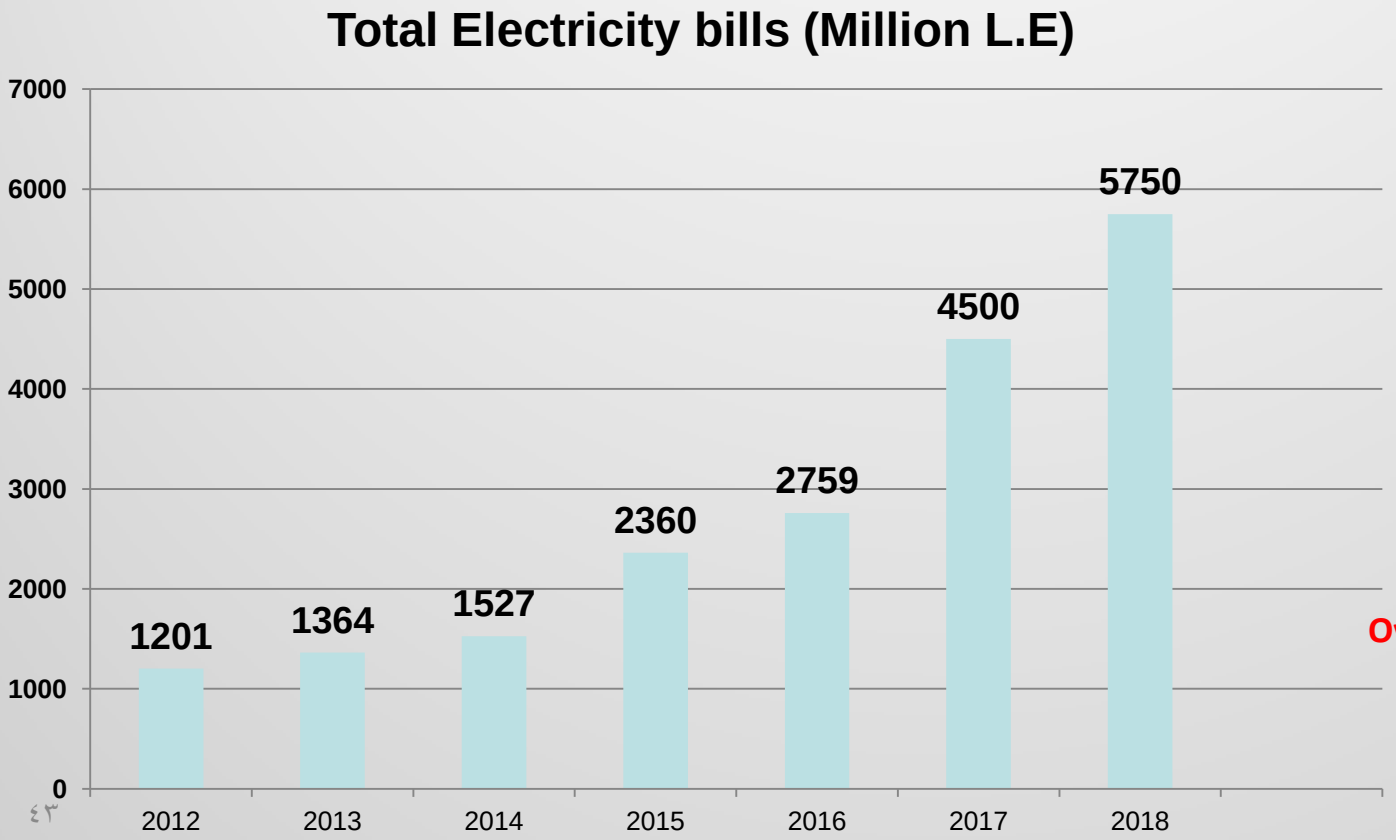
Energy Management

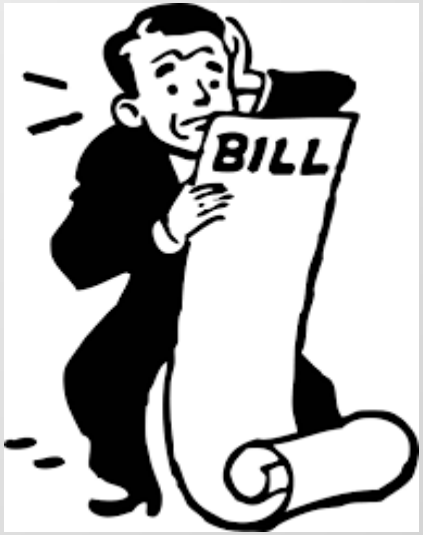
Energy Management

1. HCWW 25 AC's are consuming about **5000 GWH annually** with average rate of **600 MWH.**
2. The **electricity cost** was about **5.75 billion EGP** for last year and this cost are increasing rapidly according to change in electricity tariff.
3. **Electric demand** is expected to reach **900 MWH At 2027.**
4. Cooperation with International **donors** to optimize our energy consumption As **GIZ & WORLD BANK.**

Cost Of Electricity Consumption

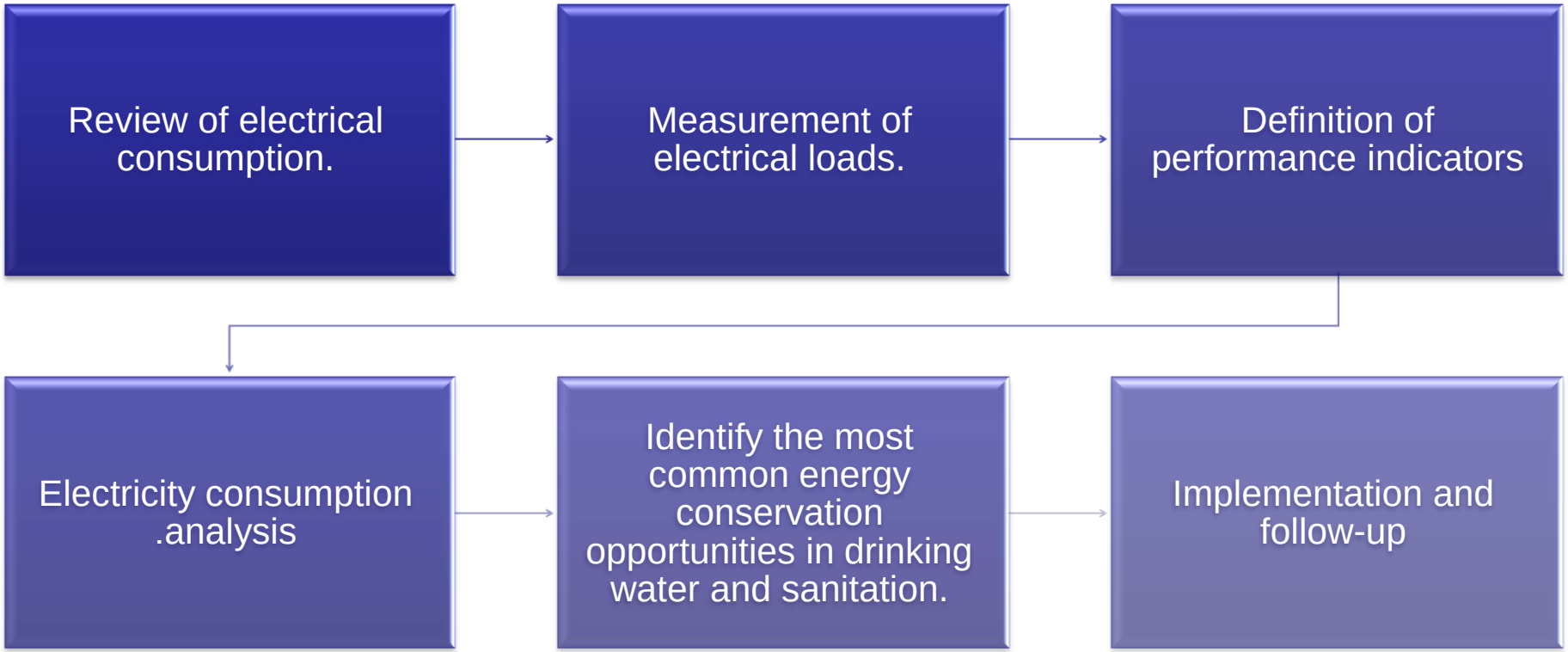
FY	2012	2013	2014	2015	2016	2017	2018
Million EGP	1201	1364	1527	2360	2759	4500	5750





Overall Increase over past 6 years 479%

Energy Management Procedures



Energy Saving Achievements

Renewable Energy (Al Gabal Alasffar)

Biogas Energy

- Existing Capacity = 2 Million m3/d, Ongoing capacity = 500,000 m3/d
- Biogas production of 5 MW at Al gabal al asfar WWTP using sludge anaerobic digester to generate electric power enough to cover about 60% of the plant electric power demand
- **Future Projects (Abu Rawash and Alex east and west)**

Renewable Energy (Sakha WWTP)

شركة مياه الشرب
والصرف الصحي بكفر الشيخ
kfscww.com

Energy Saving Achievements

Renewable Energy (Sakha WWTP)

Biogas Energy

- Biogas production of 1 Mega (500KW) in its first phase , with cooperation with private sector (IM power company) using sludge anaerobic digester in **Sakha WWTP with capacity of 90000 m3/d.**
- **Feeding Tariff structure**

Energy Saving Achievements

Renewable Energy

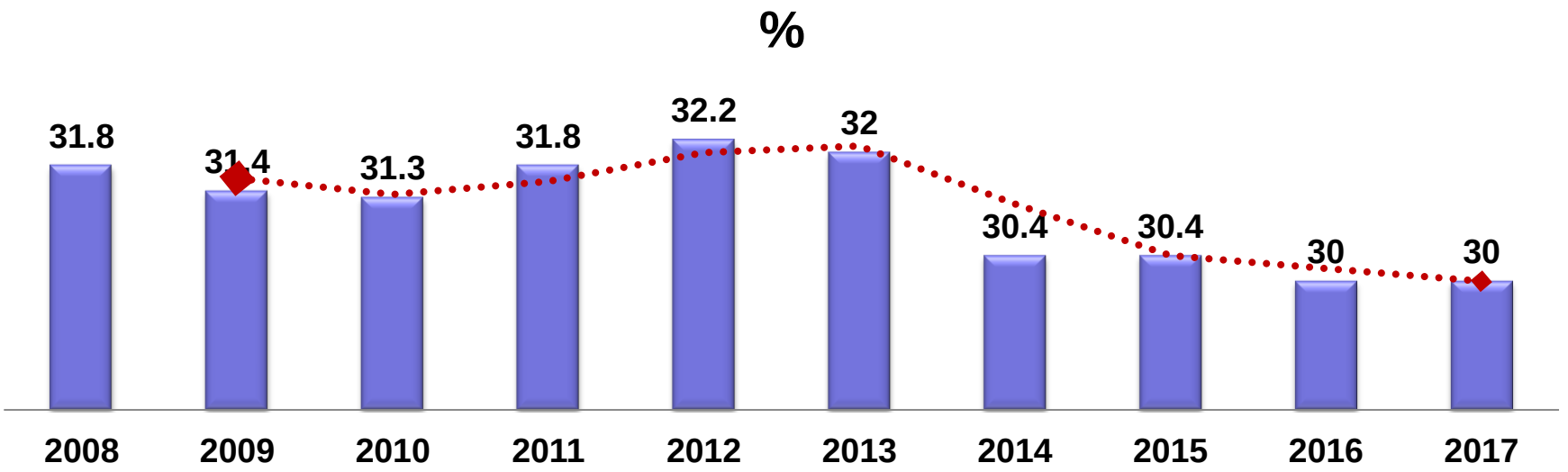
Solar Energy

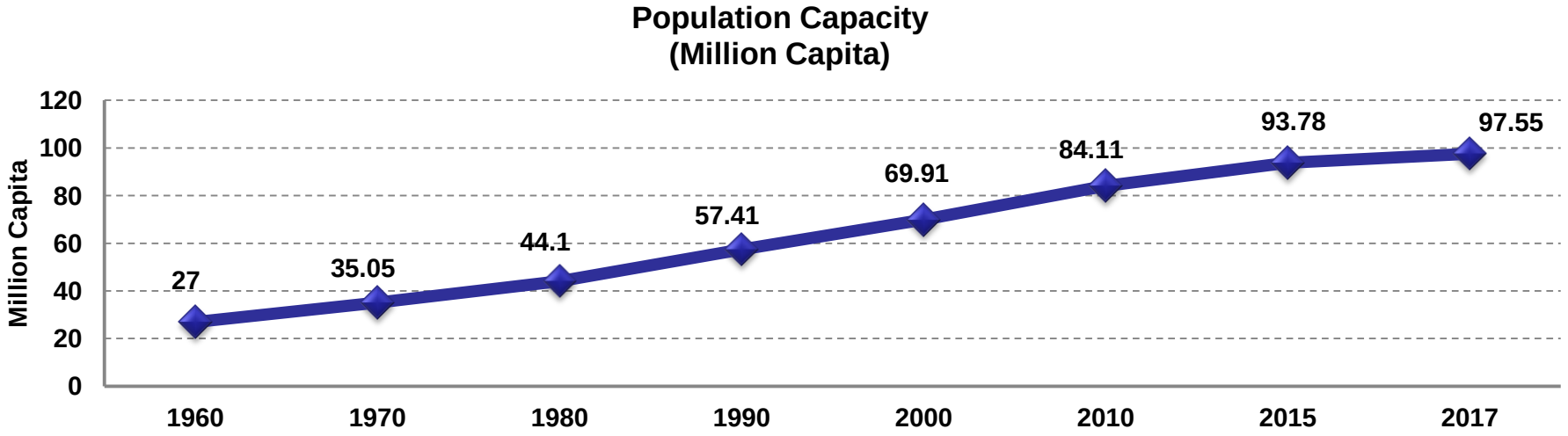
- Solar panels of 60 KW is installed at **Alexandria water company.**
- Solar panels of 23KW are to be installed at **Menofiya AC.**
- **For water** Shalatten,Northen Sinai,Matrooh&Northwest Coast

✓ *Reduction Of Non Revenue Water.*

Non Revenue Water Reduction in Egypt

Annual Loss Percentages

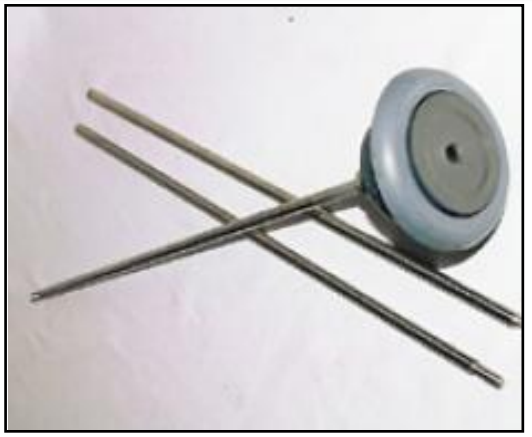




Leakage Detection Instruments

Ground Microphone

Cover Locator

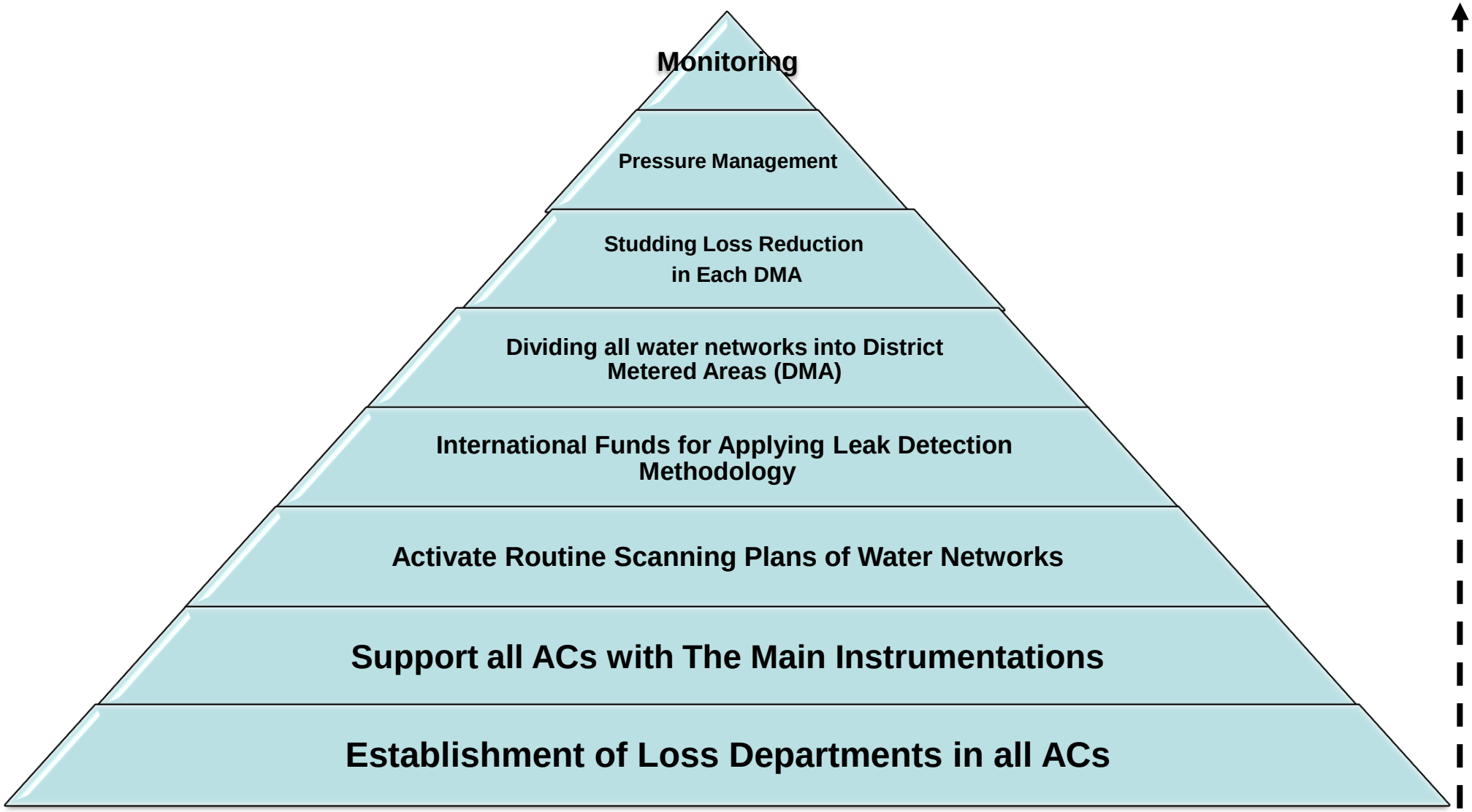


listening stick

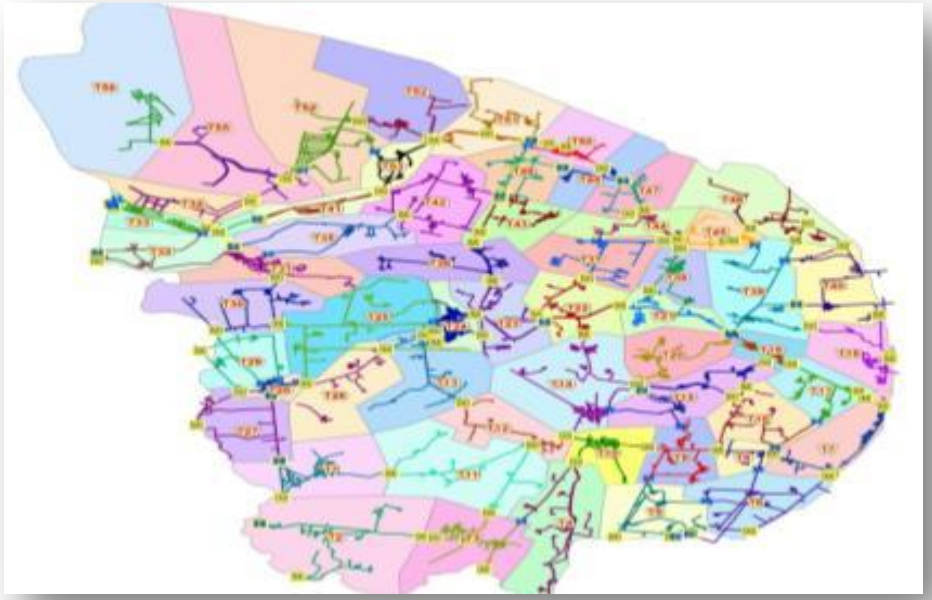
Pipe Locator

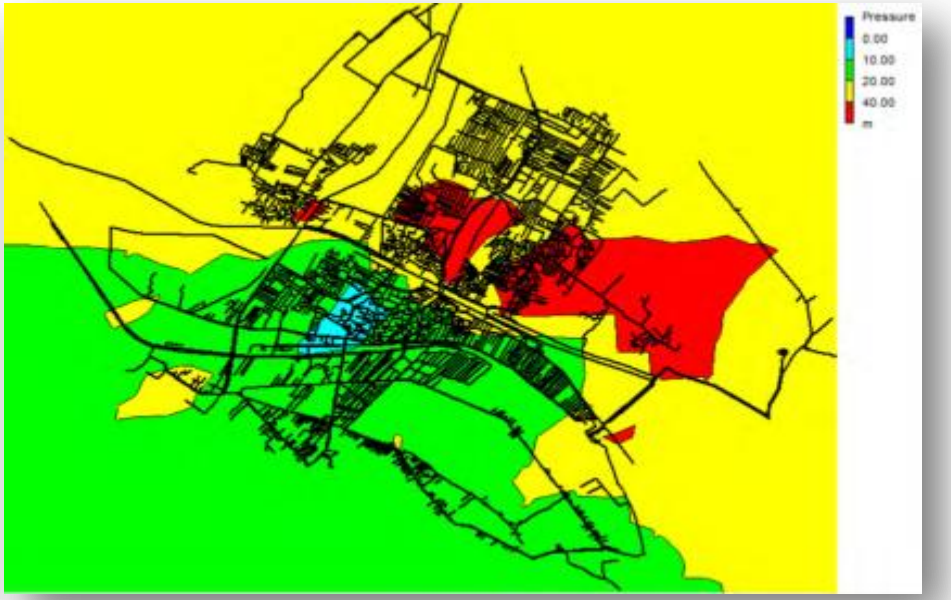
Correllator

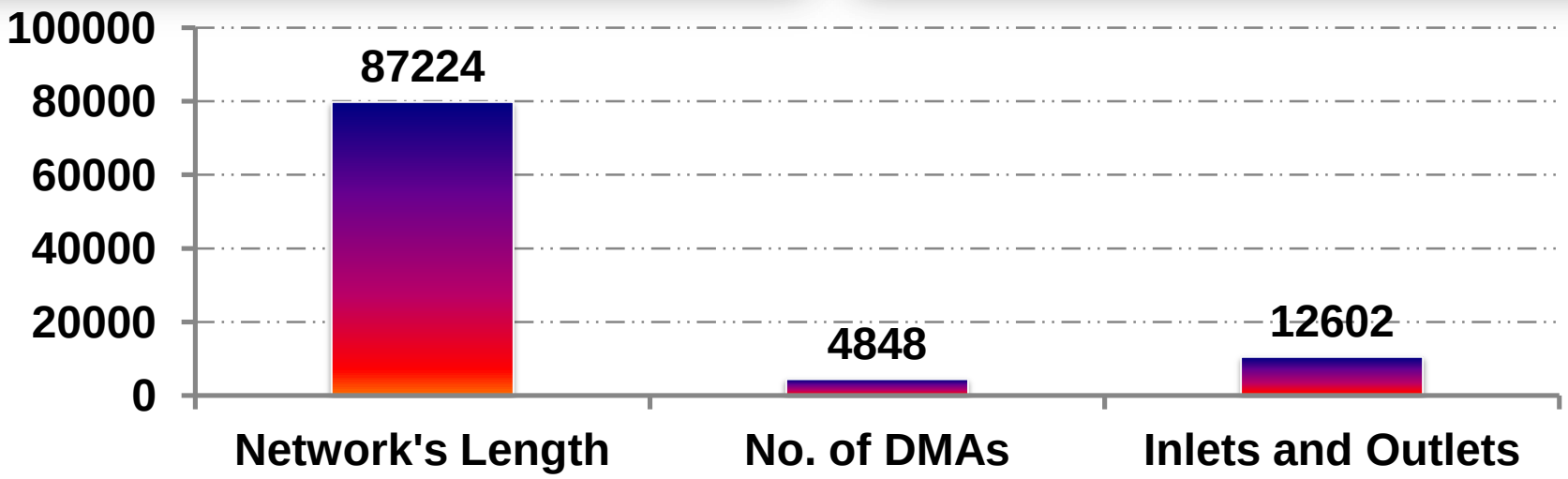
Development of Real Loss Reduction Strategy



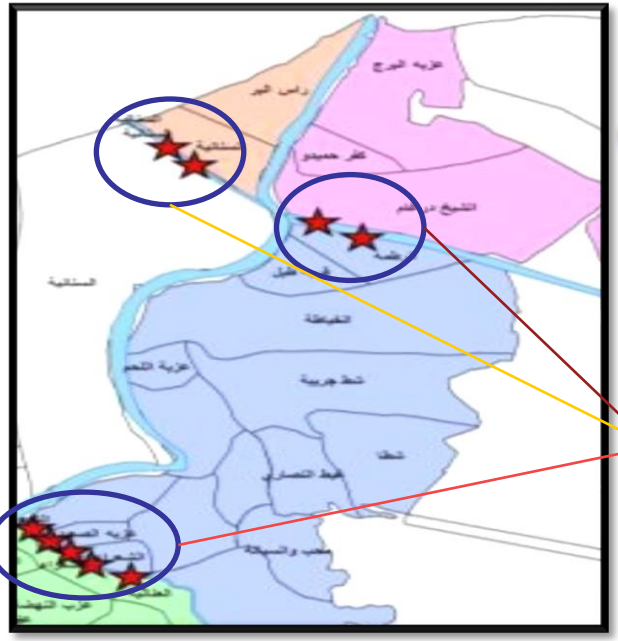
Division of water Networks into DMAs



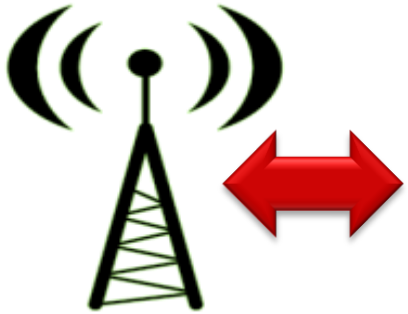


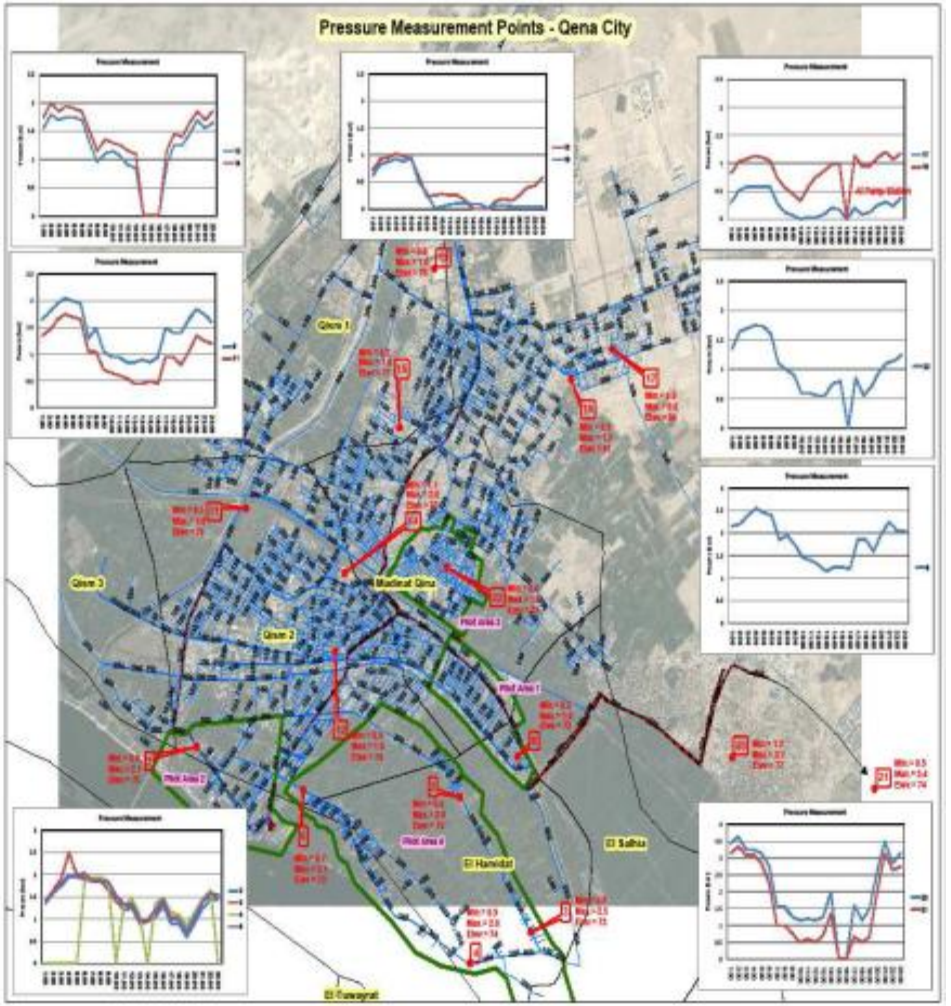


Measurements Meters and Remote Monitoring System



GSM
Modem





Technical Sustainable Management

Technical Sustainable Management

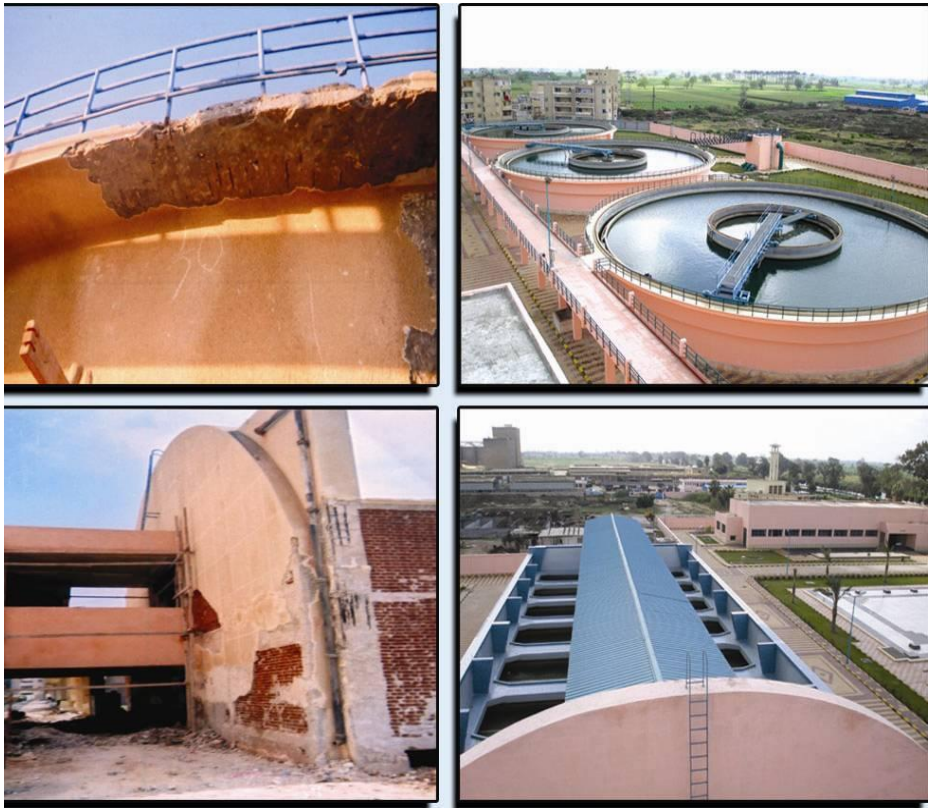
TSM (Technical Safety Management) – is a system originally developed by the DWA & DVGW (German Water/Gas Associations) to support German Utility companies in meeting their regulatory obligations

to support the Egyptian Water Sector to meet all its regulatory obligations in a wider range of operational aspects we call our system:

TSM Egypt (Technical Sustainable Management) – with a wider focus of O&M, occupational health & safety (OHS), quality assurance/quality control and human resource management (HRD) at plant level

Technical Support

- **175 plants have a TSM certificate**



- **Replacement and Renovation**
  - **Continuous replacement and renovation program for W&WWTPs and networks**

Certificate

For the Achievement of
Egyptian Technical Sustainable Management requirements
TSM Egypt
of Potable Water / Wastewater Treatment Plants
From March 2015 to March 2017

It is hereby certified that the

El-Towirat Water Treatment Plant

operated by the

Qina Company for Water and Waste Water

has successfully fulfilled the TSM Egypt requirements that cover

- Human Resources
- Occupational Health and Safety
- Operation
- Maintenance
- Quality Assurance and Quality Control

Inspected by — Chem. Wael Talaat, TSM Egypt Inspector

Inspected by — Eng. Fady Kamal, TSM Egypt Inspector

Inspected by — Eng. Amr Adel, TSM Egypt Inspector

Issued by HCWW

Eng. Mamdouh Kedar
Chairman of HCWW

German Association for Water Wastewater and Waste

Zenain WWTP

Before

After

Gerga WWTP

Before

After

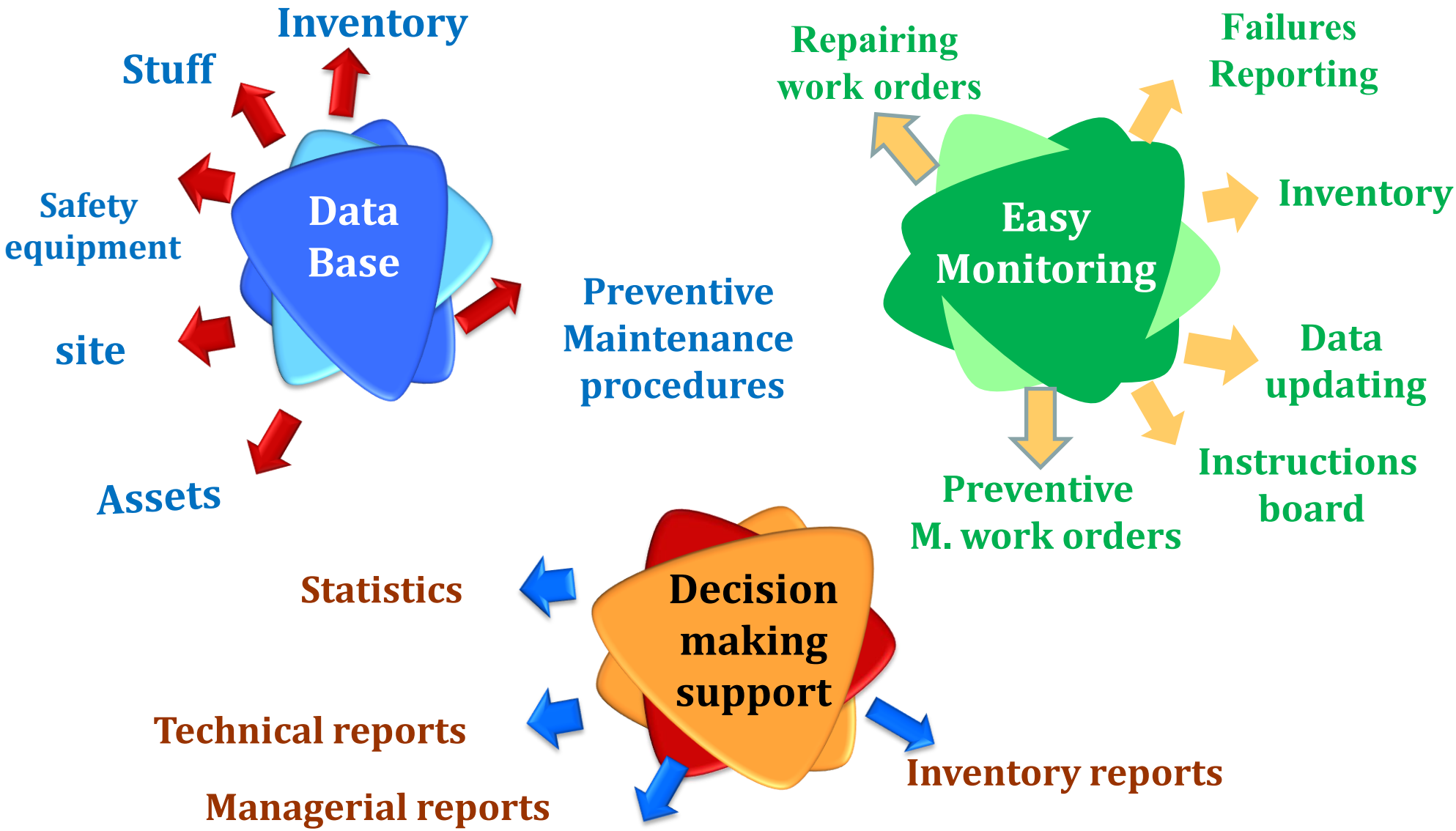
Hurgada WWTP

Before

After

(MASTER Program)

(MASTER Program) CMMS Components



Equipment Maintenance through Systematic Tracking Repair Master

Current status of applying the Master (November 2018)

No. of companies	25
No. of Water treatment plants	306
No. of Wastewater treatment plants	353
Total no. of plants	659

The program was applied through three stages:

1. Data entry
2. Printing the work orders
3. Managerial reports


Thank you
HOLDING COMPANY FOR
WATER AND WASTEWATER

Questions: