

**Integrated Urban Water Management (IUWM) to cope with Climate Change: Alexandria 2030 IUWM Strategic Plan**

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**Comparison of Traditional Water Management and IUWM**

Traditional Water Management	Integrated Urban Water Management (IUWM)
Rainwater: A curse intended to be disposed of	Rainwater: a blessing and a resource to be used
Traditional water sources: surface and groundwater	Add alternative and non-conventional water resources: rain, treated sewage, desalinated water, water demand management (rationalization of consumption), reduction of losses
Same water quality for all uses	Fit for use Water quality
Provide demand by quantity	Provide demand by quantity, quality and continuity in supply
Services focus on value	Services focus on creating value
Gray infrastructure	Gray and green infrastructure
Linear approaches to collection, processing, use and drainage	Interconnectivity approaches to reduce water and energy consumption and resource recovery and reuse
Institutions are separate	Institutions are coordinated through integrated management
Top-down planning	Engage relevant stakeholders

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**Alexandria 2030 Water Vision**

- Alexandria is a city where water resources are managed in an integrated manner, with the participation of all citizens, and these water resources are used effectively for various development purposes
- All citizens are provided with quality, sustainable and affordable domestic water supply and sanitation services (in accordance with national standards) and have a clean and healthy environment
- In 2030, Alexandria's population stabilized at about 6 million. Alexandria enjoys a dynamic and fast-growing economy with a guaranteed share of Nile water similar to that of 2007.
- Climate change tends to be more positive, with a slight rise in sea level and an increase in precipitation.

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**10 detailed studies of strategic planning**

- Groundwater Potential
- Stormwater potential
- Water Demand Management Potential
- Waste Water Reuse Potential
- Agricultural Drainage Reuse Potential
- Sea Water Desalination Potential
- Urban Water Reuse Potential
- Nile Water Availability
- Climate Change Impact
- Financial Sustainability and affordability assessment

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**Water balance of water Alexandria**

Annual Alexandria Water Balance

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**Alexandria's Water Consumption by Sector**

Alexandria's Water Consumption by Sector (%)

Sector	Consumption (%)
Residential	61.16
Commercial	11.71
Industrial	11.20
Investment	6.51
Governmental	6.73
Special Units (Discount)	0.86
Harbor	0.03
To Behira Governorate	1.80

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### Estimated Population in the Service Area in the Future Years

Service Area In the Winter	Estimates of number of inhabitants by year, (in thousands)					
	2006	2012	2017	2022	2027	2030
Alexandria	3,885	4,262	4,605	4,973	5,371	5,629
North Coast	263	308	361	218	423	466
Beheira	154	175	199	132	226	245
<b>Total</b>	<b>4,235</b>	<b>4,679</b>	<b>5,088</b>	<b>5,533</b>	<b>6,020</b>	<b>6,340</b>

  

Service Area in the Summer	Estimates of number of inhabitants by year, (in thousands)					
	2006	2012	2017	2022	2027	2030
Alexandria	5,110	5,608	6,089	6,548	7,073	7,411
North Coast	408	478	560	338	447	640
Beheira	154	175	199	132	226	245
<b>Total</b>	<b>5,580</b>	<b>6,170</b>	<b>6,742</b>	<b>7,307</b>	<b>7,746</b>	<b>8,296</b>

### 2030 IUWM Strategic Options

Code	Options	Maximum potential savings/fully I/MCM	Unit cost (P/\$/m <sup>3</sup> )
DM1	Water saving through reuse	26	0.08
DM2	Toilet replacement program	6	0.53
DM3	Tourist & commercial audit & retrofit	30	0.11
DM4	Government buildings audit & retrofit	41	0.08
DM5	Industrial customers efficiency improvement	34	0.06
DM6	System leakage reduction	58	0.02
DM7	Turf roll-outs	57	0
DM8	Agricultural efficiency offsets	75	0.01
DM9	Appliance efficiency regulation	21	0.02
S1	Seawater Desalination	777	1.15
S2	ETP and WTP wastewater reuse for industry	32	0.6
S3	Agriculture drainage desalination & reuse	62	0.03
S4	ETP and WTP wastewater reuse for agriculture	63	0.48
S5	Groundwater for green space irrigation	18	0.48
S6	Local wastewater reuse for new developments	37	0.4
S7	Rooftop water harvesting	14	1
S8	Road water harvesting	25	1.1
S9	Greywater reuse	23	1.6

### Demand for Water in the Present and Future

2010	2030		
	Business as Usual	Business as Usual	Business as Usual
Total Produced Water	847,343,750	855	1,338
Total Produced Water	656,300,000	658	825
Population	4,500,000	6,540,000	8,296,000
	Consumption	Consumption	Consumption
	%	%	%
Residential	61.26	57.8	55.38
Industrial	11.2	10	10
Commercial	13.73	13.73	13.73
Investment	6.52	7.1	7.1
Governmental	6.73	6.73	6.73
Marine	0.03	0.03	0.03
Special Units (Resort)	0.86	0.86	0.86
Un-Sector Government	1.8	1.8	1.8
Total	100	100	100
Water Lost	36	36	36
Total	93.9	93.9	93.9

### 2030 IUWM Strategic Options

Code	Options	Water saved or supplied in 2030 (Mm <sup>3</sup> /a)	Unit cost (P/\$/m <sup>3</sup> )	Total Cost (US\$)	Sort by favorable unit cost per cubic meter
DM7	Turf roll-outs	57	0	0	1
DM6	System leakage reduction	58	0.02	1,150,000	2
DM9	Appliance efficiency regulation	21	0.02	420,000	3
DM5	Industrial customers efficiency improvement	34	0.06	2,040,000	4
DM1	Water saving through reuse	26	0.08	2,080,000	5
DM4	Government buildings audit & retrofit	41	0.08	3,280,000	6
DM3	Tourist & commercial audit & retrofit	30	0.11	3,300,000	7
S6	Local wastewater reuse for new developments	37	0.4	14,800,000	8
S5	Groundwater for green space irrigation	18	0.48	8,640,000	9
S1	ETP and WTP wastewater reuse for industry	32	0.6	19,200,000	10
S3	Agriculture drainage desalination & reuse	62	0.03	1,900,000	11
DM2	Toilet replacement program	6	0.53	3,180,000	12
S7	Rooftop water harvesting	14	1	14,000,000	13
S8	Road water harvesting	4	1.1	4,400,000	14
DM8	Agricultural efficiency offsets	75	0.01	750,000	15

### 2030 IUWM Strategic Options

Code	Options	Water saved or supplied in 2030 (Mm <sup>3</sup> /a)	Unit cost (P/\$/m <sup>3</sup> )	Total Cost (US\$)	Sort by favorable unit cost per cubic meter
S8	Road water harvesting	21	1.1	23,100,000	14
S1	Seawater desalination	777	1.15	893,550,000	15
S9	Greywater reuse	23	1.6	36,800,000	16
Total		821		953,450,000	

  

Code	Options	Water saved or supplied in 2030 (Mm <sup>3</sup> /a)	Unit cost (P/\$/m <sup>3</sup> )	Total Cost (US\$)	Sort by favorable unit cost per cubic meter
DM8	Agricultural efficiency offsets	75	0.01	750,000	17
S4	ETP and WTP wastewater reuse for agriculture	63	0.48	30,240,000	18
Total		138		30,990,000	

### Meeting the expected demand for water in Alexandria until 2030

- DM1 Water saving through reuse
- DM2 Toilet replacement program
- DM3 Tourist & commercial audit & retrofit
- DM4 Government buildings audit & retrofit
- DM5 Industrial customers efficiency improvement
- DM6 System leakage reduction
- DM7 Turf roll-outs
- DM8 Agricultural efficiency offsets
- DM9 Appliance efficiency regulation
- S1 Local wastewater reuse for new developments
- S2 Groundwater for green space irrigation
- S3 Agriculture drainage desalination & reuse
- S4 ETP and WTP wastewater reuse for agriculture
- S5 Rooftop water reuse
- S6 Seawater desalination
- S7 Road water harvesting
- S8 Greywater reuse
- S9 Seawater desalination
- S10 Seawater desalination

