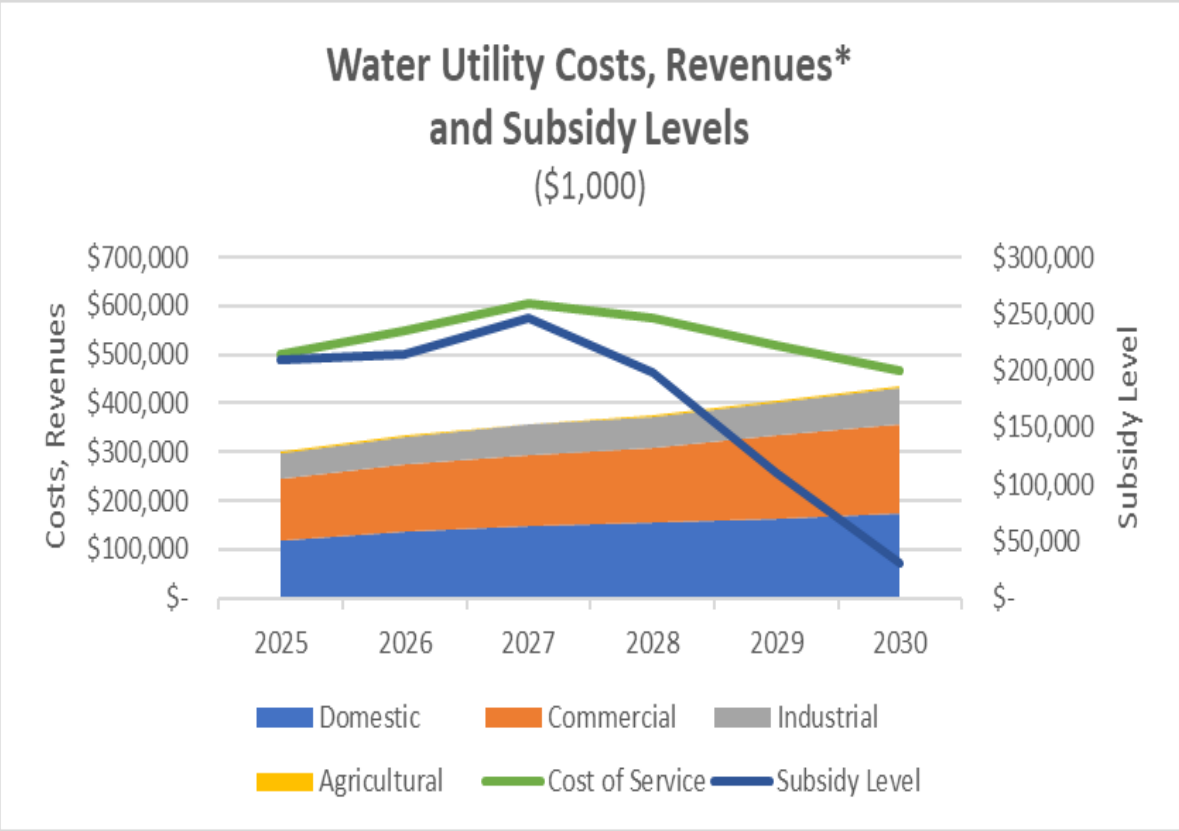
Seven-Step Utility Tariff-Setting Process for Sustainability

Elliott Tanos – May 2025

Objective

The objective is to establish regulatory accounting frameworks and utility tariff-setting processes that will methodically and progressively decrease subsidies, bolster financial sustainability, improve operational efficiency, and draw in capital investment, all while safeguarding the most at-risk households from the social impacts of tariff changes.



*Urban utility focus

Key Takeaways

- An effectively structured utility tariff-setting *process* that fosters ongoing improvements is essential to build financial strength, enhance operational performance, and attract capital investment.

- Over time, a data-driven utility ratemaking process will contribute to building trust in the regulatory framework among consumers and investors, thereby attracting private investment in the utility sectors.

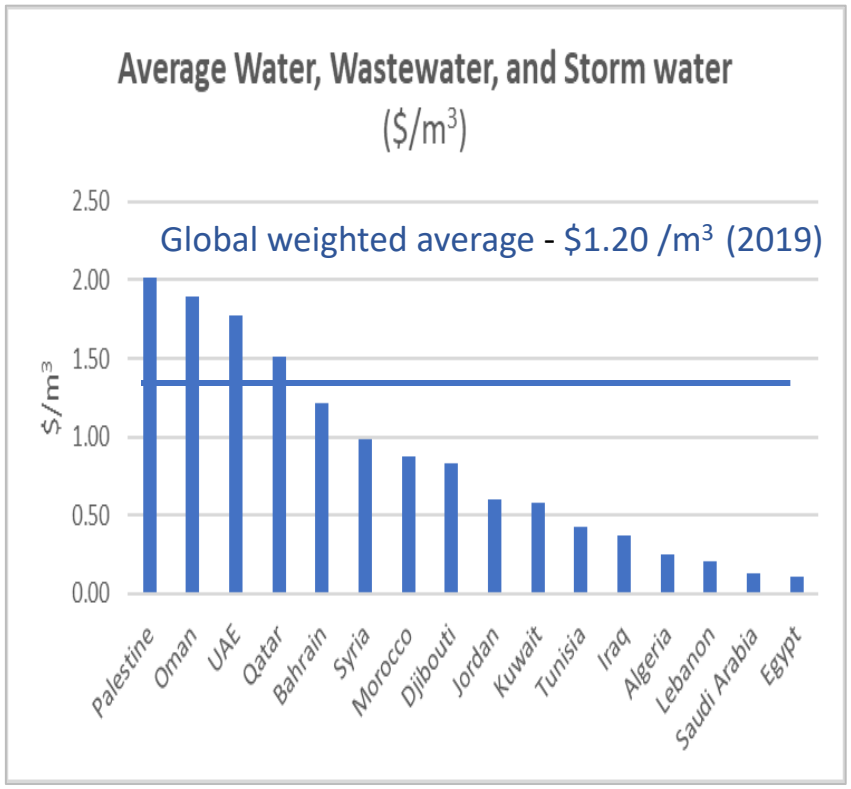
- Appropriate utility pricing in the water, wastewater, electricity, and natural gas industries, along with the pricing of watershed resources, is vital for the effective use and preservation of the country's resources.

- Carefully designed safety-net benefits will safeguard the most vulnerable households from the social impact of tariff reform.

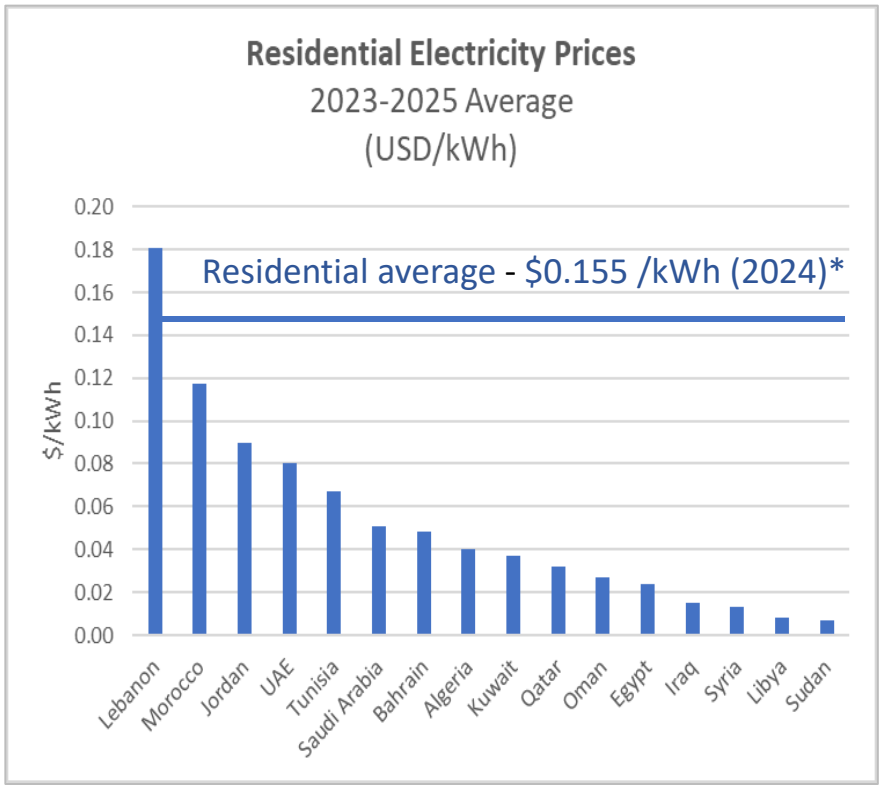
- Engaging stakeholders and implementing a thorough communication strategy is essential for the success of tariff reform.

Utility Tariff Context

Utility Tariff Comparison



Source: Global Water Intelligence, *Annual Global Water Tariff Survey*, September 2019. Several countries, including Jordan and Egypt, have increased WSS tariffs since this survey.

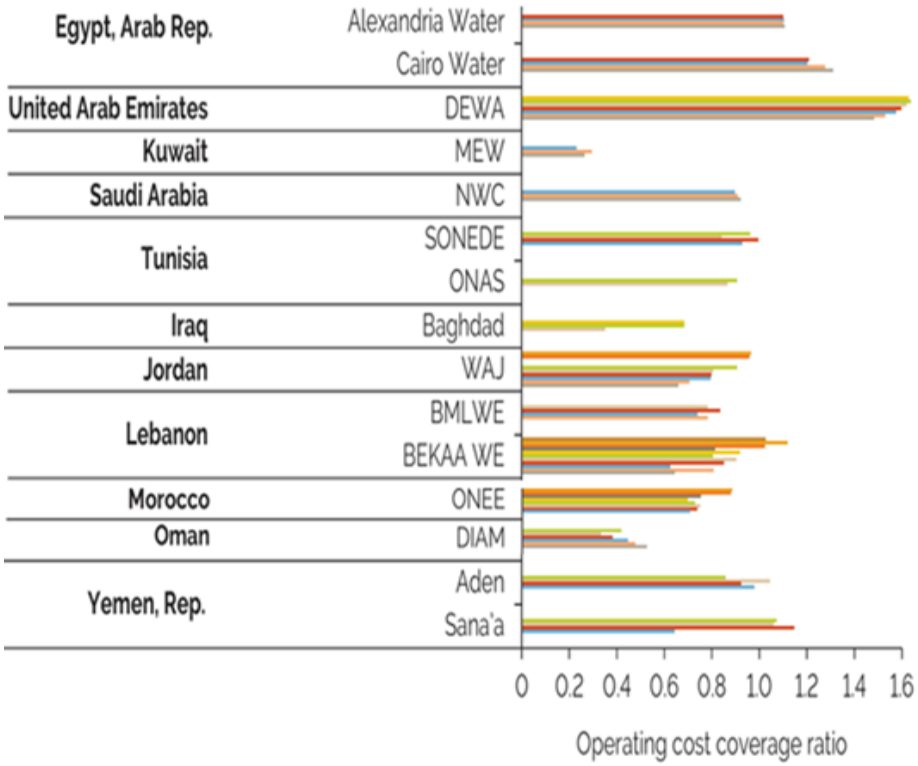


Source: Globalpetroprices.com, 2025.
* AI generated.

Significant progress has been achieved, yet obstacles persist

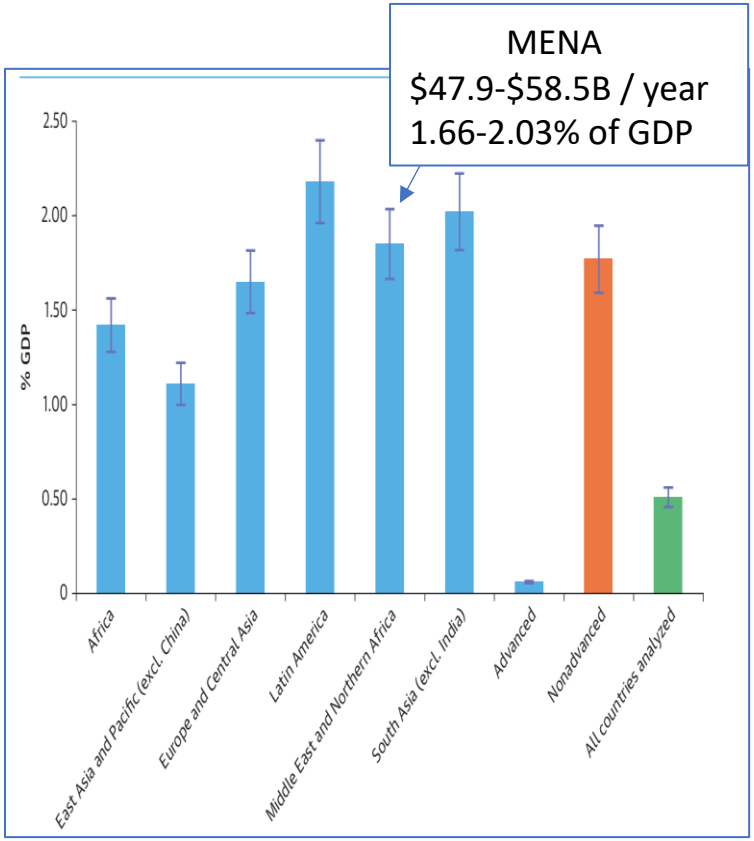
Massive subsidies are depleting resources

Operating Cost Coverage Ratio



World Bank, *The Economics of Water Scarcity in the Middle East and North Africa*, 2023.

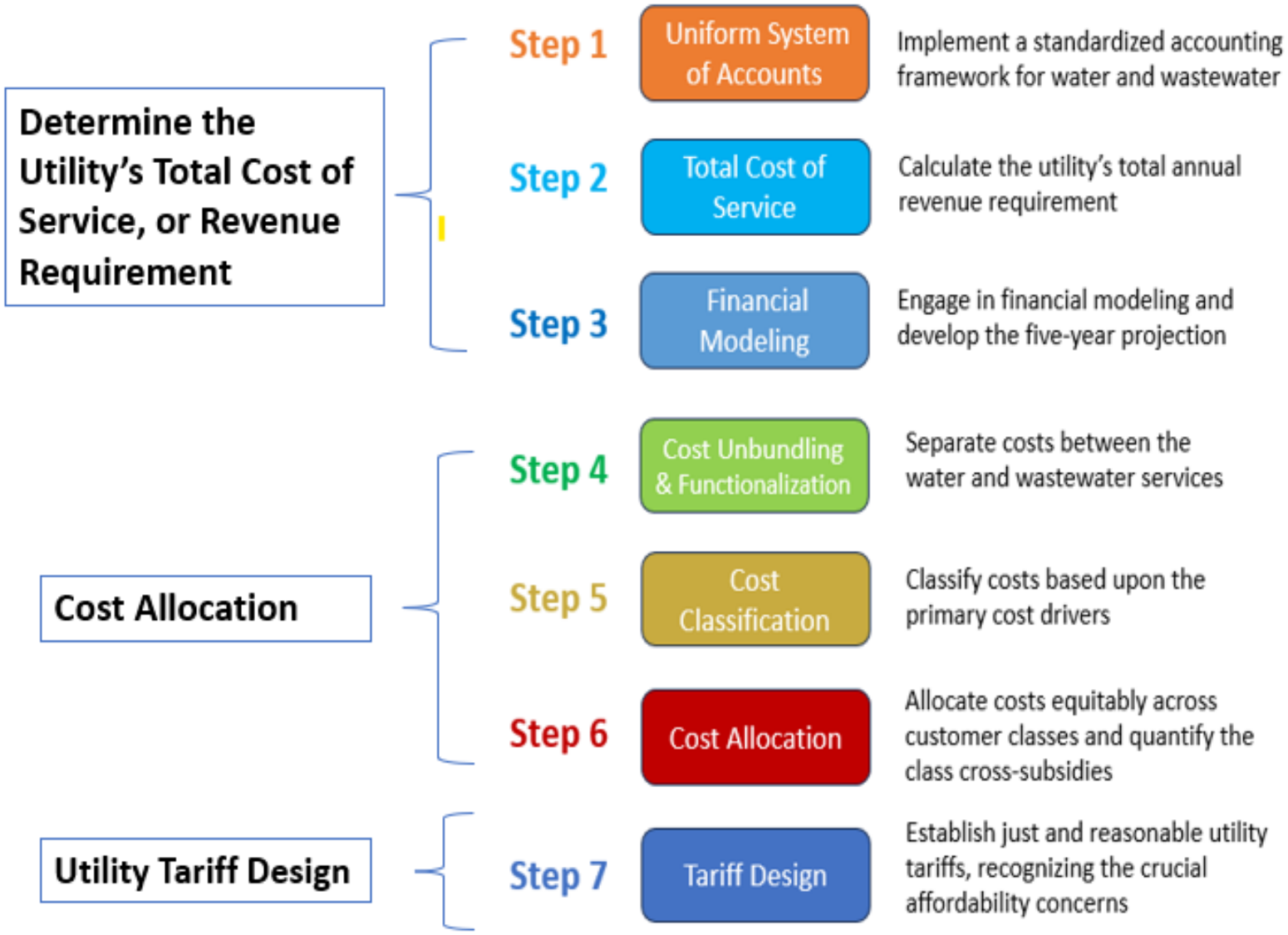
Magnitude of WSS Subsidies by Region



World Bank, *Doing More With Less, Smarter Subsidies for Water Supply and Sanitation*, 2019.

Seven-Step Utility Tariff-Setting Process

Seven Step Utility Tariff-Setting Process



Step 1

Uniform System of Accounts

Implement a standardized accounting framework for water and wastewater

National Association of Utility Regulatory Commissioners (NARUC)

Uniform Systems of Accounts (USOA) for Water and Wastewater Utilities

NARUC USOA Structure

Water

Account Number	Description
100-199	Assets and Other Debits
200-299	Equity, Liabilities, & Other Credits
300-399	Water Plant Accounts
400-489	Income, Retained Earnings, Operating Revenues
600-699	Water Operation and Maintenance Expense

Waste-Water

Account Number	Description
100-199	Assets and Other Debits
200-299	Equity, Liabilities, & Other Credits
350-399	Wastewater Plant Accounts
400-439	Income, Retained Earnings
500-549	Wastewater Operating Revenues
700-799	Wastewater Operation and Maintenance Expense

Example of NARUC USOA

Plant Account 331: Water Transmission and Distribution Mains

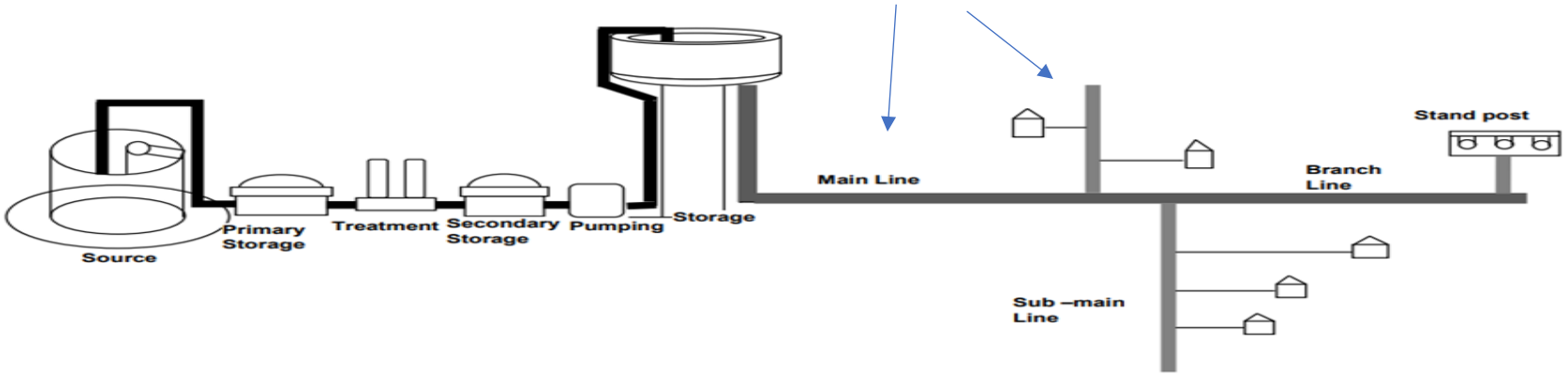
Transmission and Distribution Mains

This account shall include the cost installed of transmission and distribution mains and appurtenances.

The major MIS providers have extensive experience implementing USOA.

.Items to be included in this account:

1. Air chambers
2. Blow-offs and overflows
3. Bridges and culverts
4. Manholes
5. Pipes, Fire mains
6. Pavement disturbed…



Benefits of Using the Uniform System of Accounts (USOA)*

- Comparability
- Financial Reporting
- Regulatory Reporting
- Internal management
- External financing requirements
- Consistency
- Effective Regulation

* *Please also see* the American Public Power Association, *Public Utility Accounting, A Public Power System's Introduction to the Federal Energy Regulatory Commission Uniform System of Accounts*, 2018.

Step 2

Total Cost of Service

Calculate the utility's total annual revenue requirement

Definition of Total Revenue Requirement

The total revenues a utility is authorized to collect through its rates for its various types of service is called the **total revenue requirement**, or the total cost of service.*

The total revenue requirement is determined for a period of time, typically a one-year period (known as a test year or test period).

* NARUC, *Electricity Cost Allocation Manual*, 1992.

Two Basic Formats for Determining the Total Annual Revenue Requirement*

- **Cash Needs Approach**
- **Utility Basis Approach**
  (RAB or Rate Base / Rate of Return)

* American Water Works Association, *Principles of Water Rates, Fees, and Charges*, Sixth Edition, 2012.
* Water Environment Federation, Financing and Charges for Wastewater Systems, 2004.

Examples of Cash Needs and Utility Basis Approaches

Line No.	Item	Government-Owned Utility: Cash-Needs Approach	Government-Owned Utility: Rate Base/ ROR Approach	Investor-Owned Utility: Rate Base/ ROR Approach
1	**O&M Expense**	$6,837	$6,837	$6,837
2	**Debt Service**	2,580		
3	**Debt-Service Reserve**	180		
4	**Capital Improvements**	1,141		
5	**Depreciation Expense**		1,242	1,242
6	**Other Taxes**			1,080
7	**Income Taxes**			1,150
8	**Return (Operating Income) ***		2,623	3,325
9	**Other Operating Revenues**	(78)	(78)	(78)
10	**Nonoperating Revenues**	(159)		
11	**Net Balance From Operations**	123		
12	**Total Revenue Requrements from Rates**	**$10,624**	**$10,624**	**$13,556**

* **Return Calculations**:

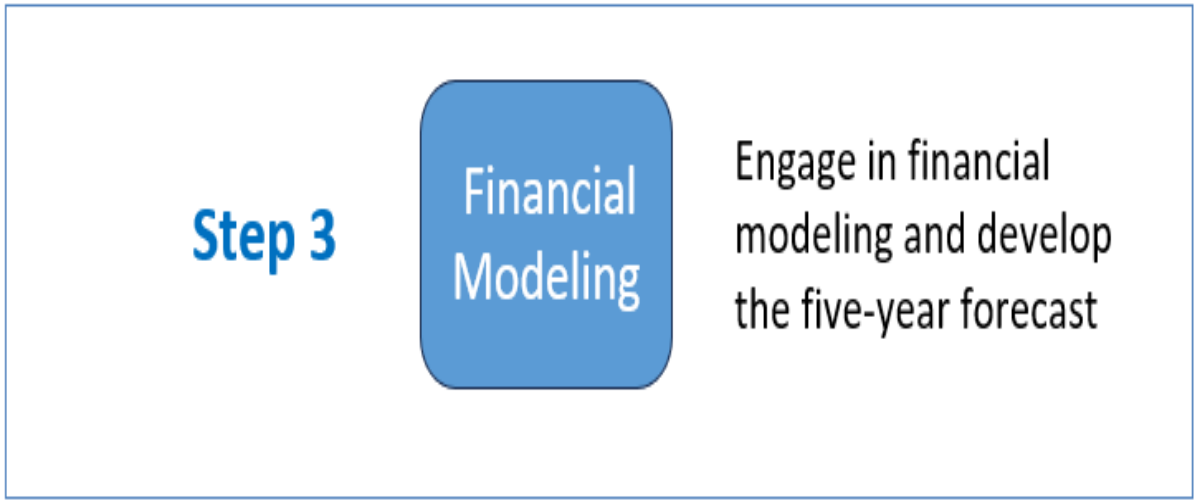
Government-Owned Utility - Return on Rate Base is derived from debt-service, debt-service reserve, and other capital-related items and equates to an overall rate of return of about 5.2%.

Investor-Owned Utility - Return on Rate base is calculated by applying an 8.0% allowed overall rate of return.

Source: American Water Works Association, *Principles of Water Rates, Fees, and Charges*, Sixth Edition, 2012.

Example of the Rate Base / Rate of Return Approach

		Total Distribution
1	**RATE BASE**	
2	Plant in service	$ 1,000
3	Less: accumulated deprectiation	(220)
4	Net plant in service	780
5	Construction Work in Progress	39
6	Cash Working Capital	5
7	Materials & Supplies	14
8	Prepayments	45
9	Customer Advances	(18)
10	Deferred Taxes	(195)
11	Rate Base	$ 670
12		
13	**REVENUES**	
14	Total Operating Revenues	$ 172
15		
16	**OPERATING EXPENSES**	$ 125
17		
18	**NET OPERATING INCOME**	$ 47
19		
20	**RATE OF RETURN**	7.0%



The Goal is to gradually and systematically reduce the overall revenue deficit and subsidy levels*

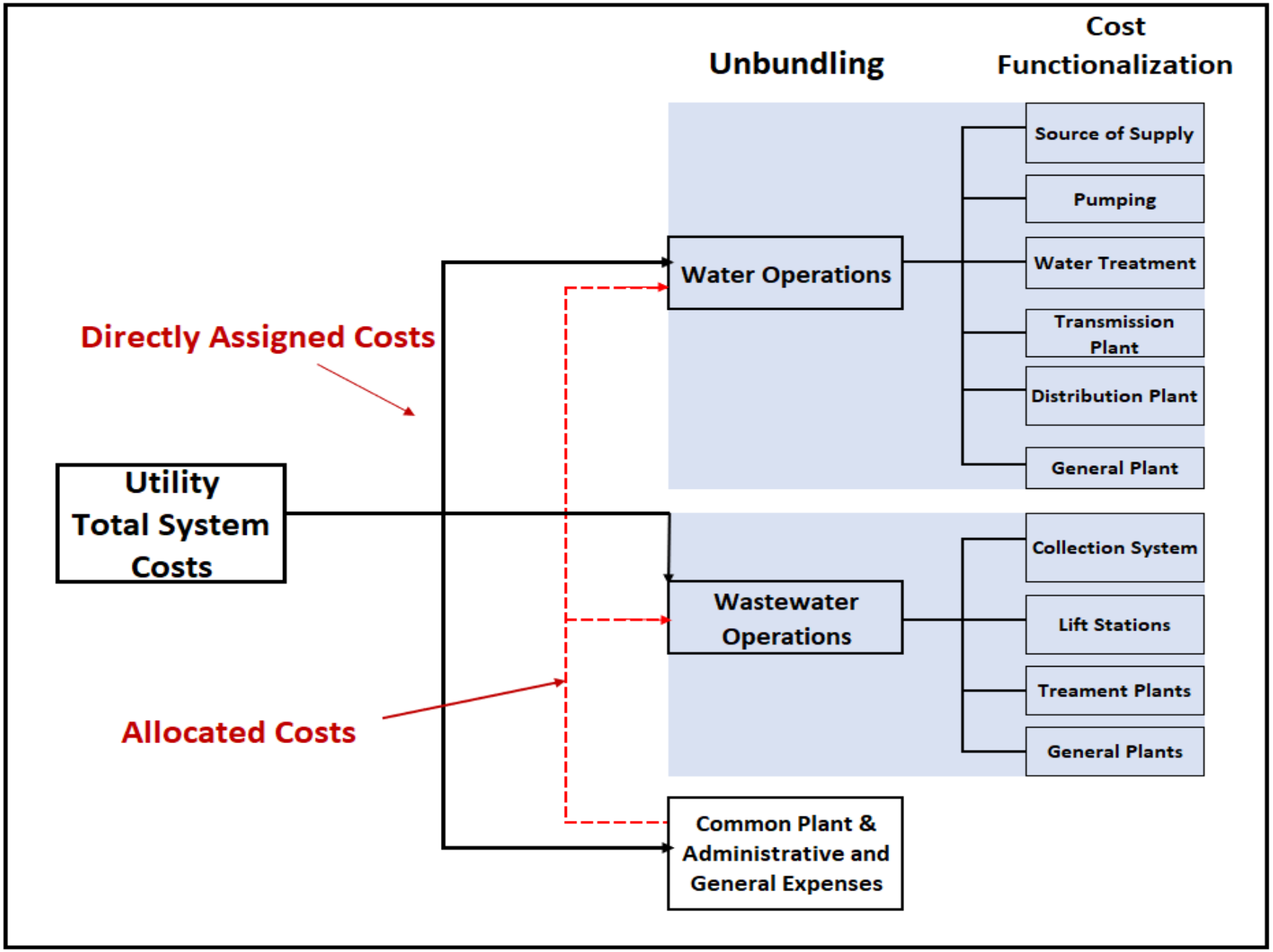
- ✓ Excel-based modeling linking the core financial statements, and discounted cash flow analysis
- ✓ Forecasting the financial impact of utility tariff initiatives
- ✓ Sensitivity analysis
- ✓ Industry benchmarking

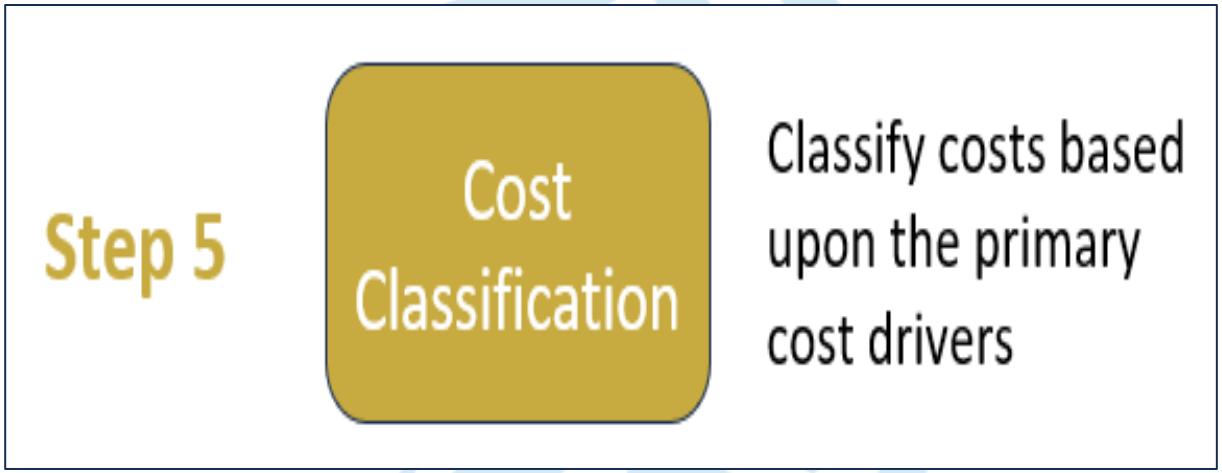
* Please refer to Annex 1 for a proposed format for utility forecasting.

Step 4

Cost Unbundling & Functionalizaton

Separating costs between the water and wastewater services

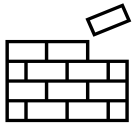

Unbundling
Cost Functionalization
Directly Assigned Costs
Utility Total System Costs
Allocated Costs
Water Operations
Wastewater Operations
Common Plant & Administrative and General Expenses
Source of Supply
Pumping
Water Treatment
Transmission Plant
Distribution Plant
General Plant
Collection System
Lift Stations
Treament Plants
General Plants



Cost Classification

Important for cost allocation & tariff design

Consumption-related



Demand-related
Peak related costs

Customer-related
e.g., meters

Water COSS Cost Drivers inlcude:
- Annual volume of water consumed - Peak water demand - Number of customers served

Wastewater COSS Cost Drivers include:
- Volume - Capacity - Suspended Solids - Biochemcial Oxygen Demand (BOD) - Total Kjeldahl Nitrogen - Customer-related Costs

Step 6

Cost Allocation

Allocate costs equitably across customer classes and quantify the class cross-subsidies

Customer Class Cost-of-Service Study (COSS) *

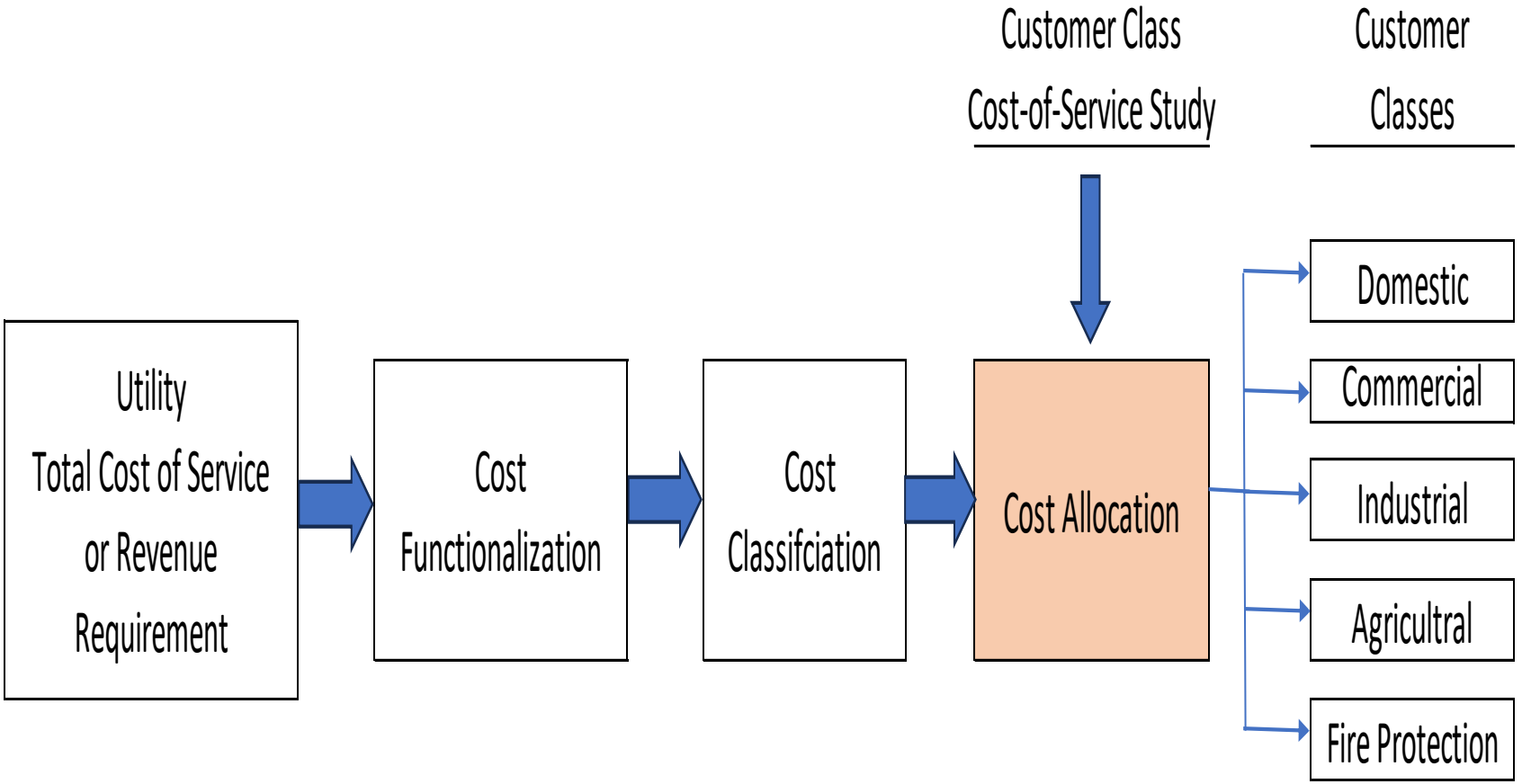
- The class cost-of-service study (COSS) is a detailed analysis that assigns the utility's total revenue requirement to the customer groups on the basis of **cost causation**.

- COSS are among the basic tools in the ratemaking process and are submitted as part of the major utility base rate case proceedings in the U.S. across utility sectors.

- The fundamental principle underlying the cost-of-service study is that costs should be attributed to the particular customer group(s) that cause the utility to incur such costs.

* The COSS referenced is an embedded cost of service study that uses the accounting costs recorded on the utility's books as the basis for the study. In comparison, a marginal cost study estimates the resource costs associated with producing the last unit of output.

Customer Class Cost-of-Service Study (COSS)



Example Water COSS Summary*

Urban Water Utility**

Line No.	$1,000	Total Cost of Service	DOMESTIC	COMMERCIAL	INDUSTRIAL	AGRICULTURAL
1	SALES REVENUE	$272,000	$107,248	$114,851	$47,246	$2,655
2	OTHER OPERATING REVENUES	3,000	1,917	693	245	144
3	**TOTAL REVENUES**	**$275,000**	**$109,165**	**$115,545**	**$47,491**	**$2,799**
4	O & M EXPENSE	350,000	222,743	78,560	34,533	14,163
5	DEBT SERVICE	150,000	95,891	34,699	12,113	7,297
6	**TOTAL REVENUE REQUIREMENT** (ln 4 + ln 5)	**$500,000**	**$318,634**	**$113,259**	**$46,646**	**$21,461**
7	LESS: NON-RATE REVENUES	3,000	1,917	693	245	145
8	**TOTAL REVENUE REQUIREMENT FROM TARIFFS**	**$497,000**	**$316,717**	**$112,566**	**$46,400**	**$21,317**
9						
10	**COST RECOVERY TARIFFS**					
11	WATER SALES (km^3)	230,000	140,000	55,000	25,000	10,000
12	**COST RECOVERY TARIFFS** ($/m^3$) (ln 8 / ln 11)	**2.16**	**2.26**	**2.05**	**1.86**	**2.13**
13						
14	**AVERAGE TARIFFS CHARGED** ($/m^3$) (ln 1 / ln 11)	**1.18**	**0.77**	**2.09**	**1.89**	**0.27**
15						
16	**TARIFF REVENUE (Deficiency)** (ln 1 – ln 8)	**($225,000)**	**($209,469)**	**$2,285**	**$846**	**($18,662)**
17	**TARIFF REVENUE (Deficiency)** ($/m^3$) (ln 16 / ln 11)	**-0.98**	**-1.5**	**0.04**	**0.03**	**-1.87**
18						
19	**RETURN ON RAB**	**-23.10%**	**-33.70%**	**1.30%**	**1.50%**	**-38.70%**
20	OPERATING COST RECOVERY FACTOR	79%	49%	147%	138%	20%

** **Assumptions for urban water utility in transition:**

- Population: 1 million
- Under-capitalized
- NRW = 40-50%
- Excessive A/R
- Under-priced
- DESAL included in water supply

* The figures in this table are order-of-magnitude and are presented for expository purposes. The COSS results for each utility will differ depending on its unique context.

Example: 2024 U.S. Water Utility COSS Summary

	$1,000	COST OF SERVICE	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	PUBLIC	OTHER WATER UTILITIES	FIRE PROTECTION PRIVATE	FIRE PROTECTION PUBLIC
1	Revenue from Sales	$ 585,185	$ 386,080	$ 143,095	$ 20,261	$ 9,350	$ 18	$ 19,127	$ 7,255
2	Other Revenues	11,159	7,469	2,669	419	164	0	283	155
3	Total Operating Revenues	596,344	393,549	145,764	20,680	9,514	18	19,410	7,410
4									
5	Less: Operating Expenses	300,891	220,637	68,980	10,824	4,259	3	5,515	-9,328
6									
7	Less: Income Taxes	17,684	10,207	4,677	549	334	1	938	979
8									
9	Net Return	$ 277,770	$ 162,707	$ 72,106	$ 9,306	$ 4,920	$ 14	$ 12,957	$ 15,759
10									
11	Rate Base	$ 4,315,666	$ 2,610,325	$ 1,073,465	$ 168,416	$ 65,426	$ 34	$ 139,891	$258,109
12									
13	**Rate of Return, Percent**	**6.44**	**6.23**	**6.72**	**5.53**	**7.52**	**41.31**	**9.26**	**6.11**
14	**Relative Rate of Return**	**1.00**	**0.97**	**1.04**	**0.86**	**1.17**	**6.42**	**1.44**	**0.95**

Cost Allocation Example: Water Main Plant Costs

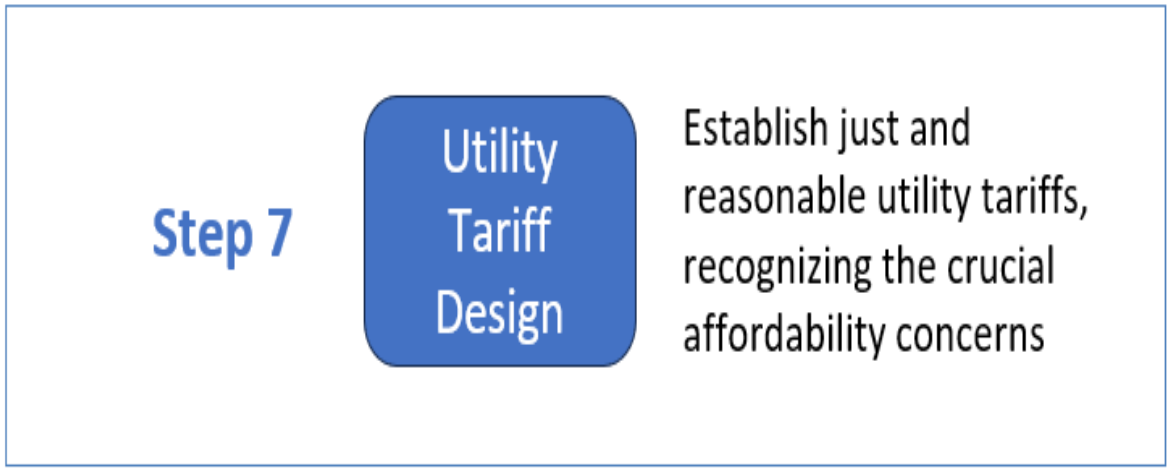
Account 331: Water Mains & Accessories ($ millions)

Item	Alloc Factor	Plant Value	RES	COMM	INDUS	OTHER	PRIVATE FIRE PROTECT	PUBLIC FIRE PROTECT
12" Mains	**3**	**$ 694**	389	207	36	13	19	31
Under 12"	**4**	**$2,218**	1,238	605	93	37	92	154

Cost allocation factors 3 & 4 reflect the (1) customer class average consumption and (2) class peak demands placed on the different main plant facilities. This allocation approach uses the Base-Extra Capacity method.

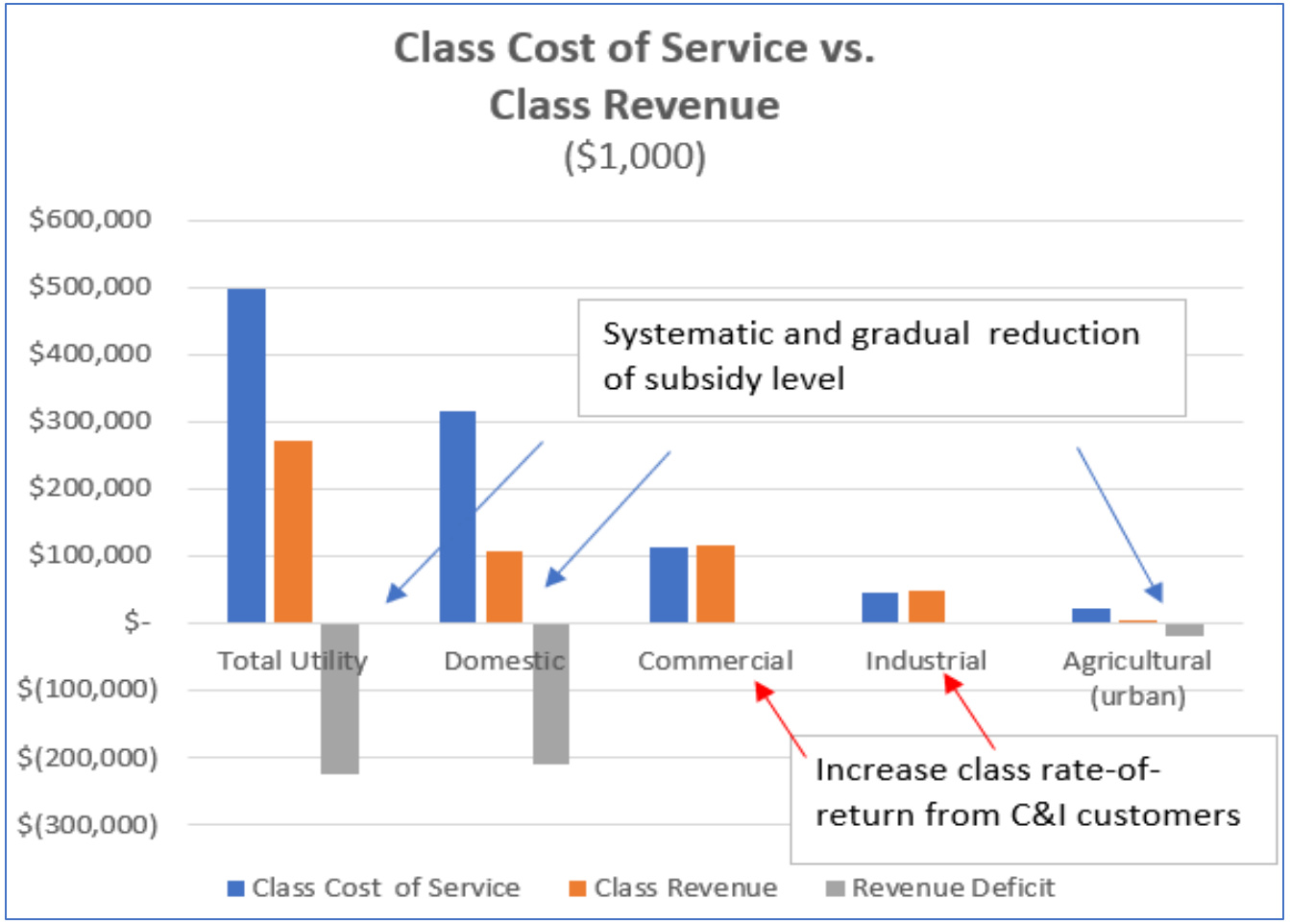
Please see Annex 2 that provides a brief description of the Base-Extra Capacity method.

Also, please see the referenced American Water Works Association (2012) and Water Environment Federation (2004) publications.



Utility Tariff Development - Revenue Allocation

The goal is to gradually and systematically reduce the overall revenue deficit and the customer class subsidy levels.



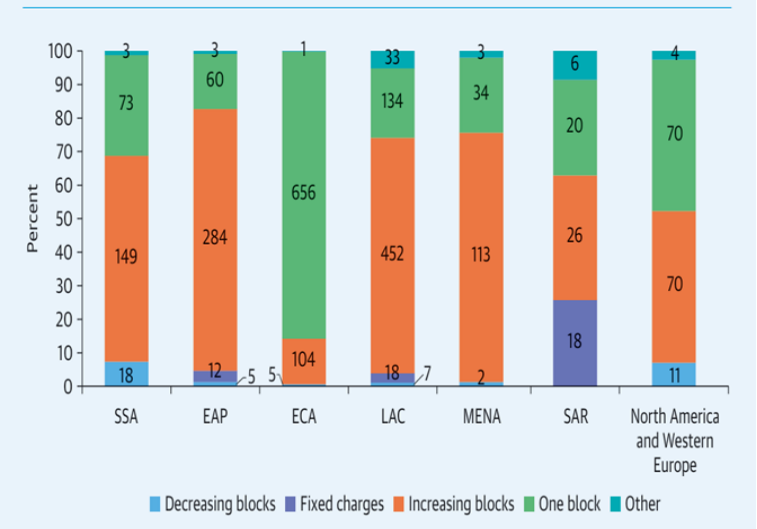
Utility Tariff Design

Increasing Block Tariffs (IBTs)

Jordan
2025 Water Tariffs
(USD)

Block of Consumption	Water Tariff
0 -6 m3	$3.53 (fixed/month)
7-12 m3	$0.85 per m3
13-18 m3	$1.13 per m3
19-24 m3	$1.55 per m3
25-30 m3	$1.97 per m3
31-42 m3	$2.54 per m3
> 42 m3	$3.10 per m3

Summary of Tariff Structures Implemented by Utilities by Region*



Challenges of IBTs in reaching the poor households*

- ✓ Many of the poor households are not connected to the piped network
- ✓ The correlation between piped water use and income is low
- ✓ Poor households are more likely to share water from their connection with other households, increasing their water use in the higher IBT blocks.

* World Bank, *Doing More With Less, Smarter Subsidies for Water Supply and Sanitation*, 2019.

Importance of Fixed Cost Recovery through Fixed Charges

Example: U.S. Water Rate Schedule – AQUA Pennsylvania (2025)

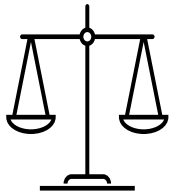
MONTHLY SERVICE CHARGE

Customer Charge ($)	Rate Zones 1 & 2
Fixed (per Customer)	
Meter Size	
5/8 inch	$ 23.90
3/4 inch	41.00
1 inch	69.70
1 1/2 inch	134.20
2 inch	191.10
3 inch	383.00
4 inch	625.00
6 inch	1,288.00
8 inch	2,254.00
10 inch	3,330.00
12 inch	4,033.00
Unmetered	$ 97.01

AQUA also has the following water rate schedules:

- Industrial Standby Rates
- Resale & Electric Generation
- Demand-based industrial rates
- Off Peak/Interruptible Service

MONTHLY CONSUMPTION CHARGE	(US$/1,000 gal/month)
	Rate Zones 1 & 2
Residential	
Up to 2,000 Gallons	$ 17.349
Over 2,000 Gallons	$ 20.540
	Rate Zones 1, 2, & 3
Commercial and Public	
Up to 10,000 Gallons	$ 18.048
Next 23,300 Gallons	$ 15.857
Next 300,000 Gallons	$ 13.155
Next 333,300 Gallons	$ 12.040
Industrial	
Up to 10,000 Gallons	$ 11.731
Next 23,300 Gallons	$ 10.307
Next 300,000 Gallons	$ 4.867
Next 9.666.700 Gallons	$ 4.455
Over 10,000,000 Gallons	$ 3.582
Sales to Other Utilities: Rate per 1,000 gallons	$ 18.048
Tank Sales: Rate per 1,000 gallons	$ 18.048



Balancing Cost Recovery and Consumer Affordability

Market Segmentation

Affordability / Willingness-to-Pay

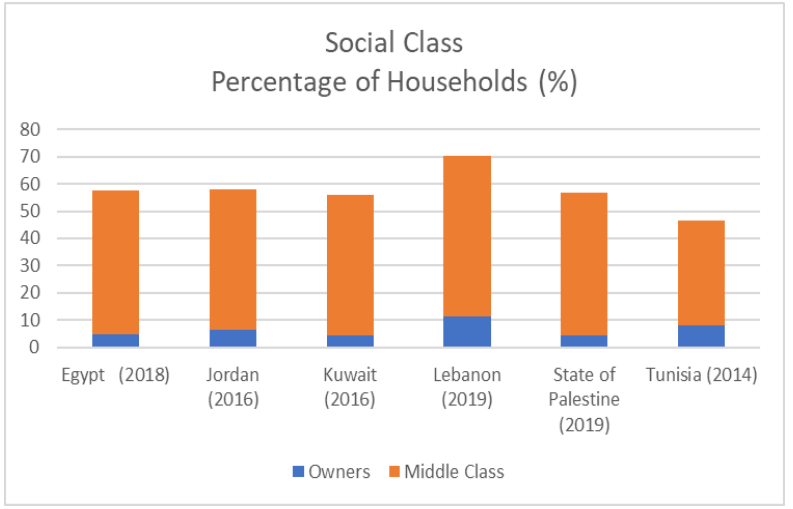
Affordability

MENA – Millions of People Living in Poverty

Poverty Line ($/Day)	2020	2021	2022	2023	2024
$2.15	22	25	26	28	30
$3.65	67	71	69	71	73
$6.85	200	199	195	197	199
Total MENA Pop.	482	488	498	508	

World Bank, *Poverty, Prosperity and Planet Report,* 2024.

Willingness-to-Pay



United Nations, ESCWA, *The Middle Class in Arab Countries,* 2023.

- An alternative to tariff measures can be that targeted social measures are set to achieve equity goals and are delivered outside the water bill.
- In countries where targeted social programs for non-water services already are in place, such as for housing or healthcare, it is wise to employ the same, or similar, household data and eligibility criteria for targeted social measures for WSS services, to the extent practicable.
- The 3Ts, tariffs, taxes, and transfers can be combined to finance the WSS service requirements, e.g., property taxes and transfers to help finance wastewater system buildout.

OECD, *Addressing the Social Consequences of Tariffs for Water Supply and Sanitation*, 2020.

Recap

RECAP

- This presentation outlines a **seven-step approach to establishing utility tariffs** with an emphasis on sustainability. It highlights the significance of regulatory accounting frameworks and the clear identification of the utility's cost-of-service, or revenue requirement.

- Additionally, it discusses the cost-of-service studies for different customer classes that identify the levels of subsidy required, facilitating the creation of a viable strategy to gradually reduce these subsidies.

- Furthermore, it stresses the importance of thoroughly understanding market segments that can accommodate higher utility costs, in contrast to households that may struggle to pay, to more effectively target social benefits and improve cost recovery.

Annex 1:
Utility Forecasting Format

Line Number	Utility Revenue Requirement ("Cash Needs" approach)	Unit of Measure	2024	2025	2026	2027
			Act		Forecast	
1	**REVENUE**					
2	**Operating Revenues**					
3	Sales Revenues	$	xxx	xxx	xxx	xxx
4	Other Operating Revenue	$	xxx	xxx	xxx	xxx
5	Total Revenue	$	xxx	xxx	xxx	xxx
6	**OPERATIONS AND MAINTENANCE EXPENSE**	$	xxx	xxx	xxx	xxx
7	**CAPITAL REQUIREMENTS**					
8	Debt Service - Existing Debt	$	xxx	xxx	xxx	xxx
9	Debt Servce - Proposed Debt	$	xxx	xxx	xxx	xxx
10	Capital Improvements from Revenue	$	xxx	xxx	xxx	xxx
11	**TOTAL CAPITAL REQUIREMENTS**	$	xxx	xxx	xxx	xxx
12	**PAYMENTS-IN-LIEU-OF-TAXES**	$	xxx	xxx	xxx	xxx
13	**TOTAL REVENUE REQUIREMENT** (ln 6 + ln11 + ln12)	$	xxx	xxx	xxx	xxx
14	**LESS OTHER NONRATE REVENUE**	$	xxx	xxx	xxx	xxx
15	**TOTAL REVENUE REQUIREMENT FROM RATES** (ln 13 - ln14)	$	xxx	xxx	xxx	xxx
16	**COST RECOVERY TARIFF LEVELS**					
17	Amount of Electricity Sold	kWh	xxx	xxx	xxx	xxx
18	Cost Recovery Tariff (ln15 / ln17)	$/kWh	xxx	xxx	xxx	xxx
19	**AVERAGE TARIFF CHARGED**					
20	Tariff Revenues (Ln3)	$	xxx	xxx	xxx	xxx
21	Average Tariff Charged (ln20 / ln17)	$/kWh	xxx	xxx	xxx	xxx
22	**TARIFF REVENUE SURPLUS (DEFICIENCY)**					
24	Tariff Revenues Surplus (Deficiency) (ln15 - ln 20)	$	xxx	xxx	xxx	xxx
25	Tariff Revenues Surplus (Deficiency) (ln24 / ln 17)	$/kWh	xxx	xxx	xxx	xxx
29	**RETURN ON RAB**					
30	RAB Value	$	xxx	xxx	xxx	xxx
31	Return Amount	$	xxx	xxx	xxx	xxx
32	Overall Rate-of-Return (ln31 / ln31)	%	xxx	xxx	xxx	xxx
33	**SELECTED KPIs**					
34	Operating Cost Recovery Ratio	%	%	%	%	%
35	Debt Service Coverage	xTimes	xxx	xxx	xxx	xxx
36	Current Ratio	xTimes	xxx	xxx	xxx	xxx

Organizing Cost Structures

Uniform System of Accounts for OPEX & CAPEX

Cost-Reflective Tariffs

RAB approach (discuss)

Important KPIs

Annex 2:
Description of
Base-Extra Capacity
Cost Allocation Method

Annex 2: Description of the Base-Extra Capacity Cost Allocation Method

The **Base-Extra Capacity Method** is well-recognized and applied in the U.S. water industry and this allocation approach is described in the American Water Works Association text, entitled, *Principles of Water Rates, Fees, and Charges*.

The concept underlying the Base-Extra Capacity allocation approach is that the utility incurs capital and operating costs to deliver the total quantity of water used throughout the year under average load conditions, or an average (annual) rate of use. The costs associated with the average rate of use are termed, the Base Costs.

The utility must also incur capital and operating costs to meet peak demand rates of use in excess of the average (base) use. These costs are termed Extra-Capacity Costs.

Base costs represent costs that tend to vary with the total quantity of water used plus those O&M expenses and capital costs associated with service to customer under average load conditions and include a portion of the O&M expenses of supply, treatment, pumping, and distribution facilities.

Extra capacity costs are costs associated with meeting peak demand rates of use in excess of average (base) use and include O&M expenses and capital cost for system capacity beyond that required for the average rate of use. The extra capacity cost components are subdivided into costs required to meet base and maximum-day extra demand and base and maximum-hour demand requirements.

Customer Costs are generally fixed costs associated with the number of customers served. Examples of customer-related costs include customer accounting and billing, collection activity, meter reading costs, and the investment and operations and maintenance (O&M) expenses associated with customer service lines and customer meters.

Annex 2: Description of the Base-Extra Capacity Cost Allocation Method (cont.)

The graphic below shows the cost allocation approach for selected water plant-in-service (fixed assets) using the Base-Extra Capacity method.

	Item	Base	Extra Capacity		Customer Meters & Service	Direct Fire Protection Service
			Max Day	Max Hour		
	Source of Source					
	Reservoir	X				
	Pumping	X	X			
	Water Treatment	X	X			
	Transmission & Distribution					
	Distribution Storage	X		X		
	Transmission Mains	X	X			
	Distribution Mains	X	X	X		
	Services				X	
	Meters				X	
	Hydrants					X
	General Plant	X	X	X	X	X

Thank You!