NRW is the most critical challenge facing utilities

- Hundreds of million were invested to reduce NRW
- But still NRW % is high
- In Amman Capital of Jordan, approximately of 500 Million Dollar were invested to reduce NRW
- The latest report from regulatory body in Jordan shows that the NRW still is 46%

Through WMI Project financed by USAID, ACWUA developed Jordan NRW Reduction Master Plan in March 2019.

ACWUA applied its NRW Diagnostic tools that was developed by ACWUA Experts to investigate the current situation in the Jordanian utilities and proposed a road map to improve, transfer and sustain the NRW Reduction in the utilities from

- Level A to Level B
- Level B to Level C
- Level C to Level D

The Jordan NRW Reduction Master Plan was based on the following:

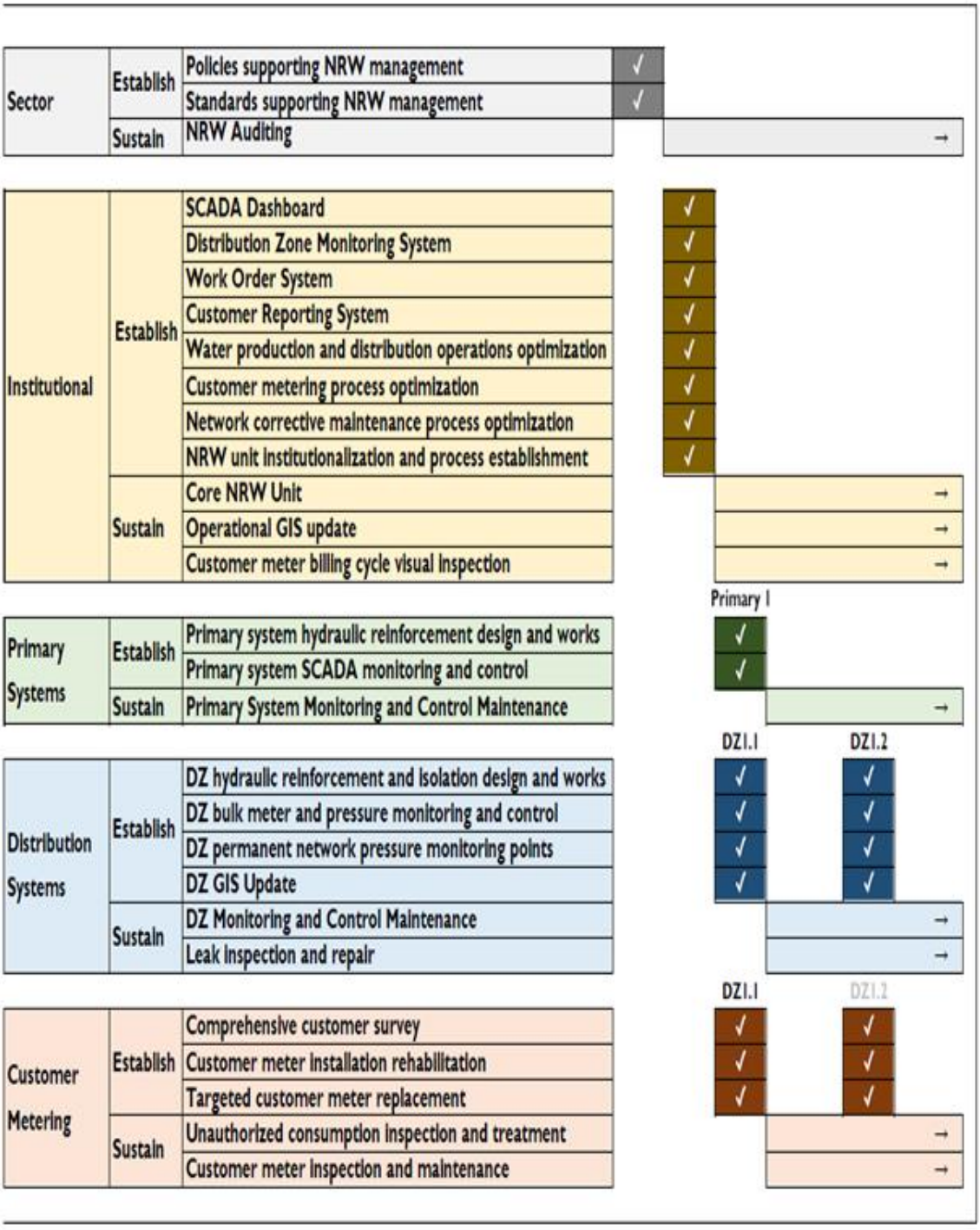
- The Vision of NRW Management in Jordan
  - The Impact Lifecycle of NRW Management
  - Management of Primary Systems
  - Management of Distribution Systems
  - Management of Customer Metering and Billing
- Assessment Results
  - Assessment of Losses
  - Prevention of Losses
  - Monitoring of Losses
  - Inspection of Losses
  - Treatment of Losses
  - Classification of Losses
- NRW Master Plan Elements
  - Establishing Sector Policies And Standards For NRW Management
  - Policies And Standards
  - Establishing Institutional Capacity For NRW Management
  - Information Systems
  - Business Processes
  - Establishing Supply System Infrastructure For NRW Management
  - Primary Systems Infrastructure
  - Distribution Systems Infrastructure

- Customer Metering Infrastructure
- Sustaining Supply Systems
- NRW Assessment And Planning
- Monitoring And Control Maintenance
- Water Loss Inspection And Treatment
- Operational GIS Update

The plan for transition and sustain the NRW reduction in utilities from Category A to B, B to C and C to D

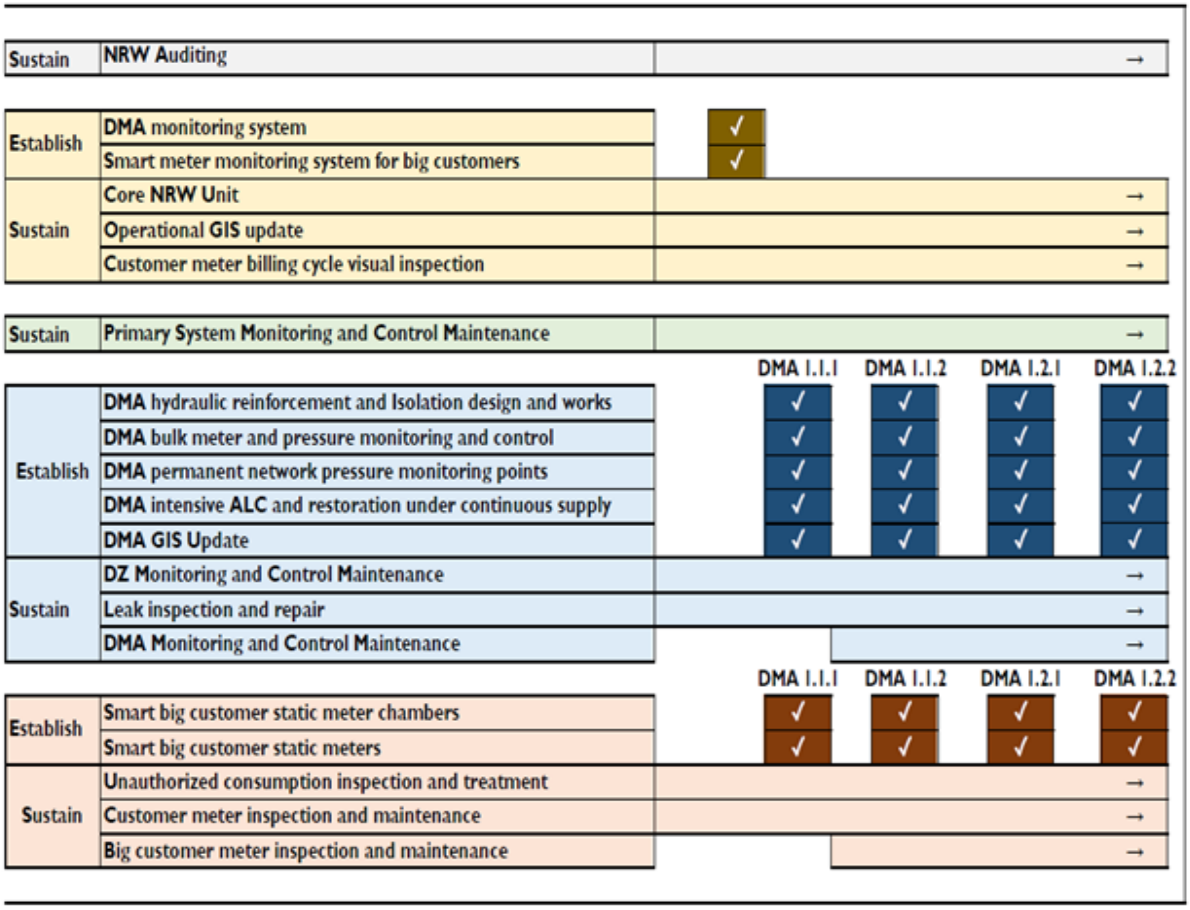
Transitioning From Category A to Category B

Transitioning from Category A to Category B is the most common challenge in Jordan due to most water systems falling under Category A. Below figure outlines the interventions and actions needed to be established and sustain this transition and described as following.



Utility Transitioning from Category A to Category B

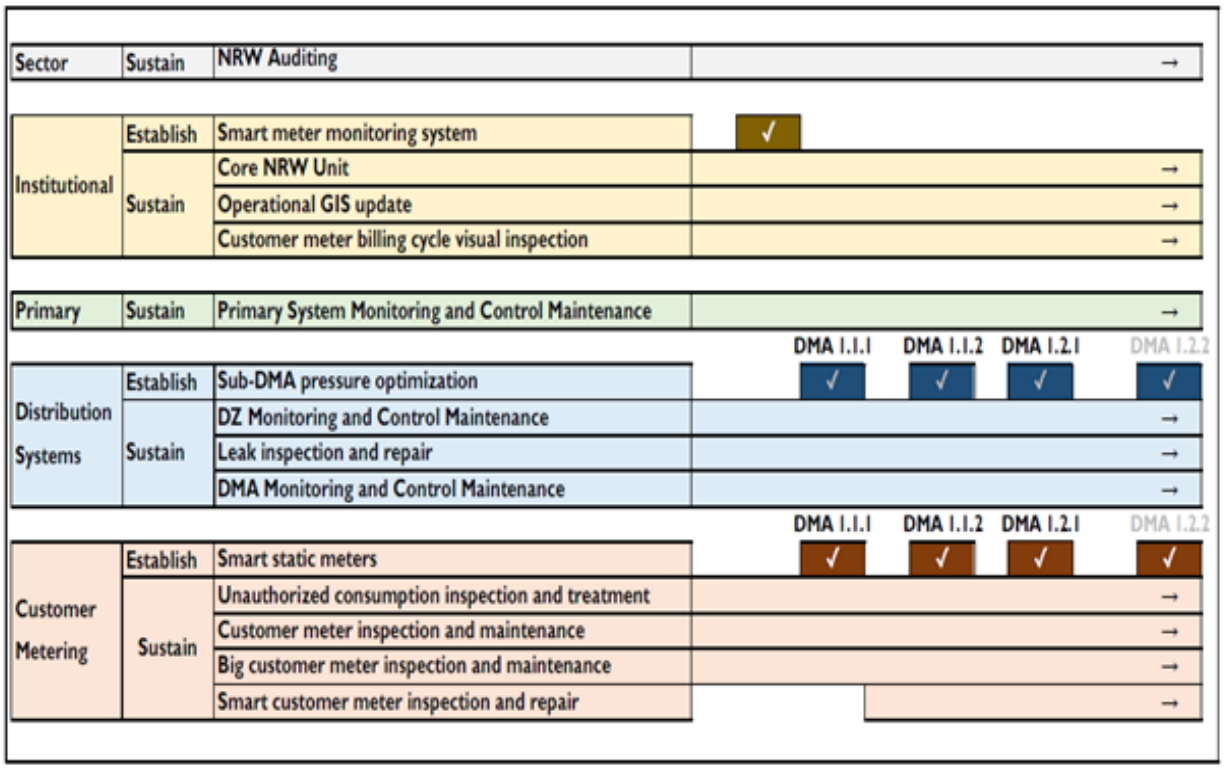
Transitioning From Category B to Category C



Utility Transitioning from Category B to Category C

Transitioning From Category C to Category D

Transitioning to Category D mainly focuses on upgrading all customer meter types to static smart meters that can avoid the damage caused by impurities in the water and operate at high accuracy across a wider range of flowrates.



Utility Transitioning from Category C to Category D

The Financial Estimations for implementing the Master Plan

Example: Amman

No.	Intervention	Unit Fixed Cost (USD)	Unit Annual Cost (USD)	Scaling Unit	Scale (No.)	Ratio Required (%)	Capital Cost (USD)	Annual Operating Cost (USD)
7.1	Core NRW Unit		80,000	Utility	1	100%		80,000
9.1	Leak inspection and repair teams		70,000	1000 Km	10	100%		700,000
9.2	Unauthorized consumption inspection and treatment teams		50,000	50K cust'mr	14	100%		700,000
9.3	Billing cycle visual inspection readers/inspectors		20,000	4K cust'mr	173	100%		3,460,000
9.4	Customer meter inspection and maintenance teams		50,000	50K cust'mr	14	100%		700,000
10.1	Operational GIS update teams		50,000	500 Km	20	100%		1,000,000
Total								6,640,000

JWC-Amman Basic NRW Operating Costs

No.	Intervention	Unit Fixed Cost (USD)	Unit Annual Cost (USD)	Scaling Unit	Scale (No.)	Ratio Required (%)	Capital Cost (USD)	Annual Maintenancee Cost (USD)
1.1	Policies supporting NRW management	30,000	6,000	Sector	1	0%		
1.2	Standards supporting NRW management	30,000	6,000	Sector	1	0%		
2.1	SCADA Dashboard	100,000	20,000	Utility	1	100%	100,000	20,000
2.2	Distribution Zone Monitoring System	50,000	10,000	Utility	1	100%	50,000	10,000
2.3	Work Order System	100,000	20,000	Utility	1	100%	100,000	20,000
2.4	Customer Reporting System	50,000	10,000	Utility	1	50%	25,000	5,000
3.1	Water production and distribution operations optimization	200,000	50,000	Utility	1	100%	200,000	50,000
3.2	Customer metering process optimization	500	125	1000 cust'mr	690	100%	345,000	86,250
3.3	Network corrective maintenance process optimization	20	5	Km	9850	100%	197,000	49,250
3.4	NRW unit institutionalization and proceess establishment	100,000	10,000	Utility	1	100%	100,000	10,000
4.1	Primary system hydraulic reinforcement and protection	120,000	4,000	Prim. section	80	100%	9,600,000	320,000
4.2	Primary system SCADA monitoring and control	35,000	3,500	SCADA Point	160	69%	3,885,000	388,500
5.1	DZ hydraulic reinforcement and isolation design and works	12,000	400	km	9850	40%	47,280,000	1,576,000
5.2	DZ bulk meter and pressure monitoring and control	20,000	4,000	DZ	50	25%	250,000	50,000
5.3	DZ permanent network pressure monitoring points	6,000	1,200	DZ	50	100%	300,000	60,000
5.4	DZ GIS Update	100	10	Km	9850	100%	985,000	98,500
6.1	Comprehensive customer survey	5	1	cust'mr	690000	0%	0	0
6.2	Customer meter installation rehabilitation	500	50	connection	200000	5%	5,000,000	500,000
6.3	Targeted customer meter replacement	50	5	cust'mr	690000	15%	5,175,000	517,500
Total							73,592,000	3,761,000

JWC-Amman Capital Investments to transition from Category A to Category B

No.	Intervention	Unit Fixed Cost (USD)	Unit Annual Cost (USD)	Scaling Unit	Scale (No.)	Ratio Required (%)	Capital Cost (USD)	Annual Operating Cost (USD)
7.1	Core NRW Unit		80,000	Utility	1	100%		80,000
8.1	Primary system Monitoring and Control Maintenance teams		70,000	SCADA Point	4	100%		280,000
8.2	DZ Monitoring and Control Maintenance teams		50,000	DZ	1	100%		50,000
9.1	Leak inspection and repair teams		70,000	1000 Km	10	100%		700,000
9.2	Unauthorized consumption inspection and treatment teams		50,000	50K cust'mr	14	100%		700,000
9.3	Billing cycle visual inspection readers/inspectors		20,000	4K cust'mr	173	100%		3,460,000
9.4	Customer meter inspection and maintenance teams		50,000	50K cust'mr	14	100%		700,000
10.1	Operational GIS update teams		50,000	500 Km	20	100%		1,000,000
Total								6,970,000

JWC-Amman Operating Costs to Sustain Category B

No.	Intervention	Unit Fixed Cost (USD)	Unit Annual Cost (USD)	Scaling Unit	Scale (No.)	Ratio Required (%)	Capital Cost (USD)	Annual Maintenancee Cost (USD)
2.5	DMA monitoring system	50,000	10,000	Utility	1	100%	50,000	10,000
2.6	Smart meter monitoring system for big customers	100,000	20,000	Utility	1	100%	100,000	20,000
5.5	DMA hydraulic reinforcement and Isolation	6,000	200	Km	9850	80%	47,280,000	1,576,000
5.6	DMA bulk meter and pressure monitoring and control	20,000	4,000	DMA	657	50%	6,570,000	1,314,000
5.7	DMA permanent network pressure monitoring points	9,000	1,800	DMA	657	100%	5,913,000	1,182,600
5.8	DMA intensive ALC and restoration under cont. supply	5,000	500	Km	9850	100%	49,250,000	4,925,000
5.9	DMA GIS Update	100	10	Km	9850	100%	985,000	98,500
6.4	Smart big customer static meter chambers	4,000	400	big cust'mr	300	100%	1,200,000	120,000
6.5	Smart big customer static meters	1,000	200	big cust'mr	300	100%	300,000	60,000
Total							111,648,000	9,306,100

JWC-Amman Capital Investments to transition from Category B to Category C

No.	Intervention	Unit Fixed Cost (USD)	Unit Annual Cost (USD)	Scaling Unit	Scale (No.)	Ratio Required (%)	Capital Cost (USD)	Annual Operating Cost (USD)
7.1	Core NRW Unit		80,000	Utility	1	100%		80,000
8.1	Primary system Monitoring and Control Maintenance teams		70,000	SCADA Point	4	100%		280,000
8.2	DZ Monitoring and Control Maintenance teams		50,000	DZ	1	100%		50,000
8.3	DMA Monitoring and Control Maintenance teams		50,000	DMA	14	100%		700,000
9.1	Leak inspection and repair teams		70,000	1000 Km	10	100%		700,000
9.2	Unauthorized consumption inspection and treatment teams		50,000	50K cust'mr	14	100%		700,000
9.3	Billing cycle visual inspection readers/inspectors		20,000	4K cust'mr	173	100%		3,460,000
9.4	Customer meter inspection and maintenance teams		50,000	50K cust'mr	14	100%		700,000
9.5	Big customer meter inspection and maintenance teams		50,000	50 big cust'mr	6	100%		300,000
10.1	Operational GIS update teams		50,000	500 Km	20	100%		1,000,000
Total								7,970,000

JWC-Amman Operating Costs to Sustain Category C

No.	Intervention	Unit Fixed Cost (USD)	Unit Annual Cost (USD)	Scaling Unit	Scale (No.)	Ratio Required (%)	Capital Cost (USD)	Annual Maintenancee Cost (USD)
2.7	Smart meter monitoring system	100,000	20,000	Utility	1	70%	70,000	14,000
5.10	Sub-DMA pressure optimization	20,000	4,000	DMA	657	100%	13,140,000	2,628,000
6.6	Smart static meters	150	15	cust'mr	690000	70%	72,450,000	7,245,000
Total							85,660,000	9,887,000

JWC-Amman Capital Investments to transition from Category C to Category D