

Terms of Reference UNICEF IRAQ Evaluation of the WASH Smart City Initiative Pilot Project in Baghdad

Background

Global Context

1. The United Nations Convention on the Rights of the Child, which forms the basis of UNICEF's work, is the first legally binding international instrument to incorporate the full range of cultural, economic, political and social rights for children. The 2030 Agenda for Sustainable Development, established in 2015, reaffirmed a global commitment to ensuring the "availability and sustainable management of water and sanitation for all" (SDG 6). Safe drinking water and hygienic toilets protect people from disease and enable societies to be more productive economically.

Iraqi Context

2. The Middle East in general, and Iraq in particular, faces challenges to provide enough quality water to its population due to decades of decreasing water levels in the Tigris and Euphrates rivers. The Tigris and Euphrates rivers provide 98% of water consumed in Iraq, but also pass through Turkey and Iran, respectively. Turkey and Iran store huge quantities of water in dams constructed upstream which, combined with climate and environmental changes like reduced rainfall, exacerbate the water crisis.¹ The quantity of water in the Euphrates and Tigris is expected to decline by 50% and 25% respectively by 2025 unless efficient water supply management systems are introduced. Unless water management is improved, the water crisis will continue with increasingly severe consequences for the health of Iraq's population and the country's economy.

3. Both Iraq's population and rate of urbanization are rising rapidly, which has raised demand for water. Existing water infrastructure is not sufficient to provide quality water to the population because it is both inefficient and poorly maintained. Per capita water consumption in Iraq is 327 litres / person / day on average, as compared to 150 litres / person / day in EU countries. The overuse and misuse of water are due to the fact that in most areas, water consumption is not metered² and domestic water is highly subsidized (USD 0.0034 / m³). Water sector revenues are therefore not enough to cover more than 5% of the water system's operation and maintenance costs. The agricultural sector alone utilizes 90% of available raw water resources. Millions of people in Iraq are deprived of their right to safe drinking water because the government has struggled to regulate and manage Iraq's water resources.

4. In summary, the main problems facing domestic water supply in Iraq are:

- Reduced river water availability because of drought and increased demand in upstream countries
- Water quality deterioration and increased health risk, especially in the central and southern governorates, due to reduced river flows and weak environmental law enforcement
- High consumption rates that exceed the average rates in industrialised countries
- Low supply efficiency due to high losses (estimated loss is more than 50%)
- Lack of water policy, institutional restructuring or efficient management of the sector
- Lack of comprehensive and integrated monitoring system for the water supply chain
- Lack of public awareness on water use efficiency or the associated health risk
- Inefficient operation and maintenance procedures.

¹ Iraq relies mainly on surface water from international riparian rivers.

² In Baghdad, 90% of installed water meters at household level are not functional.

5. UNICEF has long been active in the global WASH sector, particularly in humanitarian settings. In Iraq, capacity development of national partners is a core part of UNICEF's programming. This capacity building approach is aligned with the Country Programme, the Regional Refugee and Resilience Plan and the Iraq Humanitarian Response Plan in that this approach prepares the Iraqi WASH sector for the eventual transition from humanitarian to development programming. In the WASH sector, UNICEF has been particularly involved in the capacity building and infrastructure updating aspects of the Iraq Public Sector Modernization Project Phase II (IPSM-II), both of which aim to provide more rights holders in Iraq with equitable access to water. UNICEF and UN-Habitat are working in cooperation with other United Nations agency to implement this modernization project, with the ultimate goal of creating a modern and efficient public sector, particularly in the areas of health, education, water and sanitation.

SMART City Initiative

6. Through UNICEF Iraq's WASH section's close collaboration with the Iraqi Ministry of Municipalities, Mayoralty of Baghdad and Kirkuk Directorate of Water, UNICEF supported the adoption of a 'Smart City' initiative. The initiative promotes improved national capacity for water conservation and management, combined with enhanced public access to water monitoring and online billing, through e-Governance under joint initiatives as part of the Iraq Public Sector Modernization Project Phase II (IPSM-II). A smart city is one that uses electronically collected data to improve efficiency in resource use and service provision. The Smart City Initiative in Iraq aims to improve capacity for water conservation, improve water management and enhance public access to water.

7. The Smart City Initiative, in addition to providing smart meters, also provides an online water and municipal services billing and complaint system. This accelerates the collecting of water bills, improves water service provision and makes sector governance more sustainable through an efficient cost-recovery and complaints management system.

8. UNICEF began planning and coordinating with partners for a Smart City Initiative pilot project in 2018, and the pilot began in Baghdad and Kirkuk cities in 2019. The Smart City Initiative in Baghdad and Kirkuk consists of installing smart meters that replace manual meters, rolling out the smart meter software, developing a complaint system for customers to communicate directly with water service providers, and establishing an online billing system. This work is done using networked smart water grids that automate water monitoring and control. The smart water meters are installed to establish water consumption patterns using predictive analysis, reduce operational costs, and streamline the water supply management and improve water service delivery to subscribers, including in marginalized and socially deprived areas in Baghdad and Kirkuk. By doing this work, the initiative also aims to enhance government capacity for water auditing, boost consumer confidence and increase water sector revenue.

9. The overarching goal is to reduce water consumption levels, improve network management and reduce wastages and illegal connections through the implementation of sustainable solutions to the water crisis, water misuse and overuse and its endorsement by the political authorities and affected population.

10. In Baghdad and Kirkuk cities, the Smart City Initiative has introduced Information and Communication Technology (ICT) platforms to solve water sector issues including water leaks, over-use, water quality issues, and response to drought and natural disasters. In partnership with the Mayoralty of Bagdad, UNICEF has provided technical and financial support as part of this initiative to develop an online billing for water and municipal services. In Kirkuk, UNICEF provided similar support but worked in partnership with the Ministry of Municipalities. In 2020, UNICEF Iraq's WASH Section and partners are working to scale the Smart City Initiative to other parts of the country, and the Ministry of Municipalities will be UNICEF's main partner on the smart city initiative in these other locales. During 2020 the UNICEF Iraq WASH section also plans to link the Smart City infrastructure in Baghdad with its water safety planning infrastructure by introducing new software that can monitor both water usage and quality.

11. In 2018 alone, more than 650,000 subscribers whose water service provider is the Mayoralty of Baghdad accessed the newly established, public web-based online water billing and complaints system and 16,000 inhabitants of Baghdad and Kirkuk cities reduced their water consumption through early leakage detection. The Smart City Initiative also conducts capacity training on data management for federal technical staff and operations and management training for staff working on the new water billing system.

Theory of Change

12. The Smart Cities Initiative Theory of Change (ToC) stipulates that an online water billing and complaints system combined with digitalized water safety and quality control systems will allow consumers and civil society organizations to better monitor their water usage. This increased monitoring capability, alongside a concerted effort to increase public knowledge about the financial and environmental impact of water mismanagement and overuse, should lead consumers to decrease their daily water usage. Decreased usage, when coupled with improved water management infrastructure, will lead to a more environmentally friendly water supply system management approach that is financially efficient and reduces water misuse and overuse. This approach is aligned with the infrastructure improvements and capacity building goals outlined in the Iraqi government's [Iraq Public Sector Modernization Project Phase II](#) (IPSM-II). A more detailed ToC, which was the result of a 2018 causality analysis conducted by UNICEF Iraq Country Office (ICO) on the WASH sector, is represented in Annex 1 and provides a key reference for the evaluation of the initiative.

13. This ToC assumes that there is a direct link between technical assistance and improvements in water management practices, and that improved water management will actually lead to sufficient and timely water quantity and quality. The ToC also assumes that consumers are able to use the smart water system to monitor and decrease their water consumption, that this monitoring will result in improved household water availability and that smart city farming techniques will lead to lower water usage in the agricultural sectors.

Purpose and Objectives

Purpose

14. The purpose of the evaluation is to independently examine the extent to which the smart city initiative has improved water management, having better data to monitor water wastage and provision in Baghdad city. This analysis will then inform efforts to replicate the smart water initiative across Iraq and UNICEF's efforts to contribute to SDGs 6.1, 6.3 and 6.4.

Objective

15. The UNICEF Iraq WASH Section has plans to scale the SMART City initiative in the short-term, so all findings from this evaluation will inform decisions and planning for bringing the initiative to scale.

16. The specific objectives of the evaluation are:

- Assess the extent to which the smart city initiative has improved water management and provision in Baghdad city by documenting the initiative's achievements and limitations.
- Assess the capacity of the consumers and key stakeholders to sustain the smart water meters installations
- Provide evidence of the intervention's successes and failures in terms of technical, financial and managerial practices in order to facilitate future planning of such projects.
- Examine the scalability of the intervention in terms of relevant legal regulations and stakeholder roles and responsibilities

Scope

17. The evaluation will assess the extent to which the project achieved its objectives, its relevance to the needs of rights holders, and how efficient, effective, sustainable and coordinated the smart city initiative pilot in Baghdad has been. The evaluation exercise will cover the smart water meter programming in Baghdad over the last two years (2018-2019). Smart water meter programming has taken place in the Al Mansour quarter, where roughly 250 households and a number of public buildings, schools, and a mosque have received smart meters. Customer surveying is ongoing and has been focused until now on the Al Mansour quarter. Customer surveying gives a clearer picture of daily water consumption patterns as well as the unexpected internal leakage or seepages that household experience. The evaluation will look into all components of the smart city project including the work at the Ministry of Municipalities level systems. For future visioning and scaling up of the project some information will be collected in Kirkuk.

Evaluation Questions

18. The key questions for this evaluation were formulated mainly based on a selective combination of the OECD DAC criteria and the ALNAP criteria. This evaluation will examine the following domains of the intervention: (i) relevance, (ii) effectiveness, (iii) efficiency, (iv) impact (v) sustainability, (vi) synergies and (vii) gender. The evaluation will examine all these criteria using gender, equity and human right-based approaches. Conducting the evaluation in this way will facilitate learning for decision makers as they craft interventions and seek sustainable results. It will also allow those involved in programme design and administration to adjust the programming as needed. The evaluation aims to answer the following questions:

Relevance

- To what extent are the smart city initiative objectives and activities tailored to the needs and capabilities of consumers and stakeholders, including the Ministry of Municipalities, Mayoralty of Baghdad and service providers?
- Is it in line with the comparative advantage of UNICEF?

Effectiveness

- To what extent has the Smart Cities Initiative facilitated increased access to quality water and better water management practices for its target population, particularly disadvantaged and vulnerable population groups?
- To what extent are the Smart Cities Initiative's monitoring and reporting mechanisms able to accurately capture initiative results and act on resulting insights?
To what extent has the programme led to water saving?

Efficiency

- To what extent does the smart city initiative use its resources in a way that allows for cost monitoring and maximum achievement per dollar of investment?
- To what extent is the initiative's structure (particularly with regards to human resources, cost driver management, monitoring systems) fit for purpose, particularly as compared to the alternative water metering systems?

Impact

- To what extent has the Smart City Initiative generated significant positive and negative, higher-level effects, both intended and unintended?
- To what extent have the project's effects contributed (or not) to more equitable access to water services in Baghdad?

Sustainability

- To what extent did capacity building approaches prepare technical staff, municipalities, the directorate of water and policymakers to continue maintaining infrastructure established as part of the project (i.e. smart meters, water network)?
- Which aspects of the services provided by the project are likely to be replicable / not replicable in other Iraqi cities and why?

Synergies

- How effective was partner coordination in the Smart City Initiative?
- In what ways were different stakeholders' efforts coordinated and complementary (or not)?

Gender

- To what extent has this initiative's design and monitoring taken gender into consideration?

Stakeholders

The stakeholders involved in this evaluation are the Ministry of Municipalities, Mayoralty of Baghdad, water service providers, the Council of Ministers Secretariat and the UNICEF WASH section. The Mayoralty of Baghdad has served as UNICEF's major partner in the Baghdad smart city programming, while the Ministry of Municipalities has been the major partner in the Kirkuk programming and will be involved in the national scaling of the smart city initiative. The Council of Ministers Secretariat is currently working on a strategy to apply a more widespread e-governance system and is therefore interested in learning from the experience of the smart cities initiative. Other UN agencies working in the field on similar initiatives like UNDP, UNHABITAT and the World Bank.

Methodology

The evaluation will take place during the time of continued restrictions due to COVID-19, therefore; the viability of various methods needs to be appropriate to the prevailing situation, giving the flexibility to adjust depending on what is applicable and what is not.

19. A mixed methodology composed of qualitative data collection as well as secondary data review is required to carry out this evaluation. The gender, equity, human and child rights principles should be incorporated into every step of the evaluation process, from design to analysis. The methodology is based on UNEG norms and standards and refers to relevant UNEG and UNICEF guidance materials such as the guidance on integrating human rights and gender into evaluation. The consultant's data analysis approach should ensure that the evaluation purpose, objectives and questions are comprehensively addressed.

20. The evaluation team will determine the data requirements and define the procedures for collecting data on a) smart water meters and water network installation, b) the water supply system (quantity, quality, seasonal fluctuations), c) the quality and reliability of the real-time two way data transmission, d) water network and smart meter operations and management practices, e) water system leakages and losses, and f) the tariff levels. All activities conducted to review the water supply system's performance will disaggregate results by gender and examine each research question from a gender lens.

21. In the areas where the project is implemented, the evaluation team will measure the flow and pressure at appropriate points of the system as required, in consultation with the Mayoralty of Baghdad, and will assess weaknesses or strengths of the existing water supply system by comparing the one in the project area with a given water supply system out of the project area. The evaluation team, in consultation with the UNICEF WASH Section and the local service providers, will choose a water supply system for comparison. Based on this analysis, the consultants will identify the underlying causes for non-performance and non-adherence to standards.

22. The evaluation team will also perform a sample survey of households who have been provided with smart water meters by the Smart Cities Initiative; all of these households are located in the Al Mansour quarter. The survey will investigate the ratio of the smart water meters that are functional, the profile of household beneficiaries (number, revenue, level of education of household members), household consumption level and household satisfaction with the online billing and complaints feedback mechanism. The evaluation team will generate a sample for the household survey with the WASH Section's support. Additional survey questions will examine household experience with the smart water meters from a gender and human rights perspective. Survey data will be disaggregated by gender.

23. The mixed methods approach will consist of:

- Administration of questionnaires to a sample of households in the Al Mansour quarter of Baghdad;
- Qualitative and quantitative analysis of service provider records detailing customer water usage and customer-service provider interactions;
- Focus Group Discussions (FGDs) with members of technical staff from Ministry of Municipalities, Mayoralty of Baghdad, service providers, consumers and UNICEF WASH Section personnel involved in the project;
- Key informant interviews with technical and non-technical staff from Ministry of Municipalities, Mayoralty of Baghdad, service providers, consumers and UNICEF Wash personnel involved in the project;
- Technical analysis of water management infrastructure

24. The consultants will develop a more detailed methodology that will use these methods, and any other methods necessary, to complete the tasks listed below and other tasks they feel relevant to the evaluation questions listed above. The consultants will propose the overall methodology, including questionnaire content and FGD guides, in the inception report, which will be approved by UNICEF Iraq before the evaluation begins. Prior to the inception report, the evaluation team is expected to review relevant programme documents including, but not limited to:

- Country programme document
- Online Water Billing & Complaints System for the Mayoralty of Baghdad Manual
- Iraq Public Sector Modernization Program functional reviews and service delivery reports for the water and sanitation sector
- Iraq Public Sector Modernization Program costing studies
- Iraq Public Sector Modernization Program road map
- Online billing and complaints reports
- ToRs for smart meter and online billing service providers
- Smart city knowledge management reports

25. The evaluation team will need to secure the necessary research permissions to conduct this research, and the Evaluation Manager will work with the evaluation team to facilitate this process during evaluation inception phase. The evaluation team's inception report will include a detailed account of the proposed research methodology as well as all informed consent scripts, survey questions and other data collection materials.

Governance

26. The Research and Evaluation Specialist will manage the evaluation. The Evaluation Manager will provide quality assurance for the evaluation process and particularly on all deliverables: (a) the inception report; (b) the preliminary findings presentation and (c) the draft report.

27. The Evaluation Manager will act as secretariat for the Steering Committee. The Steering Committee is a group of stakeholders that provides input and guidance during the evaluation process. The Steering Committee will endorse the terms of reference and the inception report. All key stakeholders will provide feedback on preliminary findings and endorse the evaluation report.

28. Any unforeseen events and challenges that the evaluation might face should be discussed in the Steering Committee. Terms of reference of the Steering Committee will be shared and discussed by the members.

29. The Chief of WASH section will ensure that all relevant documentation is available to the consultants and will support with arranging evaluation team meetings with relevant stakeholders. The consultants' team leader will coordinate the inputs of the team and be responsible for the quality of the deliverables.

30. The evaluation team will work closely with the response partners, both governmental and non-governmental, during the evaluation. The Evaluation Manager and UNICEF partners will provide specific information on stakeholders. The Evaluation Manager will also support any coordination which might be deemed necessary. All local travel should be discussed and approved by the Evaluation Manager in advance.

Limitations

31. The evaluation will not conduct research with members of the population who have not been involved in the Smart City Initiative thus far; while this will certainly limit the diversity of viewpoints available, it will also help to focus this evaluation on determining the extent to which the intervention has been helpful for those engaging with it directly. This is an evaluation of a pilot project that took place in two cities; however, the evaluation will only cover one of these two cities; findings may have limited applicability to other areas in which UNICEF Iraq operates.

Deliverables

32. The contract will have the following deliverables: inception report (including questionnaires, focus group guides, informed consent scripts and all other materials needed to conduct field research), presentation of preliminary findings, draft report, final report and response to the comment matrix. The timeline is laid out in the table below, noting that it starts with the actual work and it does not include some additional time prior to the work for the team mobilization. In several of the stages, more than one person will work on the deliverable in parallel.

Task	Timeline	Deliverable	Responsibility
Desk review and draft inception report detailing the consultant's understanding of the ToRs, methodology, workplan, deliverables	One week	Draft inception report	Evaluation Team
Acceptance of inception report	Two weeks	Final inception report	Evaluation Manager / Steering Committee
Data collection and analysis	Five weeks	Interim reports on activities, verbal or written, to the Evaluation Manager	Evaluation Team
		Presentation of preliminary key findings from the field to the Steering Committee	Steering Committee gives comments on preliminary findings
Draft evaluation report	Three weeks	Draft report	Evaluation Team

Report quality assurance	One week	Comments on draft report	Evaluation Manager coordinates the Steering Committee's involvement
Submission of final report	One week	Final report and filled comments matrix	Evaluation Team Leader
Distribution workshop	One week	Draft management response	WASH Section

33. The inception report must include the proposed methodology, interview guides and informed consent documents translated into the languages to be used in the field, as appropriate. The evaluation team will produce a high-quality evaluation report in line with UNICEF-adapted UNEG Evaluation Report Standards. The report will have an executive summary suitable for national and international circulation and reporting information of sufficient value for informed decision-making, learning, and accountability. The report must include action-oriented recommendations, required adjustments, potential alternative ways of implementation and lessons learnt from the project supported by facts from the field.

Team Composition

34. UNICEF is looking for an experienced multi-disciplinary team of consultants (both international and national) with experience in designing and conducting evaluation for WASH humanitarian response in an emergency context. The Evaluation Team is expected to be mixed in teams of gender and cultural backgrounds. Evaluation Team's proposal must include a detailed plan of how these translation and interpretation will be provided.

35. The below table sets out the tentative workload of the different specialists, as well as the required skills for the different team members. The number of days is indicative as the actual time will change depending upon the proposal of the consultants. The consultants might consider a different team composition if justified. The team would have to explain how it will deal with translation and interpretation if required. Any proposed changes to the team composition should be justified in the consultants' proposal.

Team member	Number of days proposed
Team leader	45
Urban Systems Governance Specialist	30
Water Management Specialist	30

Team leader / Evaluation Specialist	• Relevant master's degree (evaluation, development studies, economics, social science, etc.) • Experience in managing evaluations in the UN system and managing a team • Ability to conduct statistical analyses • Proven ability to produce high-quality reports • Good understanding of integrating gender, equity, human and child rights into evaluations • Strong interpersonal skills • Ability to work with senior officials • Cultural sensitivity • Fluency in English, proficiency in Arabic (preferred)
Urban Systems Governance Specialist	• Master's degree in public finance, economics, public accounts, political or social science or other relevant field with at least 5 years of experience in financial management

	• 3-5 years of experience designing and conducting survey research • Experience analysing local resource allocation decisions and advising on governmental budget management in complex environments • Experience analysing city subsidy policies, financial viability, and creditworthiness • Strong interpersonal skills • Ability to work with senior officials • Cultural sensitivity. • Fluency in English, proficiency in Arabic
Water Management Specialist	• Master's degree in hydrology, climatology, geography, civil engineering, or related • 3-5 years of experience designing and conducting hydrogeological investigations, particularly for evaluating water conservation and water supply forecasting data • Experience analysing water supply issues and municipal water projects • Ability to interpret water quality results and suggest chemical dosage changes to treatment process • Strong interpersonal skills • Ability to work with senior officials • Cultural sensitivity. • Fluency in English, proficiency in Arabic

Ethical Considerations

36. The evaluation consists of an exhaustive and rigorous analysis of the Smart City Initiative implemented in Baghdad city. The evaluation shall take into consideration certain professional and ethical requirements, including:

- Anonymity and confidentiality: the evaluation must respect the right of individuals to provide information while ensuring anonymity and confidentiality.
- Responsibility: any disagreement or difference of opinion that may arise between the members of the team, or between consultants and UNICEF Iraq, relating to the conclusions and / or recommendations should be mentioned in the report. All claims must be supported by the team or have a disagreement noted.
- Integrity: the evaluation team will be responsible for highlighting questions that are not specifically mentioned in this ToR, if necessary, for obtaining a more complete analysis.
- Independence: the evaluation team must not have links or personal interests in the Smart City Initiative, its management or any of its components.
- Validation of the information: the evaluation team must ensure the veracity of the compiled information and will be ultimately responsible for the information presented in the evaluation report.
- Evaluation report: the dissemination of the information compiled, and the final report is the sole responsibility of UNICEF Iraq.

Payment

37. Payment is contingent on clearance by the Evaluation Manager and will be made in three instalments:

- 20 percent after the inception report

- 30 percent after the presentation of preliminary findings
- 50 percent on completion of all deliverable to the satisfaction of UNICEF

Location

38. The work will be home based except for the duration of the field work in Iraq.

ICT Considerations

39. The evaluation team will require access to some of the UNICEF internal databases and documents.

Evaluation of Proposal

40. Given that the company has been preselected in the LTA process, proposals will be assessed based on whether the CVs of the proposed team members match the evaluation ToR's requirements as well as the overall team's availability and the price. The team CVs will be assessed based on appropriateness and, if appropriate, proposals will be selected based on price. Each proposal should include the following:

- Curriculum vitae for all team members in English
- Financial proposal

41. All proposals should be sent to UNICEF Iraq Bids at irqtender@unicef.org. A Bid Selection Committee will review all applications as they arrive.

Unsatisfactory Performance

42. In case of unsatisfactory performance, payment will be withheld until quality deliverables are submitted. If the selected institution is unable to complete the assignment, the contract will be terminated by notification letter sent 30 days prior to the termination date. In the meantime, UNICEF will initiate another selection process to identify appropriate candidate.

Conditions and Administrative Issues

43. The contractor will work on its own computer(s) and use its own office resources and materials in the execution of this assignment. The contractor's fee shall therefore be inclusive of all office administrative costs.

44. Granting access to UNICEF ICT resources for consultants / non-staff is considered as 'exception,' and therefore shall only be granted upon authorization by the head of the office on justification / need basis. This includes creation of a UNICEF email address, as well as access to ICT equipment such as laptops and mobile devices.

45. All evaluation consultants must uphold the UNEG Code of Conduct for Evaluation in the United Nations system. All persons engaged under a UNICEF service contract, either directly through an individual contract, or indirectly through an institutional contract, shall be subject to the UN Supplier Code of Conduct: <https://www.ungm.org/Public/CodeOfConduct>

46. Please also see UNICEF's Standard Terms and Conditions attached.

ANNEX 1: SMART City Initiative Theory of Change

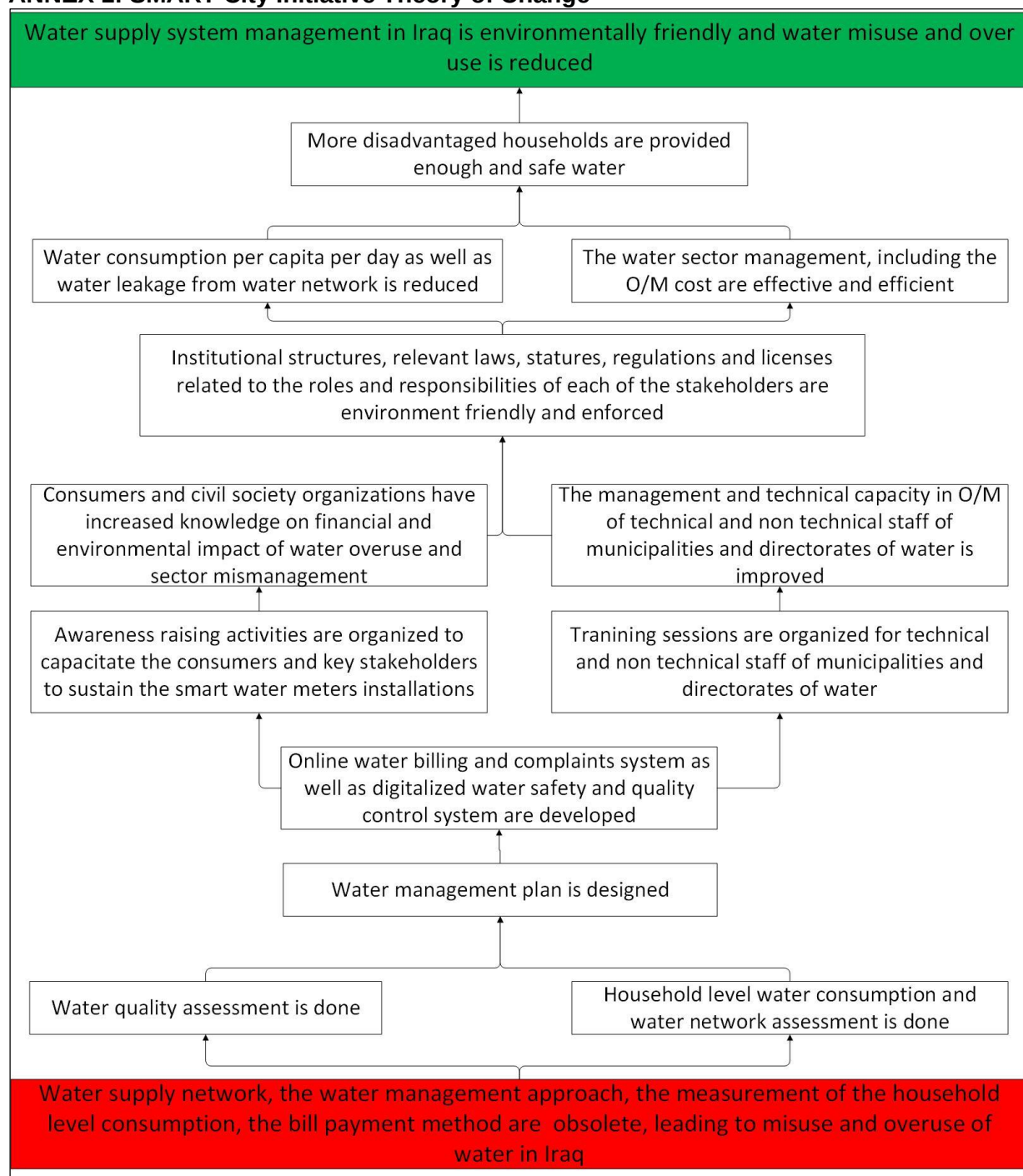


Figure 1: The theory of change of the smart city initiative