National Water Sector Strategy

"A right for every citizen, a resource for the whole country"





LEBANESE REPUBLIC
MINISTRY OF ENERGY AND WATER

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Baseline

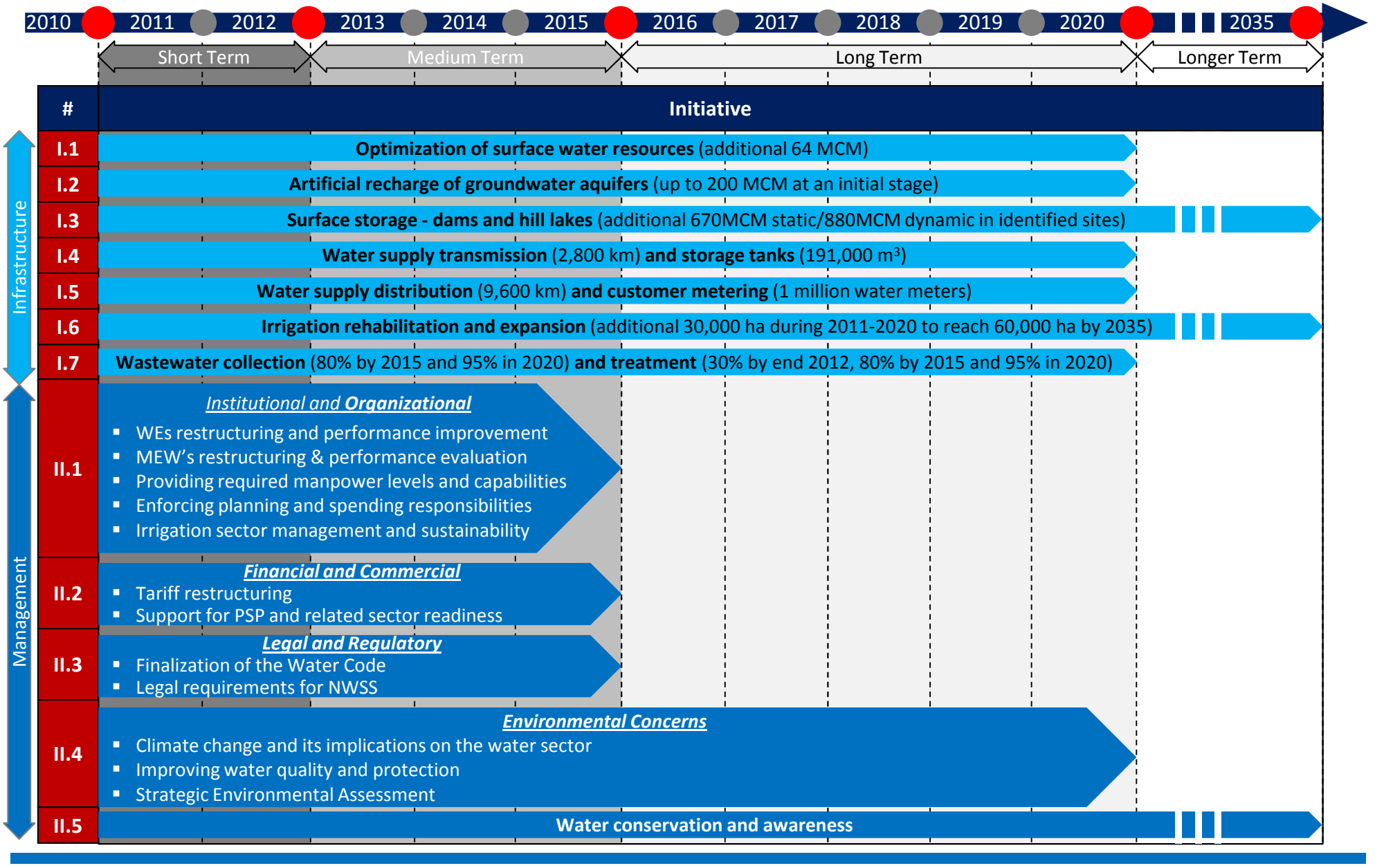
Demand/Supply Forecasts

Sector Enabling Environment

Investment Plan

Strategic Roadmap

NWSS - Strategic Roadmap



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I. Infrastructure Initiatives

II. Sector Management Initiatives

Infrastructure – Initiative Summary (1/6)

#	Initiative		Implementation time & CAPEX						Financing
			11	12	13	14	15	16-20	
I.1	▪ **Optimization of surface water resources** – Limited optimization of around 1% per year for the period 2011 -2015, and a second stage 2016-2020 – Experience proved the efficiency of superficial improvement of the catchment of surface water springs – An increase of 10-15% of the initial flow during the low season would be achieved	2011-2015: Additional 38MCM 2016-2020: Additional 30MCM	50 M$					50 M$	GoL
I.2	▪ **Artificial groundwater recharge** – Artificial recharge is technically feasible in a large portion of the country – Pilot projects can be started near Beirut, Tripoli and Baalbek. The situation in South Lebanon requires deeper consideration – Preliminary studies show that each well could have a potential flow of 50-100 l/s during a period of at least 3 months	2011-2015: 120MCM 2016-2020: 80MCM	64 M$					64 M$	Grants GoL
I.3	▪ **Surface storage** – Around 46 sites have been identified as suitable for surface storage – Detailed designs and tender documents for a number of sites are ready. Execution could start in early 2011 including:	*As detailed below*	1,264M$					711 M$	

Infrastructure – Initiative Summary (2/6)

#	Initiative	Capacity (MCM) Static - Dynamic	Implementation time & CAPEX						Total CAPEX (MUSD)	Financing
			11	12	13	14	15	16-20		
I.3 Cont'd	▪ ***BML***	***166-233***							***859.0***	
	– Qaysamani Lake	1.0	12.5	12.5					25.0	
	– Boqaata Dam	6-12	17.3	17.3	17.3	17.3			69.0	
	– Aazounieh Dam	4.1-5.0	16.3	16.3	16.3	16.3			65.0	
	– Maaser El Chouf Dam	2.2	13.3	13.3	13.3	13.3			53.0	
	– Janneh Dam	30-90		60.0	60.0	60.0	60.0	60.0	300.0	
	– Laklouk Lake	0.5			7.0	7.0			14.0	
	– El Manzoul Dam	0.4			4.0	4.0			8.0	
	– Bisri Dam	120.0						300.0	300.0	
	– Mokhada Lake	2.0			7.5	7.5			15.0	
	– Ratiba Lake	0.3			5.0	5.0			10.0	
	▪ ***North***	***80-151***							***488.0***	
	– Brissa Dam	0.8	3.0						3.0	GOL
	– Kouachra Lake (Rehabilitation)	-	3.0						3.0	
	– El Bared Dam	37-90	28.8	28.8	28.8	28.8	28.8		144.0	
	– Qarkaf Dam	20-25		20.3	20.3	20.3	20.3		81.0	
	– Mseilha Dam	6-12	13.8	13.8	13.8	13.8			55.0	Loans
	– Balaa Dam	1.2-2.2	8.7	8.7	8.7				26.0	
	– Rahwe Lake	2.2			12.5	12.5			25.0	
	– Iaal Dam	12-18						100.0	100.0	
	– Ouadi Chich - Arz Lake	1.0						30.0	30.0	PSP
	– Atolbe Lake	0.7						12.0	12.0	
	– Hadath El Jebbeh Lake	0.4						9.0	9.0	
	▪ ***South –*** Ibl Es Saki Dam	***50***				50.0	50.0	200.0	***300.0***	
	▪ ***Bekaa***	***83***							***328.0***	
	– Assi Project Phase I	1.5	12.5	12.5	12.5	12.5			50.0	
	– Assi Project Phase II	63	28.2	28.2	28.2	28.2	28.2		141.0	
	– Younine	5.8	16.5	16.5	16.5	16.5			66.0	
	– Ouadi Sbat	0.6				7.5	7.5		15.0	
	– Barhacha Lake	2.0		5.0	5.0				10.0	
	– Massa Dam	2.5			8.3	8.3	8.3		25.0	
	– Rachaya - Ain Arab Lake	8.0				10.5	10.5		21.0	

Infrastructure – Initiative Summary (3/6)

#	Initiative		Implementation time & CAPEX						Financing
			11	12	13	14	15	16-20	
I.4	▪ **Water Supply Transmission** – Replacement of existing over-aged transmission systems and associated equipment and bulk meters – Leakage detection/rehabilitation and partial replacement of damaged middle-aged systems and associated equipment – Expansion of transmission systems to meet growing demand including district metering – Rehabilitation/replacement of existing storage tanks including hydraulic equipment and flow meters – Construction of new storage tanks to meet growing demand and achieve 0,5 and 1 day retention time for BML and other WE's respectively including hydraulic equipment and flow meters – Construction of Awali – Beirut and Canal 800 (WS share only) conveyors and related transmission systems and equipment	2011-201: Full/partial replacement of 2,550 km of pipes and additional 156,000 m3 of storage in 465 tanks 2016-2020: Replacement of 250 km of pipes and additional 35,000 m3 of storage in 96 tanks	814 M$					121M$	GoL Loans/ Grants

Infrastructure – Initiative Summary (4/6)

#	Initiative		Implementation time & CAPEX						Financing
			11	12	13	14	15	16-20	
I.5	▪ **Water Supply Distribution** – Replacement of existing over-aged distribution networks including house connections – Rehabilitation and partial replacement of damaged middle-aged networks, supported by leakage detection campaigns – Expansion of distribution networks to cover new geographic areas and meet growing demand including house connections – Installation of customer water meters. Metering targets by 2015 in BML 95%, in North/South 85% and Bekaa 75%	2011-2015: Full/partial replacement of 6,900 km of pipes with house connections and installation of 640,000 meters 2016-2020: Full/partial replacement of 2,700 km of pipes with house connections and installation of 365,000 meters	580M$					274 M$	GoL Loans/ Grants

Infrastructure – Initiative Summary (5/6)

#	Initiative	Area (ha)	Implementation time & CAPEX						Financing
			11	12	13	14	15	16-20	
I.6	▪ **Irrigation** – Rehabilitation/replacement of existing over-aged irrigation systems and networks – Implementation of additional 15,000 ha of irrigation schemes until 2015 and 15,000 ha between 2016-2020	*As detailed below*	372 M$					205 M$	GOL Loans/ Grants
	North	***5,750***							
	• Noura El Tahta Scheme	5,000	4.0	4.0	9.0	9.0	9.0	29.0	
	• El Bared Scheme	750							
	Bekaa	***13,650***							
	• Assi Scheme	5,400							
	• Younine Scheme	1,550	15	15	36	36	36	119	
	• South Bekaa Phase 2 (Left Bank)	6,700							
	South	***14,700***							
	• South Lebanon Conveyor 800	14,700	20	28	48	56	47	56	

Infrastructure – Initiative Summary (6/6)

#	Initiative	Implementation time & CAPEX						Financing
		11	12	13	14	15	16-20	
I.7	▪ **Wastewater** – Collection and treatment to at least preliminary level of 80% by 2010 and 95% by 2020 – Pre-treatment of all industrial wastewater by 2020 – Reuse of 20% of treated wastewater by 2015, and 50% by 2020 – Secondary treatment and reuse of all inland wastewater by 2020 and secondary treatment by 2020 of coastal wastewater where reuse is economically justified 1. Integrated and prioritized immediate investment: a. Funded networks for the seven completed and two operational WWTPs along the coast b. Completion of already funded projects c. Networks for already completed projects (23 inland and 11 coastal plants) 2. Preparation of regional wastewater master plans 3. Integrated national investment program 2013-2020 a. Preparation and implementation b. MEW responsibility for budget execution and project implementation with staff recruitment and capacity building 4. Economic reuse of treated wastewater and sludge (studies and investment) 5. Capacity building and pilots for wastewater sub-sector ▪ **Long term (wastewater)** – Continuation of the integrated national investment program – Updating pre-treatment plants to secondary and extension of Jbeil plant – Investments for reuse of treated wastewater for irrigation	1,895M$ 190 490 880 4 200 20 31 80					1,213M$	GoL Loans/ Grants PSP

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Management – Initiative Summary (1/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.1	**1.1. Perform all priority actions required to complete the restructuring of WEs and address potential limitations,** mainly: – Development of revised and improved organization structures for WEs based on roles and responsibilities – Drafting revised WE organization bylaws, supporting in the approval process and following up on their enactment – Implementation of the restructuring of WEs – Evaluate the potential for outsourcing of certain non-core functions – Providing needed support for WEs to gradually reach full administrative and financial autonomy **1.2. Improve on the operating model between WEs and MEW,** through: – Ensuring an integrated management of water resources – Ensuring the involvement of WEs in project planning and implementation for water supply, irrigation and wastewater – Improvement in coordination – Ensuring operational and financial empowerment of WEs together with proper mechanisms for performance management **1.3. Improve on the performance efficiency of WEs** to reflect: – More focus on irrigation and wastewater responsibilities, in addition to current water supply activities – Most suitable organization for technical functions – Improvements to support functions e.g., Strategic Planning and Business Planning, Water Demand Management, performance management, more focus on IT, Fixed Asset Management, Supply Chain Management, Customer Service, Control and Audit functions	14 M$						Technical Assistance Grants GOL

Management – Initiative Summary (2/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.1 Cont'd	**1.4. Restructure MEW's organization in line with the requirements of laws 221 and 247** to reflect more its water governance role, with main focus on policy making, planning and regulatory roles: – Development of revised organization structures for MEW – Drafting a revised organization law, supporting in the approval process and following up on its enactment – Implementation of the restructuring of MEW **1.5. Develop the process for the performance monitoring and evaluation of WEs,** including: – Monitoring body – Performance indicators – Tools and procedures	2 M$						Technical Assistance Grants GOL
	1.6. Provide the required manpower levels and capabilities to ensure an appropriate operation and maintenance of assets and the delivery of water at optimal service levels, through the: – Reduction of current vacancies (over 81% at MEW and 67% in WEs) to required manpower levels according to recommended organization structures – Continuous development of staff through proper training	4 M$						Technical Assistance Grants GOL

Management – Initiative Summary (3/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.1 Cont'd	**1.7. Enforce planning and capital spending responsibilities and coordination among various players in the water sector with a clear delineation of authorities,** where: – MEW is responsible for setting policies, strategies and national planning – CDR is in charge of planning and securing foreign financing of capital projects based on national plans – WEs, LRA and other national entities develop their specific business plans and master plans according to policies and guidelines of the national plan							-
	1.8. Involve stakeholder participation in the design and management of irrigation projects according to best practices, through: – Creation of formal Water Users Associations (WUAs) to replace the different organizations currently in charge of O&M of irrigation schemes – Definition of roles and responsibilities with respect to water management (including water quality) of the WUAs and other partners, in close cooperation with the intended beneficiaries – Providing well-focused training related to the establishment and management of WUAs to all involved parties			8 M$				Technical Assistance Grants GOL

Management – Initiative Summary (4/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.1 Cont'd	**1.9. Improve irrigation water demand management and cost recovery, and sustainability of irrigation schemes,** through: – Adjustment of irrigation water tariffs to cover O&M costs at a first stage, and periodically review and adjust water tariffs to reflect actual costs – Basing water charges on volume of water used rather than area. Where metering is not feasible at this time, base water charges on a combination of a fixed charge to cover the basic services, and other charges which can be used as a proxy for the volume of water used, such as crop grown and/or hourly use of water – Carrying out periodic public awareness campaigns to inform policy makers and farmers of water shortages that could be faced in the next thirty years, and the need for water conservation for irrigation							
II.2	**2.1. <u>Water Supply Tariff</u>** ▪ **Implement a new consumption-based tariff which includes fixed and variable (volumetric) charges for connections equipped with customer water meters**, where: – Current lump-sum tariff should be temporarily maintained for unmetered customers – New tariff should be based on a proper cost analysis to cover, at a minimum, O&M cost as a first stage – No tariff increase would be introduced before concrete improvements are brought to the water sector		3 M$					Technical Assistance Grants GOL

Management – Initiative Summary (5/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.2 Cont'd	**2.2. <u>Irrigation Tariff</u>** ▪ **Design and implement alternative irrigation tariff structures based on the specificities of existing and anticipated irrigation schemes**, where: – Volumetric metering would be the preferred solution wherever applicable **2.3. <u>Wastewater Tariff</u>** ▪ **Apply a new wastewater tariff to customers connected to a sewer network and to a WWTP**, where: – New tariff should be based on a proper cost analysis and cover at a minimum O&M cost in an intermediate stage, with an introductory tariff initially – Wastewater charges can be a percentage of the water bill		1 M$					Technical Assistance Grants GOL
				1 M$				
	2.4. Provide support in developing the adequate legal institutional and regulatory setting to promote PSP, in a way to ensure the interests of the Government and the Lebanese population, and provide an attractive environment to the private sector, through: – Finalizing legal texts, existing or under development and developing any additional legislation – Ensuring needed approvals from relevant authorities **2.5. Ensure the readiness of the water sector from all aspects (e.g., institutional, organizational, financial, legal and regulatory) to guarantee the success of future PSP transactions** *(this initiative is addressed throughout this document)*	1						Technical Assistance Grants GOL
					1 M$			

Management – Initiative Summary (6/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.3	**3.1. Produce the final version of the draft Water Code and follow up the process for its effective implementation and enactment,** through: – The approval of the Ministry of Energy and Water – Discussion and adoption by the Council of Ministers – Transfer by decree to the Parliament for final approval and implementation							GOL
	3.2. Strengthen the legal framework in order to improve the performance of the delivery of water and wastewater services and support the implementation of the proposed strategic initiatives, including all legal aspects related to: – Improvements to current organizational bylaws of WEs – Development and enactment of new organizational law for MEW's restructuring – Reevaluation of some provisions of law 221/2000 in view to strengthen the capacities of the management and to provide better performance to the end users – Establishment of an efficient regulatory framework – Setting of a transparent tariff structures – Development of a wastewater collection and disposal regulations – Improvement of irrigation regulation bylaws – Providing adequate legal environment to promote private sector participation – Development of performance based incentives (e.g., procurement framework,) – Ensuring normal access to potable water and sanitation including requirements for a proper implementation of operational and quality standards			2M$				GOL

Management – Initiative Summary (7/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.4	**4.1. Improve / refine climate change knowledge, and particularly its implications on the water sector and its vulnerability (i.e. refinement of model and figures):** – Collect, analyze and develop trends for climatic data (precipitation and temperature) covering all Lebanon, to compare with historic data and detect possible deviations – Establish a unified database to include all water monitoring data and maintain it regularly updated – Develop and implement long-term river, spring and snow cover monitoring programs – Update periodically water usage scenarios and thus water management options	5 M$						Technical Assistance Grants GOL
	4.2. Improve water quality and protection of recharge zones: – Review and upgrade water quality standards – Take actions to protect against contaminants that may be found in drinking water and its sources – Design and implement a comprehensive integrated surface & groundwater quality monitoring network – Develop a implement a concept for protecting recharge zones – Centralize data and ensure communications with the consumers – Design and implement an integrated monitoring system for irrigation water quality	4 M$						Technical Assistance Grants GOL

Management – Initiative Summary (8/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.4 Cont'd	**4.2. Develop flood mitigation arrangements:** – Establish a flood plain zoning – Develop an integrated flood management plan – Assess the potential use of flood water for groundwater recharge – Support initiatives aiming at combating desertification **4.3. Improve wastewater quality:** – Review and update water quality standards for wastewater discharge – Review and adopt draft standards for wastewater reuse in agriculture & sludge reuse – Implement pollution control programs			4 M$				Technical Assistance Grants GOL
				3 M$				
	4.5. Evaluate environmental consequences of the proposed NWSS (Strategic Environmental Assessment) to ensure they are : – fully included – addressed appropriately at the earliest possible stage of decision making on par with economic and social considerations	2						Technical Assistance Grants GOL

Management – Initiative Summary (9/9)

#	Initiative	Implementation time & Budget						Financing
		11	12	13	14	15	16-20	
II.5	**5.1. Conservation Initiatives on Domestic and Industrial Demand** – Installation of conservation kits (plumbing retrofits and high-efficiency toilets and showerheads, dual flush toilets, faucet aerators, kitchen aerators) – High-efficiency cloth washers – Complete retrofit of large water consumers, e.g., industrial, commercial – Public outreach, awareness and education programs – Household and establishment audits **5.2. Conservation Initiatives on Irrigation Water** – Adoption of high efficiency on-farm irrigation techniques, e.g., drip irrigation, sprinkler irrigation, overhead irrigation where applicable – Coordination with Ministry of Agriculture for the adoption towards lower consumption crops – Public outreach, awareness and farmer education programs – Farm audits and optimization according to local conditions	8 M$						Technical Assistance/ Grants GOL