

Lebanese Republic  
Council for Development and Reconstruction

# Development Program

## Public Investment Planning over 10-15 years

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Dar al Handasah (Shaer and Partners)– CNBureau s.a.r.l. - IAURIF

*This report is the third in the “Development Program”.*

*The first volume presented the “Vision for Development” over a 10-15 years horizon. It set the institutional and economic framework and defined the methodology for planning and programming.*

*The second volume presented the sectoral policies, in line with the “Vision” after an extensive dialogue with the concerned ministries.*

*This third volume translates the general methodology and the sectoral policies into a program of actions and projects.*

*The report includes six chapters*

- 1. Definitions and methodology*
- 2. The Sectors Perspective*
- 3. The Projects Perspective*
- 4. The Financial and Fiscal Perspective*
- 5. Objectives, constraints and trade offs*
- 6. Recommendations and further actions*

*The technical annex presents the actual and the targeted situation for each of the various sectors with a description of the needed projects and actions.*

## DEFINITIONS AND METHODOLOGY

In order to make the best profit of this document and to be able to criticize it and perfect it, it is necessary to abide by precise definitions of the concepts it utilizes and to understand the methodology it follows.

Complete information about the definitions and the methodology can be found in the first volume. A brief reminder is presented below.

### 1.1 A FUNCTIONAL DEFINITION OF PROJECTS

#### 1.1.1 Definitions of « Project » and « Programme »

The central concept is that of project :

*« A project is a set of activities that provide, in a sustainable way, a defined target of beneficiaries with defined benefits ».*

This definition implies that :

- Investment is only one possible component of a project
- A project deals with “defined benefits” and “defined target of beneficiaries”; it encompasses necessarily all the downstream activities to reach the end user; the physical component is only one link in the chain.

This definition is different from that commonly used:

- Many “projects” are nothing more than activities linked to the scope of a contract.
- Almost all of the « projects » are restricted to the initial physical investment.

Once the concept of « project » is agreed upon, we get to some derivative definitions:

- *A « bundle » of projects is an integrated set of projects that give the same « target group of beneficiaries » a set of complementary « benefits ».*
- *A « campaign » of projects is a uniform set of similar projects that give to different « target groups of beneficiaries » similar « benefits ».*
- *A « cluster » of projects is a connex set of projects that share, in a complementary or competitive way, the same equipments or resources ; there benefits and target groups can show variable degree of similitude.*

« Bundles », « campaigns » and “clusters” of projects need « programming »

#### 1.1.2 Definitions of « Sectors » and « Sub-sectors »

The definition of sectors and sub-sectors derives from the same approach, it is related to the final service provided.

*A sub-sector is the set of physical and human resources organized in order to produce and/or supply a defined final service. A sector is a set of sub-sectors the supplied services of which are similar or associated.*

This means that a sector cannot be defined on the basis of the use of a given natural resource (water for instance) or of a multifunctional physical equipment (like roads).

### 1.2 A GLOBAL APPRAISAL OF THE PERFORMANCE OF SECTORS

The starting point will not be the list of projects available in the Ministries for two main reasons:

- Very important projects can be absent from the list and will be absent from the program.
- It is necessary to give each project some form of rating that allows for prioritization. This implies that the costs and benefits of each project are independent from the realization of other projects or from the general level of equipment in their sector. This supposition is obviously wrong.

The method starts from the definition of a target sectoral situation in terms of stock of equipment and of institutional setup, at a horizon of 10-15 years. The comparison of the present and the target situation allows for a consistent understanding of the sectoral policies.

Once the target situation agreed upon, the projects emerge as representing steps on the path from the present to the target situation.

### 1.3 AN ECONOMIC UNDERSTANDING OF THE CONSTRAINTS

#### 1.3.1 The usual form of the financial constraint

In the usual approach, the main constraint used in programming public investment is financial and takes the form of an annual ceiling on public capital expenditure.

The sustainability of public debt being a permanent concern, fiscal simulations are regularly produced. It appears from their comparison that the « acceptable » level of capital expenditure and, more specifically, of capital expenditure that is « locally » financed (since external financing is supposed exogenous and stable) is the most volatile among all the fiscal items, demonstrating that capital expenditure is looked at as a residual and is probably the most exposed to budgetary cuts as it appears from international experience.

#### 1.3.2 Limits of the financial approach

Capital expenses should not be subjected to volatile constraints. Being spread over several years and considering what the global stock of equipment implies in terms of maintenance and operations, they should normally be very stable.

Subjecting capital expenditure to tight or volatile constraints is not efficient since it is always possible to substitute current expenditure (through outsourcing or leasing or BOTs) for capital expenditure or to postpone expenses or charging unconsolidated public entities.

Putting too much emphasis on the difference between external and domestic financing is misleading. The more the ratio of operation and maintenance costs to investment cost is high, the more linking priority of projects to the availability of external financing becomes dangerous because it induces an increased need for internal financing or a significant loss in production.

#### 1.3.3 The economic approach as the time dimension

The most important point pertains to a common misunderstanding of both sides of the inequality that is usually used to express the financial constraint; the misunderstanding pertains to the economic meaning and to the temporal validity:

By nature, investment expenditure have two specificities:

- They cover only a small part of a long string of cash-flows that are negative for a short period in the beginning and that should turn positive for a long period afterwards;
- They necessarily imply a annex series of expenses for maintenance and operation that appear under current expenses.

The idea of “financial ceiling” is of little use since the sustainability of public debt is a matter of economic solvency that makes sense on the long term and not a matter of liquidity on the short term.

Both for investment and for sustainability, what is at stake is the quest for long term equilibria and for convergence paths towards these equilibria rather than for static accounting figures.

Two consequences stem from there :

1. The appraisal of the justification of an investment expenditure ought to be economic and long term. This implies the respect of the following conditions<sup>o</sup>:
  - A high efficiency of expenditure on equipment but also on the maintenance and operations of the built and existing equipment.
  - The recuperation through fees or taxes of a significant part of the benefits of the projects so as to fully cover their cost ;
  - A sufficient level of economic return for the « project » and not for the sole « investment », at the level of the whole economy and secondly for public finance.
2. The economic approach does not necessarily solve the financial question.
  - In Lebanon, the financial constraint is generally not tight and since the needs of the Government are huge, the marginal impact, positively or negatively, of capital expenditure is quite limited.
  - In general terms, the financial constraint should apply not to capital expenditure but to the sum of expenditure on equipment, maintenance and operation.

Because of this duality between the economic and financial dimensions, it is important to look at « non market” financing (mainly multilateral and bilateral) as efficient countercyclical instruments to correct and overcome financial disturbances.

### 1.3.4 The joint management of the economic and financial constraint

The starting point is simple. If any expenditure were to be financed by borrowing, it is primarily capital expenditure. Such a financing is natural because expenditure is concentrated in time while returns are delayed and persistent. It is necessary because relying on taxes would make the present generation pay for benefits that future generations will pick.

It happens that the only category of expenditure that is economically justified to financed through borrowing is the most subjected to financial constraints.

A recent study on the subject states<sup>1</sup> :

- “It is not acceptable to attribute the entire cost of an investment project to a single year's accounts. Investment implies future returns: its cost should thus be distributed over time as those returns accrue.

<sup>1</sup> Olivier J Blanchard and Francesco Giavazzi: “Improving the SGP through a proper accounting of public investment” Discussion paper Series, No. 4220, CEPR, 2004

- Public investment is worthwhile from a social point of view although its net financial rate of return may be lower than the financing cost, which in turn is expected to be smaller than the social rate of return on government projects”

As a result, “all public investment projects with a sufficiently high social rate of return should be implemented. This is what the modified rule allows, since it eliminates cash constraints. So should all private investment, with a sufficiently high private rate of return”.

### 1.4 A NESTED AND SLIDING PROCESS OF PLANNING

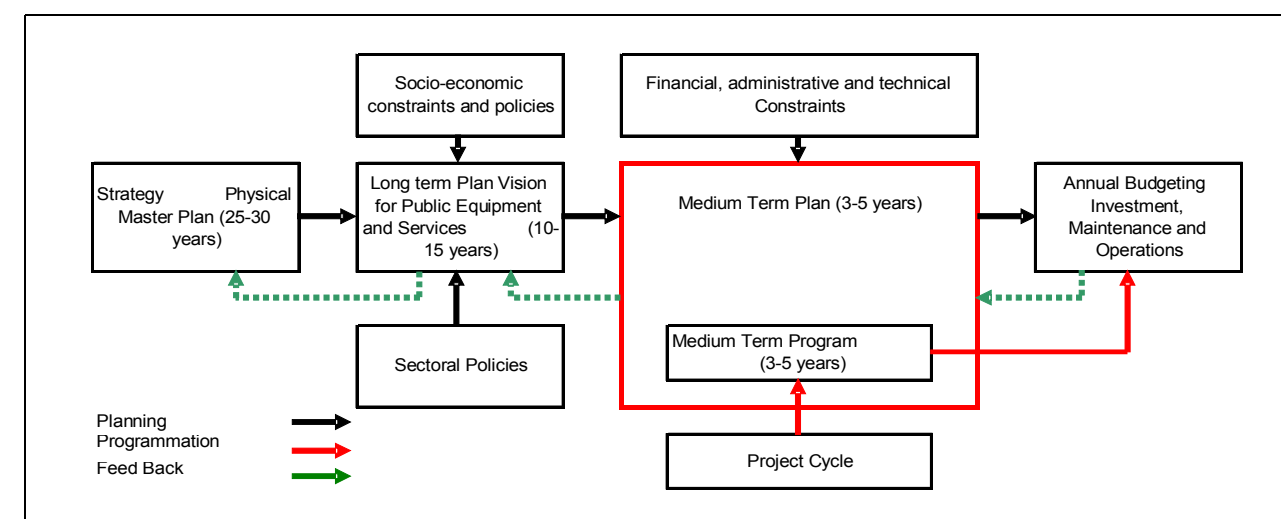
In the same way as planning and programming actions aim at anticipating time to come, they must evolve with time. Nothing is worse than the absence of planning but plans that remains unchanged with time.

Time dimension is present twice in the process of planning: in the delay for effect and in the delay for maturation.

One of the most serious handicaps on planning in Lebanon stems from the negative effect due to the similitude between the successive lists of priority projects. This similitude is, to a large extent, the consequence of the short span of programming (3 to 5 years). Over three years, very little change can be expected because the delay of maturation of projects is longer than the horizon of programming.

The process of planning and programming ought to be nested and sliding/

- Nested in the sense that the time horizons of programming are many (yearly for budgeting, 3 to 5 years for programming, 10 to 15 years dor planning and 25 to 30 years for prospective), accuracy being higher for the shorter spans.
- And sliding in the sense that the various levels of planning and programming ought to be reviewed and corrected on a regular basis, in the view of actual evolutions.



#### 1.4.1 Long term planning: The physical Master Plan (Schéma d'Aménagement du Territoire Libanais) 25 – 30 years

The SDATL draws the synthesis of long term trends (physical, demographic, etc.), it defines basic choices in terms of land use, urban skeleton and structuring equipment. It constrains the action of Ministries and restrains the margins of sectoral policies so as to ensure their consistency.

#### **1.4.2 Medium term planning: vision over 10-15 years**

The “planning vision” is inspired from the SDATL, it expresses allocative and redistributive choices of the State (both socially and spatially), explicits sectoral policies and defines equipment programs and institutional changes.

The 10-15 years delay corresponds to the necessary time to cover the complete cycle of important projects ou programs.

The “planning vision” constrains programming actions. Its production gives the opportunity to review the SDATL.

#### **1.4.3 Programming : 3 5 years**

Programming over 3 to 5 years is inspired from medium term planning, it defines projects to be implemented, to be reviewed or to be cancelled. It clarifies the operational procedures and quantifies the means needed.

It should be noted that the margin of variation is limited at the level of infrastructure realizations because the delay of maturation of such endeavors generally exceed the span of programming. But it is decisive for launching or amending longer term projects and institutional changes.

It defines the framework of the annual budgeting process that encompasses expenditure on equipment, maintenance and operation. Its production gives the opportunity to review the “planning vision”.

#### **1.4.4 Budgeting : year by year**

Budgeting is inspired by programming. It is the annual exercise through which previsions of expenditure translate into authorizations.

Its production gives the opportunity to review the “program”.

The present document covers in the same time the medium term planning (over 10 to 15 years and we conventionally adopted 12 years as a reference) and the programming (3 to 5 years and conventionally adopted 4 years as a reference). The 12 years span has been divided into there periods of 4 years each.

Note that for certain sectors, the speed of technological change is such that planning cannot reasonably exceed the 4 years horizon, this is the case of telecoms.

## THE SECTORS PERSPECTIVE

### 1.5 SECTORS AND SECTOR AUTONOMOUS PRODUCTION ENTITIES (SAPE))

The appraisal of the present and desired situation of sectors in a systematic and consistent way needs to be carried at the same scale at which the service is produced and provided.

In this perspective, the various sectors show one of the four following patterns:

- Open networks,
- Pavings,
- Star-type networks
- Nodal points

For each of those configurations, “sub sector autonomous production entities” (SAPE) can be defined and adopted. Electricity, for instance, is an open network and the whole country belongs to the same SAPE while Primary Health Care Centers (PHC) have a limited radius of influence and the service that each center provides has little to do with the service that another center provides (or does not provide).

Sectors are also operated by different agencies: the Ministries (Government), Municipalities and various autonomous public entities:

Sector	Remarks	Agency	Configuration
Wastewater	Not storm water	Water Authorities	Star-type networks
Water Supply		Water Authorities	Star-type networks
Irrigation		Water Authorities	Star-type networks
Electricity		EdL	Open networks
Telecommunications		Telecom	Open networks
Health Schemes	Services bought from the private	Government	Open networks
Hospitals		Government	Pavings
Pharmaceuticals		Government	Pavings
PHC		Government	Pavings
Education Schemes	Services bought from the private	Government	Open networks
Pre-school		Government	Pavings
General education		Government	Pavings
Vocational education		Government	Pavings
University		Government	Pavings
Natural and Regional Parks		Government	Pavings
General Government Services		Government	Open networks
Roads	Main network	Government	Open networks
Rail		OCFTC	Open networks
Maritime		Government	Nodal points
Air		Government	Nodal points
Economic Activity Zones		Government	Pavings
Urban extensions	Including local networks	Municipalities	Pavings
Solid Waste		Municipalities	Pavings

For each SAPE in each sub-sector, a specific sheet has been produced. The sheets are presented in annex.

For simplicity very small SAPEs (like those related to PHC for instance) have been amalgamated in one sheet per large geographic zone (Greater Beirut, Rest of Mount Lebanon, North, South and Bekaa).

The list of SAPEs is the following

SAPE	SAPE
<b>Waste water</b>	<b>Health</b>
1 Waste Water National	31 Health Schemes
2 Waste Water G Beirut and Mount Lebanon	32 Hospitals
3 Waste Water North	33 Pharmaceuticals
4 Waste Water South	34 Primary Health Care
5 Waste Water Bekaa	<b>Education</b>
<b>Water</b>	35 Education Schemes
6 Water Reg-Nat	36 Pre-school
7 Water Greater Beirut	37 General Education
Water Mount Lebanon	38 University
8 Water Barouk	39 Vocational education
9 Water Metn	40 <b>Natural and Regional Parks</b>
10 Water Kesrwan	<b>General Government Services</b>
11 Water Jbeil	41 Civil Services
Water North	42 Security Services
12 Water Qbayyat	<b>Transportation</b>
13 Water Tripoli	43 Individual uses of roads
14 Water Akkar	44 Collective uses of roads
15 Water Batroun	45 Rail
16 Water Koura	46 Maritime
17 Water Zgharta	47 Air
18 Water Minieh	<b>Land Development</b>
19 Water Bcharré	Economic Activity Zones
Water South	48 Economic Activity Zones Bekaa
20 Water Jabal Amel	49 Economic Activity Zones South
21 Water Nabee El-Tasseh	Urban extensions
22 Water Tyr	50 Urban Extensions Greater Beirut
23 Water Saida	51 Urban Extensions Mount Lebanon
Water Bekaa	52 Urban Extensions North
24 Water Baalback-Hermel	53 Urban Extensions South
25 Water Zahlé	54 Urban Extensions Bekaa
26 Water Chamsine	<b>Solid Waste</b>
27 <b>Irrigation</b>	55 Solid Waste GBA and Mount Lebanon
28 <b>Electricity</b>	56 Solid Waste North
<b>Telecommunications</b>	57 Solid Waste South
29 Fixed lines telecommunications	58 Solid Waste Bekaa
30 Wireless telecommunications	

**1.6 THE SYNTHETIC SHEET OF FACTS**

The following table has been used to represent the situation of all the Sector Autonomous Production Entities (SAPEs). This uniformity is an essential feature because it allows for a systematic treatment of sectoral policies.

Sector		Population(2003)														
Sub-Sector / Technically Autonomous Unit		Population(2003)														
Component	Present Situation	Target Situatio	Projects											Priority		
			Technical Constraints			Cost					Impact	Uncertainty				
Geographic area	Sp	St	AS	Remarks	Description	Min. delay to start (Year)	Min. constr. Period (Year)	Investment Mil US\$	Land value / expro. %	Yearly maintenance cost %			Major rehab/replac. cost %	Span for rehab./replc	Yearly operation cost %	Uncertainty
Physical Stock																
Institutional Setup																
Economic values: Investment Land value / expropriation Yearly maintenance cost Major rehab/replac. cost Span for rehab/replc Yearly operation cost Yearly revenues																
Performance Indicators: Results Means																

The sheet organizes information into three categories:

- General information (in pink)
- Information on the sectoral level (columns in yellow)
- Information on projects (rows in blue)

The intersection of columns and rows describes the existing and targeted process of supply of the service related to the SAPE.

The following table presents the terms that appear in the sheet with basic explanatory comments:

Term	Comments
<b>General information</b>	
Sector:	
Sub-Sector / Technically Autonomous Unit	
Population(2005)	Population served by the SAPE, as per the ACS estimates in 1996 with extrapolation (it might be different from the population living in the neighborhood of the premises)
Population (2020)	Population served by the SAPE, as per SDATL calculations
<b>Information on SAPE</b>	
Present Situation (Sp)	The column describes the present situation of the SAPE
Target Situation (St)	The column describes the targeted situation of the SAPE
Projects (AS)	Projects defined as consistent actions that lead from Sp to St
Physical Stock	Stock of available or targeted equipment described along the chain of production/supply of the service
Institutional Setup	Human and institutional resources
Economic values:	
Investment (Mil\$) (a)	Economic value of the physical stock of equipment (mios \$)
Land value / expropriation	Value of land used by the SAPE (mios \$)
Yearly maintenance cost	
Major rehab/replac. cost	Cost of replacement of equipment
Span for rehab/replc	Number years for replacing equipment
Yearly operation cost %	Cost of inputs for production of services or cost of purchase of services for provision
Uncertainty	
Impact	
Uncertainty	
Yearly operation cost	
Yearly revenues	Revenues related to the provision of the service
Performance Indicators:	
Results	Quantitative indicators of the quantity and quality of the service provided
Means	Quantitative indicators of the means used for the production of the service
<b>Information on Projects</b>	
Characteristics	
Technical Constraints	
Description	Project identification
Min. delay to start (Year)	Minimal period to launch project (antecedents, feasibility, etc.)
Min. construc. Period (year)	Minimal period for execution studies, works, training , etc.
Cost	
Investment Mios USD	Non recurring expenses including studies, training, etc.
Land value / expropriation%	As percentage of Investment Cost
Yearly maintenance cost %	As percentage of Investment Cost
Major rehab/replac. cost %	As percentage of Investment Cost
Span for rehab./replacement	
Yearly operation cost %	As percentage of Investment Cost
Uncertainty	Level of uncertainty on estimates of cost
Impact	
Uncertainty	Level of uncertainty on estimates of impact
Priority	1, 2 or 3 for each successive three periods of 4 years

## 1.7 PRESENT AND TARGETED SITUATION OF SECTORS

The table below presents a summary of the economic situation of the various sectors in the present and in the targeted situation as well as indicators about the projects envisaged for each sector.

	Wastewater	Water Supply	Irrigation	Electricity	Telecommunications	Insurance Schemes	Hospitals	Pharmaceuticals	Primary Health Care	Education Schemes	Pre-school	General education	Vocational education	University	Natural and Regional Parks	Services General Government	Roads	Rail	Maritime	Air	Economic Activity Zones	Urban extensions	Solid Waste	TOTAL	
<i>All figures in mios of fixed USD in 2005</i>																									
<b>PRESENT SECTORAL SITUATION</b>																									
Investment (a)	613	977	400	2 500	1 120	7	165	0	13	1	34	256	100	300	5	1 800	1 000	10	600	500	0	7 255	20	17 675	
Land value / expropriation (a')	12	111	13	500	15	2	55	0	0	0	11	85	33	100	2	1 400	12 800	600	800	1 000	0	24 126	17	41 684	
Yearly maintenance cost (b)	7	13	4	12	65	0	2	0	0	0	0	1	1	2	1	9	40	0	18	25	0	109	0	310	
yearly Major rehab/replac. Cost	24	3	6	100	0	0	5	0	1	0	1	7	3	6	0	23	70	0	2	5	0	44	3	303	
Yearly operation cost (e)	63	64	60	90	80	70	35	0	9	2	37	384	70	114	1	1 400	55	0	18	25	0	145	19	2 741	
Yearly running cost	94	80	70	202	145	70	42	0	10	2	38	392	74	122	2	1 432	165	0	38	55	0	297	23	3 354	
Yearly cost of inputs	0	0	0	1 517	0	515	0	100	0	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2 282
Yearly cost of capital	31	50	20	133	56	0	9	0	1	0	2	14	6	17	0	111	242	10	42	40	0	725	1	1 509	
<b>Yearly Total Cost</b>	<b>125</b>	<b>131</b>	<b>90</b>	<b>1 852</b>	<b>201</b>	<b>586</b>	<b>52</b>	<b>100</b>	<b>10</b>	<b>152</b>	<b>40</b>	<b>406</b>	<b>79</b>	<b>138</b>	<b>2</b>	<b>1 543</b>	<b>407</b>	<b>10</b>	<b>80</b>	<b>95</b>	<b>0</b>	<b>1 022</b>	<b>24</b>	<b>7 145</b>	
transfers	0	0	0	0	0	-100	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
coverage by fees (mios\$)	0	86	0	530	1 100	270	0	0	0	0	0	0	0	0	0	0	255	0	80	130	0	45	0	2 496	
coverage by tax/debt	125	45	90	1 321	0	316	52	0	10	152	40	406	79	138	2	1 543	152	10	0	0	0	977	24	5 482	
private over expenditure or loss	0	80	129	1 587	0	879	77	450	116	0	233	731	221	276		0	2 362				0	0	19	7 162	
cost of negative externalities	278	65	0	602	0	220	19	38		0	26	262	51	149	23	0	602				0	256	20	2 611	
import of oil derivatives	0	0	0	2 918	0	0	0	0	0	0	0	0	0	0	0	0	1 508	0	0	0	0	0	0	4 426	
<b>TARGETED SECTORAL SITUATION</b>																									
Investment (a)	1 892	1 849	800	4 500	1 481	20	350	0	64	2	84	298	151	500	25	2 000	2 200	200	670	510	204	10 689	47	28 536	
Land value / expropriation (a')	53	271	20	550	0	7	117	0	0	0	28	99	50	167	10	1 400	13 750	650	950	1 000	90	34 050	11	53 273	
Yearly maintenance cost (b)	7	10	4	111	101	2	5	0	0	0	3	9	5	15	3	20	110	6	20	26	3	160	1	619	
yearly Major rehab/replac. Cost	0	2	2	75	0	0	11	0	2	0	1	3	6	5	0	19	33	3	3	5	1	53	3	227	
Yearly operation cost (e)	53	117	40	90	115	115	100	0	35	0	45	349	60	140	6	1 980	689	2	20	26	10	214	25	4 230	
Yearly running cost	60	129	46	276	216	117	116	0	37	0	49	361	71	160	9	2 019	832	11	43	56	14	428	28	5 076	
Yearly cost of inputs	0	0	0	1 575	0	1 265	0	316	0	376	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3 533
Yearly cost of capital	95	96	40	233	74	1	19	0	3	0	5	16	8	28	1	121	316	20	48	41	12	1 045	3	2 226	
<b>Yearly Total Cost</b>	<b>155</b>	<b>226</b>	<b>86</b>	<b>2 084</b>	<b>290</b>	<b>1 383</b>	<b>135</b>	<b>316</b>	<b>40</b>	<b>376</b>	<b>53</b>	<b>377</b>	<b>79</b>	<b>188</b>	<b>10</b>	<b>2 140</b>	<b>1 148</b>	<b>31</b>	<b>91</b>	<b>97</b>	<b>26</b>	<b>1 473</b>	<b>31</b>	<b>10 835</b>	
transfers	0	0	0	0	0	-387	118	269	0	-376	124	251	0	0	0	0	0	0	0	0	0	0	0	0	0
coverage by fees (mios\$)	51	110	0	1 320	1 711	207	17	47	6	56	5	36	11	24	0	0	658	11	67	76	0	21	24	4 459	
coverage by tax/debt	104	116	86	764	0	1 176	0	0	35	320	0	90	68	163	10	2 140	490	20	24	20	26	1 451	7	7 110	
private over expenditure or loss	0	0	0	0	0	0	0	0	27	0	0	0	95	125		0	3 526				0	0	3	3 775	
cost of negative externalities	12	18	0	326	0	231	23	53		0	7	50	11	42	1	0	326				0	78	3	1 178	
import of oil derivatives	0	0	0	1 575	0	0	0	0	0	0	0	0	0	0	0	0	2 582	0	0	0	2 395	0	0	6 552	
<b>PROJECTS</b>																									
land appropriation	46	102	5	143	0	0	0	0	0	0	0	0	0	0	8	15	924	52	0	0	90	2 393	34	3 811	
ongoing projects	176	287	0	0	0	0	3	0	0	0	0	13	0	13	0	0	757	0	0	0	0	0	0	0	1 248
new physical investment	933	1 566	200	2 765	65	25	183	6	51	0	50	44	51	215	20	200	1 208	187	158	16	204	1 128	62	9 334	
total investment	1 108	1 853	200	2 765	65	25	186	6	51	0	50	56	51	228	20	200	1 965	187	158	16	204	1 128	62	10 582	
coverage by contribution	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	231	0	0	0	130	1 950	0	2 311	
net new total capital expenditure	978	1 668	205	2 907	65	25	183	6	51	0	50	44	51	215	28	215	1 901	239	158	16	164	1 571	96	10 834	
yearly maintenance	12	15	2	56	6	2	7	0	3	0	2	1	2	6	3	0	34	5	0	0	3	17	60	235	
yearly provision for replacement	5	4	2	38	0	1	5	0	2	0	0	0	0	0	0	1	5	0	0	0	1	3	0	69	
yearly operation	108	166	20	597	4	1 386	51	0	29	0	13	11	11	30	6	40	8	1	2	3	14	55	31	2 587	



share of imported equipment	35%	35%	10%	80%	90%	0%	60%	80%	20%	0%	15%	15%	20%	15%	5%	15%	35%	20%	10%	20%	10%	10%	10%	3 995
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It is useful to compare globally the initial and final situation of all sectors and to assess to impact of the planed projects on the sectoral performance.

### 1.8 ALTERATION OF SECTORAL PERFORMANCE

The table below gives the global picture. It covers not only the Central Government operations but also Municipalities, Social Security and the various agencies involved (such as EdL, Telecoms, Water Authorities, etc.) and shows both their expenditure and revenues (as opposed to showing only the net balance).

Amounts in mios of fixed USD in 2005	Initial situation 2006	Final situation 2018	variation (final- initial)	Relative variation	Initial situation %GDP	Final situation %GDP
Investment	17 675	28 536	10 860	61%	80.3%	71.3%
Land value / expropriation	41 684	53 273	11 589	28%	189.5%	133.2%
<b>GDP</b>	<b>22 000</b>	<b>40 006</b>	<b>18 006</b>	<b>82%</b>		
Yearly maintenance cost	310	619	309	100%	1.4%	1.5%
Yearly major rehab/replac. cost	303	227	-76	-25%	1.4%	0.6%
Yearly operation cost	2 741	4 230	1 489	54%	12.5%	10.6%
Yearly running cost	3 354	5 076	1 723	51%	15.2%	12.7%
Yearly cost of inputs	2 282	3 533	1 250	55%	10.4%	8.8%
Yearly cost of capital	1 509	2 226	717	48%	6.9%	5.6%
<b>Yearly Total Cost</b>	<b>7 145</b>	<b>10 835</b>	<b>3 690</b>	<b>52%</b>	<b>32.5%</b>	<b>27.1%</b>
coverage by cost of private capital contribution	0	116	116		0.0%	0.3%
coverage by fees	2 496	4 459	1 962	79%	11.3%	11.1%
coverage by tax/debt	5 482	6 995	1 512	28%	24.9%	17.5%
private over expenditure	7 162	3 775	-3 387	-47%	32.6%	9.4%
cost of negative externalities	2 611	1 178	-1 432	-55%	11.9%	2.9%
total direct cost	15 141	15 229	88	1%	68.8%	38.1%
total social cost	17 752	16 407	-1 345	-8%	80.7%	41.0%
import of oil derivatives	4 426	6 552	2 126	48%	20.1%	16.4%

Note first that over the coming 12 years, the population is estimated to increase by about 12% or half a million and that the level of services provided will improve dramatically if the actions mentioned in the program are implemented.

The total value of equipment would increase by about 10.5 billions USD from a base figure of 17 billion which represents 60% (this amount includes investments of the Government but also of the Municipalities –about 7 billions- and various public agencies). Its ratio to GDP would decrease from 80% to 70%.

The GDP would increase by 80% at an average annual rate of 5.1% which means an increase in the per capita GDP of 60% or an annual rate of 4%. Growth is estimated endogenously on the basis of a base rate of 1.5% and through the effects of the variations in costs (demand channel) and of the stock of capital expenditure (supply channel).

Due to the increase in maintenance cost (almost the double for 60% more equipment), the yearly provision for rehabilitation and/or replacement will decrease even in absolute terms.

The operation cost increases by about 55%. Along with maintenance and replacement, it adds up to the running cost.

The cost of inputs covers the price of services bought from private suppliers (hospitals, schools, etc.) and provided to the population through public service schemes. This item increases significantly with the generalization of health coverage and free basic education. It includes also the purchases of oil derivatives by public entities (mainly EdL), this item is kept constant significantly

in spite of the rise in production, due to the improvement in efficiency. The total imports of oil derivatives is significantly reduced.

The cost of capital represents the annualized impact of capital investment, the rate applied being 5% (all figures are in real terms). This item should be accounted for in case of privatization in the course of the calculation of the price of services (probably at different rates). Since a part of public investment is (and should be) supported by private contributions from those who benefit from positive externalities due to public investment, the increase in investment translates into an increase in the yearly cost/income of those private contributions (116 billions USD).

Total cost (including capital cost as substitute for investment) increases by 3.7 billions USD or 42% but its share to GDP decreases (-5.3%). It is covered by the annualized effect of private contributions, a sharp increase in fees (+2 billions or 79%) and a moderate increase in tax and/or debt; debt being finally nothing else that postponed taxes (+1.5 billion or 28%). The increase in fees is calculated with the hypothesis of raising moderately the average actual price for electricity (from 130 LBP per kwh to 165) which means a significant subsidy. The increase in the fees reflects therefore mainly an increase in the quantity of goods and services supplied.

Private over-expenditure represents costs that are incurred by the population either to complement services that are only partially supplied by public institutions (health, education, transport) or to remedy the deficiencies in the provision of such services (water, electricity, etc.). This element of cost is very important to assess in the course of any economic evaluation of the provision of public services. It decreases from 7.2 billions USD (almost one third of the GDP) to 3.8 billions USD (about 10% of GDP).

The cost of negative externalities (pollution of air and water, loss of time in transport, diseases, leakages and low quality in education, etc.) decreases sharply (-1.4 billion USD or -55%). The decrease in private over-expenditure and negative externalities can be seen as a main target of the whole program since all the studies show clearly that the Lebanese economy suffers from extremely high cost and relatively low quality of infrastructure and social services<sup>2</sup>.

The evaluation of private over-expenditure and cost of negative externalities was carried on the basis of existing studies and direct sectoral data each time that was possible. In the other sectors, they were derived from indicators of the quantity and quality of the services provided, using the actual costs and reasonable elasticities.

The total direct cost (fees + taxes and debt + complementary private expenditure) remains almost constant in real terms (in spite of the increase in quantity and quality), it decreases as share of GDP from 69% to 38%. If we add externalities, the effect is stronger (decrease from 80% to 40%).

In economic terms, these two synthetic indicators best summarize the effect of the proposed 12 billions USD investment program.

The import of oil derivatives is maintained fixed in spite of the large increase in energy consumption and in the number of trips.

<sup>2</sup> See the World Bank « Public Expenditure Review », 2005

### 1.9 MATTERS OF EFFICIENCY GAINS

It is worth noting that the final situation is not simply the sum of the present situation and the projects.

<i>All figures in mios of fixed USD in 2005</i>	Initial situation 2006	Final situation 2018	variation (final-initial)	projects	initial + projects	variation due to substitution & efficiency gains (final-initial & projects)	% of initial
Investment	17 675	28 536	10 860	10 631	28 306	229	1%
Land value / expropriation	41 684	53 273	11 589	3 811	45 495	7 778	19%
Yearly maintenance cost	310	619	309	238	548	71	23%
Yearly major rehab/replac. cost	303	227	-76	70	373	-146	-48%
Yearly operation cost	2 741	4 230	1 489	2 616	5 357	-1 127	-41%
Yearly running cost	3 354	5 076	1 723	2 924	6 278	-1 202	-36%

There are several reasons for the differences:

- New investments do not add to the stock because part of the stock will gets obsolete and decays; it might be replaced or not.
- The value of land increases more than the new additions because of the effect of equipment on the value of the existing stock (this effect amounts to 19% of the initial value).
- The significant decrease in the running cost (-11% of the investment and -36% of the initial level) expresses the gains in productivity that the new investments and the institutional actions are able to generate.

# THE PROJECTS PERSPECTIVE

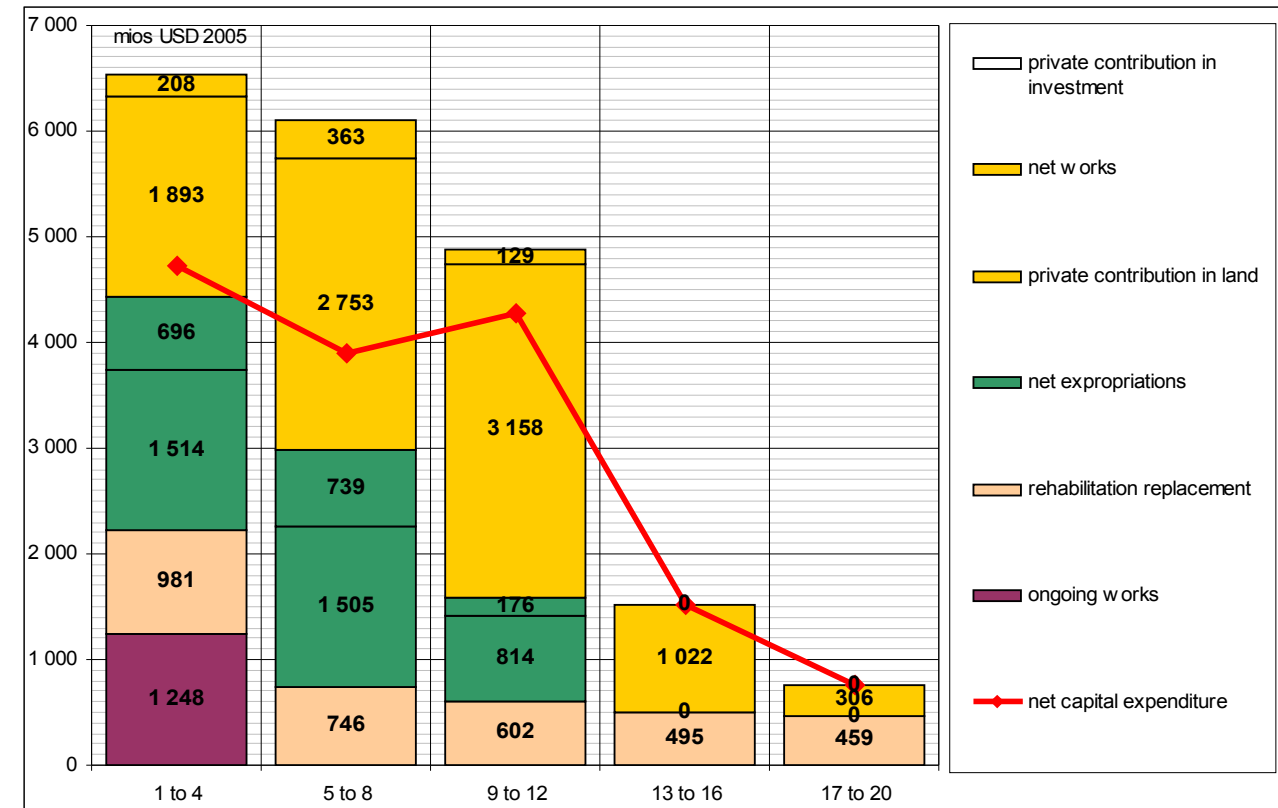
## 1.10 GENERAL FEATURES OF THE PROGRAM

The investment program is presented in details in the annex.

The following table and graph summarize the evolution over time of the main indicators of the provision of public services due to the progressive realization of the investment program. Only the expenditure side is presented. Those indicators are related to the interlinked four components of expenditure: 1)°expropriations, 2)°works and equipment, 3)°rehabilitation and replacement, 4)°operations and maintenance (excluding transfers and purchase of inputs).

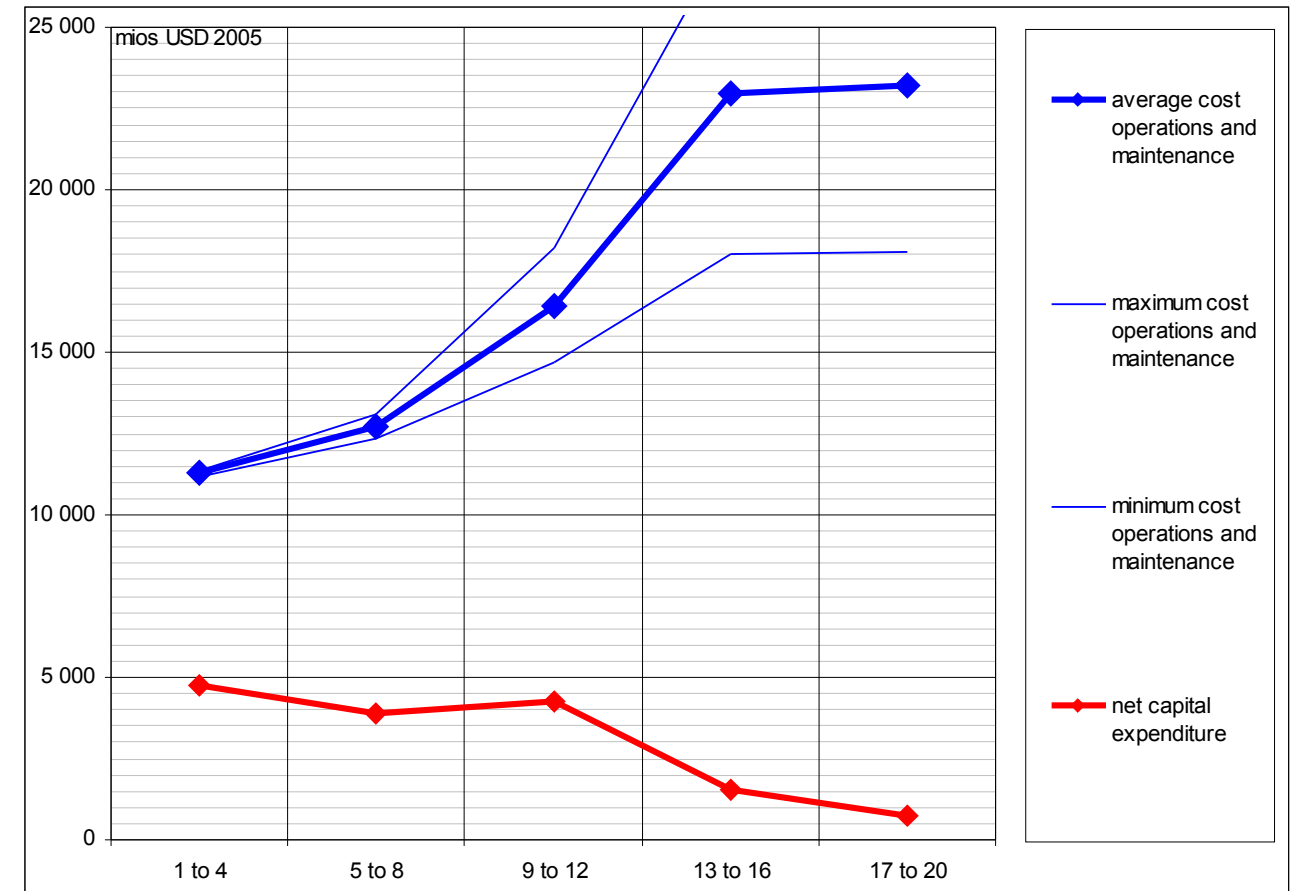
The relative uncertainty on the costs of equipment and of operations shows a clear increasing trend over time; the least known projects having been delayed.

<i>mios of fixed USD in 2005</i>	years	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	Total
Expropriations		1 514	1 505	814	0	0	3 832
Ongoing works		1 248					1 248
New works		1 893	2 753	3 158	1 022	306	9 133
Rehabilitation replacement works		981	746	602	495	460	3 284
Total works		4 122	3 500	3 760	1 517	766	13 665
Contribution of private capital		904	1101	305	0	0	2 311
Net total public capital expenditure		4 732	3 903	4 268	1 517	766	15 186
Cost of operations and maintenance		11 270	12 727	16 434	22 986	23 219	86 635
Total cost		16 002	16 630	20 702	24 503	23 985	101 821
relative uncertainty in operations costs		1%	3%	11%	22%	22%	
relative uncertainty in equipment costs		18%	25%	25%	28%	23%	



On yearly basis, net capital expenditure (expropriations, works and equipment and rehabilitation and replacement minus contributions from private property owners through the necessary channels) would stand at about 1.1 billion USD per year.

The share of rehabilitation is very high at the beginning while that of new projects increases in the second phase.



It is worth comparing the size of capital expenditure (on the left scale in the figure) to that of operations and maintenance (on the right scale). Ten billion USD invested once go with a rise in expenditure by a yearly equivalent amount. Putting rigid arithmetic constraints on capital expenditure alone is an economic nonsense.

The following chapters analyze the distribution of capital expenditure according to the responsible agencies, the types of expenditure, the sectors, the dates and the beneficiary regions.

**1.11 TYPES OF EXPENDITURE, RESPONSIBLE AGENCIES AND DATES**

expropriations agency	date					Total
	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	
Government	136	197	705	0	0	1 037
Municipalities	524	570	0	0	0	1 094
EdL	77	39	27	0	0	143
Water Authorities	62	7	79	0	0	148
OCFTC	50	0	2	0	0	52
Telecom	0	0	0	0	0	0
<b>Total</b>	<b>849</b>	<b>812</b>	<b>814</b>	<b>0</b>	<b>0</b>	<b>2 474</b>

equipment agency	date					Total
	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	
Government	599	722	810	273	0	2 403
Municipalities	374	588	246	0	0	1 208
EdL	167	859	1 421	221	92	2 760
Water Authorities	566	538	670	529	214	2 517
OCFTC	170	2	10	0	0	182
Telecom	18	45	0	0	0	63
<b>Total</b>	<b>1 893</b>	<b>2 753</b>	<b>3 158</b>	<b>1 022</b>	<b>306</b>	<b>9 133</b>

rehabilitation replacement agency	date					Total
	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	
Government	374	266	271	211	186	1 308
Municipalities	138	123	131	138	138	668
EdL	386	308	172	128	123	1 115
Water Authorities	83	49	28	17	13	190
OCFTC	1	1	1	1	1	4
Telecom	0	0	0	0	0	0
<b>Total</b>	<b>981</b>	<b>746</b>	<b>602</b>	<b>495</b>	<b>460</b>	<b>3 284</b>

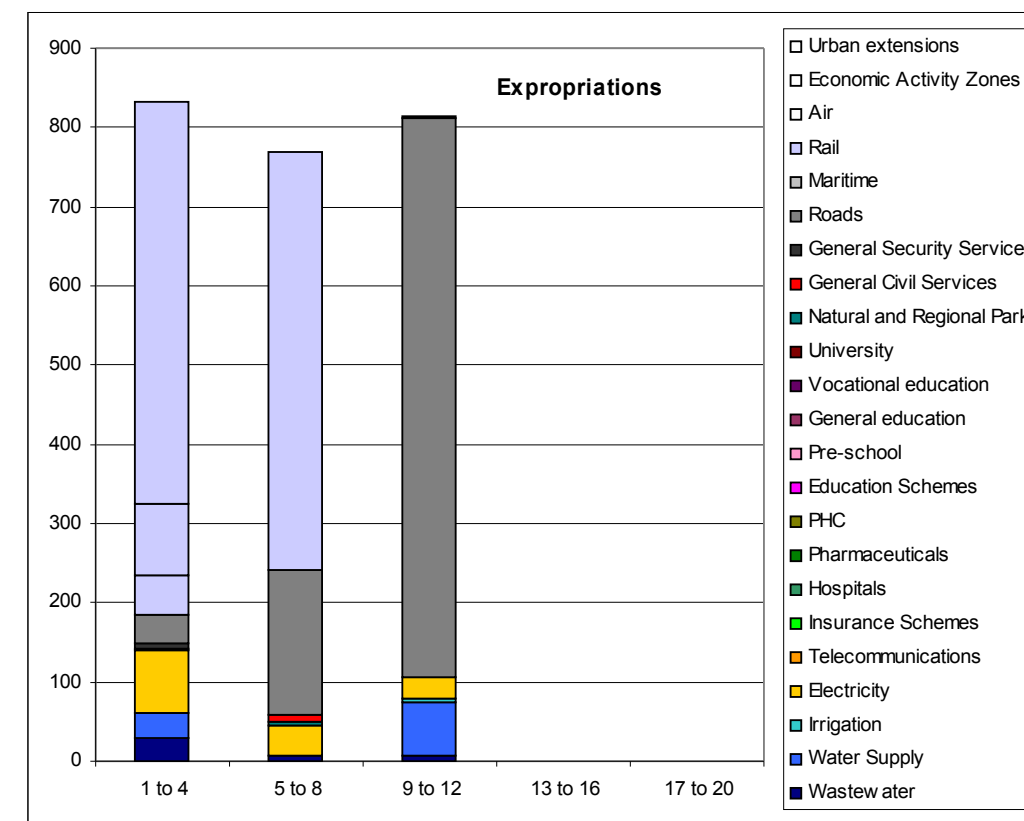
A special attention is due to the financial situation of the municipalities that have to face heavy responsibilities.

The strengthening of the institutional and financial capacities of the Water authorities is also urgent.

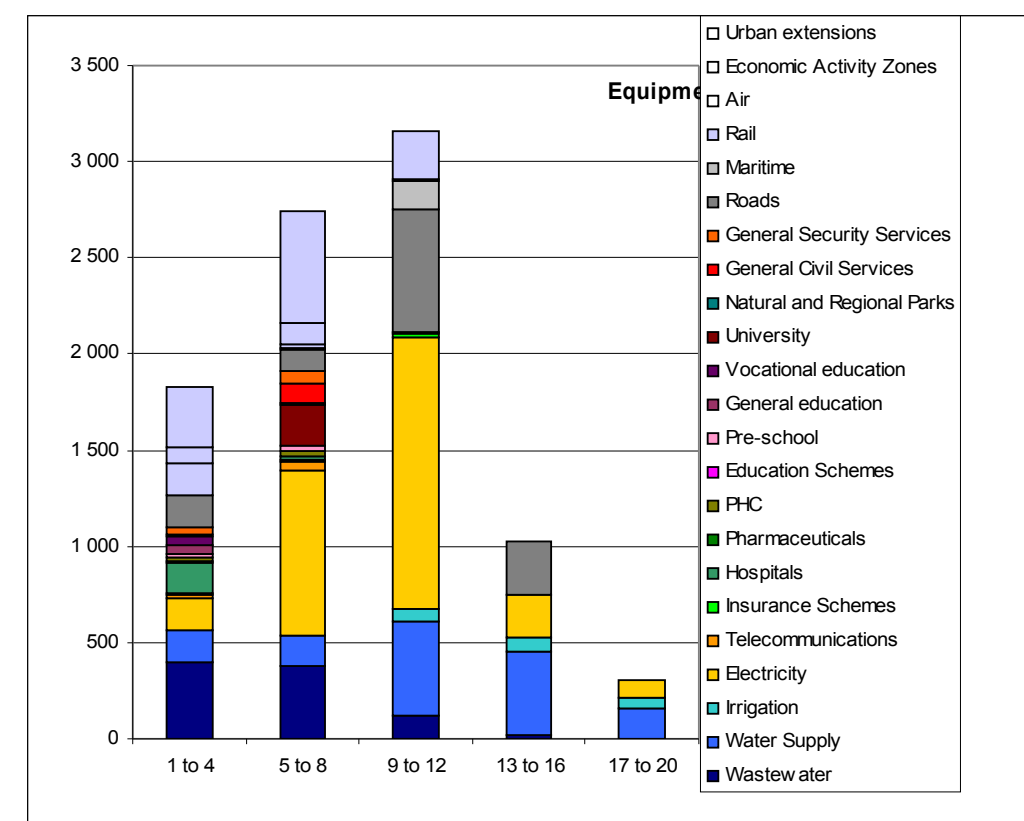
The same applies of course to EdL.

**1.12 TYPES OF EXPENDITURE , SECTORS, AND DATES**

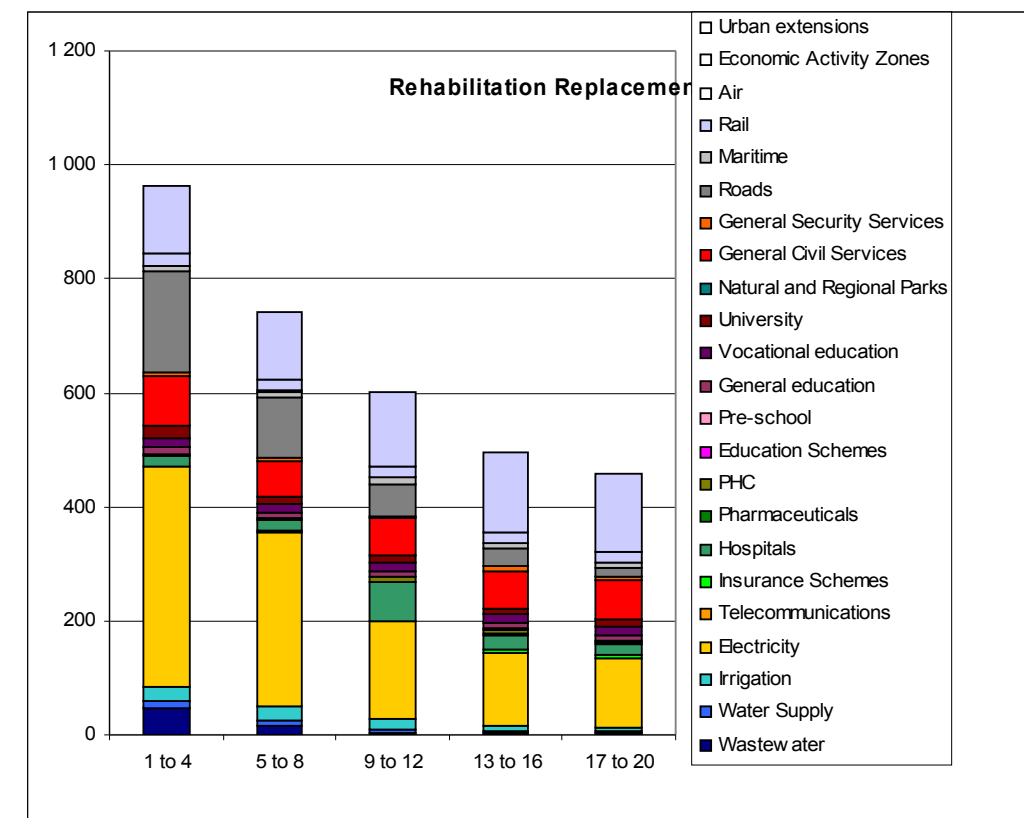
expropriations	year	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	Total	
Wastewater		29	7	6	0	0	42	2%
Water Supply		33	0	69	0	0	102	4%
Irrigation		0	0	5	0	0	5	0%
Electricity		77	39	27	0	0	143	6%
Telecommunications		0	0	0	0	0	0	0%
Insurance Schemes		0	0	0	0	0	0	0%
Hospitals		0	0	0	0	0	0	0%
Pharmaceuticals		0	0	0	0	0	0	0%
PHC		0	0	0	0	0	0	0%
Education Schemes		0	0	0	0	0	0	0%
Pre-school		0	0	0	0	0	0	0%
General education		0	0	0	0	0	0	0%
Vocational education		0	0	0	0	0	0	0%
University		0	0	0	0	0	0	0%
Natural and Regional Parks		3	5	0	0	0	8	0%
General Civil Services		0	8	0	0	0	8	0%
General Security Services		8	0	0	0	0	8	0%
Roads		35	184	705	0	0	924	37%
Rail		50	0	2	0	0	52	2%
Maritime		0	0	0	0	0	0	0%
Air		0	0	0	0	0	0	0%
Economic Activity Zones		90	0	0	0	0	90	4%
Urban extensions		507	528	0	0	0	1 035	42%
Solid Waste		17	42	0	0	0	59	2%
<b>Total</b>		<b>849</b>	<b>812</b>	<b>814</b>	<b>0</b>	<b>0</b>	<b>2 474</b>	<b>100%</b>



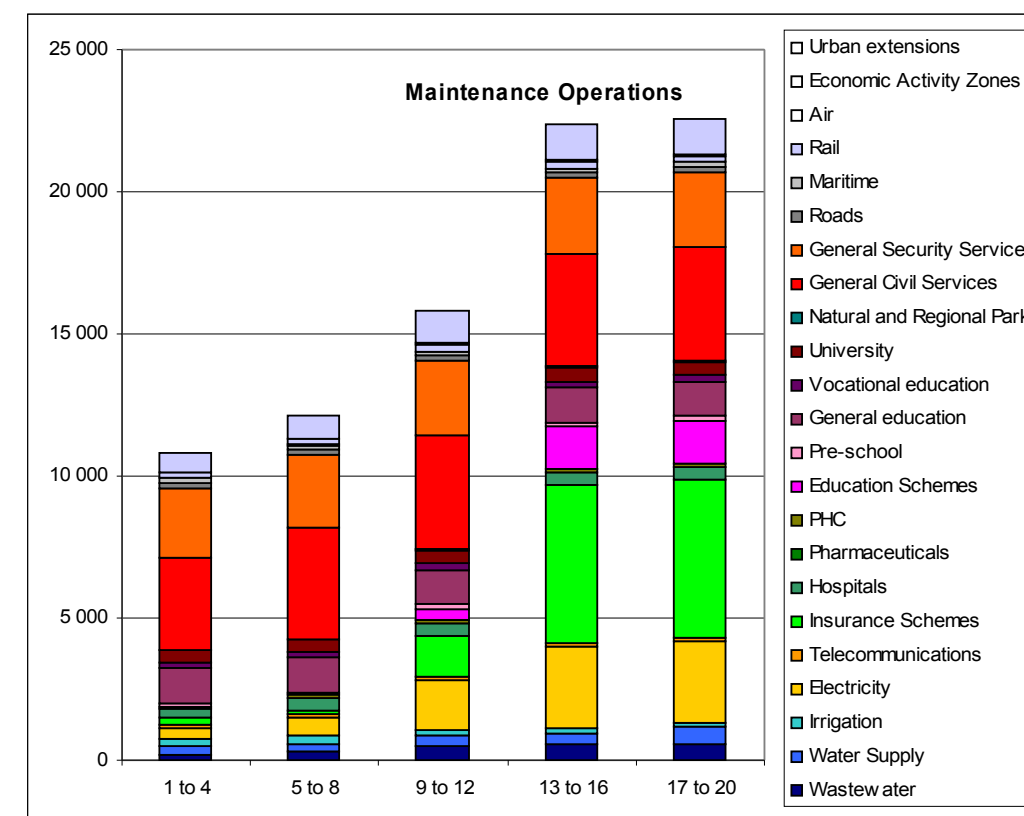
Equipment	year	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	Total	
Wastewater		398	380	119	19	0	916	398
Water Supply		168	158	492	429	154	1 401	168
Irrigation		0	0	60	80	60	200	0
Electricity		167	859	1 421	221	92	2 760	167
Telecommunications		18	45	0	0	0	63	18
Insurance Schemes		6	8	10	0	0	24	6
Hospitals		160	22	0	0	0	183	160
Pharmaceuticals		4	0	0	0	0	4	4
PHC		22	20	10	0	0	51	22
Education Schemes		0	0	8	0	0	8	0
Pre-school		21	29	0	0	0	50	21
General education		42	2	0	0	0	44	42
Vocational education		51	0	0	0	0	51	51
University		0	215	0	0	0	215	0
Natural and Regional Parks		9	11	0	0	0	20	9
General Civil Services		0	100	0	0	0	100	0
General Security Services		33	67	0	0	0	100	33
Roads		162	111	633	273	0	1 178	162
Rail		170	2	10	0	0	182	170
Maritime		0	6	150	0	0	156	0
Air		0	16	0	0	0	16	0
Economic Activity Zones		87	117	0	0	0	204	87
Urban extensions		308	574	246	0	0	1 128	308
Solid Waste		66	14	0	0	0	80	66
<b>Total</b>		<b>1 893</b>	<b>2 753</b>	<b>3 158</b>	<b>1 022</b>	<b>306</b>	<b>9 133</b>	<b>1 893</b>



rehabilitation replacement	year	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	Total	
Wastewater		48	16	4	2	4	74	2%
Water Supply		12	9	6	3	3	33	1%
Irrigation		24	24	18	12	5	83	3%
Electricity		386	308	172	128	123	1 115	34%
Telecommunications		0	0	0	0	0	0	0%
Insurance Schemes		0	0	0	4	4	9	0%
Hospitals		20	20	68	26	20	154	5%
Pharmaceuticals		0	0	2	2	0	3	0%
PHC		2	2	8	7	5	24	1%
Education Schemes		0	0	0	0	0	0	0%
Pre-school		2	1	1	1	1	8	0%
General education		11	10	10	10	10	49	2%
Vocational education		16	16	16	16	17	81	2%
University		23	12	11	11	11	68	2%
Natural and Regional Parks		0	0	0	0	0	0	0%
General Civil Services		85	64	64	64	69	346	11%
General Security Services		7	6	6	11	6	36	1%
Roads		177	106	56	31	16	386	12%
Rail		1	1	1	1	1	4	0%
Maritime		10	10	10	8	8	45	1%
Air		20	20	20	20	20	99	3%
Economic Activity Zones		0	0	0	0	0	0	0%
Urban extensions		119	117	130	137	137	641	20%
Solid Waste		19	6	2	1	1	28	1%
<b>Total</b>		<b>981</b>	<b>746</b>	<b>602</b>	<b>495</b>	<b>460</b>	<b>3 284</b>	<b>100%</b>



maintenance operations	year	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20	Total	
Wastewater		184	340	520	574	585	2 203	3%
Water Supply		294	250	327	382	575	1 829	2%
Irrigation		256	256	206	159	141	1 018	1%
Electricity		419	656	1 789	2 870	2 893	8 628	10%
Telecommunications		104	117	126	126	126	598	1%
Insurance Schemes		255	138	1 419	5 553	5 553	12 919	15%
Hospitals		296	418	432	432	432	2 011	2%
Pharmaceuticals		1	1	1	1	1	6	0%
PHC		60	108	143	155	155	620	1%
Education Schemes		0	0	377	1 507	1 507	3 391	4%
Pre-school		124	118	134	134	134	642	1%
General education		1 249	1 213	1 211	1 211	1 211	6 097	7%
Vocational education		184	222	222	222	222	1 073	1%
University		457	407	484	484	484	2 316	3%
Natural and Regional Parks		4	21	34	34	34	127	0%
General Civil Services		3 232	3 904	3 984	3 984	3 984	19 089	22%
General Security Services		2 459	2 608	2 648	2 648	2 648	13 012	15%
Roads		188	152	163	194	218	916	1%
Rail		6	21	24	27	27	106	0%
Maritime		144	147	150	130	130	701	1%
Air		200	207	211	211	211	1 041	1%
Economic Activity Zones		0	0	68	68	68	204	0%
Urban extensions		725	851	1 117	1 249	1 249	5 191	6%
Solid Waste		429	571	641	629	629	2 898	3%
<b>Total</b>		<b>11 270</b>	<b>12 727</b>	<b>16 434</b>	<b>22 986</b>	<b>23 219</b>	<b>86 635</b>	<b>100%</b>



**1.13 TYPES OF EXPENDITURE, REGIONS AND DATES**

Resident population by region:

Greater Beirut	Mount Lebanon	G Beirut & Mount Lebanon	North	South	Bekaa	Total
1 670	315	1 985	850	760	550	4 145
40%	8%	48%	21%	18%	13%	100%

expropriations region	date					Total		/ resident
	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20			
Whole Lebanon	170	46	734	0	0	950	38%	229
G Beirut	57	202	50	0	0	309	13%	185
Mount Lebanon	79	40	7	0	0	126	5%	401
G Beirut & Mt Lebanon	136	243	57	0	0	436	18%	219
North	157	183	8	0	0	349	14%	410
South	193	167	13	0	0	373	15%	491
Bekaa	193	173	1	0	0	367	15%	667
Total	849	812	814	0	0	2 474	100%	597

equipment region	date					Total		/ resident
	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20			
Whole Lebanon	567	1 116	2 232	493	92	4 500	49%	1 086
G Beirut	229	338	299	226	6	1 098	12%	657
Mount Lebanon	298	220	205	127	99	949	10%	3 014
G Beirut & Mt Lebanon	527	558	503	353	105	2 047	22%	1 031
North	319	360	152	28	4	863	9%	1 016
South	222	423	196	134	101	1 076	12%	1 416
Bekaa	259	296	75	13	3	646	7%	1 175
Grand Total	1 893	2 753	3 158	1 022	306	9 133	100%	2 203

rehabilitation replacement region	date					Total		/ resident
	1 to 4	5 to 8	9 to 12	13 to 16	17 to 20			
Whole Lebanon	784	598	407	339	311	2 439	74%	588
G Beirut	104	86	91	96	92	468	14%	280
Mount Lebanon	30	24	32	27	27	138	4%	439
G Beirut & Mt Lebanon	134	109	122	122	119	607	18%	306
North	48	30	37	26	27	168	5%	198
South	11	6	18	5	2	42	1%	55
Bekaa	4	3	19	2	1	29	1%	53
Total	981	746	602	495	460	3 284	100%	792



Total	4 500	1 098	949	863	1 076	646	9 133
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## 1.14 TYPES OF EXPENDITURE, SECTORS, AND REGIONS

expropriations sub sector	region						Total
	Lebanon	G Beirut	Lebanon	North	South	Bekaa	
Wastewater	0	10	11	3	15	3	42
Water Supply	0	50	38	8	5	1	102
Irrigation	0				5		5
Electricity	143						143
Telecommunications	0						0
Insurance Schemes	0						0
Hospitals	0	0	0	0	0	0	0
Pharmaceuticals	0						0
PHC	0	0	0	0	0	0	0
Education Schemes	0						0
Pre-school	0	0	0	0	0	0	0
General education	0	0	0	0	0	0	0
Vocational education	0						0
University	0					0	0
Natural and Regional Parks			4	2	2		8
General Civil Services	8						8
General Security Services	8						8
Roads	740	100		28	28	28	924
Rail	52						52
Maritime	0						0
Air	0						0
Economic Activity Zones					45	45	90
Urban extensions		111	59	305	270	290	1 035
Solid Waste		38	15	2	3	1	59
Total	950	309	126	349	373	367	2 474

rehabilitation replacement sub sector	region						Total
	Lebanon	G Beirut	Lebanon	North	South	Bekaa	
Wastewater	0	12	3	39	16	4	74
Water Supply	0	15	5	3	5	4	33
Irrigation	83				0		83
Electricity	1 115						1 115
Telecommunications	0						0
Insurance Schemes	9						9
Hospitals	99	5	7	11	16	16	154
Pharmaceuticals	3						3
PHC	8	4	3	3	3	3	24
Education Schemes	0						0
Pre-school	8	0	0	0	0	0	8
General education	49	0	0	0	0	0	49
Vocational education	80					1	81
University	68					0	68
Natural and Regional Parks				0	0	0	0
General Civil Services	346						346
General Security Services	36						36
Roads	386	0		0	0	0	386
Rail	4						4
Maritime	45						45
Air	99						99
Economic Activity Zones						0	0
Urban extensions		412	119	110	0	0	641
Solid Waste		21	1	2	1	2	28
Total	2 439	468	138	168	42	29	3 284

equipment sub sector	region						Total
	Lebanon	G Beirut	Lebanon	North	South	Bekaa	
Wastewater	2	148	339	184	182	62	916
Water Supply	7	440	478	280	149	47	1 401
Irrigation	0				200		200
Electricity	2 760						2 760
Telecommunications	63						63
Insurance Schemes	24						24
Hospitals	0	16	23	35	54	55	183
Pharmaceuticals	4						4
PHC	0	12	10	10	10	10	51
Education Schemes	8						8
Pre-school	0	12	6	25	5	3	50
General education	2	23	5	11	2	2	44
Vocational education	0		8	28	5	10	51
University	0				138	77	215
Natural and Regional Parks			8	5	7		20
General Civil Services	100						100
General Security Services	100						100
Roads	1 078	40		20	20	20	1 178
Rail	182						182
Maritime	156						156
Air	16						16
Economic Activity Zones					102	102	204
Urban extensions		380	53	254	190	251	1 128
Solid Waste		28	21	11	14	7	80

maintenance operations sub sector	region						Total
	Lebanon	G Beirut	Lebanon	North	South	Bekaa	
Wastewater	0	417	631	583	354	218	2 203
Water Supply	3	640	334	499	186	166	1 829
Irrigation	996				22		1 018
Electricity	8 628						8 628
Telecommunications	598						598
Insurance Schemes	12 919						12 919
Hospitals	984	72	134	204	302	315	2 011
Pharmaceuticals	6						6
PHC	149	108	73	97	97	97	620
Education Schemes	3 391						3 391
Pre-school	428	51	23	111	18	11	642
General education	5 888	112	24	54	8	10	6 097
Vocational education	854		30	131	18	40	1 073
University	1 841				305	170	2 316
Natural and Regional Parks			49	26	52		127
General Civil Services	19 089						19 089
General Security Services	13 012						13 012
Roads	867	20		10	10	10	916
Rail	106						106
Maritime	701						701
Air	1 041						1 041
Economic Activity Zones					102	102	204
Urban extensions		3 070	841	944	144	192	5 191
Solid Waste		1 529	522	311	325	211	2 898

Total	71 501	6 018	2 661	2 970	1 943	1 542	86 635
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## THE FINANCIAL AND FISCAL PERSPECTIVE

As stated in the methodology, financing, even though not operative as a planning tool to make choices about investment, still can impact investment as a constraint.

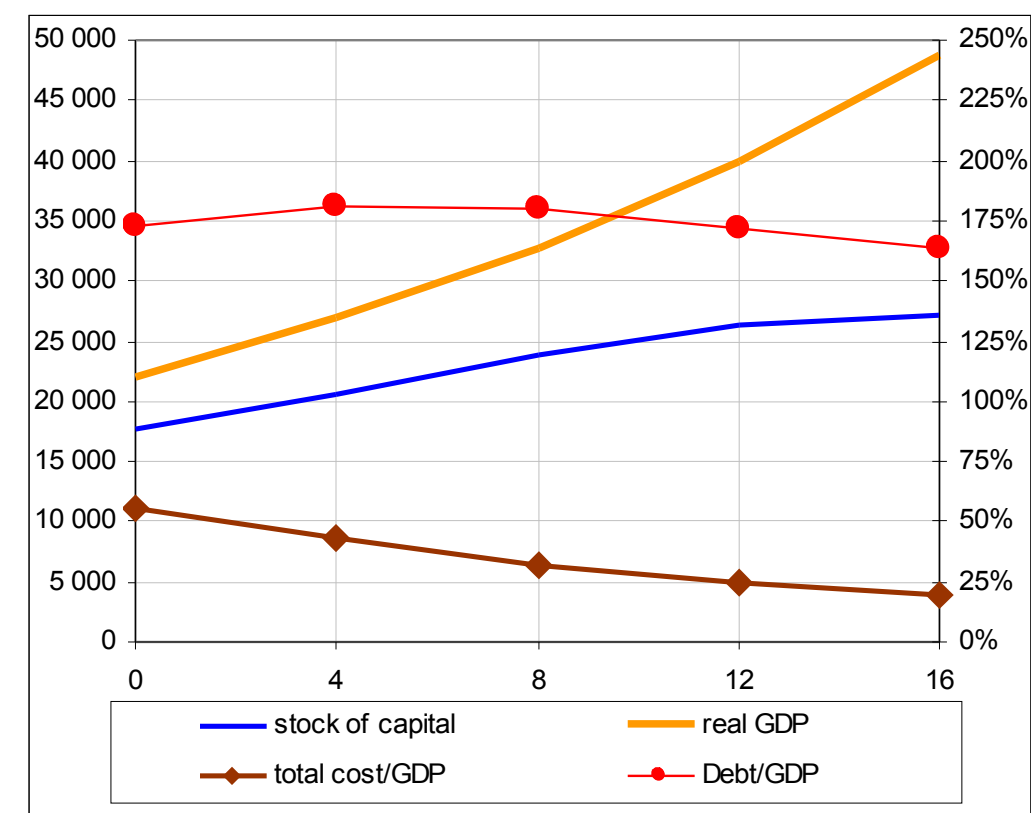
In return, investment can impact significantly the financial and fiscal situation both directly and indirectly through its effects on growth.

The following table restates the results of the programming from the fiscal point of view:

Mios USD	year	0	4	8	12	16	20	24
stock of capital		17 705	20 516	23 862	26 432	27 068	27 286	27 506
real GDP		22 000	26 853	32 776	40 006	48 831	59 602	72 749
Net capital expenditure		503	1 076	914	633	245	248	327
current expenditure		5 636	6 458	7 437	8 189	8 375	8 439	8 504
revenues related to services		2 496	3 039	3 685	4 182	4 304	4 346	4 389
other fiscal revenue		3 561	4 368	5 327	6 065	6 247	6 310	6 373
total revenue		6 058	7 407	9 013	10 246	10 552	10 656	10 762
consolidated primary fiscal balance		-78	325	806	1 176	1 267	1 298	1 330
real interest rate		8%	7.5%	7.1%	6.6%	6.2%	5.9%	5.7%
public debt		38 000	48 694	58 961	68 876	79 793	92 345	106 834
Debt/GDP		173%	181%	180%	172%	163%	155%	147%
private over expenditure		7 162	6 226	5 110	4 253	4 041	3 969	3 895
negative externalities		2 611	2 215	1 743	1 380	1 291	1 260	1 229
total cost/GDP		56%	43%	32%	25%	20%	16%	13%

It is important to note that fiscal revenues that are not linked to the concerned services have been kept as a fixed percentage of the GDP. The figures about debt are therefore indicative in the sense that the outcome can be changed by changes in tax policies.

Most of the impact of the investment program can be seen at year 12 or 16. Beyond that point no new investment is taken in consideration.



## OBJECTIVES CONSTRAINTS AND TRADE OFFS

Three main types of factors intervene in the process and influence its outcomes:

1. Environment exogenous factors
2. Financing constraint applied to capital expenditure
3. Sectoral policy choices

For each of those categories, 3 sets of hypotheses were tried, generating 27 scenarios to assess the relative impact of each of those categories of factors on the economic and social outcome and to design the most adapted policies to the changes in external conditions. A public investment program is above all a decision tool.

The environment can be negative, neutral (as per the base scenario that was used to calculate the figures presented in this report) or positive, financing of capital expenditure can be constrained, balanced (as per the base scenario) or eased and sectoral policies can be timid, average (as per the base scenario) or bold (which is recommended).

The following table lists the variables and the values that have been attached to the variables.

weight	-1	0	1
<b>Environment exogenous factors</b>	<b>negative</b>	<b>neutral</b>	<b>positive</b>
price of oil (USD/barrel)	90	70	50
real interest, weighted cost of capital	6%	5%	4%

<b>Financing constraint</b>	<b>constrained</b>	<b>balanced</b>	<b>eased</b>
ceiling on total yearly capital expenditure	850	1266	1500

<b>Sectoral policy choices</b>	<b>timid</b>	<b>average</b>	<b>bold</b>
tax rate on gas	10%	17.5%	25%
landowners share in investment	35%	52.5%	70%
landowners share in expropriation	25%	25%	25%
priority to private car or mass transport (P/M)	P	M	M
rate of coverage of cost of mass transport	60%	50%	40%
provide gaz for electricity production (1/0)	0	1	1
use of LNG instead of dry Gaz (1/0)	0	1	0
tarriff kwh (in LBP)	130	165	200
rate of collection of electricity bills	75%	80%	90%
generalize medical coverage (1/0)	0	1	1
compulsory free basic education (1/0)	0	1	1
water, wastewater, solid waste coverage of capital cost	0%	0%	0%
water, wastewater, solid waste coverage of running cost	70%	85%	100%
health and university coverage of capital cost	0%	0%	0%
health and university coverage of running cost	10%	15%	20%
share of rehabilitation in capital expenditure	20%	22.5%	25%
share of public transport in mass transit	25%	50%	75%

The scenarios are presented in the next page.

The table below gives an idea of the sensitivity of the main outcomes to changes in each of the three categories of variables (the results were linearly regressed against the weights: -1, 0 and 1)

	Constant	Environment factor	Financing factor	Policy factor
current expenditure	8 348	-731	634	0
revenues related to services	4 437	-168	886	0
other fiscal revenue	5 644	-238	826	577
consolidated primary fiscal balance	927	326	950	379
service related fiscal balance	-3 910	564	252	0
cost paid for public services	4 437	-168	886	0
private over expenditure	4 564	-408	-1 751	0
negative externalities	1 591	-17	-619	0
total social and economic cost	10 593	-593	-1 485	0
Yearly operation cost	4 231	-241	504	0
Yearly running cost	5 077	-241	504	0
Yearly cost of inputs	3 271	-490	130	0
Yearly cost of capital	2 226	-445	0	0
growth rate	3.8%	-0.3%	1.3%	0.8%
real GDP year 12	34 865	-1 470	5 104	3 565
duration of the investment program	17.8	0.0	0.5	-10.0
imports of oil	6 770	-1 138	-698	0
price of 20 litres (LBP)	28	-8	2	0
yearly losses of EdL(mios USD)	-574	488	872	0
debt/GDP year 16	291%	-94%	-163%	-83%

The main results are:

- The environment factor has a direct and huge impact on the financial situation of EdL and therefore on the fiscal stance (debt and deficit) and on the balance of trade. Its effects on growth can look paradoxical but it should be kept in mind that the impact of the expected gains in efficiency due to the investment program increases with the price of energy.
- The financing factor impacts obviously the delay of execution of the program, reducing the 12 years to 9 or increasing them beyond 20 once the amounts allocated hardly exceed the part reserved for rehabilitation. It is worth noting that putting constraints on the capital expenditure does not reduce the debt/GDP ratio but, on the contrary, increases it significantly.
- The policy options are the most determining factor. A bold policy increases expenditure but increases in a larger proportion revenues and benefits.

environment	negative	negative	negative	negative	negative	negative	negative	negative	negative	neutral	neutral	neutral	neutral	neutral	neutral	neutral	neutral	neutral	neutral	positive	positive	positive	positive	positive	positive		
	timid	timid	timid	median	median	median	bold	bold	bold	timid	timid	timid	median	median	median	bold	bold	bold	timid	timid	timid	median	median	median	bold	bold	bold
action	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased
	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased	strained	balanced	eased
<b>Changing Cells:</b>																											
price of oil (\$/barrel)	90	90	90	90	90	90	90	90	90	70	70	70	70	70	70	70	70	70	70	50	50	50	50	50	50	50	50
real interest, weighted cost of capital	6%	6%	6%	6%	6%	6%	6%	6%	6%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	4%	4%	4%	4%	4%	4%	4%	4%
ceiling on total yearly capital expenditure	850	1266	1500	850	1266	1500	850	1266	1500	850	1266	1500	850	1266	1500	850	1266	1500	850	1266	1500	850	1266	1500	850	1266	1500
tax rate on gas	10%	10%	10%	18%	18%	18%	25%	25%	25%	10%	10%	10%	18%	18%	18%	25%	25%	25%	10%	10%	10%	18%	18%	18%	25%	25%	25%
landowners share in investment	35%	35%	35%	53%	53%	53%	70%	70%	70%	35%	35%	35%	53%	53%	53%	70%	70%	70%	35%	35%	35%	53%	53%	53%	70%	70%	70%
landowners share in expropriation	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
priority to private car or mass transport (P/M)	P	P	P	M	M	M	M	M	M	P	P	P	M	M	M	M	M	M	P	P	P	M	M	M	M	M	M
rate of coverage of cost of mass transport	60%	60%	60%	50%	50%	50%	40%	40%	40%	60%	60%	60%	50%	50%	50%	40%	40%	40%	60%	60%	60%	50%	50%	50%	40%	40%	40%
provide gaz for electricity production (1/0)	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1
use of LNG instead of dry Gaz (1/0)	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0
tarriff kwh (in LBP)	130	130	130	165	165	165	200	200	200	130	130	130	165	165	165	200	200	200	130	130	130	165	165	165	200	200	200
rate of collection of electricity bills	75%	75%	75%	80%	80%	80%	90%	90%	90%	75%	75%	75%	80%	80%	80%	90%	90%	90%	75%	75%	75%	80%	80%	80%	90%	90%	90%
generalize medical coverage (1/0)	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1
compulsory free basic education (1/0)	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1
water, wastewater solid waste coverage of capital cost	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
water, wastewater solid waste coverage running cost	70%	70%	70%	85%	85%	85%	100%	100%	100%	70%	70%	70%	85%	85%	85%	100%	100%	100%	70%	70%	70%	85%	85%	85%	100%	100%	100%
health and university coverage of capital cost	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
health and university coverage of running cost	10%	10%	10%	15%	15%	15%	20%	20%	20%	10%	10%	10%	15%	15%	15%	20%	20%	20%	10%	10%	10%	15%	15%	15%	20%	20%	20%
share of rehabilitation in capital expenditure	20%	20%	20%	23%	23%	23%	25%	25%	25%	20%	20%	20%	23%	23%	23%	25%	25%	25%	20%	20%	20%	23%	23%	23%	25%	25%	25%
share of public transport in mass transit	25%	25%	25%	50%	50%	50%	75%	75%	75%	25%	25%	25%	50%	50%	50%	75%	75%	75%	25%	25%	25%	50%	50%	50%	75%	75%	75%
<b>Result Cells:</b>																											
current expenditure	8 273	8 273	8 273	9 332	9 332	9 332	9 654	9 654	9 654	7 572	7 572	7 572	8 609	8 609	8 609	8 819	8 819	8 819	6 881	6 881	6 881	7 930	7 930	7 930	8 059	8 059	8 059
revenues related to services	3 646	3 646	3 646	4 631	4 631	4 631	5 536	5 536	5 536	3 542	3 542	3 542	4 459	4 459	4 459	5 317	5 317	5 317	3 437	3 437	3 437	4 281	4 281	4 281	5 087	5 087	5 087
other fiscal revenue	4 430	4 631	4 690	5 364	6 844	7 378	5 483	6 904	7 323	4 392	4 547	4 604	5 221	6 476	6 932	5 268	6 399	6 742	4 366	4 490	4 544	5 111	6 202	6 601	5 105	6 028	6 316
consolidated primary fiscal balance	-700	-790	-567	88	1 199	1 550	768	1 799	2 095	-141	-276	-56	495	1 382	1 655	1 170	1 911	2 131	419	252	471	887	1 608	1 825	1 537	2 070	2 235
service related fiscal balance	-4 627	-4 627	-4 627	-4 701	-4 701	-4 701	-4 119	-4 119	-4 119	-4 030	-4 030	-4 030	-4 150	-4 150	-4 150	-3 502	-3 502	-3 502	-3 444	-3 444	-3 444	-3 649	-3 649	-3 649	-2 972	-2 972	-2 972
cost paid for public services	3 646	3 646	3 646	4 631	4 631	4 631	5 536	5 536	5 536	3 542	3 542	3 542	4 459	4 459	4 459	5 317	5 317	5 317	3 437	3 437	3 437	4 281	4 281	4 281	5 087	5 087	5 087
private over expenditure	7 440	7 440	7 440	4 058	4 058	4 058	3 369	3 369	3 369	6 743	6 743	6 743	3 775	3 775	3 775	3 273	3 273	3 273	6 002	6 002	6 002	3 382	3 382	3 382	3 036	3 036	3 036
negative externalities	2 434	2 434	2 434	1 195	1 195	1 195	1 195	1 195	1 195	2 417	2 417	2 417	1 178	1 178	1 178	1 178	1 178	1 178	2 399	2 399	2 399	1 162	1 162	1 162	1 162	1 162	1 162
total social and economic cost	13 520	13 520	13 520	9 884	9 884	9 884	10 100	10 100	10 100	12 702	12 702	12 702	9 412	9 412	9 412	9 768	9 768	9 768	11 838	11 838	11 838	8 824	8 824	8 824	9 285	9 285	9 285
Yearly operation cost	3 780	3 780	3 780	4 499	4 499	4 499	5 159	5 159	5 159	3 717	3 717	3 717	4 230	4 230	4 230	4 703	4 703	4 703	3 664	3 664	3 664	4 006	4 006	4 006	4 322	4 322	4 322
Yearly running cost	4 626	4 626	4 626	5 345	5 345	5 345	6 005	6 005	6 005	4 563	4 563	4 563	5 076	5 076	5 076	5 549	5 549	5 549	4 510	4 510	4 510	4 852	4 852	4 852	5 168	5 168	5 168
Yearly cost of inputs	3 647	3 647	3 647	3 987	3 987	3 987	3 649	3 649	3 649	3 009	3 009	3 009	3 533	3 533	3 533	3 270	3 270	3 270	2 372	2 372	2 372	3 078	3 078	3 078	2 891	2 891	2 891
Yearly cost of capital	2 671	2 671	2 671	2 671	2 671	2 671	2 671	2 671	2 671	2 226	2 226	2 226	2 226	2 226	2 226	2 226	2 226	2 226	1 781	1 781	1 781	1 781	1 781	1 781	1 781	1 781	1 781
growth rate	1.8%	2.2%	2.3%	3.5%	5.6%	6.3%	3.7%	5.7%	6.2%	1.8%	2.1%	2.2%	3.2%	5.1%	5.7%	3.3%	5.0%	5.5%	1.7%	1.9%	2.1%	3.1%	4.7%	5.3%	3.0%	4.5%	4.9%
real GDP year 12	27 367	28 605	28 969	33 136	42 278	45 575	33 869	42 647	45 235	27 132	28 092	28 439	32 250	40 006	42 821	32 543	39 531	41 645	26 969	27 736	28 072	31 573	38 310	40 778	31 537	37 236	39 015
duration of the investment program	>20	11.5	9.5	>20	15.2	10.4	>20	13.8	10.3	>20	11.5	9.5	>20	15.2	10.4	>20	13.8	10.3	>20	11.5	9.5	>20	15.2	10.4	>20	13.8	10.3
imports of oil	9 006	9 006	9 006	7 559	7 559	7 559	7 125	7 125	7 125	7 603	7 603	7 603	6 552	6 552	6 552	6 223	6 223	6 223	6 162	6 162	6 162	5 464	5 464	5 464	5 236	5 236	5 236
price of 20 litres (LBP)	33.8	33.8	33.8	36.1	36.1	36.1	38.4	38.4	38.4	26.3	26.3	26.3	28.0	28.0	28.0	29.8	29.8	29.8	18.8	18.8	18.8	20.0	20.0	20.0	21.3	21.3	21.3
yearly losses of EdL(mios USD)	-2127	-2127	-2127	-938	-938	-938	-121	-121	-121	-1489	-1489	-1489	-488	-488	-488	255	255	255	-852	-852	-852	-38	-38	-38	630	630	630
debt/GDP year 16	719%	686%	640%	448%	206%	141%	385%	164%	109%	504%	489%	451%	335%	163%	114%	292%	133%	89%	346%	335%	304%	242%	120%	82%	212%	97%	62%

## RECOMMENDATIONS AND FURTHER ACTIONS

The quality of data gathered in the process of this project is variable. We have accepted certain preliminary information (with the necessary remarks about their uncertainty) privileging the consistency of the methodology.

It is necessary for the CDR to develop the work done and to keep it up to date in collaboration with the ACS and the concerned Ministries and agencies.

## PROJECT TEAM

This report has been produced by the study association comprising

Dar al Handassah (Shaer and Partners)

CNB<sup>o</sup>ureau s.a.r.l.

IAURIF (Institut d'Aménagement et d'Urbanisme de la Région Ile de France)

This association was represented with the Council for Development and Reconstruction by M. Riad Mneimné, Director of Operations at Dar al Handassah (Shaer and Partners).

The study team was directed by M. Charbel Nahas, engineer and economist, with the assistance of MM. Bassem Nsouli, Souheil Srour (Dar al Handassah) and Fouad Awada (IAURIF), engineers and urban planners.

The study involved the following experts :

Dar al Handassah: Naji Berri and Joumana Hoteit (water and waste water), Nabil Mina (solid waste), Hader el Hout (electricity), Joseph Tannous (telecoms) and Ghassan Alam (transport).

Consultation and Research Institute s.a.r.l. : Kamal Hamdan, Rida Hamdan (education) and Lara Batlouni (health).