



# Market Readiness Analysis for Sustainable Public Procurement In Lebanon

Final Report  
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With the support of: ***Institut des Finances Basil Fuleihan (IOF)***  
***United Nations Development Program (UNDP)***  
***United Nations Environment Program (UNEP)***



## Introduction

In December 2010, the Basil Fuleihan Institute for Economy and Finance (IOF) commissioned Sofres-Liban to conduct a market assessment study on the status of Sustainable Public Procurement (SPP) in Lebanon. The first part of the study consisted of a prioritization of products to be targeted for SPP using a simplified methodology<sup>1</sup>. This was achieved through extensive desk research and interviews with experts in the field of sustainable development. The second part of the Sofres study consisted of a survey of the businesses that could supply or import the chosen products and a review of national SPP efforts.

In January 2011, the IOF gave InfoPro the task of reviewing and updating the Market Readiness Analysis that had been carried out by Sofres. InfoPro kept the priority products identified by Sofres, but re-assessed and completed the balance of the analysis, including the business survey and national initiatives. This was done through additional desk research, as well as in-depth interviews with Lebanese governmental institutions and supply chain partners.

In carrying out their respective work on the Market Assessment Analysis, both Sofres and InfoPro benefited from the support of the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP).

## Research Background

### **The Marrakech Task Force on Sustainable Public Procurement (MTF on SPP)**

The Marrakech Process was initiated in response to the Johannesburg Plan of Implementation agreed at the World Summit on Sustainable Development in 2002. It is a global multi-stakeholder process for supporting the implementation of Sustainable Consumption and Production (SCP) projects. The first meeting took place in Marrakech, Morocco in June 2003, hence the name.

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<sup>1</sup> "Sustainable Procurement – first steps", Barbara Morton (Eveline Venanzoni – Farid Yaker), 3<sup>rd</sup> International Conference on Green Purchasing Suwon, Republic of Korea, 21 October 2009



In order to support the implementation of tangible SCP projects at regional and national levels, seven Marrakech Task Forces were created with the participation of experts from developing and developed countries. The Task Forces and their lead countries are: Cooperation with Africa (Germany), Education for Sustainable Consumption (Italy), Sustainable Buildings and Construction (Finland), Sustainable Lifestyles (Sweden), Sustainable Products (United Kingdom), Sustainable Tourism (France) and Sustainable Public Procurement (Switzerland). Sustainable Public Procurement is the focus of the present project.

## Defining Sustainable Procurement

Sustainable Procurement is “the process whereby organizations meet their needs for goods, services, works, and utilities in a way that achieves value for money on a whole life basis. It results in benefits not only to the organization, but also to society and the economy, whilst minimizing damage to the environment.”<sup>2</sup> Sustainable Procurement seeks to achieve an appropriate balance between the economic, social, and environmental aspects of development.

Governments are major consumers of goods and services. Their purchasing power represents 15% to 25% of GDP in most nations. Governments are therefore strong levers for change and have a duty to lead by example and make responsible decisions to create a better and safer world.

Public procurement will be sustainable when procurement officers include sustainability issues at all stages of the procurement process – from the selection of suppliers to the management contracts. This implies new practices, such as the screening of suppliers throughout the supply chain to check for compliance with labor laws and the insertion of social and ecological criteria into technical specifications in the bidding documents (e.g. lower carbon emissions from vehicles, organic food, or certified wood...).

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<sup>2</sup> Source: “Procuring the Future”, the report of the UK Sustainable Procurement Task Force, June 2006. This definition has been adopted by the Swiss-led Marrakech Task Force on Sustainable Public Procurement.



## Capacity Building for Sustainable Public Procurement in Developing Countries

The Marrakech Task Force on Sustainable Public Procurement (MTF on SPP) has developed an Approach for implementing SPP in both developed and developing countries. In January 2009, the UNEP initiated a project to implement this approach in up to 14 emerging countries. This project, entitled “Capacity building for sustainable public procurement in developing countries” is supported by the European Commission, the Swiss government, and the Organization of Francophone countries. It is currently being implemented by the UNEP and tested in seven countries, namely Mauritius, Tunisia, Costa Rica, Colombia, Uruguay, Chile and Lebanon.

### Research Objectives

The MTF Approach on SPP is illustrated in Figure 1. First, pilot countries assess their procurement status through an online questionnaire. Second, a legal review is undertaken to identify the legislative framework for public procurement in the country. Third, a country-based Market Readiness Analysis is carried out. After successful completion of these three preliminary steps, pilot countries are to develop a SPP Policy Plan. Subsequent training for the relevant procurement stakeholders will provide guidance for its implementation.

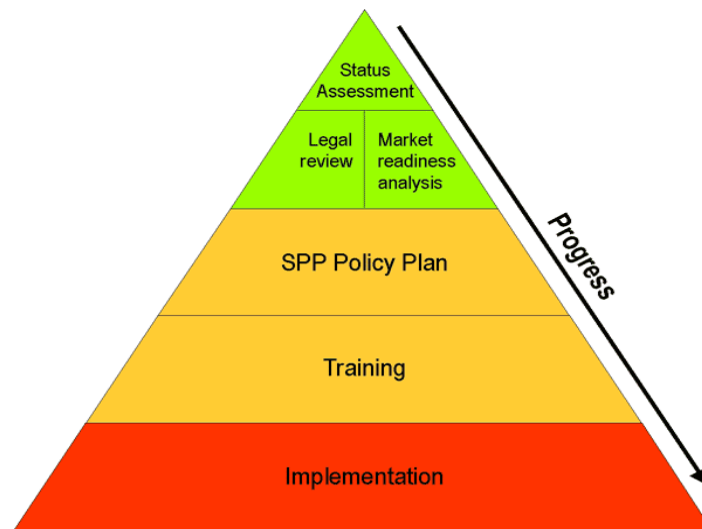


Figure 1 – The Marrakech Task Force Approach on Sustainable Public Procurement



The Market Readiness Analysis will therefore be the basis of the SPP Policy and Implementation Plan in Lebanon. Its purpose is to define the existing productive capacities for sustainable products and services in Lebanon and to determine the responsiveness of the Lebanese market to potential SPP tenders.

This kind of research is of particular importance to Lebanon. Although Lebanon was a prosperous upper-middle income country in the mid-seventies, with the government interested in development, preserving the environment was not perceived as an end in itself. Fifteen years of civil war have deteriorated the environment and increased the social disparities in the country. It is presently characterized by a chaotic urbanization which is advancing on the coastal plains, land abandonment and the degradation of agricultural land, and forest destruction mostly through fires. Unplanned digging of water wells has led to saline water intrusion into aquifers, and solid and liquid wastes have been dumped on land and in the coastal waters. Cultural heritage and natural scenery sites have been neglected. Great reconstruction efforts have been deployed since 1992, unfortunately without much attention to environmental and social constraints. Therefore the major challenge facing Lebanon is the transformation from emergency reconstruction to sustainable long-term development.

### **Prioritization Results**

Following the guidelines of the simplified prioritization methodology, the Sofres study was conducted in six steps:

- Step 1: Identification of all Lebanese government priorities regarding sustainability issues.
- Step 2: Reduction of the complete list of priorities into a shorter list regrouping top priorities.
- Step 3: Conversion of the short-listed issues into risk questions.
- Step 4: Analysis of the types of public expenditure reflecting these issues.
- Step 5: Selection of the types of public expenditure having the highest impact on sustainable development.
- Step 6: Formulation of strategic recommendations based on the risk/value matrix.





### *Identifying sustainability impacts*

In order to create a complete list of sustainability issues, Sofres considered the following data sources:

- Professional documents and reports prepared by the UNDP and the World Bank (Plan Bleu<sup>3</sup>, Cost of Environment Degradation<sup>4</sup>, State of the Environment<sup>5</sup>).
- Official documents of different Lebanese ministries, including the Ministry of Environment, the Ministry of Finance, the Ministry of Social Affairs, and the Ministry of Tourism, relating to missions and objectives, as well as ongoing and potential programs.
- Current Lebanese press articles.

Each of the above mentioned documents was thoroughly analyzed, then summarized around key terms. Sofres had unified the terminology used in order to regroup all key words. Through this process they compiled a list of 25 priorities shown in Table 1.

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<sup>3</sup> "Mediterranean Country Profile: Lebanon – Environment and sustainable development issues and policies", (1999), Plan Bleu

<sup>4</sup> "Cost of Environmental Degradation – The Case of Lebanon and Tunisia", (2004), Maria Sarraf, Bjorn Larsen and Marwan Owaygen, The World Bank Environment Department, Environmental Economics Series, Paper n°97.

<sup>5</sup> "Lebanon State of the Environment Report", (2001), ECODIT and Ministry of Environment/ LEDO



**TABLE 1 – Initial List of 25 National Priorities**

<b>Air and water pollution and waste disposal</b>
Air pollution
Climate change
Renewable energy promotion
Waste management (hazardous/non-hazardous)
<b>Resource Use</b>
Quarries management
Fair regional energy distribution
Clean energy sources
Natural resources preservation (mountains/water)
Management of agricultural water use
Wastewater management
Water (production and residential use)
Bio-diversity preservation
<b>Environmental quality</b>
Forest management (reforestation and fire management)
Coastal area preservation
Pesticide management
Agricultural land preservation (land capital/maintenance)
<b>Education and employment</b>
Development of regional job opportunities
Improvement of the quality of education
Minimization of regional disparities
Reduction of regional poverty
<b>Health</b>
Health care management (equitable health care)
Health indicators
<b>Communities and other social aspects</b>
Traffic management (co-transportation / state of vehicles)
Improvement of public transportation
Urban development planning



### *Prioritizing Sustainability Impacts (from long-list to short-list)*

The second step of this prioritization consisted in identifying the most important and pressing national priorities. Sofres consulted seven experts in the three main areas of sustainable development, i.e. economical, ecological, and social (see Appendix A).

Three key questions were asked of each expert (see Appendix B):

- How important is this issue to your government?
- What is the scope for improvement?
- Will the market be able to respond to this issue?

The experts rated their priorities on a scale from 1 to 5. The average score for each of the 25 priorities is listed in Appendix C. Eight major priorities were identified as shown in Table 2. A brief description of each priority is provided in Annex D.

**TABLE 2 – Top Eight Priorities**

<b>Top Rated Priorities</b>	<b>Average</b>
Minimization of regional disparities	4.29
Renewable energy promotion	4.24
Traffic management (co-transportation / state of vehicles)	4.19
Water management (production and residential use)	4.17
Improvement of public transportation	4.10
Waste management (hazardous/non-hazardous)	4.07
Coastal area preservation	4.07
Development of regional job opportunities	4.07

At this stage, and in agreement with the IOF, the top eight priorities were regrouped into six priorities, since “Traffic management” and “Public Transportation” go hand in hand and “Development of regional job opportunities” is an integral part of “Minimization of regional disparities”. The shortlist of priorities is shown in Table 3.



**TABLE 3 – Shortlist of Priorities**

<b>Top Six Priorities</b>
Minimization of regional disparities
Renewable energy promotion
Transport and Traffic sector improvement
Water management (production and residential use)
Waste management (hazardous/non-hazardous)
Coastal area preservation

### *Developing Risk Questions*

The third step of the prioritization consisted of transforming the list of six major national priorities into risk questions. These questions were formulated in a generic way in order to include a broader range of public procurement. The types of public procurements were regrouped into major categories (i.e. “Construction”, “Maintenance”, “Acquisitions”, “Health”, “Materials & Equipment”, “Service Purchases”, “Rentals”, and “Others”) in a way to optimize the answers of the interviewed experts. A brief description of each type of procurement was attached to the questionnaire to enable improved understanding of the question, if needed (see Appendix E).

### *Analyzing Expenditures*

While working on the national priorities, Sofres performed an analysis of public expenditures. The Ministry of Finance provided relevant documentation concerning the policies and procedures of public sector procurement in Lebanon.

The Ministry of Finance also provided Sofres with several website links on the distribution of governmental expenditures by ministry, by function, and by economic sector. Among these various classifications, Sofres retained the most relevant, i.e. the economical classification by sector. Table 4 below provides the list of the 40 types of expenditure identified at this stage.



**TABLE 4 - Expenditures Based on the 2011 Government Budget proposal**

#	Description	Million LL	USD	%
17	Financial Expenses	5,776,000	3,832,780,358	32.88
14	Transfers	5,029,292	3,337,287,367	28.63
13	Allocations, Salaries, Wages, and Miscellaneous	2,432,564	1,614,176,377	13.85
227	9 Other Establishments	1,278,520	848,387,525	7.28
227	5 Electricity Establishments	831,125	551,509,622	4.73
16	7 Hospitalization Expenses - Private Sector	334,285	221,821,500	1.90
223	Allocations for Construction of Public Works of Roads, Ports and Airports	203,500	135,036,496	1.16
11	4 Medical and Laboratory Supplies	181,658	120,542,468	1.03
228	3 Maintenance - Roads	180,095	119,505,640	1.03
16	3 Transportation and Travel Expenses	155,556	103,222,429	0.89
227	3 Construction of Roads	144,010	95,560,717	0.82
229	1 Expenses for Studies, Consultations, and Supervision	143,850	95,454,545	0.82
227	3 Buildings: Construction	114,270	75,826,145	0.65
226	2 Technical Equipment	106,434	70,626,410	0.61
11	2 Administrative Supplies	94,128	62,460,650	0.54
227	4 Water Establishments	92,130	61,134,705	0.52
12	1 Rent and Common Services	87,700	58,194,816	0.50
11	7 Water, Electricity, and Wireless / non Wireless Communication	77,390	51,353,934	0.44
228	2 Maintenance - Buildings	58,133	38,575,315	0.33
224	3 Allocation for Water Networks	50,000	33,178,500	0.28
12	4 Printed Advertisements and Public Relations	46,567	30,900,464	0.27
226	3 Computer Equipment	35,861	23,795,952	0.20
226	1 Furniture and Office Equipment	14,132	9,377,571	0.08
11	3 Transportation Expenses	12,879	8,546,317	0.07
16	4 Delegations and Conferences	11,326	7,515,395	0.06
228	7 Maintenance - Computer Equipment	10,766	7,143,663	0.06
11	5 Pesticides	10,434	6,923,689	0.06
12	9 Cleaning	9,887	6,560,907	0.06
11	8 Specialized Supplies	9,645	6,400,133	0.05
16	3 Transportation and Travel Expenses	7,100	4,711,347	0.04
228	8 Maintenance - Means of Transportation	7,059	4,684,141	0.04
11	1 Office Supplies	5,482	3,637,359	0.03
	Other Maintenance	4,233	2,808,560	0.02
12	6 Car and Machinery Rental	3,312	2,197,412	0.02
228	4 Maintenance - Water Constructions	2,490	1,652,289	0.01
16	5 Studies	1,957	1,298,607	0.01
226	5 Heating and Cooling Equipment	1,606	1,065,693	0.01
228	1 Maintenance - Land	1,000	663,570	0.01
12	5 Insurance	885	587,459	0.01
222	Building	500	331,785	0.00
	<b>Total</b>	<b>17,567,759</b>	<b>11,657,437,832</b>	<b>100</b>



The first three items (i.e. “Financial Expenses”, “Transfers”, and “Allocations, Salaries, Wages and Miscellaneous”) were eliminated given their non-relevance to the SPP study, although they represent about 75% of the annual budget as per the Ministry of Finance.

The fourth item “Other Establishments” is not itemized in detail but rather as a lump sum. These expenditures concern activities of the Council for Development and Reconstruction (CDR) and were therefore retained by Sofres.

Finally, fuel expenses were omitted since they require the formulation and implementation of a national policy.

### *Selection of Expenditures*

Among this preliminary list of 37 types of expenditures, those accounting for more than 0.5% of the total were selected, which led to the retention of 33 sectors.

Sofres interviewed three sets of experts for each priority, according to their respective field of expertise, in order to assess the level of risk associated with the procurement of goods and services. The Total Risk Score was assigned by adding the totals given for each of the abovementioned themes. In this way, the six government priorities were transformed into risk questions in order to obtain the risk expenditure that each priority requires. The main objective was to calculate the number of “Yes” each expenditure category scores for the final mapping (Table 5).



**TABLE 5 – Risk Questionnaire Results**

	Minimizing regional disparities	Preserving coastal areas	Improving the transportation sector	Renewable energy sources	Waste management (hazardous / non-hazardous)	Water	Total	%
<b>Construction</b>								
Roads	2	0	1	1	3	2	9	3.53
Buildings	1	0	1	3	3	3	11	4.31
Electrical	3	1	2	3	2	1	12	4.71
Water Infrastructure	3	1	1	2	3	2	12	4.71
Other	2	0	2	1	2	2	9	3.53
<b>Maintenance</b>								
Roads	2	2	1	1	1	1	8	3.14
Building	2	2	1	2	1	2	10	3.92
Transportation Material	2	2	3	2	1	0	10	3.92
IT Systems	3	0	3	1	1	0	8	3.14
Other Maintenance	3	2	3	0	1	0	9	3.53
Water Infrastructure	3	2	2	1	2	2	12	4.71
<b>Acquisitions</b>								
For Road Development	1	1	2	0	0	1	5	1.96
For Water Supply	3	2	1	1	0	3	10	3.92
<b>Health</b>								
Private Sector Hospitalization	0	1	0	2	2	0	5	1.96
Medicine	3	1	0	0	3	0	7	2.75
<b>Material and equipment</b>								
Material for Public Sector								
Transport Machinery	2	1	2	0	2	0	7	2.75
Technical Equipment	3	1	3	0	1	0	8	3.14
Managerial Material	3	1	1	0	2	0	7	2.75
IT Material Supply	3	0	1	1	1	0	6	2.35
Agriculture: Pesticides /Various	3	0	0	1	3	2	9	3.53
Specialized Material	2	0	1	1	1	1	6	2.35
Transportation Material Purchase	2	0	2	0	1	0	5	1.96
Office Supplies	2	0	0	0	1	1	4	1.57
Office Furniture	2	0	0	0	1	0	3	1.18

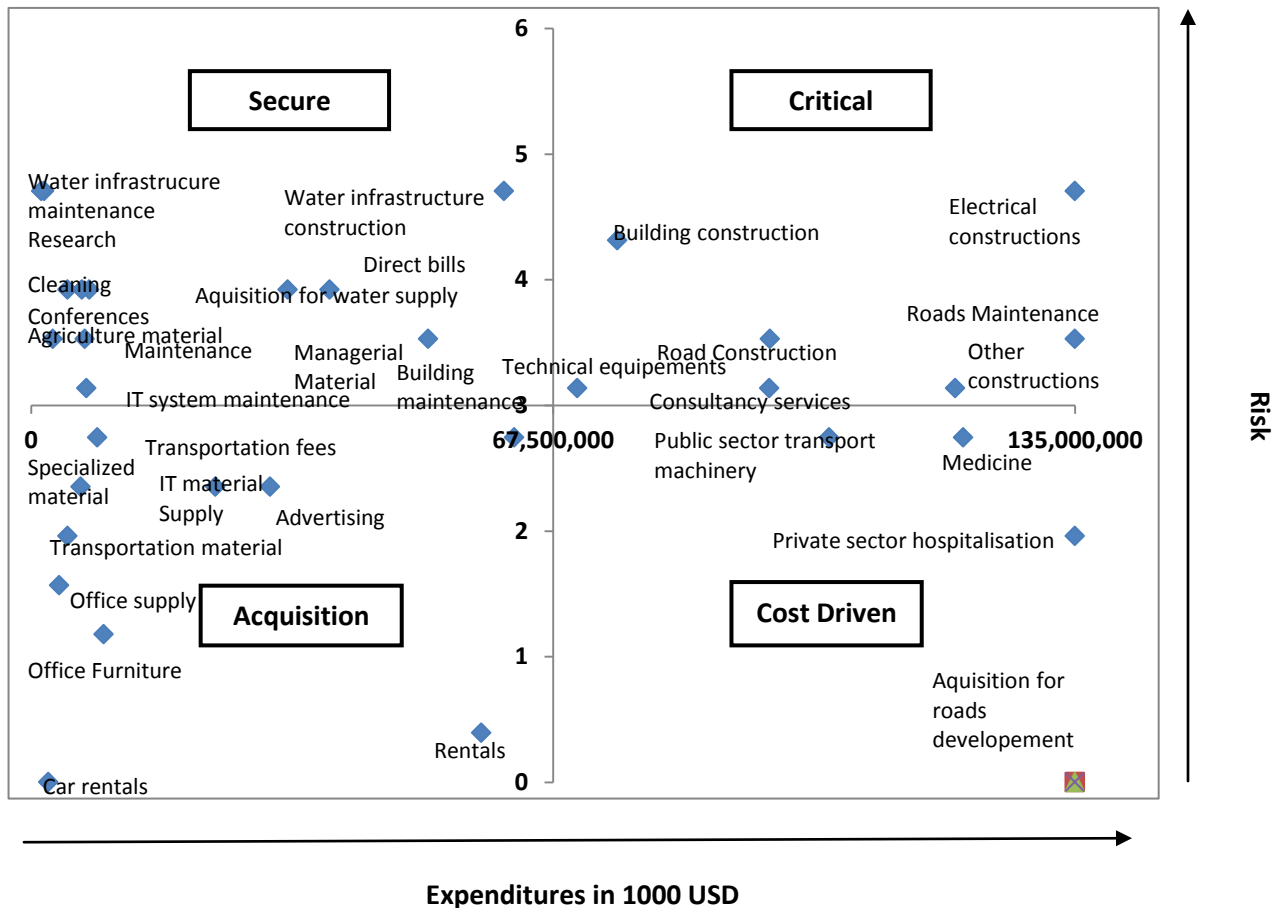


<b>Service purchases</b>								
Advertising	1	0	1	2	1	1	6	2.35
Consultancy Services	1	2	2	2	0	1	8	3.14
Cleaning	3	2	2	0	2	1	10	3.92
Conferences	2	2	3	2	0	1	10	3.92
Research	2	2	3	2	2	1	12	4.71
<b>Rentals</b>								
Rentals	1	0	0	0	0	0	1	0.39
Car rentals	0	0	0	0	0	0	0	0
<b>Other</b>								
Electricity, Water, and Communication (direct payment)	2	1	0	3	1	2	9	3.53
Transportation Fees	3	1	1	1	1	0	7	2.75
<b>Total</b>							255	<b>100</b>





**Mapping Risk**





### *Preliminary Strategically Recommended Priorities*

At this stage and further to the initial risk mapping, Sofres recommended the following 13 priorities:

- Electrical construction
- Building construction and maintenance
- Road construction and maintenance
- Water infrastructure construction and maintenance
- Cleaning
- Agricultural material
- Acquisition for water supply
- IT systems maintenance
- Management material
- IT materials supply
- Transportation fees
- Medicine
- Public sector transport machinery

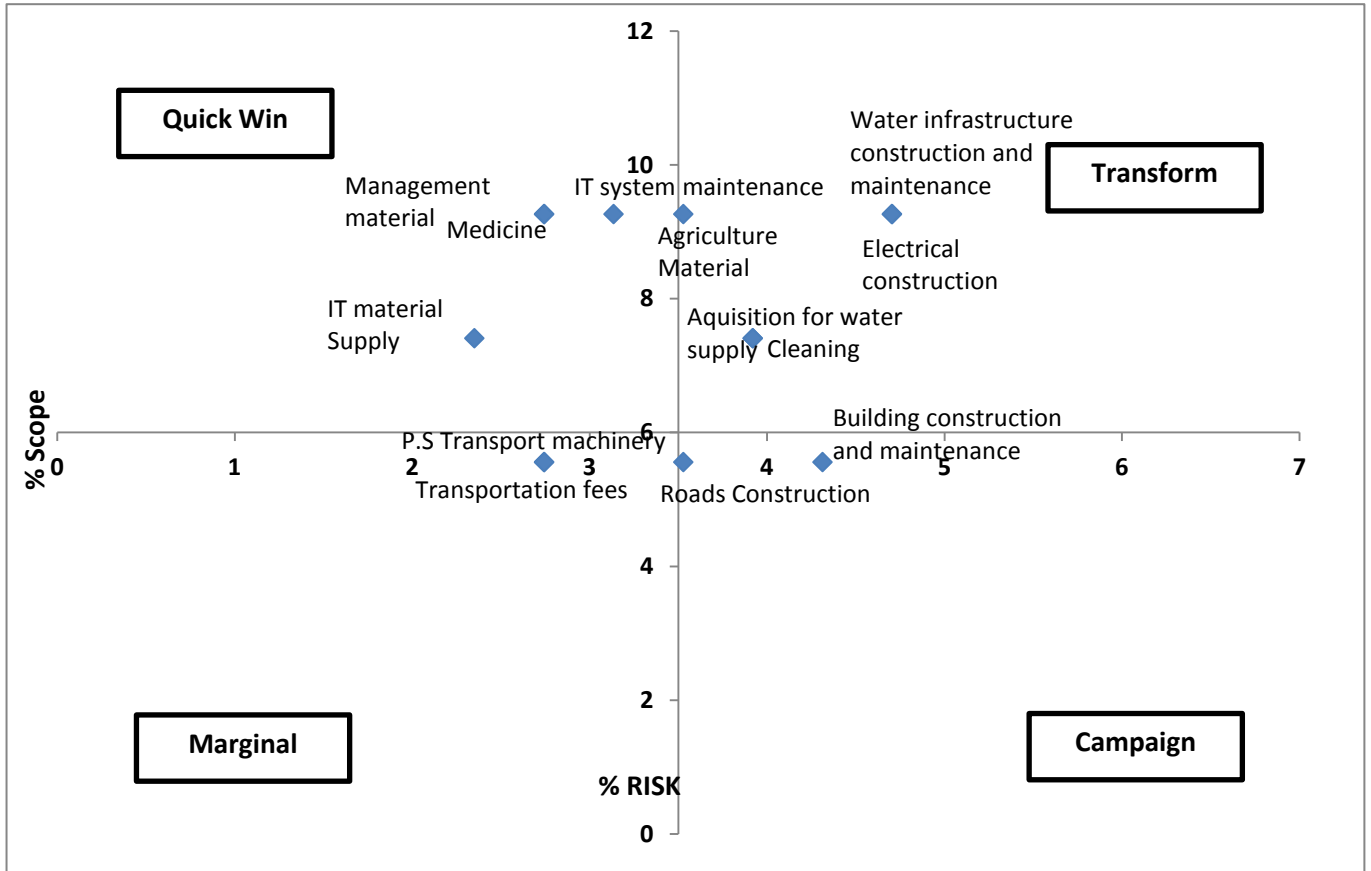
The steering committee deliberately disregarded the expenditure categories in the “Acquisition” and “Cost Driven” quadrants since they do not have a major effect on national sustainability priorities (i.e. “Regional disparities minimization”, “Renewable energy promotion”, “Transport and public sector improvement”, “Water management”, “Waste management”, and “Coastal area preservation”).

The decision to exclude these categories was mainly based on the experts’ survey results as well as on the consolidation of interconnected and redundant categories.



*Mapping – Scope – Risk*

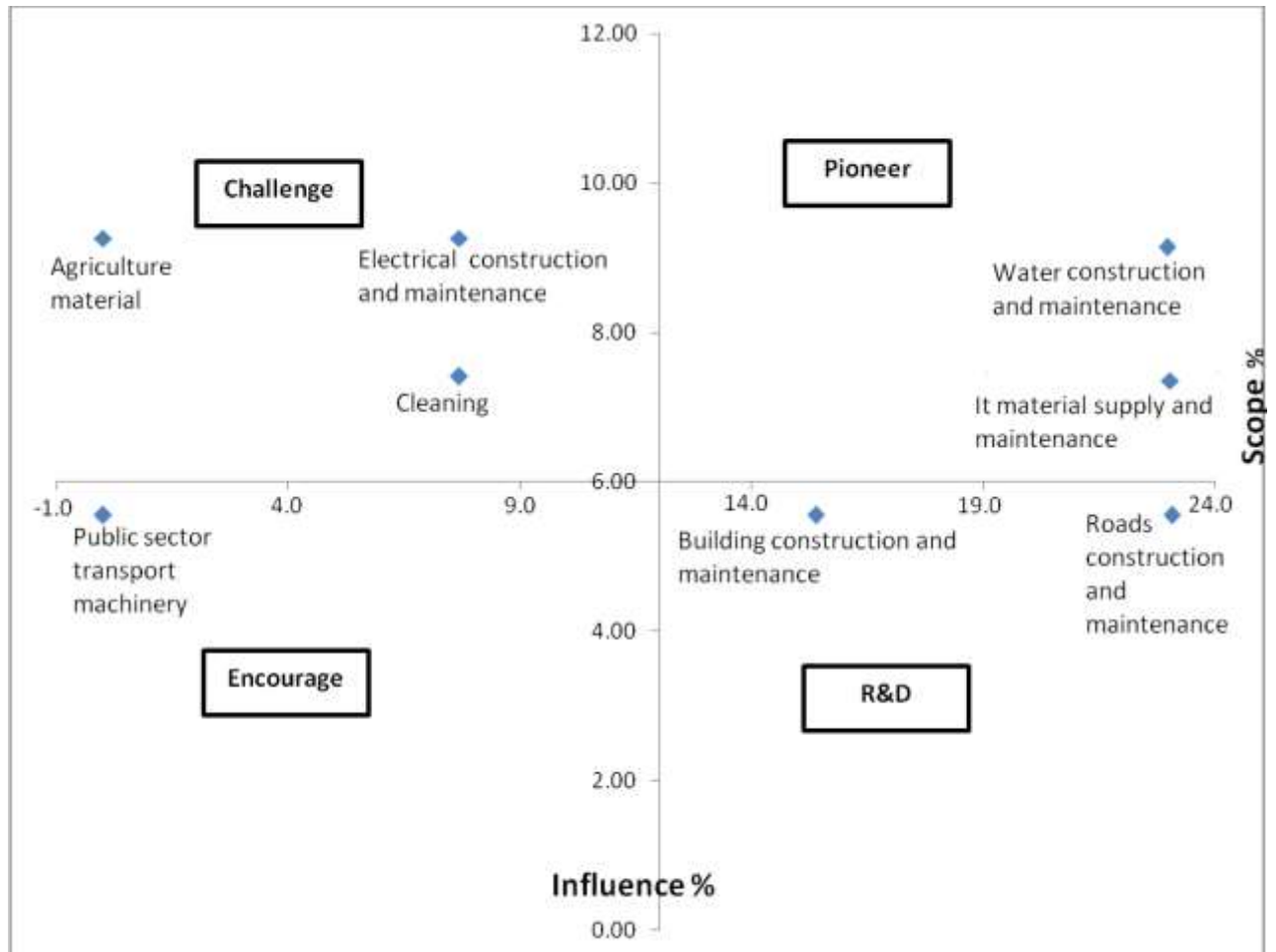
	Regional disparities minimization	Coastal area preservation	Transport and traffic sector improvement	Water management (production and residential use)	Waste management (hazardous/non-hazardous)	Total	%
Building Construction and Maintenance	N	N	Y	Y	Y	3	6.12
Road Construction and Maintenance	N	N	Y	Y	Y	3	6.12
Public Sector Transport Machinery Purchases	Y	Y	Y	N	N	3	6.12
Transportation Fees	Y	Y	Y	N	N	3	6.12
Cleaning	Y	Y	N	Y	Y	4	8.16
Acquisitions for Water Supply	Y	Y	N	Y	Y	4	8.16
IT Materials Supply	Y	Y	N	Y	Y	4	8.16
Electrical Construction	Y	Y	Y	Y	Y	5	10.20
Water Infrastructure Construction and Maintenance	Y	Y	Y	Y	Y	5	10.20
Agricultural Material	Y	Y	Y	Y	Y	5	10.20
IT systems Maintenance	Y	Y	Y	Y	Y	5	10.20
Management Material	Y	Y	Y	Y	Y	5	10.20
						49	100.00





*Mapping – Scope – Influence*

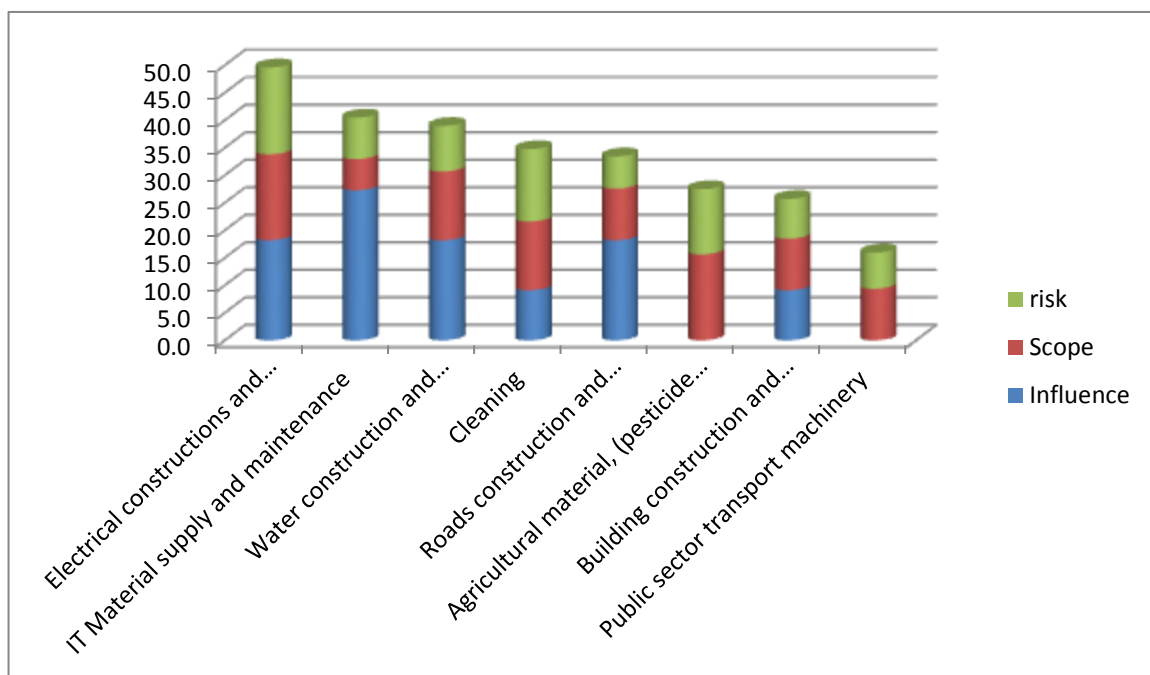
				Public relations		Improving suppliers				
	Saturated market	Market Share	Suppliers turnover	Clients	Society	Policy	Legislation	Compliance	Total Yes	Influence Score
Cleaning Agricultural material (incl. pesticides)	Y	N	N	N	N	N	N	N	1	9.1
Electrical construction & maintenance	N	N	N	N	N	N	N	N	0	0.0
Building construction & maintenance	N	Y	Y	N	N	N	N	N	2	18.2
Road construction & maintenance	N	Y	Y	N	N	N	N	N	2	18.2
Water construction & maintenance	N	Y	Y	N	N	N	N	N	2	18.2
Public sector transport machinery	N	N	N	N	N	N	N	N	0	0.0
IT Materials supply & maintenance	N	Y	Y	N	N	N	N	Y	3	27.3
<b>Total</b>									<b>11</b>	<b>100</b>





### *Final Strategically Recommended Expenditures*

The final recommended priorities for a sustainable national procurement policy were obtained as per the recapitulative graph below, considering the risk, scope, and influence of each type of expenditure (Figure 2).



**Figure 2 – Final National Priorities**

According to the recommendations and guidelines of the SPTF, it is always advisable to start the SPP process with a limited number of expenditure areas, mainly those with a substantial impact on sustainable development objectives. Following this rationale, Sofres, in coordination with the steering committee, chose eight categories to be retained for in-depth analysis:

- Electrical construction and maintenance
- IT materials supply and maintenance
- Water construction and maintenance
- Cleaning
- Road construction and maintenance



- Agricultural materials
- Building construction and maintenance
- Public sector transport machinery

The experts provided a preliminary list of products for each expenditure category, shown below.

Electrical constructions & maintenance	Building construction & maintenance	Road construction & maintenance	Water construction & maintenance
<ul style="list-style-type: none"> <li>• Alternative and renewable energy production systems</li> <li>• Efficient electric transmission/ distribution equipment</li> <li>• Energy-efficient products/ equipment</li> <li>• Waste / emission control and treatment systems</li> </ul>	<ul style="list-style-type: none"> <li>• Construction equipment</li> <li>• Energy-efficient construction materials.</li> <li>• Waste / sewage treatment equipment</li> <li>• Inspection and testing systems and equipment (for control and audit purposes)</li> <li>• Cement</li> <li>• Painting</li> <li>• Cabling</li> <li>• Lighting</li> <li>• Architecture</li> </ul>	<ul style="list-style-type: none"> <li>• Construction equipment</li> <li>• Road maintenance equipment</li> <li>• Traffic control systems</li> <li>• Public transport solutions</li> <li>• Lighting</li> <li>• Asphalt</li> <li>• Painting</li> </ul>	<ul style="list-style-type: none"> <li>• Waste water treatment systems</li> <li>• Water storage systems</li> <li>• Irrigation systems</li> <li>• Distribution systems</li> </ul>
<b>IT material supply and maintenance</b>		<b>Public sector transport machinery</b>	
<ul style="list-style-type: none"> <li>• PCs + printers</li> <li>• Servers</li> <li>• Switches</li> <li>• Routers</li> <li>• Software and licenses</li> </ul>		<ul style="list-style-type: none"> <li>• Police and army cars</li> <li>• Operating government cars</li> </ul>	





Cleaning	Agricultural material (including pesticides)
<ul style="list-style-type: none"> <li>Environment-friendly detergents without phosphates</li> </ul>	<ul style="list-style-type: none"> <li>Bio-pesticides</li> <li>Bio-insecticides</li> </ul>

At this stage, the Sofres consultant called a meeting in order to receive the input and approval from all steering committee members on the final products to be adopted based on the prioritization study. After consulting for one full week, the committee provided the Sofres consultant with the score results shown in Table 6 below. All agreed that a short-term list and a medium/intermediate-term list of products would be retained for further assessment based on the eight categories that were previously identified.

Short-term products were chosen in different expenditure categories without scoring, but by consensus among the steering committee members. Medium-term products were chosen using a scoring methodology. In the category of IT material and supply and maintenance, the choice fell on printers and toners since their life-cycle is relatively short and the impact is therefore felt immediately. As for paper, although it was not identified in the original eight types of expenditure, all present members agreed that it was an interesting product meriting further study.

**TABLE 6 – Steering Committee Medium Term Products Score Results**

Category	Score 1	Score 2	Score 3	Score 4	Score 5	Score 6	Score 7	Score 8	Score 9	Total
Lighting	1	3	2	1	2	1	1	1	1	13
Water saving taps	2	1	4	2	4	2	2	2	2	21
Alternative energy production	5	2	1	3	5	3	3	4	3	29
Architecture	4	4	3	4	3	4	4	3	5	34
Asphalt	3	5	5	5	1	4	4	5	4	36



**TABLE 7 – The Final List of Chosen Products**

Short Term	Medium Term
1- Paper 2- IT (Printers and toners) 3- Detergents 4- Pesticides	5- Lighting 6- Water saving taps



## Market Readiness

### Overview

#### *Local Market*

Among the six priority products that were identified, only a few are manufactured locally. Detergents have a relatively high rate of local production of 60% to 70%. There is no local production of office paper, printers or toner, pesticides, lamps, water taps, or flushing systems. Lebanon relies heavily on the import of finished products and raw materials.

The share of government procurement of the priority products is shown in the table below. Government institutions are important buyers of short-term office products, in particular paper, but have a smaller presence in the market for the medium-term products. With the exception of detergents, public purchases are large enough in each sector for the government to be able to influence the rest of the market through its spending decisions.

Product	Share of Government Procurement	Market Share of Sustainable Products
Paper	50%	2% to 5%
IT (printers / toners)	20% to 30%	10% to 15%
Detergents	5%	70%
Pesticides	15% to 20%	10%
Lighting	20%	35%
Water taps / flushing systems	10%	5%

Although sustainable products can be found in the local market, their market share is small in many cases, and they have to be imported.

Recycled paper is quite common in packaging and tissues, but not in office paper. Suppliers do not see much demand for it. The situation is similar for the printers with which the paper is used. Sustainability attributes relating to the manufacturing process of IT machines are rarely found in products available locally, and not specifically



demanded. As a result, printers made with recycled or bio-based plastic or featuring induction heating technology still have a small market share.

In toners, sustainability can be achieved through the re-use of the cartridges. A number of local companies collect old cartridges from clients and refill them. The problem is that the ink used for refilling is often toxic. Some remanufactured cartridges, for example the American brand Katun, are also imported.

In detergents, sustainability is derived from the raw materials. Cleaning products made from bio-renewable sources are not available locally and ammonium is still used as an ingredient, but a large share of detergents in the domestic market is sustainable up to a point in that they are phosphate-free, biodegradable, and non-toxic.

In the pesticide sector, bio-pesticides or bio-control agents are the sustainable alternatives to chemical fertilizers. They are sourced exclusively from abroad and are being used only on a trial basis, hence their low share in the local market.

In lighting there is a large availability of substitutes for the conventional incandescent lamps, such as compact fluorescent lamps (CFL) or Light-Emitting Diodes (LED) lamps. The 35% market share of sustainable lighting products is composed of LED (10%) and mercury-free CFL (25%). CFL and LED are often chosen by consumers in order to save electricity, not necessarily the environment.

Sustainable water taps and flush cisterns are usually bought because of their design or quality, not because they save water or have recycled content. Their market share is low.

### *Supplier Situation*

For most products, the supplier is also the importer, due to the lack of domestic production of consumer goods. However, local companies do add value in most sectors, for example by cutting in paper, mixing of raw materials and packaging in detergents and pesticides, and assembly in lighting and water systems.



**TABLE 8 – Local Market Status for Priority Products**

Product	Supplier Awareness	CMS	Sustainable Products	National Programs	Willingness
Paper	Medium to high	ISO 9000 among some producers	Only through import	No - only NGOs and private sector	Yes, contingent upon transparency
IT (printers / toners)	Medium	Lacking	Only through import	No - only NGOs and international producers	Yes
Detergents	Low	Lacking	Basic forms	No	Low
Pesticides	High	Lacking	Only through import	Ministry of Agriculture	Yes
Lighting	High	Lacking	Only through import	Ministry of Water and Energy	Yes
Water taps / flushing systems	High	Lacking	Only through import	Ministry of Energy and Water	Yes

Supplier awareness of sustainable products is the lowest for detergents, and their willingness to adopt such products is also low. Awareness is medium to high for office paper and medium for the printers and toners which are used with it, and there is a readiness in both sectors to take on sustainable products.

The majority of suppliers condition their willingness to provide sustainable products on sufficient private and public demand, and in some cases on government regulation of the sector to impose sustainable product standards. Few of the companies that were interviewed had Corporate Management Systems (CMS) and ISO certification as they viewed it as costly, cumbersome, and unrewarding, at least in a local market context. Moreover, many companies did not think it was required of them since they are traders and not manufacturers.

For pesticides, lighting, and water taps, supplier awareness is high and so is their willingness to source sustainable products. Incidentally, there have been national programs in exactly these sectors.



### *Price Comparison*

The upfront cost of sustainable products is usually higher than that of conventional products, although the difference can be marginal. A price list of sustainable alternative product is provided in Appendix I.

<b>Product</b>	<b>Sustainability Premium</b>
Paper	10% to 20%
IT (printers and toners)	30%
Detergents	10% to 30%
Pesticides	20% to 35%
Lighting	500% to 800%
Water taps / flushing systems	10% to 20%

Recycled paper costs about 10% to 20% more than non-recycled paper, and the premium can be reduced for large quantities by an average of 5 percent. The situation is similar for water taps and flushing systems. In the IT sector, highly sustainable products have a price premium of about 30%. For detergents, the premium depends on the level of sustainability of the product, the highest being cleaning products made from bio-renewable sources. Organic pesticides can be 20% to 35% more expensive than conventional products.

The purchase price of sustainable lamps is several times that of conventional lamps, but the total cost of ownership is lower due to their lower energy consumption and higher longevity. As the total cost is being considered more often, the upfront premium is no longer dissuasive for the buyer.

A more accurate price comparison between sustainable and non-sustainable products can be made with life-cycle costing. In procurement, life-cycle costing generally aims to determine the lowest cost of ownership of a fixed asset, taking into consideration its purchase price, installation, operation, maintenance and upgrading, disposal, and other costs during the product's economic life.

The priority products for Lebanon include a number of consumables, which do not lend themselves to life-cycle costing, in particular paper, detergents and pesticides. Where possible, savings from the economic use of sustainable products as well as



environmental and health externalities were considered instead. Since water costs are low when compared to electricity costs, the total cost of ownership is lower for devices that use water than for lighting.

Private and public buyers in Lebanon are very price-conscious. Exactly how sensitive they would be to a change in price brought on by government incentives or taxes depends on the demand-price elasticity of each product, shown in the table below.

The demand-price elasticity of consumer goods largely depends on the number of available alternatives. The higher the number of available substitutes, the higher the elasticity. Sustainable alternatives could easily replace non-sustainable products in most sectors except for recycled paper, which is not accepted as a perfect substitute for virgin paper because of the difference in aspect and difficulties in printer use (paper jams), and bio-pesticides, which sometimes do not act against the same range of pests as chemical pesticides do.

Product	Number of available substitutes	Degree of necessity	Price/Income	Time Effect	Estimated Price Elasticity of Demand
Paper	Medium	Medium	Low	Low	> 1
IT (printers and toners)	High	Low	Medium	Medium	> 2
Detergents	High	High	Low	Low	> 1
Pesticides	Medium	Medium	Low	High	> 2
Lighting	High	High	Low	Low	> 1
Water taps / flushing systems	High	Medium	Low	Medium	> 2

The degree of necessity for living is also a factor. People are more willing to pay for basic products they need for living. Therefore, the more a product is indispensable for life, the more inelastic its demand. Staple goods such as lamps and detergents are among such products, although they are not as essential as food for example.

Products that consume a large part of a user's income or have a high degree of luxury also tend to have greater elasticity. With the exception of printers, all of the priority products are low-cost goods, and none of them are luxuries.



Items for which a purchase can easily be postponed, such as pesticides which can be bought from season to season, often have more elastic demand than goods that have to be replaced as soon as they run out.

The above table shows that demand for sustainable products is fairly elastic, meaning that a small change in price can signify a large change in demand. A financial incentive for sustainable products or a tax on their non-sustainable substitutes could therefore be an effective way to affect local market demand.

## **Survey of Businesses**

A total of 30 companies active in the production and/or import of the priority products, which are listed in Appendix H, were interviewed by InfoPro with the objective of learning more about their current status regarding sustainability issues and the sustainable product alternatives available in the local market.

The interviews explored the corporate executives' awareness of sustainability and public procurement, general information on the market of sustainable products within their respective industry, company policy implementation, and the products that are considered sustainable.

### *Paper*

Paper production is intensive in water and electricity. The paper industry is the largest user of industrial water and the fifth largest user of energy in the world.

Sustainable paper can be defined as any effort to reduce deforestation for paper production as well as consuming less energy and water and producing fewer emissions in manufacturing.

Today, paper is made in many environmentally responsible forms. Paper can be manufactured from partly to fully recycled materials using pre- and post-consumer waste. It can be produced without chlorine bleaching. Paper can also be derived from sustainable forests, where trees are farmed specifically for paper production. Finally, paper can be produced from plant fibers other than timber such as cotton, hemp, bamboo or sugar cane.





### *International Sustainability Trends*

Virgin paper, which is the most commonly used, comes directly from trees. It contains the strongest fiber but requires the most energy to manufacture and has the most immediate impact on forests. However, that impact may be diminished if the pulp is harvested from a source that is part of a sustainable forest certification program (labeled Forest Stewardship Council (FSC) or Program for the Endorsement of Forest Certification (PEFC) - see Appendix G).

Recycled Paper is a broad term, generally applied to any sort of environmentally friendly paper. It can be made from paper used by the consumer (post-consumer recycling) or from scraps from the paper mills that were not used in making finished paper (called post-production or pre-consumer recycling).

Paper can be recycled seven times. The production of recycled paper requires less energy, chemicals, and water than making paper from trees. It relieves pressure on forests and reduces the amount of waste going to landfills.

With the improvements in paper technology and in chemical additives, the technical specifications of recycled paper are now almost as good as those of virgin paper. Only under severe moisture conditions (which affect especially agricultural packaging), virgin paper is stronger. Different studies of recycled copy paper performance conducted in the USA and Europe contradict the commonly held belief that recycled paper always causes more paper jams and equipment malfunctions than virgin paper. The price gap between the price of virgin and recycled paper is narrowing.

Wood-free paper is made from fibers/chemical pulp only. Wood-free paper helps reduce deforestation for paper production. These fibers can be mixed with recycled paper fibers. Wood-free paper is cheap, but uses around five times as much toner and leads to a higher rate of replacement for ink cartridges. Its price is therefore ultimately higher than that of paper from wood pulp.

The usage of chlorine in the paper making process is extremely harmful to the environment. There are three types of sustainable bleaching: process chlorine free (PCF), elemental chlorine free (ECF), and totally chlorine free (TCF). These have international labels which are detailed in Appendix G. Other certifications for



sustainable paper procurement include the Nordic Ecolabel (or Swan label), ISO 14000, and the European Ecolabel.

### *Local Sustainability Trends*

Most locally available office paper is recyclable. Only a few types of paper cannot be recycled because they contain tar. In the case of virgin paper, there is an 80% chance that it is certified either FSC or PEFC. There is no virgin paper production in Lebanon, one reason being the lack of suitable trees. The local office paper suppliers either import packs of paper for distribution, or they buy rolls of paper from abroad and cut them. The type of paper is not controlled.

The share of government purchases in total office paper demand is projected at 50%. Of the total public procurement, an estimated 60% is cut locally and 40% is packaged abroad, but all government suppliers are local. There is currently an agreement with the Lebanese government according to which, if the price offered by the local paper converter is 15% below the price of the ready-made foreign paper package, the local converter wins the tender. However, this preferential treatment of national firms is circumvented by some government institutions by specifying a certain foreign brand in the tender conditions. Local paper converters sometimes deal with the government through brokers or printing companies rather than directly.

Leading domestic office paper companies include Diapaper, Bassile Frères, Mohamed Khalil Daouk, Société Kamel Bekdache et Fils (SKB), Oriental Paper Products, Nahhal Paper, Fabriano, REAM Trading, and RAK Paper & Board. The government often does not deal with these companies directly but via brokers.

Due to its high paper consumption, the government could have a large impact if it started applying the three Rs: Reduce, reuse, and recycle. Printing on both sides of a page can cut paper consumption in half. Virtual technology can help to reduce paper consumption. Using e-mail instead of traditional paper memos, for example, could eliminate the use of large amounts of paper while saving on purchasing, filing, storage, and disposal costs.

In Lebanon, office paper, books, and magazines are all made of virgin material. There is no local production of recycled office paper. The recycled office paper market share accounts for 5% versus 95% recyclable but not recycled. It has to be imported from



Europe (Italy or Spain), Canada, the Philippines, Thailand, or China, so CO<sub>2</sub> emissions during transport also play a role. For a potential local production of recycled office paper, a major obstacle is the high energy costs of energy-intensive industries such as paper and glass. Given the low demand for recycled office paper, companies are not willing to invest in such a venture.

The price range for non-recycled office paper is from LL 3,500 (wood-free) to LL 8,000 (premium). The cheapest type of paper absorbs the most ink and is therefore more expensive in the long run. The average price of non-recycled office paper is LL 5,000. The average price of good-quality recycled paper is LL 6,000, so the premium is about 10% to 20% more than non-recycled paper, and can be reduced by five to ten percent for large quantities.

Although the up-front price difference is negligible, sustainable paper is much cheaper than its non-sustainable counterpart if the environmental impact is considered. The highest environmental cost of paper lies in its production. These costs are not clearly visible to the local consumer as they concern countries with forestry industries, and global environmental issues such as the warming of the atmosphere through CO<sub>2</sub> emissions and the depletion of water resources.

Disposal is also an important aspect in the paper sector. Some local NGOs, in particular Terre Liban and Craft, are collecting consumed paper and preparing it for recycling. Craft also offers training in the three Rs, provides special paper bins, and facilitates contact with the nearest recycling plant. The four recycling plants buy waste paper for recycling at a price of USD70 per ton, with a minimum one-ton truckload per purchase.

The government is currently paying the national waste company Sukleen to pick up its waste paper. Sorting is not a part of their mandate. Sukleen sells the paper on to the recycling plants, and pockets the profits. They are thereby illegally receiving two incomes for the same task, while the public sector is foregoing a potential source of savings. The government could negotiate directly with the recycling plants or make an agreement with Sukleen whereby it would receive a percentage of the profits of the waste sold.

According to the Ministry of Environment, paper and cardboard constitute 20% of the solid waste in the Greater Beirut Area, and 17% in Lebanon overall. Only eight percent of paper waste is recycled, but this could potentially be increased to 30%, which is the



average for developing countries. The rate of recycling shows regional variations: It is highest in Beirut, but as low as one percent in other places such as Saida or Tripoli.

Of the sustainable products in the overall paper industry - which includes office and school paper as well as cardboard, wrapping paper, and tissue - about 40% to 45% is produced in Lebanon. Lebanese paper companies are at a competitive disadvantage to their foreign counterparts because of the high energy cost, which can constitute up to 30% of their total base cost. As paper manufacturing is an energy-intensive business, it is very sensitive to energy prices. In Syria, Egypt, and Saudi Arabia, fuel is subsidized, while in Europe, cheaper natural gas is used. As a result, local recycled packaging paper is about 10% more expensive than its foreign equivalent.

The use of recycled material is common in the cardboard and packaging part of the paper industry. In packaging, 70% of the input is recycled paper, and 30% is virgin paper from renewable forests. The virgin paper for industrial use comes from USA, Brazil, Russia and other Eastern European countries, Finland, and Sweden.

The biggest Lebanese recycling company is Solicar, part of Gemayel Freres. It is followed by Sicomo, which produces a variety of cardboard products made with 100% recycled waste paper, and exports 80% of its goods. Another recycling company is Sipco, which makes acid-free packages, book binding, and corrugated boards from 85% to 100% recycled and 30% post-consumer waste material. Finally Unipak and Sanita have a joint operation.

The four companies use recycled paper but do not produce it – their output consists of craft paper or cardboard or packaging. Several of the local companies have ISO 9000 series certification for quality, and a number received awards from the Lebanese Center for Clean Production.

Interviewed firms stated that if a major user such as the government would buy recycled office paper, it would become much cheaper due to economies of scale, and it would become accessible to everyone. This speaks for making procurement of good quality recycled paper mandatory, once prices have been negotiated. To that effect, the public administration could impose purchasing guidelines on municipalities and Ministries.

An NGO stated that it approached the government about an office paper recycling initiative, but the government indicated that such an effort should be started in the



private sector. The companies and universities contacted by the NGO usually do not recycle because they are not aware of the existence of recycling factories in Lebanon, they do not know who to contact, believe that it would be costly, or they are not aware of the impact on the environment.

The Lebanese market at this point does not have laboratories, instruments, or tools to certify and verify the sustainability of paper imports. Local companies rely on the international eco-friendly labels available on the packs they buy, such the chlorine-free and forest management labels and the European labels. They also depend on the ISO 14000 series certification (environment) and ISO 9000 series certification (quality) of their suppliers. However local companies should beware that not all labels guarantee that the product has been produced in a sustainable manner. Some of the labels that can be relied upon are the Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC).

LIBNOR has adopted some paper standards, shown below, but these do not directly concern sustainability.

Document Number/ Publication Year	Title	Mandatory
NL 734 :2005	Writing paper and certain classes of printed matter - Trimmed sizes - A and B Series	Yes
NL ISO 2758 :2000	Paper - Determination of bursting strength	No
NL EN 12281 :2005	Printing and business paper - Requirements for copy paper for dry toner imaging processes	Yes

Because the government is such a major consumer of paper, changes in its paper purchasing, use, and disposal methods could have such a major impact, and such changes are easy to adopt, paper should be at the top of the list of priority products.

Government institutions should immediately introduce sustainability in their PP specifications and start giving paper for recycling to NGOs and local recycling plants. Provided the budgetary mechanism is flexible enough, the savings from reduced and responsible use of paper and from the disintermediation of Sukleen for disposal could be used by the institutions to purchase good quality recycled paper.



In the medium term, the adoption of PP targets for increased recycled content in purchased paper is recommended. A national paper recycling initiative should also be launched. In the long term, tax incentives could be introduced for sustainable manufacturing of paper products in general and to encourage the local production of recycled office paper.

### *IT Products (Printers and Toners)*

Sustainable printing is the process of producing commercial printed materials with the least impact on the environment.

The main issue for printers and their impact on the environment revolves around the production process and whether it incorporates recycled components. There is no local production of printers or toners in Lebanon, so the sustainability in production is determined indirectly through the choice of imported products. One way to minimize the impact on the environment is by using multi-functional devices which combine several tasks such as printing, copying, faxing, and scanning, or machines capable of duplex printing, which cuts paper use in half. Another environmentally friendly choice is a printer which is compatible with different types of paper, including recycled paper.

The second issue for printers is waste and recycling. Waste from the printing process can include plastic and ink, including ink cartridges. As was shown in the paper segment, the level of ink consumption partly depends on the type of paper used, but it also depends on the type of toner. In toners, sustainability can be achieved through the re-use of the cartridges. Printers can also be disposed of responsibly at the end of their three to five year lifecycle. IT machines can be disassembled into their plastic, iron, aluminum, and copper components.

An additional issue for toners is the toxicity of chemicals used. Some toners can be very hazardous to human health.

Finally, the energy consumption of the printer also has to be examined. Lower power consumption and energy saving features apply to at least 80% of current IT technologies.

Considering these issues in combination, a carefully considered choice, use, and disposal of printers and their accessories can make significant progress towards lessened environmental impact.



### *International Sustainability Trends*

Printers made with recycled or bio-based (as opposed to petroleum-based) plastic or featuring induction heating technology have a higher level of sustainability than conventional printers. Low electricity consumption, ink-saving technologies, compatibility with different types of paper, and upgradeability with readily available parts are all features that improve sustainability. Among the different printing technologies, laser printing is generally considered more polluting than water-based printing. Laser printers also consume much more electricity.

One sustainable printing alternative is Emulsion Aggregation (EA) toner. It uses less energy than conventional toners since the toner particles are produced by non-mechanical means. The EA manufacturing process requires approximately 25% to 35% less energy per pound of toner and generates less waste compared to the conventional method of making toner. The quality of printing with EA toners is approaching that of offset printing with liquid ink because of the extremely small size of the toner particles, which leads to 40% to 50 % less toner per printed page. Overall, EA technology offers an estimated 60% to 70% energy saving per printed page.

Another alternative is solid ink color printing, which produces 90% less waste than a typical color laser product. A loose ink block does not leave any residual cartridge after it is consumed, only a plastic packing tray and a recyclable cardboard packaging box. Another advantage is the ozone-free production. Solid inks are resin-based and non-toxic. They can be used on different types of paper, including recycled paper, since they have a good tolerance for changes in media types. The main drawback of using solid inks in Lebanon is the high frequency of power outages. These make the machine consume more wax which keeps on melting through each power cut. Adding a UPS only raises the overall purchasing cost.

Toners are composed of chemicals that can pose a health hazard to the operator and cause reactions varying from asthma to dizziness and vomiting, and be equally harmful to the environment. The use of non-toxic toner is therefore paramount.

Common international sustainability labels for printers and toners are Energy Star, ISO 14000, and the Nordic Ecolabel for cartridges (see Appendix G).



### *Local Sustainability Trends*

The concept of sustainability only started being applied to printers around three or four years ago. The demand for sustainable products is still negligible in the Lebanese market, an estimated ten percent to 15%, but the suppliers are willing to import sustainable products if the government or any other major client becomes interested. The share of government procurement is currently estimated at 20% to 30%.

Highly sustainable products have a price premium of about 30%. This is not a lot considering all the potential savings from using a sustainable product. The lifetime of a printer is assumed to be five years, after which it can be recycled. Long-life parts and high-quality assembly help to maximize the lifespan and minimize maintenance costs.

An important part of printer costs involves the electricity that is used. Public establishments pay a flat rate of 140 LL/kWh (USD 0.0933/kWh). Energy-Star labeled printers have up to 25% less power consumption for color laser printers and up to 40% for color inkjet printers, so the electricity savings can be considerable.

The purchase price of the printer is just a fraction of the total cost of ownership. The costs of paper and toner compatible with the printer model, as well as the rate of paper and toner use, have to be considered. These costs can be several times the value of the printer itself.

For toners, a sustainable alternative is Emulsion Aggregation toner which uses 40% to 50% less toner per printed page.

Importers in the IT products category are aware of the sustainability aspect of their products. Several of them recycle paper waste, plastic, and other materials like old IT equipment. For the latter, they work with Beeatoona, a local non-governmental organization that retrieves IT machines from companies and organizations and readies them for recycling. Companies recommend the government to do the same.

Some local companies collect old cartridges from clients and refill them. As long as the ink used in the refill is low in toxicity, which is not the case in Lebanon, they contribute to the protection of the environment and human health. Certain remanufactured cartridges, for example the American Katun brand, are also imported.





Importers that are representatives of multinational companies are bound to follow certain standards. There is a set of requirements that must be met, including product quality, anti-corruption, anti-bribery, environment-friendly, and following a code of ethics. All these can be requested by the strategic partners of IT companies such as HP, Microsoft, Oracle, and Cisco.

Some of the interviewed companies indicated that since all IT products are imported, their sustainability is guaranteed by international class suppliers and therefore no additional verification is needed. LIBNOR has issued only a few standards, shown below, and these are not specific to printers or toners. Raising the level of sustainability in LIBNOR standards for IT machines was considered a long-term target by interviewed firms.

Document Number/ Publication Year	Title	Mandatory
NL 22 :1999	Information Technology: A Definition Of Year 2000 Conformity Requirements	Yes
NL 505 :2002	Safety of information technology equipment	Yes
NL 505 :2002	Safety of information technology equipment	Yes

In the short-term, IT firms recommended prohibiting the import of toxic toners and imposing an age-limit on imported printers. The government could also adjust its own IT purchases to become more sustainable. It would do much to raise the awareness of sustainable printing products in the local market.

Recommendations for short-term action include the introduction of sustainability in PP specifications by government entities. They could also start disposing more efficiently by having toner cartridges refilled and handing over broken printers to NGOs for recycling. On the regulatory front, a short-term recommendation is to put an age limit on imported printers and to prohibit the import of toxic and non-biodegradable products. Sustainability should be considered in import specifications in the medium term, and the level of sustainability in LIBNOR standards should be raised in the longer term.



## *Detergents*

Liquid detergents comprise liquid soap for the hands and body, shampoos, multipurpose cleaning agents, dishwashing agents, and stain removers, as well as all gel cleaning agents. Solid Detergents are all paste and powder agents for multipurpose cleaning, washing clothes by hand or machine, as well as shaving foam and stain removers.

One way to achieve sustainability in detergents is by improving efficiency. Consumers can wash the same amount of laundry with less detergent and less water. Smaller packaging means each bottle uses less plastic, enabling retailers to stock higher number of bottles in the same space, saving on labor and out-of-stock costs. This represents big savings for companies, in manufacturing and transportation as well.

## *International Sustainability Trends*

Leading international detergent companies are under pressure from both retailers and consumers to go green. Consumers want more environmentally friendly products but do not want to pay more for them or compromise on performance. At the same time, a myriad of new laws in the international arena banning many traditional chemicals have reinforced the need for detergent makers to find alternatives.

The life-cycle analysis graph below shows that most of a household laundry detergent's impact occurs at the use phase. Encouraging consumers to adopt more sustainable consumption patterns is therefore one of the better ways to help protect the environment.

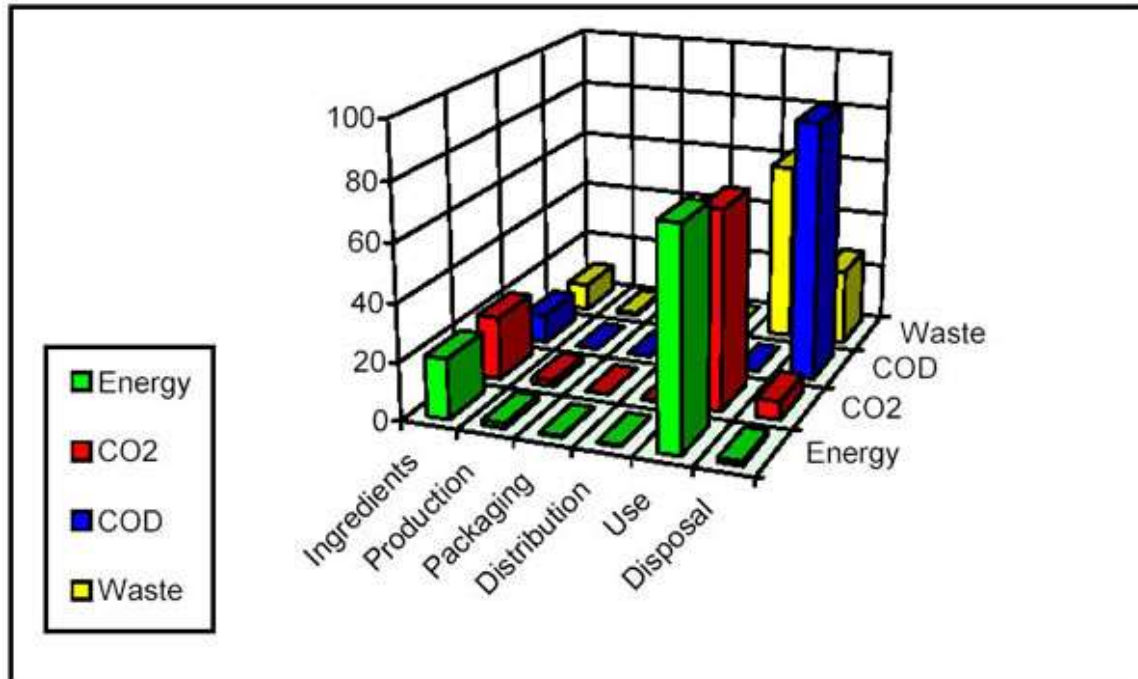


Figure 3 Detergent Life Cycle Analysis

Source: [www.aise.eu](http://www.aise.eu)

Residential or industrial detergents are harmful to the environment by their very nature, but many advances have been made in this industry. Ecologically friendly detergents are phosphate-free and non-toxic, use biodegradable enzymes, and are efficient at lower water temperatures. Producers should apply green manufacturing, packaging, and distribution processes. An even higher level of sustainability is attained by cleaning products made from bio-renewable sources such as sunflowers, corn, or soy.

International detergent eco-labels (detailed in Appendix G) include the Design for the Environment Program (DfE), ISO 14001, the European Ecolabel, and Energy Star.

### Local Sustainability Trends

Among the priority products for SPP, detergents have the highest rate of local production with 60% to 70%. Local manufacturers include Spartan, Obegi Group, Life, ES Trading, Oteri, and Saboun. They buy their raw materials directly from their foreign-based parent or supplier, or from local chemical importers like Robert Njeim. Foreign



brands such as those of Procter & Gamble are imported by its local branch or by traders such as Fattal.

The share of government procurement in total consumption is estimated at around five percent. Only a small proportion of detergents are bought through tenders (which are done mostly by the Armed Forces) since the Ministries use outside cleaning services, and individual public buildings, including schools and prisons, simply buy their cleaning supplies from the nearest supermarket.

Detergent manufacturers often do not sell to the government directly but through trading companies. These conclude package deals with governmental institutions where detergents are included among other hygiene products, toiletries, and cleaning equipment.

Only the major Lebanese detergent manufacturers and the raw material importers that supply them are aware of the sustainability aspects of their industry. They assert that awareness is lacking among many smaller domestic producers as well as private and public consumers.

LIBNOR has adopted standards for a few types of detergents, shown below. The larger detergent firms believe that this is insufficient and that the Ministry of Environment must get involved to prohibit non-biodegradable products from entering the country.

Document Number/ Publication Year	Title	Mandatory
NL 218 :2008	Household Synthetic Detergent in Granular Form	No
NL 219 :2008	Liquid Hand Dishwashing Synthetic Detergent	No
NL 220 :2002	Olive Oil Soap	Yes
NL 251 :2002	Toilet Soap	Yes

No national programs or policies are in place to promote sustainable production (and none are expected), but there have been some private initiatives: Two Lebanese, a Jordanian, and a Syrian company, along with Henkel and Ariel, were invited to AISE, the International Association for Soaps, Detergents and Maintenance Products ([www.aise.eu](http://www.aise.eu)). It promotes itself as being the sole partner for all EU governments as a green developer in the hygiene field. It does not provide a certificate but offers



guidelines and specifications. It spearheaded a drive to use 20% less cardboard and 20% less volume in laundry detergents with the same active ingredients.

In Lebanon, detergent sustainability involves the raw materials. Cleaning products made from bio-renewable sources are not available locally and ammonium is still used as an ingredient, but about 70% to 80% of detergents in the domestic market are ecological to an extent in that they are phosphate-free, biodegradable, and non-toxic.

Two examples of eco-friendly chemicals used locally are linear alkyl benzene sulfonic acid (LABSA) which is used in washing powder and dishwashing detergents, and lauryl ether sulfate (SLES), which used in many personal care products such as soaps and shampoos.

The sustainability premium is 10% to 30%, and this is because the higher cost of the sustainable raw materials is passed on to the consumer. The premium depends on the level of sustainability of the product, the highest being cleaning products made from bio-renewable sources. The human health and environmental costs of using toxic products justify paying more for sustainable alternatives.

In detergents, externalities that have to be taken into account in estimating the true value of the product include the costs to human health and to the environment from the chemical-filled waste water. High operational efficiency, combined with a correct dosage by the user, can result in savings for the user. Some local companies might claim ISO 9000 and more rarely ISO 14000 series or Hazard Analysis and Critical Control Points (HACCP), but certification is not a priority for domestic companies. They assert that since the raw materials they import and/or use in manufacturing are sustainable products from reputed international suppliers that correspond to foreign standards, additional domestic certification and sustainability testing are no longer required.

About 30% to 40% of the local detergent market is made up of international brands, which rely on the standards applicable in their home countries. Detergent companies indicated that consumers prefer foreign products because they do not trust local production. Local products therefore have to be cheaper.

As local suppliers of detergents often exhibit a low level of awareness, the government has a vital role to play in making cleaning products safer. It can do that by establishing production guidelines and raising local standards to a higher level of sustainability. It can



also provide tax incentives for sustainable manufacturing. In the medium term, government institutions could facilitate direct PP access for local detergent manufacturers.

Another way the government could improve the situation is by enforcing LIBNOR standards and imposing bans on the import of toxic, non-biodegradable and hazardous chemicals and detergents. Another action that could be realized immediately is the launch of a public awareness campaign about ways to clean more efficiently using less water and without endangering human health.



## *Pesticides*

The improper use of agrochemicals has negative impacts on human health, ecosystem health, the balance of trade, and the cost of production of agricultural products. Misuse of pesticides results in long-term pollution of water resources, pesticide residues on foods, and reduced populations of beneficial insects, birds, mammals, and micro-organisms. Sustainable pesticides and fertilizers are used mostly in areas that have started organic farming.

### *International Sustainability Trends*

Many synthetic pesticides dissolve in groundwater, which can become unfit for human consumption and can cause adverse environmental impacts when discharged to streams and oceans. The sustainable alternatives to chemical pesticides are biopesticides (based on bacteria, fungi, viruses, or nematodes, for example *Bacillus Thuringiensis* (or BT), pyrethrin, neem oil, garlic oil, canola oil or baking soda) or bio-control agents (such as insect predators, microbes, or parasites that feed on plant pests).

Eco-labeling and certifications in the agrochemical sector are detailed in Appendix G. They include the American for Organic Production label for pesticides derived from natural sources. GLOBAL G.A.P (Good Agriculture Practices) provides certification through national organizations for sustainability practices in farming. Integrated Pest Management (IPM) is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.

### *Local Sustainability Trends*

Of the approximately 5,000 farmers in Lebanon, only about 100 are organic farmers. A number of them are certified by the Mediterranean Institute of Certification (IMC) or LibanCert.

The IMC is a private company that has public authorizations and international accreditations for certifying companies that work in the agricultural, agro food, hotel restaurant and café, and tourism sectors. LibanCert is a private organic inspection and certification body that provides farmers, processors, and traders with organic certification services.



According to FAO pesticide studies and the 1995 METAP study, Lebanese farmers use both pesticides and fertilizers too intensively, including the use of spray nozzles which discharge too high an amount of chemicals, not following recommendations for the scheduling of pesticide applications, and regularly applying banned pesticides such as DDT, Aldrin, carbofuran, and parathion. It is also likely that farmers do not follow recommended safety precautions when applying or storing pesticides. The FAO study found that farmers use old pesticide containers for water and that pesticide distributors do not properly store their pesticides.

Currently, the pesticides most in demand are insecticides, which constitute about 40% of the total demand, followed by fungicides with 30%, herbicides with 20%, and acaricides with 10%. The decline of agricultural research and extension services has left farmers dependent upon the recommendations of the distributors of agro-chemicals, who often conceal the commercial and scientific names of pesticides, do not include instructions on labels, and mask expiration dates. The ban on imports of chemicals whose use is prohibited in their countries of origin is not enforced.

At the time of the FAO study in 1995, there was no research on or application of integrated pest management (IPM) in Lebanon. Today, few farmers, if any, receive effective training in pesticide application, IPM, or the principles of farm management needed to determine the most cost-effective and environmentally friendly levels of application of pesticides and fertilizers. Farmers often do not accept the use of sustainable pesticides because they perceive the chemical products as being more efficient than bio products. For example, there is only one bio product for each insect, but the chemical product kills all kinds of insects. Corporate executives in the pesticide category are highly aware of sustainability issues but indicate a low level of awareness in the broader market. Pesticides are sourced exclusively from abroad and sustainable products are being used only on a trial basis, hence their low shares of the local market. Around 90% of pesticides that are being used in Lebanon are conventional, and the rest are biopesticides.

Organic pesticides can be 20% to 35% more expensive than conventional products. For example one kg of *Bacillus Thuringiensis* BT costs USD 40, but the one liter of a chemical pesticide costs a maximum of USD 20. Although they are difficult to quantify, the potential costs to human and animal health and the contamination of soil and groundwater from chemicals make the higher price for sustainable pesticides worthwhile.





Companies that import organic pesticides include users Bio-COOP Lebanon as well as traders Unifert, Debbaneh Frères, and Agricultural Materials Company (AMC).

The products that are being imported have to be registered and standardized at the Ministry of Agriculture. Lebanon follows European more than American standards, including in the banning of products. The products are tested every year by local laboratories. Imports have to have registration certificates from the country of origin, or else they are not allowed to enter the country. Importers rely heavily on the labeling available on the products of international companies. Nevertheless, over half of the imported pesticides (about 55%) are from China. They are almost all conventional, and they are just starting to be certified.

The Ministry of Agriculture has various programs for organic farming and genetically modified food, among other programs. Under one such program, it has offered each organic farmer some bio-pesticides based on copper and sulfur. In the terms of its tender calls, the Ministry of Agriculture specifies the active ingredient and the chemical formula of the pesticide. The Lebanese government constitutes about 15% to 20% of the total pesticide demand.

To encourage progress in the local market, it is recommended to prohibit import of toxic and non-biodegradable pesticides. This is a goal that the government could achieve in the short term. In the medium term, updating and enforcing LIBNOR standards is strongly recommended. In the long term, government institutions should strive to raise the level of sustainability in PP and LIBNOR standards, and offer tax incentives for sustainable manufacturing by local producers.

### *Lighting*

Sustainable lighting meets the qualitative needs of the visual environment with the least impact on the physical environment. The goal of sustainable lighting is to use fewer resources than are capable of being replenished.



### *International Sustainability Trends*

There are three main types of light bulbs: Incandescent, Compact Fluorescent (CFL), and Light-Emitting Diodes (LED) lamps.

Incandescent lamps are highly inefficient, as about 98% of the energy input is emitted as heat, which can cause fires. Nevertheless, some architects and interior decorators still prefer them to energy-saving lamps due to the "warm" yellow quality of their light. Older light fixtures are designed for the size and shape of these traditional bulbs. Incandescent lamps usually have a lifespan of about 500 hours.

Europe is following a time plan for the phasing out of certain incandescent lamps and other lighting products that are heavy users of electricity. After certain cutoff dates, the sale of such lamps will be banned. In addition, the EU Restriction of Hazardous Substances (RoHS) directives restrict the amounts of mercury, phosphor, and lead in lamps.

Compact Fluorescent Lamps (CFL) are usually designed to replace incandescent lamps and can fit into their light fixtures. The average life of a CFL is between 8 and 15 times that of an incandescent light bulb. CFLs typically have a lifespan of about 6,000 hours. CFL street lamps last even longer, from 8,000 to 10,000 hours. CFL emit varying levels of carcinogenic mercury, but mercury-free CFL are starting to be produced and are expected to become the norm in the future.

Light-Emitting Diodes Lamps (LED) are the most sustainable as they have the lowest energy consumption and zero mercury emission. LED lamps last about 150,000 hours. LEDs are damaged by being run at higher temperatures, so LED lamps typically include heat management elements such as heat sinks and cooling fans. LED lamps offer a long service life and high energy efficiency, but initial costs are higher than those of fluorescent lamps.

Energy Star, the European Union energy label, and LEED are the international certifications that confirm a lighting product's sustainability (see Annex G).



### Local Sustainability Trends

The share of government procurement in the overall lighting market, including street lamps, is estimated at 20% by domestic companies in the sector.

Companies are taking their own initiatives and the private sector is ahead of the public sector in the adoption of sustainable products.

Local companies in the lighting category are well aware of sustainable products. They indicated that technological advances in their sector are oriented towards less energy consumption and increased safety, at a falling price premium. They also noted that the local demand for sustainable lighting is increasing. Some suppliers see a direct relation between the income and education level of consumers and their choice of lamps. Although the initial purchase cost of sustainable products is still substantially higher than that of conventional products, the usage cost is lower and its lifespan is longer.

There has been some public encouragement of greater sustainability in the lighting sector. The Ministry of Energy and Water launched the three million lamp initiative in an effort to replace existing non-efficient bulbs with new sustainable ones. Lighting companies lauded this effort but some remarked that its execution was not entirely effective – many households did not receive the lamps intended for them. The Ministry of Education has also included energy conservation as part of the sustainable development teaching package.

Setting standards through LIBNOR would help to make the electrical sector more sustainable. Some existing standards in the sector are listed below.

Document Number/ Publication Year	Title	Mandatory
NL 95 :2002	Tungsten Filament Lamps for Domestic and Similar General Lighting Purposes: Performance Requirements	Yes
NL 96 -1:2002	Safety Specifications for Incandescent Lamps – Part 1: Tungsten Filament Lamps for Domestic and Similar General Lighting Purposes	Yes
NL 96 -2:1999	Safety Specifications for Incandescent Lamps – Part 2: Tungsten Halogen Lamps for Domestic and Similar General Lighting Purposes	Yes



NL 97 :2001	Double-Capped Fluorescent Lamps: Performance Specifications	Yes
NL 98 :1999	Tungsten Halogen Lamps (Non-Vehicle)	Yes
NL IEC 60882 :2005	Pre-Heat Requirements for Starterless Tubular Fluorescent Lamps	Yes
NL IEC 60901 :2007	Specification for Single-Capped Fluorescent Lamps. Performance Specifications	No
NL IEC 60968 :2007	Specification for Self-Ballasted Lamps for General Lighting Services. Safety Requirements	No
NL IEC 60969 :2007	Self-Ballasted Lamps for General Lighting Services. Performance Requirements	No
NL IEC 61199 :2007	Single-Capped Fluorescent Lamps. Safety Specifications	No

According to companies in the lighting sector, examples of strong standard-setting organizations that deserve to be followed include the Association Française de Normalisation (AFNOR), the Qatar General Electricity and Water Corporation (Kahramaa) and the Saudi Arabian Standards Organization (SASO). These institutions issue standards which the executive branch of government imposes on the corporate and private citizens. The government can refuse to grant a building license, or deliver electricity or water if its conditions are not fulfilled.

The market share of sustainable lighting products has increased over the last few years. The 35% market share of sustainable lighting products is composed of LED (10%) and mercury-free CFL (25%). If all CFL are taken into consideration, the market share would increase to 50% to 80%.

Type of lamp	Energy saved	Lifespan (hours)	Current price	Current Market Share	Future Market Share
Incandescent	0%	500	\$0.25	50%	0%
CFL	60%	6,000	\$1.50	40%	50%
LED	90%	150,000	\$10-\$30	10%	50%



Incandescent lamps are expected to have no market share at all in the future. Mercury-free CFL are projected to have a share of the market equal to LED lamps, whose price will come down to a level close to that of CFL. The development in market shares will be not so much due to local demand, but rather to advances in manufacturing. Some importers see future LED demand being driven by large projects, major companies, and a renewal of street lights. Expected price decreases are the result of economies of scale in manufacturing. To accelerate the process, an increase of customs duties or a ban on non-sustainable products would be instrumental in reducing the price gap with conventional lamps. Customs duties are currently five percent on any kind of lamp and two percent if it has a European certificate of origin.

The production, transport, and disposal of electric lamps do not use a lot of energy; 90% of the energy is consumed during the operation phase. The table below shows a price comparison of the different kinds of lamps assuming an electricity price of USD 0.0933/kWh, which is the going rate for public entities.



Type of lamp	Unit cost	Lifespan (hours)	No.of lamps for 150,000 hours	Cost of lamps	Consumption (W)	Electricity cost for 150,000 hours	Total cost
Incandescent	\$0.25	500	300	\$75	40	\$ 560	\$635
CFL	\$1.50	6,000	25	\$37.5	8	\$ 112.5	\$150
LED	\$20	150,000	1	\$20	8	\$ 112.5	\$132.5

The above constitute the bulk of the operational costs, but the overall assessment should also include maintenance costs. After all, a total of 300 incandescent lamps would have to be changed for every LED lamp.

The production of lamps involves the use of substances such as lead, mercury, and cadmium. Mercury gases are emitted when the lamps are used, except for LED lamps and a new range of CFL. Using more sustainable lamps can therefore also be a saving on health costs.

As there is no local production, all lamps have to be imported. The main importers are Debbas (which won the tender for the three million lamps initiative), Sakr, Rafik Gazzaoui, Harb Electric, Light Incorporated, Al-Bounian, Ayanian Lighting, and Energy Links.

Their trading partners are mainly in Europe, and they rely on the labels imposed in their respective supplier countries in the absence of local certification tools. Some local companies have obtained or are in the process of getting ISO 9000 certification.

In the short term, it is recommended to adopt sustainability criteria in PP specifications for lighting products and to increase customs duties for incandescent lamps. In the medium term, the import of incandescent lamps should be prohibited completely. A follow-up initiative on the three million lamps project is also recommended. LIBNOR standards and lamps should also be updated and enforced. In the longer term, the level of sustainability in PP and LIBNOR standards should be raised and sustainable lamps should be incorporated into green government buildings equipped according to local ARZ or European LEED specifications.



## *Water Taps and Flushing Systems*

For water taps and toilet flushing systems to be considered sustainable, their material and production process as well as their water consumption or usage have to be taken into account.

### *International Sustainability Trends*

In water taps, there are two main systems for water preservation. One is automatic water taps, which have a battery-powered hands-free automatic sensor-operated system. The water stops running automatically when the person removes his or her hands from under the tap. Automatic taps are common in new installations and in restaurants.

The other solution for saving tap water comes from reducing the water flow. One of the technologies used for this is an aerator which discharges 50% water and 50% air, thereby saving up to 50% of water. Another technology which saves the same amount of water consists of an economizer cartridge with two positions. The mixer dispenses 50% of the total possible water flow if its handle is lifted once, and 100% if it is lifted to the maximum position.

In flushing systems, water-saving technology is also advancing. Similarly to automatic taps, battery-powered automatic sensors operate the flush system. Infrared sensors identify when the urinal has been used (or when someone has stood in front of it and moved away), and activate the flush. Thus the urinal is cleaned, but water is not wasted when the toilet is not used. Automatic flush facilities can be retrofitted to existing systems.

In dual flush cisterns, the discharge valve gives the user a choice between a single or dual flush. Pressing the large button will release all 1.6 gallons (6 l) of water. Pressing the eco button flushes with a reduced volume of around 0.8 gallons (3 l) of water.

LEED, a certification system which provides standards for green buildings and takes water reduction as one of its main certification criteria awards points for water saving. If water reduction is over 20% LEED credits are earned. Additional LEED credits are granted if the flushing systems, which are usually made of plastic, have a minimum of five percent of recycled content. LEED credits can also be gained in manufacturing if the materials are harvested within 500 miles of the assembly plant.



The international sustainability labels used for water taps and flushing systems include the Leadership in Energy and Environmental Design (LEED) label for green buildings (see Appendix G).

### *Local Sustainability Trends*

Lebanon is blessed with an abundance of water, but this natural resource is becoming scarcer due to global warming and climate change. In some areas such as the Bekaa, there have been signs of desertification. Both local residents and government institutions are purchasing water for all types of consumption, so the need for a water savings strategy is starting to make itself felt.

There is no local manufacturing in the sector. Lecico is the only producer of ceramic sanitary ware in Lebanon, but it does not make taps or flushing systems. These are imported mainly by Geahchan Bath & Kitchen, George Khoury, Wadih Jreissati & Fils, George Fadlo Nasr, Kanafani Nagi & Fils, Abdulrahim Diab (Ideal Standards) and Khalil Fattal & Fils.

Among their clients, importers see eco-friendly behavior as the new trend, along with demand for good quality and design. According to the marketing motto, “Green is the new Black”. The vast majority of clients are not specifically asking for sustainable products, with some constructors of green buildings being the only exception. Companies indicated that the government could bolster demand if it required environmentally friendly products in its bids and commissioned the construction of green government buildings.

The Lebanese government is essentially inactive in the formulation of rules and regulations promoting water conservation and efficiency. The only public-sector initiative that broaches the subject of water is an awareness campaign for sustainable development by the Ministry of Education. However, a local NGO, the Lebanon Green Building Council (LGBC), has created the ARZ Building Rating System. It measures the extent to which existing commercial buildings consume the right amount of energy and water, and are healthy workplaces.

The trading partners of many of the local companies are located in Europe or the United States. For products from these regions, certain standards are assumed, so clients do not demand ISO certification. For Chinese products, a few clients ask for ISO





certification. Among the 20 to 30 companies that import the targeted products, only a few have LEED-certified products.

The market share of sustainable products is only about five percent. Sustainable taps are 10% more expensive than their conventional counterparts, and flushing systems 20% more expensive. Increased customs duties for non-sustainable products could help in eliminating the price difference. Currently steel, copper, or aluminum water taps all have five percent customs duty, while plastic flushing cisterns have a ten percent customs duty. A short-term recommendation for promoting the increased use of sustainably produced and water-savings products in the local market would therefore be to increase customs duties for non-sustainable products.

The high durability and low water use of sustainable water taps and flushes signify more savings for the users. Aerators or economizer cartridges in water taps cut the water use in half, as do dual flush cisterns. Automatic water taps and flushes dispense water only for a limited time. Although tap water is relatively cheap in Lebanon, the water-saving features of sustainable taps and flushing systems should in themselves justify paying the moderate premium, quite apart from considerations of the environmental impact of sustainable manufacturing.

In the medium term, the launch of a national water-saving initiative is recommended to make people aware of the need for a responsible use of water. In the long term, the installation of sustainable taps and flushing devices should be standard for green government buildings constructed along ARZ or LEED specifications.

## **National Initiatives**

A number of national sustainability initiatives are being undertaken by local and international NGOs and the private sector. In some instances these are subsidized by the Lebanese government whose involvement is felt especially through pilot projects, educational campaigns, and private-public partnerships.

### *Environmental Initiatives*

The UNDP is especially involved in environmental initiatives in Lebanon, with ongoing projects valued at over USD 24 million. One of its major projects is **CEDRO III** (Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of



Lebanon) ([www.undp-cedro.org.lb](http://www.undp-cedro.org.lb)), a USD 3.5 million program managed in collaboration with the Ministry of Energy and Water (MEW), the Ministry of Finance and the CDR. It focuses on renewable energy for public hospitals and schools, street lighting, solar water heaters, wind turbines, photovoltaic systems, and energy efficiency. One example of its activities is the launch in June 2011 of a renewable energy competition “Madinati Khadraa” (my green city) for municipalities to submit a project on renewable energy or an energy efficient proposal to win a grant of up to LL 60 million to implement the project.

The UNDP also supports the **Lebanese Center for Energy Conservation (LCEC)** ([www.lcecp.org.lb](http://www.lcecp.org.lb)) ([www.lebanese-cpc.net](http://www.lebanese-cpc.net)), a local technical agency affiliated to the MEW. LCEC addresses end-use energy conservation and renewable energy at the national level. It supports the government in developing and implementing national strategies that promote efficient and rational uses of energy and the use of renewable energy at the consumer level. LCEC has conducted a pilot project in collaboration with the UNDP to install 500 solar heaters in private households which were donated by the Chinese government (mainly in the South). In another project, the Swedish government donated solar water heaters to not-for-profit facilities such as the civil defense, the Red Cross, hospitals and orphanages.

The **Lebanese Cleaner Production Centre (LCPC)** ([www.lebanese-cpc.net](http://www.lebanese-cpc.net)) was established with the support of the European Commission-LIFE Programme (EC-LIFE), United Nations Industrial Development Organisation (UNIDO), the Austrian Government, and the Ministry of Environment (MoE) in Lebanon. It assists local industrial enterprises in increasing their efficiency and reducing production risks to humans and the environment. The aim is for the companies to be able to export their products in the wake of Lebanon's efforts to access the World Trade Organization. The LCPC's main activities are awareness-raising events, in-plant demonstrations, and training and capacity building. Until the end of 2009, the LCPC targeted seven main industrial sectors: Agrofood and Canning, Dairy, Paper & Cardboard, Plastic Production & Recycling Sectors, Textile Sector, and others. In the Paper & Cardboard sector, it helped Kfoury Paper Converting, Sicomo, Solicar and its parent Gemayel Freres.

A **National Energy Efficiency Action Plan (NEEAP)** has been adopted by the Council of Ministers. The plan, which covers the 2011-2015 period, is the first comprehensive strategy in energy efficiency and renewable energy to be adopted in Lebanon - and in the Arab world. It was developed by the LCEC in collaboration with national and international partners. The NEEAP calls for the development of solar, wind, and hydro



energy; the adoption of an energy conservation law; the banning of incandescent lamps; and the development of financing mechanisms for energy efficiency projects, among others. The NEEAP paves the way towards achieving Lebanon's target of having 12% of its energy consumption come from renewable energy by 2020.

In 2011, the Central Bank launched the **National Initiative for Energy Efficiency and Renewable Energy** (NEEREA) to support the financing of energy efficiency and renewable energy projects across Lebanon through commercial banks. These could include solar power, liquid or solid waste, recycling ecotourism, or the construction of green buildings that conform to LEED standards. In May 2011 The Central Bank approved the first project in energy efficiency under NEEREA. Credit terms for new projects include a credit period of a maximum of 10 years plus a six month to four year grace period.

The LCEC has also been tasked by the MEW with replacing three million incandescent lamps with three million Compact Fluorescent Lamps (**CFL project**). This initiative will allow the banning the import of incandescent lamps to Lebanon by the end of 2012.

In December 2011, the MEW launched **NET Metering**, an electricity scheme for consumers who own renewable energy production facilities, such as wind or solar power generating cells. Under the program, users of renewable power generators sign a contract with the Electricité du Liban (EDL) which allows them to receive discounts on their electricity bills according to the amount of energy they produce. A digital reader is installed at the locations that use renewable energy resources. The device measures the energy exported to the grid, and that imported from it (per kWh). If the energy exported to the grid is larger than that imported from it, the excess is saved as energy credit. The application is ideal for use by entities which have seasonal operations, such as schools and hotels in mountain areas. Subscribers to Net Metering would be exempted from regular electricity subscription fees if their output of renewable energy was at least equal to 75% of their energy consumption. The project will be followed up with a Feed In project, which will allow EDL to buy surplus power from customers using NET Metering.

The **Lebanese Association for Sustainable Energy (LASE)** ([www.lebanonenergy.org](http://www.lebanonenergy.org)) is a non-profit organization established in October 2009 in collaboration with the Ministry of Interior to assist in taking decisions to correct the energy generation problem in Lebanon. It is involved in the **Mediterranean Solar Plan (MSP)**, a key component of the Union for the Mediterranean (UM), which was launched in July 2008. The UM's interests



include water and energy resource management, environmental challenges, and more broadly the development of economy and trade. The MSP includes sixty projects involving the countries of the south and south-east Mediterranean. It mainly addresses the security and energy independence of the Mediterranean basin, the control of energy consumption, and the promotion of renewable energies.

The Ministry of Environment is fighting deforestation and promoting the **National Reforestation Plan (NRP)** ([www.moe.gov.lb/Reforestation](http://www.moe.gov.lb/Reforestation)). Under Law 326 dated 28 June 2001, the government allocated LL 25 billion from the national budget to the execution of reforestation projects at the national level over a period of five years. The program was extended under Decree 40 of 22 February 2007 with LL 25 billion in funding scheduled over five years.

Existing classification of **Protected Areas** in Lebanon includes eight Nature Reserves, 24 Natural Sites including forests, landscapes, and rivers, five Himas, 12 Protected Forests, 14 touristic sites, and a multitude of other sites that are worth protecting. Seven Nature Reserves have been established by law and one by ministerial decision, aiming at the protection of endangered species and the conservation of their habitats. They cover nearly five percent of the country's overall area. They include Al Shouf Cedars (about 200 km<sup>2</sup>), Horsh-Ehden (about 10 km<sup>2</sup>), Palm Islands (three islands of Palm, Sanany and Ramkeen with a total area of about 4.15 km<sup>2</sup>), Bentaël (1.5 km<sup>2</sup>), Tannourine (12 km<sup>2</sup>), Tyre Coast, and Yammoune. March 10 was declared National Day for Nature Reserves by a Council of Ministers Decision in 2002.

The Ministry of Agriculture is promoting the **Hilly Areas Sustainable Agriculture Development (HASAD)** with the support of the International Fund for Agricultural Development (IFAD), which was approved in September 2009. The total project cost is USD 21.4 million, including an approved IFAD loan of USD 4.0 million and grant of USD 598,000. IFAD's investments in Lebanon aim to assist the government in its efforts to alleviate poverty by making the rural economy more competitive at the levels of smallholder production, processing, and marketing. To achieve this goal, IFAD has focused on enabling poor rural people to improve their access to rural credit, and on fostering participation through the formation of cooperatives and access to markets and services, as well as reducing soil and water erosion, improving the socio-economic prospects of rural women, and rehabilitating the livestock sector. IFAD has assisted 8,500 families in the Bekaa Valley in rebuilding their lost herds, replacing existing stock with improved breeds, and strengthening animal health services.



The **Ministry of Education** developed a plan in line with the second phase of the Decade for Education for Sustainable Development, entitled "stage of commitment and construction", which lasted from 2008 to 2011. The plan included the organizing of workshops and meetings at the local and national levels with the participation of local and regional organizations and civil society groups, in order to promote the culture of sustainable development. The Educational Center for Research and Development has developed teaching packages for each level of basic education including activities consistent with academic subjects, and aiming to educate students and equip them with information, skills and attitudes related to sustainable development.

The private sector has also stepped forward to help protect the environment. Lebanon Opportunities magazine in June 2011 announced the **Green Business Initiative**. It consists of a series of workshops, lobbying efforts, and petitions that aim to foster a more eco-friendly economy. A certificate is delivered during local conferences in order to publicly acknowledge those organizations going green. At the heart of the campaign is the "Green Pledge" where signatory companies agree to undertake some extra operational measures, including minimizing waste and toxic emissions, measuring environmental impacts of operations, and raising awareness among staff members.

Projects initiated under the Green Business Initiative are the **Green Web Portal** (<http://green.opportunities.com.lb/>) and the **Green Business Guide and Directory**. The Green web portal is dedicated to sustainable business behavior in Lebanon. The portal includes practical information on all aspects of sustainable business conduct, a directory of suppliers, links to other green portals, information on NGOs involved in the promotion of sustainable business, best green practices, laws, certifications, and much more. The **Green Business Guide and Directory** contains a comprehensive directory of suppliers in Lebanon with product detail and contact information.

Non-governmental organizations are also doing their part in spreading awareness and assisting local organizations in moving towards environmentally friendly products and services. Among these NGOs is **Beeatoona** ([www.beeatoona.org](http://www.beeatoona.org)) whose primary aim is the promotion of good environmental practices among the Lebanese and Arab communities for a sustainable development. Among its ongoing projects is the ecycle-me electronic waste management campaign ([www.ecycle-me.org](http://www.ecycle-me.org)) targeting computer retail shops and students in particular. NGOs that advocate and practice paper recycling include **Craft** (<http://craft-lebanon.com>) and **Terre Liban** (<http://terreliban.org/>). In the agricultural sector, the Association of Importers and Distributors of Supplies for Agricultural Production in Lebanon (**ASPLANTE**) has contributed to the creation of



pamphlets on the safe use of pesticides as part of the Agriculture Extension Project in Lebanon.

The **Lebanon Green Building Council (LGBC)** ([www.lebanon-gbc.org](http://www.lebanon-gbc.org)) is a local NGO that provides stewardship towards a sustainable built environment. It promotes and helps implement high performance construction concepts that are environmentally responsible, healthy, and profitable. LGBC acts on market, educational, and legislative issues to achieve its goals. It came up with the ARZ Building Rating System ([www.arzrating.com](http://www.arzrating.com)) designed to measure the extent to which existing commercial buildings in Lebanon are healthy, comfortable places for working, consuming the right amount of energy and water, while having a low impact upon the natural environment.

#### *Social and Economic Initiatives*

The Ministry of Social Affairs ([www.socialaffairs.gov.lb](http://www.socialaffairs.gov.lb)), among others, is formulating and implementing pilot projects which focus primarily on sustainable aspects, including the protection of children and the reduction of regional disparity and poverty.

The UNDP is involved in pro-poor projects worth over USD 27 million. One project of particular interest is **Live Lebanon**, which aims at the channeling of Lebanese expatriate monetary support to local community and development projects.

The UNDP is also funding governance projects with a total of over USD 24 million. It supports the Administrative Reform Program which aims at assisting the government and the Office of the Minister of State for Administrative Reform and Development (OMSAR) ([www.omsar.gov.lb](http://www.omsar.gov.lb)) to plan and coordinate the country's **National Administrative Rehabilitation Program (NARP)** both in the short and medium to long term. The objectives of the project are to formulate and implement an institutional development strategy; to efficiently manage and execute technical cooperation, including office and information technology, technical assistance, training and other components; to develop a resource mobilization strategy to assist OMSAR in its public sector management reform efforts; and to coordinate external assistance and provide support to management of rehabilitation projects programmed under NARP and financed by the World Bank, the Arab Fund and the European Union.

**QUALEB** ([www.qualeb.org](http://www.qualeb.org)) was a EUR 15 million EU-funded project established in October 2004 for a 38-month period at the Ministry of Economy and Trade. QUALEB was a quality program providing support and expertise to both local organizations and



the public sector by promoting quality, conformity, and excellence, thereby helping local producers to export their products and services. With an overall budget of EUR 2 million, QUALEB was extended for 18 months from January 2008 to June 2009. QUALEB sought to align Lebanese practices with those of the EU in the fields of Standardization, Testing, Certification and Inspection, Accreditation, Technical Regulations and Conformity Assessment, and Market Surveillance. It has provided direct support to 16 private and public testing and calibration laboratories, supported the drafting of several laws needed for the quality chain, and assisted 50 national companies in the implementation of ISO 9001:2000 and ISO 22000:2005 standards.

The Lebanese Standards Institution **LIBNOR** ([www.libnor.org](http://www.libnor.org)), under the guidance of the Ministry of Industry, issued a number of Lebanese standards for different sectors including medical, building and civil engineering, packaging, environmental management systems, and food and agriculture. The Lebanese standards are voluntary in principle. However, for reasons of public health or public safety or national interest, the Lebanese government made some of them mandatory.

Alongside the public sector, different organizations in the private sector are taking individual initiatives in order to project a good image as a socially responsible partner and a good citizen through ISO certification and by adhering to the standards set within their industries or LIBNOR.



## Conclusion and Policy Recommendations

The market readiness review sheds some light on market awareness and predisposition to respond positively to sustainable goods.

The businesses executives interviewed generally showed a high level of knowledge of the sustainability aspects of their particular sector. Many are aware of foreign practices and regulations, because they import goods from abroad or because they completed their technical studies abroad. Conversely, a number of managers noted a low level of awareness of sustainability in the private and public sectors in Lebanon. The government could encourage sustainability through awareness campaigns and common initiatives with the private sector. These would resonate well with the general public if their themes were saving scarce resources such as energy and water.

Companies had varying degrees of involvement with government procurement. For some (especially paper and detergent firms) it is only indirect, through a trading company intermediary. Some companies only deal with one branch of government, the army for example.

The local market can be readied for more sustainable products in several ways. One is simply by the spillover of standards and technologies from abroad. Lebanon imports a lot of its products from Europe and the U.S., and as the level of sustainability of these increases, so will that of locally used products. Some examples are lighting, where the EU is imposing strict regulations, as well as printers, water taps and flushing systems, where companies are competing to design more efficient and resource-saving products.

Experience in Europe and Japan shows that the market can adapt to higher legal norms and this could also apply to Lebanon, whether through the adoption of the Procurement Law or the issuing of government circulars. There are currently few local tools and instruments to certify and verify the sustainability of the priority products. The government could improve this situation by the enforcement of LIBNOR standards and imposing bans on hazardous substances as well as non-sustainable products such as incandescent lamps. In addition, in sectors such as detergents where local production exists, the government can establish guidelines and raise local standards to make it more sustainable. This is especially important in cleaning products because local suppliers often exhibit a low level of awareness.





There is a general interest among companies in shifting to or focusing more on sustainable products, provided the government encourages the development of a market in such products through its own procurement, which constitutes a large part of the market in some sectors, especially office paper and IT. In paper in particular, public entities can immediately change their buying and disposal habits, and have a strong impact on the rest of the market. Paper should therefore be at the very top of the list of priority products. In the longer term, the construction of new government buildings should be green, following local (ARZ) or international (LEED) indications. This would help set a trend in the wider construction sector.

Demand can also be created through subsidies, as was done with solar panels in Europe and the U.S. In Lebanon, such support could be in the form of preferential tax treatment for companies who respect sustainability in production or value-adding processes, or increased customs duties for non-sustainable products.

Table 9 below summarizes the short, medium, and long-term recommendations for each priority product.



**TABLE 9 – Recommendations**

Product	Short-term	Medium-term	Long-term
Paper	<ul style="list-style-type: none"> <li>- Sustainability in PP specifications</li> <li>- Give paper for recycling to NGOs / local recycling plants</li> </ul>	<ul style="list-style-type: none"> <li>- PP targets for increased recycled content</li> <li>- National recycling initiative</li> </ul>	<ul style="list-style-type: none"> <li>- Tax incentive for sustainable manufacturing</li> <li>- Tax incentive to produce recycled office paper</li> </ul>
IT (printers and toners)	<ul style="list-style-type: none"> <li>- Sustainability in PP specifications</li> <li>- Age limit on imported printers</li> <li>- Recycle printers</li> <li>- Give toner cartridges for refilling</li> <li>- Prohibit import of toxic and non-biodegradable products.</li> </ul>	<ul style="list-style-type: none"> <li>- Sustainability in import specifications</li> </ul>	<ul style="list-style-type: none"> <li>- Raise level of sustainability in LIBNOR standards</li> </ul>
Detergents	<ul style="list-style-type: none"> <li>- Prohibit import of toxic and non-biodegradable products.</li> <li>- Public awareness campaign</li> </ul>	<ul style="list-style-type: none"> <li>- Update and enforce LIBNOR standards</li> <li>- Facilitate direct PP access for local detergent manufacturers</li> </ul>	<ul style="list-style-type: none"> <li>- Raise level of sustainability in PP and LIBNOR standards</li> <li>- Tax incentive for sustainable manufacturing</li> </ul>
Pesticides	<ul style="list-style-type: none"> <li>- Prohibit import of toxic and non-biodegradable products.</li> </ul>	<ul style="list-style-type: none"> <li>- Update and enforce LIBNOR standards</li> </ul>	<ul style="list-style-type: none"> <li>- Raise level of sustainability in PP and LIBNOR standards</li> <li>- Tax incentive for sustainable manufacturing</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>- Sustainability in PP specifications</li> <li>- Increase customs duties for non-sustainable products</li> </ul>	<ul style="list-style-type: none"> <li>- Update and enforce LIBNOR standards</li> <li>- Prohibit import of incandescent lamps</li> <li>- Follow-up initiative on three million lamps</li> </ul>	<ul style="list-style-type: none"> <li>- Raise level of sustainability in PP and LIBNOR standards</li> <li>- Green government buildings (ARZ/LEED)</li> </ul>
Water taps / flushing systems	<ul style="list-style-type: none"> <li>- Increase customs duties for non-sustainable products</li> </ul>	<ul style="list-style-type: none"> <li>- National water-saving initiative</li> </ul>	<ul style="list-style-type: none"> <li>- Green government buildings (ARZ/LEED)</li> </ul>



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- FSC: Forest Stewardship Council (2009). About us. <http://www.fsc.org/about-fsc.html>.



## APPENDIX A

### Expert Opinion on the Move from Long List to Short List of Priorities

NAME	POSITION
Fadi DENNO	Project manager at Indy Act, the League of independent environmental, social, and cultural activists
Lea HAKIM	Economic Officer, UNDP Project at Ministry of Finance
Nancy KANBAR	Assistant Professor of Economics at Notre Dame University, Lebanon worked at the International Food Policy Research Institute in Washington D.C where she contributed to the Millennium Ecosystem Assessment (MEA). She has fulfilled consulting assignments sponsored by the World Bank.
Lamia MOUBAYED	Head of the Institute of Finance (IOF), known as the BASIL FULEIHAN INSTITUTE for ECONOMY And FINANCE.
Rana RIZKALLAH	Procurement officer, Institute of FINANCE (IOF)
Manal MOUSALLEM	Environmental Services Consultant and Contractor Project manager in the UNDP
Sami NADER	Professor in Saint-Joseph University, Finance expert
Jihan SEOUD	Program Analyst - Officer in Charge at UNDP Energy



## APPENDIX B

### National Priorities Questionnaire

Score each of the issues listed below from 1--> 5 (1 as the lowest and 5 as the highest) according to: Importance to the government/ Scope to do more / Market responsiveness				
	Government priority	Scope to do more	Market Responsiveness	Average I.
<b>Emissions to air and water, waste to landfill</b>				
Air pollution				
Climate change				
Renewable energy promotion				
Waste management (hazardous/Non-hazardous)				
<b>Resource Use</b>				
Quarries management				
Fair regional energy distribution				
Clean energy sources usage				
Natural resources preservation (Mountains/ Water)				
Agriculture water usage management				
Wastewater management				
Water (production and residential use)				
Bio-diversity preservation				
<b>Enviromental quality</b>				
Forests management (Re-forestation and fire management)				
Coastal areas preservation				
Pesticides management				
Agricultural lands preservation (Land Capita/Maintenance)				



<b>Education and employment</b>				
Regional job opportunities development				
Quality of education improvement				
Regional disparities minimization				
Regional poverty reduction				
<b>Health</b>				
Health care management (Equitable health care)				
Health indicators				
<b>Communities and other social</b>				
Traffic management (co-transportation/ state of the vehicles)				
Public transport improvement				
Urban development planning				

Government priority:  
 Scope to improve:  
 Market responsiveness:

How important is this issue to the government  
 How this issue is currently managed and how can we improve?  
 Will the market be able to respond to this issue (Suppliers/ Mentality)



## APPENDIX C

### National Priorities Scoring

	Avg 1	Avg 2	Avg 3	Avg 4	Avg 5	Avg 6	Avg 7	Total Avg
<b>Emissions to air and water, waste to landfill</b>					II.	III.	IV.	V.
Air pollution	3.00	4.33	4.50	3.00	3.33	3.67	4.00	3.69
Climate change	3.33	4.00	4.50	3.67	2.33	3.00	4.00	3.55
Renewable energy promotion	3.33	4.33	5.00	3.67	4.00	4.67	4.67	4.24
Waste management (hazardous/non-hazardous)	2.67	4.00	4.50	4.33	4.00	5.00	4.00	4.07
<b>Resource Use</b>				VI.	VII.	VIII.	IX.	X.
Quarries management	2.67	4.00	4.50	4.00	3.67	4.33	3.33	3.79
Fair regional energy distribution	3.00	4.00	4.50	2.67	4.00	4.00	3.67	3.69
Clean energy sources usage	3.33	4.00	4.00	3.67	3.67	4.33	4.00	3.86
Natural resources preservation (mountains/ water)	4.00	3.67	5.00	2.33	3.67	3.67	3.67	3.71
Agriculture water usage management	3.67	3.67	4.50	3.00	3.67	3.67	3.67	3.69
Wastewater management	2.67	3.33	4.50	3.67	3.00	5.00	4.67	3.83
Water (production and residential use)	3.33	4.00	4.50	4.00	3.67	5.00	4.67	4.17
Bio-diversity preservation	4.00	3.33	4.00	2.67	3.00	3.00	3.67	3.38
<b>Environmental quality</b>				XI.	XII.	XIII.	XIV.	XV.
Forests management (Re-Forestation and fire management)	4.00	3.33	4.50	3.67	3.67	4.00	4.00	3.88
Coastal areas preservation	3.67	4.00	4.50	3.33	4.00	4.67	4.33	4.07
Pesticides management	3.33	4.00	4.00	2.33	3.33	3.00	3.33	3.33
Agricultural lands preservation (Land Capita/Maintenance)	3.33	4.33	5.00	3.33	3.67	3.67	3.33	3.81



				XVI.	XVII.	XVIII.	XIX.	XX.
<b>Education and employment</b>								
Regional job opportunities development	3.33	4.33	4.50	4.00	3.67	5.00	3.67	4.07
Quality of education improvement	3.67	4.00	4.00	3.67	3.67	4.67	4.33	4.00
Regional disparities minimization	3.00	4.67	5.00	4.00	4.00	5.00	4.33	4.29
Regional poverty reduction	3.00	4.33	4.50	3.50	3.00	5.00	4.33	3.95
<b>Health</b>				XXI.	XXII.	XXIII.	XXIV.	XXV.
Health care management (Equitable health care)	2.67	4.67	3.50	4.33	4.33	4.67	4.00	4.02
Health indicators	3.67	3.67	3.50	4.00	3.00	3.67	3.67	3.60
<b>Communities and other social</b>				XXVI.	XXVII.	XXVIII.	XXIX.	XXX.
Traffic management (co-transportation/ state of the vehicles)	3.00	4.67	5.00	3.67	4.00	5.00	4.00	4.19
Public transport improvement	3.00	4.67	5.00	3.67	4.00	4.67	3.67	4.10
Urban development planning	2.67	4.33	5.00	3.67	3.33	4.00	3.33	3.76





## **APPENDIX D**

### **Final Eight Priorities Definition**

#### **1- Regional disparities minimization**

Minimize the growth gap between regions (developed and underdeveloped). This gap includes the social and economical aspects, i.e. job opportunities, education, infrastructure...

#### **2- Renewable energy promotion**

Produce energy from natural sources such as sunlight, wind, rain, tides, and geothermal heat.

#### **3- Traffic management (o-transportation / state of vehicles)**

Develop a culture of co-transportation to reduce the number of vehicles in circulation. Improve state regulations of the vehicles and their gas emissions.

#### **4- Water management (production and residential use)**

Increase annual water production in the country and improve the quality of water distribution to homes.

#### **5- Public transportation improvement**

Develop the public transportation sector which will help reduce traffic and the pollution in produces.

#### **6- Waste management (hazardous / non-hazardous)**

Waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce the effect of waste on health, the environment or the landscape.



### **7- Coastal area preservation**

Improve coastal area planning (halt illegal construction and projects by the coast line) and reduce coast pollution.

### **8- Regional job opportunities development**

Create job opportunities in all the Lebanese regions.



## **APPENDIX E**

### **Risk Questionnaire**



Dear Dr.Sioufi,

My name is Patrick RIZK from Sofres-Liban. We are a market research company, currently conducting a survey on behalf of the United Nations Organization about sustainable public procurement.

This study is part of a larger ten-year framework of programs on sustainable consumption and production patterns, developed with support from the UN and other agencies. It follows guidelines developed by the Marrakech Task Force in the context of a plan on Sustainable Public Procurement (MTF on SPP), a joint initiative between the Swiss government and the United Nations Environment Program (UNEP).

Sofres-Liban has been contracted to carry out the study. More specifically, we would like to have your opinion about some aspects related to **promoting renewable energy**.



This questionnaire is just a preliminary phase, in which we would like to know which governmental expenses could have an effect on renewable energy promotion or usage.

We require that you give us your opinion with complete openness and frankness.

Your collaboration in the successful completion of this survey is very much appreciated.

Thank you.

Here is a list of public procurements. According to you, could each of the following procurements have an effect on the promotion or usage of renewable energy sources? |



Sector	Yes	No	Comment
<b>Constructions</b>			
Roads construction			
Buildings construction			
Electrical constructions			
Water infrastructure construction			
Other constructions			
<b>Maintenance</b>			
Roads maintenance			
Building maintenance			
Transportation equipments maintenance			
IT system maintenance			
Maintenance			
Water infrastructure maintenance			
<b>Acquisitions</b>			
Acquisitions for road development			
Acquisitions for water supply			
<b>Health</b>			
Health: Private sector hospitalization			
Medicine			
<b>Materials and Equipment</b>			
Materials for the public sector transport machinery			
Technical Equipment			
Managerial material			
IT materials supply			
Agriculture materials: Pesticides and various			
Specialized material			
Transportation material purchase			
Office supply			
Furniture for offices			
<b>Service purchases</b>			
Advertising			
Consultancy services			
Cleaning			
Conferences			
Research			
<b>Rentals</b>			
Rentals			
Car rentals			
<b>Other</b>			
Electricity, water, and communication (Direct payment)			
Transportation fees			



Sector	Description
<b>Constructions</b>	
Roads construction	
Buildings construction	Construction of managerial buildings, specialized and private buildings
Electrical constructions	Construction of power plants, electrical transfer center
Water infrastructure construction	Infrastructure for drinkable, agricultural, and waste water
Other constructions	Water projects, big roads constructions, construction of prisons, governmental buildings, waste treatment constructions, electrical dispatching centers, infrastructures, hospital constructions
<b>Maintenance</b>	
Road maintenance	
Building maintenance	Maintenance of managerial buildings, specialized and private buildings
Transportation equipments maintenance	
IT system maintenance	Maintenance of IT systems
Maintenance	Small maintenance of office machinery, and supplies
Water infrastructure maintenance	Maintenance of the infrastructure for drinkable, agricultural, and waste water
<b>Acquisitions</b>	
Acquisitions for road development	Lands acquisition in order to construct roads on them
Acquisitions for water supply	Real estate purchases for infrastructure of drinkable water, infrastructure for agricultural water, Infrastructure for waste water
<b>Health</b>	
Health: Private sector hospitalization	
Medicine	Different types of medicine for private sector hospitalization
<b>Materials and Equipment</b>	
Materials for public sector transport machinery	
Technical equipment	
Managerial materials	Cloth, food, fuel for generators, fuel for heating
IT materials supply	Computers, servers, ...
Agriculture materials: Pesticides and various	Purchase of pesticides and different medicines for agriculture
Specialized material	
Transportation materials purchase	Cars, bigger vehicles...
Office supplies	Papers, books, ...
Furniture for offices	Chairs, decoration, ...
<b>Service purchases</b>	
Advertising	Printing material, events and consultancy services
Consultancy services	Consultancies, studies, implementation, and control
Cleaning	
Conferences	Sponsoring international conferences and invitations, participation in international conferences
Research	



<b>Rentals</b>	
Rentals	Office rentals and services, school rentals, real estate rental
Car rentals	
<b>Other</b>	
Electricity, water and communication (Direct payment)	Electrical, water and phone bills
Transportation fees	For employees, Ministers, and army



## **APPENDIX F**

### **Expert Opinion on Priority Expenditure Areas**






<b>Full Name</b>	<b>Area of expertise</b>	<b>Position</b>	<b>Institution</b>
Marina Al Khayat	Population growth and environment	Head of public relations	Ministry of Social Affairs
Mary Deeb	Population growth and environment	Professor	American University of Beirut (AUB)
Bashir Osmat	Population growth and environment	Socio-Economic expert	
Oussama Jadayel	Transport and environment	Associate professor	University of Balamand
Tammam Nakkash	Transport and environment	Managing partner	Team International
Lilya Abi Chahine	Transport and environment	President	Fast Forward NGO
Walid Bakhos	Urban planning and environment	Architect - Urban planner	Bakhos - dcw
Jocelyne Gerard	Urban planning and environment	Professor	Saint Joseph University (USJ)
Adel Mourtada	Energy production and environment	Environmental Energy expert	
Kamal Sioufi	Energy production and environment	Electromechanical Engineer - Consultant - Vice president of the order to engineers	Consultant office - Kamal Sioufi
Tony Matar	Energy production and environment	Technical Advisor	ALMEF
Samir Faysal	Water	Head Of Hydraulic department	
Mirvat Kraideh Abou Daher	Water	Coordinator for water quality	Ministry of Energy and Water
Nicolas Gharib	Water	Professor, researcher , hydrobiology - Biodiversity	Lebanese University - Faculty of Science
Naji Chamieh	Waste	General Manager	Envirotech
Rami Samaha	Waste	Expert in recycling	
Mirvat el Hozz	Waste	Professor	





## APPENDIX G


### Relevant product labels

Label/Certification	Logo	Description	Products
Energy Star		Products that have earned the ENERGY STAR meet energy efficiency guidelines set by the U.S. Environmental Protection Agency (USEPA). It is also used in Canada and New Zealand.	Detergents, Toners, Printers, Lighting
ISO 114001		The ISO 14000 family addresses various aspects of environmental management systems. It identifies and controls the environmental impact of activities; continually improves environmental performance; and implements a systematic approach to setting environmental objectives and targets.	Paper, Detergents, Pesticides, Toners, Printers
Leadership in Energy and Environmental Design (LEED)		LEED represents the efforts of the U.S. Green Building Council (USGBC) to provide standards for green buildings. LEED certification provides verification that a building, home, or community was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health: Sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.	Water taps, Flush, Cisterns, Lighting
Nordic Ecolabel or Swan label		The Nordic Ecolabel is a voluntary scheme with 63 product groups that evaluates a product's impact on the environment throughout the whole lifecycle. The label guarantees that climate requirements are taken into account and that CO <sub>2</sub> emissions are limited.	Paper, Detergents, Toner cartridges
Design for the Environment		Design for the Environment (DfE) is a U.S. Environmental Protection Agency (USEPA) program to prevent pollution. It provides information regarding safer electronics, flame retardants, and chemical formulations, as well as the best environmental practices. DfE has a variety of design approaches to reduce the human health and environmental impact of a product, process, or service.	Detergents



For Organic Production		This is an U.S. Environmental Protection Agency (EPA) label indicating that all ingredients in a pesticide product and all uses of that pesticide meet the criteria defined in the US Department of Agriculture's (USDA) National Organic Program Rule.	Pesticides
GLOBAL G.A.P (Good Agriculture Practices)		GLOBAL G.A.P is a private sector body that sets voluntary standards for agricultural production processes. It aims to minimize the detrimental environmental impacts of farming, reduce the use of chemical inputs and ensure a responsible approach to worker health and safety, and animal welfare.	Pesticides
Recyclable or Recycled Content		Generic symbol used to show that the product can be recycled or has recycled content. It does not mean that the product has been certified.	Paper
Forest Stewardship Council (FSC)		The Forest Stewardship Council (FSC) is an international organization established in 1993 to promote the responsible management of the world's forests. Its labeling of forest products offers customers the ability to choose products from socially and environmentally responsible forestry.	Paper
Program for the endorsement of forest certifications (PEFC)		PEFC is a certification mark of forest management, aiming to contribute to the management of sustainable forests. Affixed to a wooden or wood-based product, this logo guarantees that the product consists of at least 70% of wood from forests that meet the recommendations for their management of national and regional entities to PEFC.	Paper
Elemental chlorine free bleaching (ECF)		Used for paper made using bleach instead of chlorine.	Paper
Total chlorine free bleaching (TCF)		Used for paper made without any chlorine – the most environmentally friendly way.	Paper
European Union energy label		EU Directive 92/75/EC established an energy consumption labeling scheme. It is mandatory for most white goods, light bulb packaging, and cars. The energy efficiency of the appliance is rated in terms of a set of energy efficiency classes from A (most energy efficient) to G (least efficient).	Lighting



European Ecolabel		Voluntary scheme to encourage businesses to market eco-friendly products and services. Ecolabel analyses the impact of the product or service on the environment throughout its life-cycle, starting from raw material extraction in the pre-production stage, through to production, distribution and disposal.	Detergents, Paper
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## **APPENDIX H**

### **Interviewed companies**

<b>Full Name</b>	<b>Product</b>	<b>Position</b>	<b>Company</b>
Omar Ghandour	Paper	General Manager	Lebanese Paper Products
Roy Habib	Paper	Assistant General Manager	Uni-Carton
Karim Haddad	Paper	Technical Manager	Sicomo
Fady Gemayel	Paper	General Manager	Gemayel Frères
Hadi Oulwan	Paper	Managing Director	Royal Papyrus
Pierre Daher	Paper	Project Manager	Craft
Ziad Bekdache	Paper	General Manager	Oriental Paper Products
Ramzi Choueiri	Paper	Managing Director	Ream trading
Jean Haddad	Printer and toners	General Manager	Teletrade Holding Group
Sami Khoury	Printer and toners	Operations Manager	Image Systems
Liliane Kareih	Printer and toners	Marketing manager	Computer Information Systems
Mahmoud Slaiman	Printer and toners	Sales Manager	El Haceb
Nimr Mansour	Detergents	General Manager	Lebanese Investment for Environment
Hani Rifai/Maher Rifai	Detergents	Controller Purchasing Manager/Marketing, Advertising and Creation Manager	Spartan Chemical Lebanon
Margaret Rizallah	Detergents	Owner	Zizette Group
Edgar Chemaya	Detergents	General Manager	E.S Trading
Michel Akl	Pesticides	General Manager	Société Akl Frères/ AS Plante
Lina Zoughaib	Pesticides	Business Development Manager	Robinson Agri
Gabi Faraj	Pesticides	General Manager	Faraj Agri Trading
Adrian Boughaba	Pesticides	Pesticides Line Manager	Unifert
Walid Saad	Pesticides	Operational Manager	Agri Nova
Andre Korkomaz	Lighting	Chief Technical Officer	Rafic Gazzaoui & Co
Dory El-Khoury	Lighting	General Manager	Sakr Lighting Systems
Paul Ayanian	Lighting	General Manager	G. Ayanian & Sons



Full Name	Product	Position	Company
Zoghrof Sleiman	Lighting	CEO	Al Bonian General Contracting, Trading & Industry
Rabih Mattar	Lighting	Sales Manager	Light Incorporated & Trading Co
Hiba Itani	Lighting	HR Manager	Harb Electric
Karim Geahchan	Water Taps	General Manager	Geahchan Bath & Kitchen
Ragi Khoury	Water Taps	General Manager	Georges Khoury & Co
Mosbah Ayad	Water Taps	Regional Manager	Grome Marketing



## **APPENDIX I**

### **Price list of alternative sustainable products**

Sector	Product	Brand	Specifications	Price	LL Price
Paper	Recycled paper – A4	Terre Liban	250 sheets of A4 office paper	USD 3.00	LL 6,000
	Recycled paper – Notepad		25 sheet A4 notepad with lines	USD 1.66	LL 2,500
			25 sheet A5 notepad with lines	USD 1.00	LL 1,500
	Recycled paper - Notepad	OPP	50 sheet A4 notepad with lines (completely recycled material)	USD 6.00	LL9,000
	Recycled paper – A4	REAM	250 sheets of A4 office paper	USD 4.67	LL 7,000
Printers	LBP 6200D Laser -Duplex	Canon	Laser Printer A4 speed of 25 pages / min., Duplex printing	USD 208	LL 312,000
	MF-4450 Laser		Multifunction Laser Printer, A4 speed of 25 pages / min	USD 300	LL 450,000
	LaserJet 2025n Color	HP	Laser Printer, A4 speed of 25 pages / min., Duplex printing	USD 360	LL 540,000
	Officejet Pro 8500A		Multifunction Inkjet Printer, with Fax, A4 speed of 25 pages / min., Duplex printing	USD 315	LL 472,500
	TX600FW	Epson	Multifunction Inkjet Printer with Fax, A4 speed of 38 pages / min	USD 225	LL 337,500
	RX610		Multifunction Inkjet Printer, A4 speed of 38 pages / min	USD 245	LL 367,500
Toners	C-EXV 36 Bk Toner		Compatible with iR-ADV 6000 series, yield of 56,000 based on 6% coverage A4	USD 140	LL 210,000
	Remanufactured toner	Katun	Toner cartridges compatible with Canon, HP, Toshiba, Samsung and other printers	USD 17	LL 25,500



Sector	Product	Brand	Specifications	Price	LL Price
Detergents	All-purpose cleaner Germex	Spartan	20 l, phosphate-free, biodegradable, price/l	USD 1.35	LL 1,950
	Glass cleaner Easy		30 l, phosphate-free, biodegradable, price/l	USD 1.15	LL 1,725
	Bowl Cleanse Flash		30 l, phosphate-free, biodegradable, price/l	USD 1.57	LL 2,355
	Carpet shampoo Plus 5		20 l, biodegradable, price/l	USD 2.25	LL 3,375
	Liquid hand soap Alpha		30 l, phosphate-free, biodegradable, price/l	USD 1.15	LL 1,725
	Glass cleaner Profile	LIFE	20 l, phosphate-free, biodegradable, price/l	USD1.50	LL2,250
	Bleach 100		20 l, phosphate-free, biodegradable, price/l	USD1.00	LL1,500
	Antiseptic detergent Phonel		20 l, phosphate-free, biodegradable, price/l	USD1.80	LL2,700
	All-purpose cleaner Phantastic		20 l, phosphate-free, biodegradable, price/l	USD1.80	LL2,700
Pesticides	Bacillus Thuringiensis (BT)	Unifert	Biopesticide, price per kg	USD 40	LL 60,000
Lighting	LED GU10 6W (GE97155)	GE	35 degrees, average life 25,000 h	USD 24	LL 36,000
	Master LEDGU10 7W	Philips	LED, average life 45,000 h	USD 36	LL 48,000
	Master LEDGU10 10W		LED, average life 45,000 h	USD 40	LL 60,000
	CFL Cool White		CFL, mercury cool white	USD 4.4	LL 6,600
	CFL Warm Light		CFL, mercury Warm Light	USD 4.4	LL 6,600



Sector	Product	Brand	Specifications	Price	LL Price
Water taps	Aerator for water tap	Standard Hidráulica	Saves 50% of water if installed in tap	EUR 3.55	LL 7,000
	Water saving reducer for water tap		Antiretun valve saving 50% to 60% of water if installed in tap	EUR 11.57	LL 23,000
	Delay action basin tap		Rim-mounted basin faucet with aerator	EUR 36.43	LL 73,000
			Wall-mounted basin faucet with aerator	EUR 28.28	LL 56,500
	Automatic water tap	Grohe	Rim-mounted infra-red electronic mixer, safety stop after 60 seconds	USD 731	LL 1,096,500
			Wall-mounted infra-red electronic mixer, safety stop after 60 seconds	USD 890	LL 1,335,000
		Grohe – Euro Echo	Infrared electronic water tap	USD 700	LL1,050,000
	Water mixer	Grohe – Euro Cube	Rim mounted mixer, safety stop after 60 seconds	USD274 – USD 400	LL411,000 – LL600,000
	Water mixer	Clever	Saves 50% of water	EUR 70 – EUR350	LL139,650 – LL698,250
	Water mixer	Bandini	Made of ecologically friendly material and is lead free	EUR 150	LL300,000
Water mixer	Immevi	Gives 50% water and 50% air	EUR 60 – EUR 300	LL120,000 – LL600,000	
Sensor tap	Hansgrohe		\$200 - \$350	LL300,000 – LL3750,000	
Flushing systems	Dual flush cistern	Oliveira & Irmão (OLI)	OLI 74 –Flush cistern + control plate	EUR 144	LL 288,000
			EXPERT Evo Simflex cistern + control plate	EUR 162.80	LL 325,600





## **APPENDIX J**

### **Price comparison of sustainable and non-sustainable products**

Sector	Sustainable Product	Brand	USD Price	LL Price
Paper	Recycled paper – 250 sheets A4	Terre Liban	USD 3.00	LL 6,000
	Recycled paper – 25 sheet A4 Notepad		USD 1.66	LL 2,500
	Recycled paper - 25 sheet A5 Notepad		USD 1.00	LL 1,500
	Recycled paper – 250 sheets A4	OPP	USD 6.00	LL9,000
Printers	Recycled paper – 250 sheets A4	REAM	USD 4.67	LL 7,000
	LBP 6200D Laser - Duplex	Canon	USD 208	LL 312,000
	MF-4450 Laser		USD 300	LL 450,000
	LaserJet 2025n Color	HP	USD 360	LL 540,000
	Officejet Pro 8500A		USD 315	LL 472,500
	TX600FW	Epson	USD 225	LL 337,500
RX610	USD 245		LL 367,500	
Toners	C-EXV 36 Bk Toner		USD 140	LL 210,000
	Remanufactured toner	Katun	USD 17	LL 25,500



Sector	Sustainable Product	Brand	Price	LL Price
Detergents	All-purpose cleaner Germex	Spartan	USD 1.35	LL 1,950
	Glass cleaner Easy		USD 1.15	LL 1,725
	Bowl Cleanse Flash		USD 1.57	LL 2,355
	Carpet shampoo Plus 5		USD 2.25	LL 3,375
	Liquid hand soap Alpha		USD 1.15	LL 1,725
	Glass Cleaner Profile	LIFE	USD1.50	LL2,250
	Bleach 100		USD1.00	LL1,500
	Anti-Septic Detergent Phonel		USD1.80	LL2,700
	All-purpose cleaner Phantastic		USD1.80	LL2,700
Pesticides	Bacillus Thuringiensis (BT)	Unifert	USD 40	LL 60,000
Lighting	LED GU10 6W (GE97155)	GE	USD 24	LL 36,000
	Master LEDGU10 7W	Philips	USD 36	LL 48,000
	Master LEDGU10 10W		USD 40	LL 60,000
	CFL Cool White		USD 4.4	LL 6,600
	CFL Warm Light		USD 4.4	LL 6,600



Sector	Sustainable Product	Brand	Price	LL Price
Water taps	Aerator for water tap	Standard Hidráulica	EUR 3.55	LL 7,000
	Water saving reducer for water tap		EUR 11.57	LL 23,000
	Delay action basin tap		EUR 36.43	LL 73,000
			EUR 28.28	LL 56,500
	Automatic water tap	Grohe	USD 731	LL 1,096,500
			USD 890	LL 1,335,000
		Grohe – Euro Echo	USD 700	LL1,050,000
	Water mixer	Grohe – Euro Cube	USD274 – USD 400	LL411,000 – LL600,000
	Water mixer	Clever	EUR 70 – EUR350	LL139,650 – LL698,250
	Water mixer	Bandini	EUR 150	LL300,000
Water mixer	Immevi	EUR 60 – EUR 300	LL120,000 – LL600,000	
	Sensor tap	Hansgrohe	\$200 - \$350	LL300,000 – LL3750,000
Flushing systems	Dual flush cistern	Oliveira & Irmão (OLI)	EUR 144	LL 288,000
			EUR 162.80	LL 325,600
	Electronic flush cistern		EUR 750	LL 1,500,000



## APPENDIX K

### Market share of sustainable products

Product	Market Share of Sustainable Products
Paper	5%
IT (printers and toners)	10% to 15%
Detergents	70% to 80%
Pesticides	10%
Lighting	50% to 80%
Water taps / flushing systems	1% to 20%