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Water and Energy Related Interviews for Large Jordanian Consumers Large Consumers

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PREFACE

The Public Action for Water, Energy and Environment Project (PAP) is a public education and behavior change communication program developed to support USAID's technical and policy investments in the Jordanian water and energy sectors, and to support specific initiatives in the environment, in particular with regard to solid waste. The project has been awarded to ECODIT, a US small business holding the Prosperity, Livelihoods and Conserving Ecosystems, or PLACE, Indefinite Quantity Contract with USAID.

PAP is a five years program that has been designed in three phases:

1. Data collection and assessment phase of 9 months ending July 31, 2010;
2. Participatory strategic planning phase of 3 months that will include dialogue with the relevant stakeholders; and
3. Implementation phase lasting about 4 years.

The first phase of the project (Assessment and Baseline Phase) is to be completed by the summer of 2010. As part of this phase, ECODIT is conducting numerous surveys, including 12 or more research efforts, and it is from the totality of these efforts that the project will determine its direction and focus for behavioral change. ECODIT has divided this phase into the several rapid assessments.

This report presents the findings of the interviews conducted with a representative sample of large consumers to better understand trends and behaviors related to water and energy consumption. The overall goal of the survey at hand is to better understand and quantify the attitudes and the levels of awareness amongst large consumers of water and energy. It is believed that developing a better understanding of those attitudes and awareness levels will facilitate the design of a targeted outreach and communications program that helps improve awareness and knowledge as it relates to conservation.

In general, the purpose of the all the surveys that the project is undertaking in Phase I is to bring a behavioral perspective to the technical knowledge that already exists. It will do this in three ways:

1. Examine past and recent educational and social marketing efforts by USAID and other donors to see what worked, what remains of earlier initiatives and tease out the determinants for success
2. Review current needs and expectations in the three thematic areas (water, energy and environment in particular solid waste) that will help guide the project in changing behaviors durably in the future
3. Examine the implementation process itself to ensure that knowledge gained about the process of behavior change is institutionalized into the Jordanian agenda.

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ACRONYMS AND ABBREVIATIONS

Although an effort was made to reduce the number of acronyms used in this text, in some cases this was necessary. Whenever the acronym or abbreviation appears the first time it is defined in the text. The following list is provided for ease of reference by the readers of this document.

AED	Academy for Education Development
CAPEX	Capital Expenditure
CBOs	Community Based Organizations
Ccf	100 Cubic Feet, an American Standard Measurement of Water Volume
CEP	Community Energy Planning Program
EPA's	Environmental Protection Agency
ESPC	Energy Savings Performance Contracting
ESCO	Energy Services Company
ESDs	Energy Saving Devices
IdRC	Interdisciplinary Research Consultants
NGOs	Non-governmental Organizations
OPEX	Operational Expenditure
PAP	Public Action in Water, Energy, and Environment Project
WEPIA	Water Efficiency and Public Information for Action
WSDs	Water Saving Devices
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Jordan certainly faces a perilous future in trying to keep its population adequately supplied with water and energy. In response to this, the USAID funded the Jordan Public Action in Water, Energy, and Environment Project (PAP) under the Prosperity, Livelihoods, and Conserving Ecosystems (PLACE) IQC. The implementing contractor is ECODIT with AED as core Subcontractor. The PAP is a five year program aiming at Initiating and establishing clear and identifiable behavioural changes amongst the Jordanian public and decision-makers, to lead to increased efficiency in the use of water and energy, and to improved solid waste handling practices.

As part of the surveys and assessments to be undertaken in Phase I, there are a number of activities specifically addressing behavior and awareness amongst consumers (large and non large). The report at hand summarizes the findings of the first activity which is to conduct interviews with a representative sample of large consumers to better understand trends and behaviors related to water and energy consumption. Namely, it presents the results of a survey targeting large consumers of water and energy.

The overall goal of the survey at hand is to better understand and quantify the attitudes and the levels of awareness amongst large consumers of water and energy. It is believed that developing a better understanding of those attitudes and awareness levels will facilitate the design of a targeted outreach and communications program that helps improve awareness and knowledge as it relates to conservation.

The objectives of the survey at hand were met though a seven step methodology; define the target group, sample selection, questionnaire design, data collection, data collation, data analysis, and reporting.

In general, the study at hand targeted large consumers of water and energy. Moreover, it was decided to categorize large consumers into a number of main sectors. The key sectors selected for this survey were as follows:

1) Hotel and Restaurants Sector
2) Commercial Sector
3) Hospitals,
4) Government Buildings, and
5) Industrial Sector

Ideally, data related to energy and water consumption, uses, management, etc., should be obtained from comprehensive in-field investigations, but in reality such data are not readily accessible given a number of constraints the main of which is time. Thus, field surveys for a random sample of different industries, state and commercial buildings was to be conducted by trained staff and supervised by experts in such fields in order to make sure that all needed data and information are collected.

The following criteria were used to choose the sample:

1) Sector (industrial, commercial, state buildings, etc.) and sub-sector.
2) No. of enterprises/establishments in each sub-sector.
3) Size of industry/hotel/buildings, etc.
4) Geographical location (North, Central and South regions).
5) Energy and water consumption.
6) Solid (municipal) waste generation.

Generally, four different survey tools were design; one for each of the above sectors. Although there were similarities amongst the different survey tools, there were sections that were sector specific. It should be also mentioned that the data were analyzed both as a comprehensive sample, and on a sector basis. In other words, frequency analyses were conducted for the entire sample disregarding the sector (this was only done for the common questions). However, to provide the PAP with trends of each sector, the data for each sector was analyzed individually.

The main findings of the research reported that the majority of large consumers neither monitor their water nor their energy consumptions via sub-metering scheme. This is an alarming finding as it shows that the majority of large consumers are not able to accurately determine the areas within their establishments that are the most consuming. Thus, identification of the best practices for conservation cannot be made in a manner that targets the most consuming areas/activities. The findings concluded that the large consumers who have had their facilities audited stated that the results of the last audit are not documented or they refuse to allow the survey team to see the audit reports and/or results.

Moreover, Of those that have audits conducted (whether periodic or not), it was interesting that the most frequently made energy related recommendation as a result of those audits is the practice of "monitoring and follow up". This could be interpreted as monitoring and following up on behavior and practices within the enterprise; an objective that could be easily met with appropriate education and awareness among the tenants of the various consumers.

While the attitude of the top management at such entities is a preferred one, there is a desire to have relevant technical people at an establishment be able to take the decision on the implementation of the audit recommendations. Often times the top management may not have an engineering or technical background, which may be one of the deterrents to implementing audit results. This was confirmed by the responses given by establishments that have not implemented the audit recommendations where lack of knowledge and awareness was reported to be the main barrier.

In terms of solid waste management, of the entire sample, only 15% indicated that solid waste is segregated. Almost half of those that do segregate indicated that the segregation takes place inside the facility. This finding identifies 2 key areas where awareness and Capacity building is needed; (1) promoting the concept of solid waste segregation and recycling, and (2) promoting the concept of in-house segregation. Additionally, the finding stated that the majority of the enterprises that do not recycle solid waste indicated that there is no need for such practice or that there is a general lack of awareness on the subject. Similar trends were observed for recycling of solid waste where the majority of the sample (80%) indicated that there are no recycling activities in their establishments.

While measuring the levels of knowledge and awareness among the tenants/managers of large consuming entities on general water and energy related statistics and conditions in Jordan. Key observations from the analyses conducted for this section include the unawareness on the extent to which Jordan relies on energy Imports and the value of this imports are considered serious and identifies an area was more education and awareness is needed. However, the highest frequency of respondents named the solar and wind power as future energy sources for Jordan.

The majority of respondents indicated that "Monitoring and Follow-up" were the best way to conserve energy and electricity. This finding is interesting especially that it is partially meant that consciousness and awareness of consumption are the best ways to increase efficiency and promote conservation. While this is psychologically almost always the case, this finding contradicts the finding that the majority of the sample do not conduct sub-metering to monitor consumption not do they perform audits to identify the high consuming points.

Awareness in the area of water scarcity and water resources seem to be better than that in energy and power. This was evident from the higher proportions of correct answers given on general knowledge areas related to the sector. This is indicative that previous outreach and awareness efforts have had an effect in terms of increasing awareness on the problem itself. This was also evident in the frequencies of responses given by the interviewees when asked to name the main water resources in Jordan. Again, the majority of the sample interviewed was quite aware of what the main sources of water; groundwater and wells were amongst the highest selected resources. Moreover, the majority of respondents indicated that WSDs was the top practice for water saving, again emphasizing that previous awareness programs such as WEPIA have been successful in increasing awareness in this regards.

Although 70% indicated that they aware of the state-of-the-art technologies for water and energy savings in their field and this could consider a high percentage, one would expect this ration to be higher in a country that is both water and energy poor. Higher targets should be set for the people of Jordan in terms of increasing their awareness on advanced technology at all levels and in all sectors. When asked to name such technologies, the majority of the respondents chose WSD's, ESD's, and energy saving bulbs. Although all acceptable answers, it is desired to increase knowledge on more technologies and to increase awareness on sector specific technologies rather than general devices and equipment.

Other major findings indicated that the majority of the respondents indicated that they take personal action at their workplace related to energy and water savings. It is worth mentioning that the positive responses related to energy were higher than those related to water. Although not always necessarily the case, this could be attributed to the water tariff which is relatively lower than that for electricity, which pushes decision makers to focus more on electricity savings.

Accordingly, the report recommended that PAP should focus on promoting the concept of sub-metering to help decision makers continuously monitor consumption within different areas of an establishment, and the periodic conduct of water and energy audits. This was also emphasized by the responses given to decision makers on what the main barriers to implementing conservation measures, whereby the majority indicated that there was a general lack of awareness, and the relatively higher process of saving devices which often pushes decision makers to purchase the cheaper less efficient devices. Furthermore, it should be taken into consideration that the middle managers do not have the authority to take the decision of water and energy conservation policy and that the top management is the power of change. An important recommendation made here to increase awareness on the importance of authorizing the relevant technical staff at an establishment to implement saving strategies.

The majority of respondents indicated that it is possible to reduce the water and electricity bills in their establishments. It is worthy to note that the perception for electricity cost reductions is higher than those for water. In short, significant portions of large consumers are convinced that savings could be achieved and only minimal efforts will be needed to "convince" large consumers of the possibility of cutting cost. The awareness effort has to be on helping them achieve those savings.

The respondents determined their opinions on the actions needed to achieve savings; for energy saving, they stated that the major actions could be M&E, awareness, funding, training, saving devices, and tax exemptions. While for the water saving, they stated that the major actions could be awareness, saving devices, M&E, funding, training, and periodic maintenance.

In terms of policy options, only one third of the interviewed sample was aware of governmental programs in coordination with donors and other funds that finance and support the utilization of renewable energy such as solar energy. However, only a third of those establishments indicated that they had benefited from such programs. One possible reason could be the lack of capacity amongst staff to approach such programs and preparing proposals and/or concept notes or feasibility studies that would enable them to apply for funds.

1.0 INTRODUCTION

Jordan is ranked the fourth driest country in the world on a per capita water availability basis. Demand for water exceeds Jordan's available water resources. Overexploitation of this scarce resource is the norm. Consequently, water is the single most critical natural resource since all aspects of sustainable economic, social, and political development in the country depend on the availability of an adequate water supply. Additionally, water and energy are strongly interlinked.

Also, all future water supply schemes planned by the government involve substantial energy demand since they involve desalination and/or pumping of water supplies uphill and over long distances. As groundwater levels continue to drop throughout the Kingdom, it takes additional energy to pump the water from ever deeper levels. Water conserved for an institution, utility or municipality usually results in energy savings as well.

Ways to address this water scarcity include continued investment in water supply, improving water use efficiency, and enhancing the capacity of Jordanian society and institutions to adapt to water scarcity. Another central solution in responding to the water crisis in Jordan is creating awareness among decision makers and the general public with the purpose of promoting behavioral change. Public water awareness campaigns have been conducted in Jordan in the past.

As part of its efforts to help Jordan improve the management of its water and natural resources, as well as energy consumption USAID is supporting programs that improve the ability of Jordanians to adapt to the impeding water and energy crisis. USAID is working within several areas to promote the capacity of local communities, institutions, and society as a whole to manage the water and energy crisis from within while protecting Jordan's environment and natural resource base.

1.1 Overview of Outreach Project and Survey's Scope of Work

As mentioned above, PAP is a USAID-funded behavior change and communication project implemented by ECODIT. The project aims to influence and change the behavior of Jordanians, at all levels, in favor of water and energy conservation and efficiency as well as improved solid waste management. The ECODIT team fully embraces the vision and approach of the Public Action in Water, Energy and Environment Project. Working closely with USAID and its partners, the PAP team will put in place state-of-the-art approaches, adapted to Jordan, to induce behavioral changes synergistically related to water, energy and waste; move Jordanian society closer to sustainable "Green" behaviors; and build the adaptive capacity of Jordanian institutions to sustain this behavioral change momentum beyond the life of the project.

As part of the surveys and assessments to be undertaken in Phase I, there are a number of activities specifically addressing behavior and awareness amongst consumers (large and non large). Those activities are undertaken by ECODIT and its partners and include the following surveys:

- Conduct interviews with a representative sample of large consumers to better understand trends and behaviors related to water and energy consumption,
- Conduct Focus Group Discussions with large consumers / users of water and energy within large consuming facilities,
- Conduct of rapid audits of a subsample of facilities related to water, energy, and waste covering five sectors (e.g., hotels, industry, hospitals, commercial establishments, government buildings, schools) and must include the Children's Museum of Jordan;
- Identify and interview a representative sample of vendors of water and energy efficient appliances and fixtures for households.
- Interview a sample of end-users of energy and/or water-efficient appliances

- Interview a sample of CBOs that received small grants (WEPIA, GTZ, etc.) to implement water, energy and/or recycling projects and visit target communities if needed.

The report at hand summarizes the findings of the first activity in the above list. Namely, it presents the results of a survey targeting large consumers of water and energy.

This report is comprised of four main sections in addition to this introductory section. Those are as follows:

- Section 2 Literature review
- Section 3 Study methodology
- Section 4 Results and main findings, and
- Section 5 Study conclusions and recommendations

1.2 Study Objectives

The overall goal of the survey at hand is to better understand and quantify the attitudes and the levels of awareness amongst large consumers of water and energy. It is believed that developing a better understanding of those attitudes and awareness levels will facilitate the design of a targeted outreach and communications program that helps improve awareness and knowledge as it relates to conservation.

Specific objectives of the study include the following:

1) Assess current behaviors and practices (including best practices) among key personnel and staff
2) at large consumers from various sectors and regions in Jordan in relation to water and energy conservation, and solid waste management and reduction;
3) Assess obstacles to behavioral change among relevant staff and personnel at large consumers including lack of knowledge, policy, institutional, managerial, financial and economic; and
4) Help the Outreach team identify (i) verifiable indicators to measure progress by large consumers towards conservation, and (ii) key consumer behaviors among relevant staff and personnel at large consumers that the Outreach Project may focus on during Phase II (Design of behavioral change campaigns).

The report includes seven appendixes; list of selected sample, survey tool, results of overall sample, main results for hotel sector, main results for hospital sector, main results for industrial sector, main results for commercial/government sector. Those appendixes will be attached to the report.

2.0 LITERETURE RVIEW

Water and energy are limited resources. With growing populations and the cost of new water and energy sources rising steadily one must learn to use those resources more efficiently and conserve where possible. For instance, water conservation is a critical element of any future water management strategy. Water conservation can help save water, save time, and save money throughout the year, not just in the summer. It is defined as the "beneficial reduction in water use, waste and loss" and is proven to be the most economical and environmentally protective management tool for meeting water supply challenges. The same concept applies to energy.

Virtually, all conservation efforts depend on public awareness and understanding of the need for conservation. Conservation efforts are only considered successful if results can be measured and results are targeted to the particular type of water and/or energy user (e.g. commercial, residential, industrial and agricultural). Minimizing use, waste, and loss over time is heavily dependent on continually evaluating and adopting new technologies and practices. Education and technical assistance programs are important to inform people about the impact of improved efficiency and conservation. Without adequate knowledge, water and energy users lack the ability to put conservation measures and practices into place, however motivated they may be.

Professionals around the country note that successful conservation programs are comprised of multiple components. Individually, each component of a conservation program can get results, but the most reliable results are obtained by the integration of all components. One of the most critical components of a program is a robust education and outreach program that reaches employees, school children, and adults. Furthermore, investments in public and targeted education have high conservation returns, and public awareness tends to build political support and participation.

The responsibility for ensuring a sustainable water and energy future lies with the community as a whole; everyone has a role to play to make sure that all water and energy resources are treated responsibly and planned for properly. Education of the public at large, municipal officials and suppliers is crucial to generate an understanding of the issues, and creating acceptance to the implementation of conservation efforts. It is important to provide to the public the basic understanding of sound resources management and planning, in addition to explain the associated economic and environmental benefits. Public education and outreach can be an essential prerequisite to the successful adoption and implementation of conservation practices.

This section of the report gives a very brief summary on some successful conservation and outreach programs that have helped achieve significant results in terms of savings and increasing efficiency of those two resources.

2.1 Arizona Department of Commerce Energy Efficiency Outreach

The Arizona Department of Commerce offers a number of programs that offer Arizona communities, a variety of commercial building owners, and low- income home owners' successful energy-saving options aimed at reducing utility costs. Relevant outreach programs include the following:

2.1.1 Energy Efficiency and Conservation Block Grants Available

To encourage and assist in the development and implementation of community energy planning for all Arizona communities, the Arizona Department of Commerce Energy Office has established the Arizona Community Energy Planning (CEP) Program that aims to assist and train communities on energy infrastructure planning. The Arizona CEP Program helps communities develop the necessary tools to engage in local energy infrastructure planning by providing them technical assistance. Communities that participate in

this program are prepared to implement community-wide energy efficiency and renewable energy improvements as identified in their CEP.

2.1.2 K-12 Benchmarking Initiative

The Arizona Department of Commerce Energy Office is dedicated to assisting K-12 school districts statewide with energy saving tips, strategies, and solutions tailored to your district's specific needs. The goal is to explore which K-12 buildings in Arizona need assistance with energy efficiency, and to have each district input data for each of their schools into EPA's Energy Star database in order to obtain an Energy Star rating.

2.1.3 Energy Savings Performance Contracting

The Energy Office provides technical and program assistance to facilitate energy efficiency programs of all types including Energy Savings Performance Contracting (ESPC). An energy savings performance contract (ESPC) is a partnership between an energy services company (ESCO) and its customer formed for the purpose of financing and implementing cost-saving energy-efficiency improvements. The ESCO pays the upfront cost of purchasing and installing new equipment, and the customer repays the ESCO over the life of the contract from the cost savings resulting from the project. ESPCs have been in use by public and private customers for over twenty years and have been proven to be an effective method for upgrading existing facilities.

2.1.4 Residential Building Science

The Residential Building Science Program works with the building trades to adopt an integrated approach to assessing, correcting and building residential structures based on the "House as a System" framework. The "House as a System" approach considers the interaction between the building site, envelope, and mechanical systems, as well as other factors. It recognizes that features of one component in the house can greatly affect others and it enables the incorporation energy-saving strategies at little or no extra cost.

2.1.5 Albuquerque Long-Range Water Conservation Strategy

Albuquerque adopted the Long-Range Water Conservation Strategy Resolution. The resolution's goal was to reduce total water usage by 30 percent, a decrease of 75 gallons per capita per day over 9 years. The water conservation program included five components:

- **Water Rates.** The city applied a summer surcharge of 21 cents per ccf (100 cubic feet) when customers' use exceeded 200 percent of their winter average. The city increased the rate by 8.8 cents per ccf of water consumed to fund the water conservation program. More than half of the revenue from the surcharge was allocated to the conservation program, and a large portion was returned to customers through rebates and other incentives.

- **Public Education.** Education programs consisted of running public relations campaigns, including water usage information in water bills, and organizing cooperative programs with schools and community organizations. The city worked with citizens and affected customers whenever new legislation or measures are developed or proposed.

- **Residential Use.** Albuquerque amended its Uniform Plumbing Code to require high-efficiency toilets (1.6 gallons or less per flush) in all new residential construction. The city also established rebates for high-efficiency toilets (up to $100) and efficient clothes washers ($100). The city offered free water audits and installation of high-efficiency plumbing devices.

- **Landscaping/Outdoor Water Use.** The city adopted the Water Conservation Landscaping and Water Waste Ordinance. The ordinance included strict requirements for landscaping new

developments, such as prohibiting the use of high-water-use grasses on more than 20 percent of the landscaped area.

- **Institutional, Commercial, and Industrial Water Use.** The city required all customers using more than 50,000 gallons per day to prepare and implement a water conservation plan. Albuquerque's water conservation program has successfully slowed the drawdown of the area's groundwater supply. Estimates indicate that the water conservation programs decreased the level of water demand in Albuquerque. Per capita water use had dropped to 205 gallons per day—a reduction of 45 gallons per day from 1995 levels. Albuquerque found that, by 2001, its landscaping program and rate structure had helped reduce peak water use by 14 percent from its high point in 1990.

2.1.6 Gilbert Arizona

The town of Gilbert, Arizona, has experienced rapid population growth, increasing from 5,717 residents in 1980 to 29,188 residents in 1990. This rapid growth has strained water resources, particularly because Gilbert is located in a very arid region, receiving an annual average rainfall of 7.66 inches and losing substantial amounts of water annually to evaporation. Gilbert was entirely dependent upon groundwater. The town now relies on a combination of water supplies, with a capacity of 27 million gallons per day (mgd) from groundwater and 15 mgd from surface water. Gilbert's average water demand is 28.5 mgd, with a peak demand of 41.5 mgd. Gilbert opted to implement a comprehensive water efficiency program to help meet increased water demand, and is recognized as the first community in Arizona to design and implement a 100year water plan. Gilbert has implemented a multifaceted approach to water conservation. First, building code requirements exist for all new construction and include requirements for efficient plumbing devices and the use of recycled water. Next, an increasing-block water rate structure was instituted. The town also sponsored several public-education programs and requires using pre-approved low water-use plant materials for all landscaping in street right-of-way. Gilbert also developed additional conservation measures, such as water-use audits, free conservation kits, Xeriscape brochures and other outdoor water saving information; a homeowner's water conservation education program; and a new school education program.

Gilbert's conservation efforts are considered a success, particularly its efforts to reuse and recharge all its reclaimed water. Gilbert receives credits from the state where the effects of recharge are measurable. Water reclamation has helped the city meet groundwater management goals and has provided an additional resource for meeting water demand.

2.1.7 Houston Department of Public Works Program

The Houston Department of Public Works and Engineering serves a population of 1.7 million and provides water service to more than 553,000 retail connections. The city also sells wholesale water to 16 other communities. Houston receives an average of 50 inches of rain per year and has sufficient water supplies to meet demand through 2030, but 43 percent of Houston's water comes from groundwater sources that are threatened by increasing instances of land subsidence, saltwater intrusion, and flooding.

In some areas, the land has actually subsided, or sunk, 10 feet. Conversion to surface sources or expanded use of surface water will require costly construction of water treatment plants and transmission mains. In addition, Houston is required by state regulations to reduce groundwater use 20 percent by 2030. These factors have led Houston to explore methods for managing its groundwater supplies. Houston implemented water conservation programs to help reduce city expenditures and capital investments. In 1993, the Texas Natural Resource Conservation Commission also required Houston to implement a conservation plan to meet state requirements.

The conservation program had four elements:

- Education program
- In-house program
- Contract customers program
- Conservation planning program

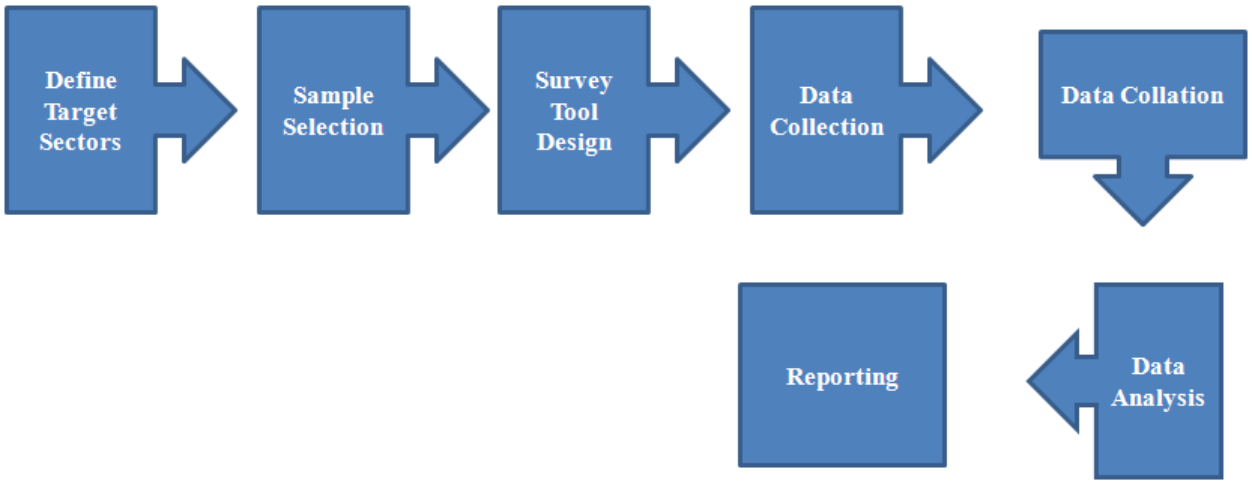
The education program consisted primarily of outreach initiatives, as well as efficiency retrofits for older structures. The in-house program includes city irrigation audits, leak detection and repair for city pools and fountains, and analysis of city departments' water use. The contract customers program eliminated unnecessary requirements; required billing based on actual water use, and added penalties for excessive water usage during peak-demand periods.

Since the program's inception, Houston has distributed 10,000 "Water Wise and Energy Efficient" conservation kits with high-efficiency showerheads and faucet aerators to area fifth-graders as part of a comprehensive education program, the majority of which were installed in homes. In addition, a pilot program at a 60-unit low-income housing development in Houston replaced 5 gallons-per-flush toilets with 1.6 gallons-per-flush toilets, fixed leaks, and installed aerators. At a total cost of $22,000, shared between the utility and the housing authority, the program reduced water consumption by 72 percent, or 1 million gallons per month. Water and wastewater bills dropped from $8,644 to $1,810 per month. These dramatic results have led the Houston Housing Authority to develop plans to retrofit more than 3,000 additional housing units.

3.0 RESEARCH METHODOLOGY

The objectives of the survey at hand were met though a seven step methodology as summarized in Figure 1 below. The following narrative describes each of the various stages of the methodology:

FIGURE 1: RESEARCH METHODOLOGY STEPS



Activity 1: Defining Target Sectors

In general, the study at hand targeted large consumers of water and energy. However, to enable the PAP project better understand sectors trends, thus, design sector specific outreach programs at a later stage, it was decided to categorize large consumers into a number of main sectors. The key sectors selected for this survey were as follows:

- Hotel and Restaurants Sector
- Commercial Sector
- Hospitals,
- Government Buildings, and
- Industrial Sector

According to Department of Statistics, in 2008, about 6x105 buildings existed in Jordan, of which 6% are used for commercial and public services purposes. The commercial sector comprises of the wholesale and retail trade; finance, insurance, real estate and business services; tourism and health-care activities; public buildings; and educational and training institutions. The number of personnel working in services and commercial activities is estimated to be around 20% of the total workforce in the country. During the last three decades large developments have occurred in education, tourism and health care sub-sectors in terms of available capacity and the provided services. It is for this reason that emphasis was placed on the first 4 categories in the list above, since it was determined that it would cover a significant portion of users to whom an awareness and outreach program would be designed in the subsequent phases of the project.

Less emphasis was placed on the industrial sector which consists of a heterogeneous mixture of manufacturing and conversion activities. In this field study, the commercial and services sector was considered to comprise 11 sub-sectors and based on this a random sample was selected as shown in the following activity, ignoring small workshops.

Activity 2: Sample Selection

Ideally, data related to energy and water consumption, uses, management, etc., should be obtained from comprehensive in-field investigations, but in reality such data are not readily accessible given a number of constraints the main of which is time. Thus, field surveys for a random sample of different industries, state and commercial buildings was to be conducted by trained staff and supervised by experts in such fields in order to make sure that all needed data and information are collected.

The following criteria were used to choose the sample:

1. Sector (industrial, commercial, state buildings, etc.) and sub-sector.
2. No. of enterprises/establishments in each sub-sector.
3. Size of industry/hotel/buildings, etc.
4. Geographical location (North, Central and South regions).
5. Energy and water consumption.
6. Solid (municipal) waste generation.

Based on the statistics gathered for the various types of building, the following was the proposed sample distribution between the sectors and amongst the various geographic areas.

TABLE 1: SAMPLE DISTRIBUTION BETWEEN SECTORS

Sector	No. Of Establishments	Sub-Sector
Schools	6000	UNRWA
		Gov
		Private
Universities & Colleges	50	Gov.
		Private
Hotels	260	5 stars
		4 stars
		3 stars
Hospitals	85	Gov
		Private
Classified Restaurants	256	Private
Governmental Buildings	108	Gov
Commercial Centers	100	Private
Financial Institutions	30	Mixed
Health/Sport Clubs	25	Private
Diplomatic Commissions	72	Embassies
Slaughter Houses		Mixed
TOTAL		
GRAND TOTAL		

TABLE 2: NO. OF ESTABLISHMENTS IN EACH SUB-SECTORS

Sub-sector	No. of establishments
Leather and Garments	250
Chemical s & Cosmetics	200
Eng., Elec. & IT	3325
Construction	150
Paper &Packaging	200
Therapeutics & Medicals	50
Rubber & Plastics	116
Furniture and Wood	85
Food & Agriculture	350
TOTAL	**1726**

As a result of the above, a list of 80 large consumers was selected as candidates for interviews. A copy of the study sample is included in the Annex.

Activity 3: Survey Tool Design

Based on previous experience, awareness of the sector, and the objectives of the survey, the study team developed a draft survey tool that was based on the original draft survey tools that were developed as part of the proposal for this project. The survey tool addressed a number of areas including the following:

- General entity information (i.e., demographics)
- Energy and Water Consumption patterns and sources
- Solid Waste behaviors and practices
- Knowledge and Awareness related to water and energy
- Current Practices and Obstacles related to promoting conservation and savings
- Technology and Policy Options for promoting conservation and savings
- Preferred Media Channels for awareness

The draft survey tools (and the main areas addressed under the tools) were then presented at a stakeholder meeting organized by the PAP project. The main topics and issues addressed in the survey tools were presented to the participants. Based on feedback and discussion received from the participants, the study team modified and finalized the draft survey tool. After the completion of the workshop, the study team re-formatted the key issues into a more formal survey tool in preparation for a second round of discussion as follows.

A second, but more targeted, stakeholder meeting was organized with representatives from the Jordan Chamber of Commerce, the Zarqa Chamber of Industry, Private Schools, Industrial Estates Corporation, and the University of Jordan Renewable Energy Center. The survey tools were discussed in more detail and

changes were made based on the participants' feedback. After this meeting, the study team developed the finalized tools in preparation for the pre-testing process. Pre-tests are usually conducted prior to a survey in order to identify any shortcomings in the data collection tools. Under this part of the study, the technical teams visited a number of entities to conduct the pre-test. Based on those visits, a number of shortcomings in the survey tool were identified; those included:

- Amendments to reduce the average time required to complete the questionnaire (for different sectors).
- There was a general agreement that questions related to employment classification, costs of consumed energy and water and annual operational costs could not be answered directly and during the interview/field visit. Also, providing copies of fuels, electricity and water bills require special permission from the management.
- It was noticed that all questionnaires did not address the issue of foreign employment. Thus, the revised version included a special question to cover this important point.
- In order to shorten the questionnaire and reduce the time, some questions on awareness and obstacles were merged together because it was found that answers related to energy and water are similar.

Based on the above, the study team finalized the survey tools; a final copy of the tools in included in the Annex.

Generally, four different survey tools were design; one for each of the above sectors. Although there were similarities amongst the different survey tools, there were sections that were sector specific. Overall, each survey tool was broken into the main sections as described below:

  - General information section to gather basic data such as name, size, year of establishment, nature of business, working shifts, areas, numbers of tenants and employees, etc.
  - A section dedicated to gathering information on the histories of consumption for water and energy in its different forms (e.g., electricity, gas, etc.)
  - A section dedicated to identify the main uses of water and energy within the establishment
  - A section dedicated to solid waste and its handling/recycling
  - A section addressing awareness and knowledge on conservation related to water and energy in Jordan
  - A section addressing practices and challenges related to conservation of water and energy in the establishment
  - A section dedicated to technology practices and equipment for conservation
  - A section related to general policies related to water and energy conservation, and
  - A section related to communications and outreach channels.

Each of the above sections contained a number of open ended and closed ended questions. Also, the survey tool was designed in a manner that different levels within the organization would have to be interviewed to obtain the needed information. For example, certain questions were to be answered by top management, whereas others were to be answered by maintenance staff, and so on.

Activity 4: Data Collection

Data were collected based on a pre-set schedule that was prepared by the study team. In cooperation with the Ministry of Water and Irrigation and the PAP project, a letter of introduction was sent out to the various entities within the selected sample. Members of the study team then followed up with those entities, and arranged appointments to conduct the visits and interviews to the various relevant members within those organizations. The interviews were held in a structured manner where all items of the survey tool were covered. Each survey team comprised of two interviewers in order to capture all the given information. In case certain information (e.g., water bill, electricity consumption, etc.), the interviewer team made arrangements with the interviewees to collect that information during a second visit.

Activity 5: Data Collation

All data were entered using an MS Access database that was designed to resemble the data collection sheet. Completed survey forms were sent to the home office on a daily basis where the data entry staff worked on coding the data, then entering it into the database. To ensure quality and integrity of the data, a data management person supervised the data entry and conducted random checks on entered forms. Furthermore, the coding of the data collection tools was conducted in a manner to eliminate the possibility of errors during data entry.

Activity 6: Data Analyses

All data were analyzed using the SPSS statistical software. The data were analyzed mainly using frequency analyses for the various questions. It should be mentioned that the survey tool contained both open ended and closed ended questions. Therefore, the responses from the open ended questions were individually reviewed and categorized into a number of response categories to enable the conduct of frequency analyses. It should be also mentioned that the data were analyzed both as a comprehensive sample, and on a sectors basis. In other words, frequency analyses were conducted for the entire sample disregarding the sector (this was only done for the common questions). However, to provide the PAP program with sectors trends, the data for each sector was analyzed individually. It must be emphasized that given the small sample size, the analysis for each sector may not necessarily have statistical significance; however, it is enough to provide indicative trends that could be used to draw inferences for each of the sectors. It is those trends that are expected to be used by the PAP team to develop communications and sector specific messages during the subsequent phases of the project.

4.0 SUMMARY OF THE MAIN FINDINGS

As mentioned before, a survey tool was designed for each of the sectors under study (i.e., hospitals, hotels, schools, and commercial/governmental buildings). While each of the survey tools was designed to be sector specific, the majority of the questions in the survey tool were common questions among the four sectors. The findings are presented in this report at the global level (i.e., the entire sample) where all the common questions were analyzed for the entire sample as a whole. The results of the analyses at the sector level are included in the Annex; however, a discussion of those results is not presented in this report. Key findings and conclusions from the sectors assessments will be extracted following consultations to be conducted with the PAP team and other stakeholders.

4.1 Results of Common Questions

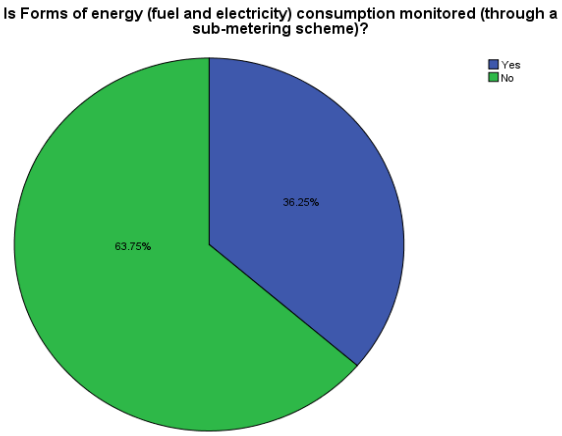
The results of the analyses for the entire sample are presented below as per the distribution of the various sections within the survey tool as described in the previous section. It must be mentioned that only questions that are common to the four sectors are presented in this section. The results are mainly presented for the sample as a whole; however, sectors trends are also presented[1] in the same section, and for each area within the questionnaire. Section 4.2 presents the results for the sector specific questions, which are presented for each area within the questionnaire separately.

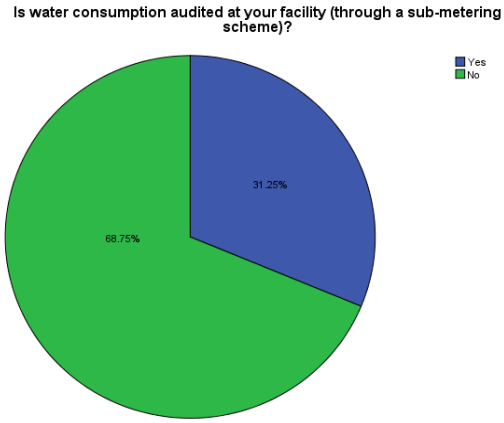
4.1.1 Water and Energy Consumption Monitoring and Auditing

In the area of monitoring consumption, it was reported that the majority of large consumers neither monitor their water nor their energy consumptions via sub-metering scheme. This is demonstrated in Figure 2 below that shows that only 36% and 31% monitor their energy and water consumption via sub-metering, respectively. This is an alarming finding as it shows that the majority of large consumers are not able to accurately determine the areas within their establishments that are the most consuming. Thus, identification of the best practices for conservation cannot be made in a manner that targets the most consuming areas/activities.

FIGURE 2: PROPORTION OF LARGE CONSUMERS THAT UTILIZE SUB-METERING FOR WATER AND ENERGY

[1] It must be emphasized again that although the trends for each sector are presented as percentages, they should not be viewed as so given the small sample sizes. These percentages are only intended to demonstrate trends and should be viewed in relation to the actual size of the sector with the interviewed sample representing a random portion of such sample





At the sectors level, practices were relatively better at industrial and hotel establishments than at commercial and health facilities whereby:

- Nearly 60% and 50% of interviewed hotels monitor consumption of energy and water through sub-metering, respectively;
- Nearly 50% of interviewed industries monitor consumption of energy through sub-metering;
- Nearly 25% of interviewed commercial entities monitor consumption of energy and water through sub-metering, respectively; and
- Only 12% and 25% of interviewed hospitals monitor consumption of energy and water through sub-metering, respectively;

The survey tool did not directly ask for reasons for the non application of sub-metering. However, from the discussion justifications given included arguments that hospitals are health providers and monitoring consumptions are not their main priority, or that the establishment is in the services sector, thus, cannot reduce the water/electricity available to its customers, etc. It has been proven that sub-metering is a very effective tool for identifying the most consuming areas/point within a facility. Therefore, PAP should set, as one of its targets, the promotion of the sub-metering concept amongst large consumers, with emphasis placed on hospitals and commercial sector buildings. It must be emphasized that there is room for further improvements for monitoring of consumption as a means for conservations among the other two sectors as well.

With regards to the conduct of audits for water and energy, the following responses were given:

- Only 50% of the interviewed sample indicated that their facilities are audited for water and energy consumption. In other words, not only is the majority (over 60%) of the sample not monitoring their own consumption, nearly half of the sample is not having water/energy audits conducted either.

- Of the portion that has had audits, only 4% has had those done by a specialized company while the majority (96%) has had those done in-house. There is no information about the technical capacity of the staff and their expertise in doing such audits. Therefore, it is safe to assume that such audits are simple straight forward measurements that do not entail detailed analyses and mass balance calculations.

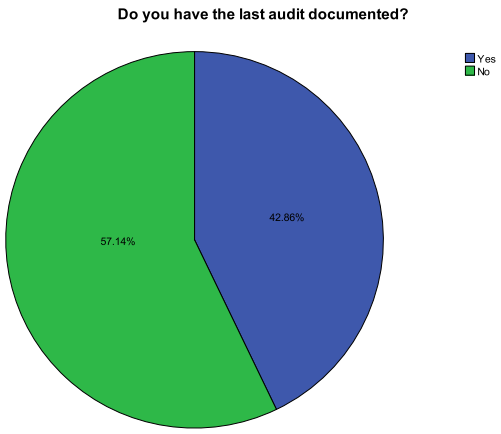
- The majority of the interviewed sample (63%) was not aware that there are entities that specialize in providing services related to water and energy audits. This could justify why the majority have their audits done by in-house staff.

- In terms of the frequency of the audits, the majority (63%) indicated that those are done periodically, while the remainder of the sample has had those audits done not less than a year ago.

- Of the establishments that indicated that they have had their facilities audited, nearly 60% indicated that the results of the last audit are not documented. This raises concern as to whether audits are taken seriously to begin with given that their results are not available and documented. Furthermore, of the proportion that indicated that the audit results are documented, over 70% indicated that the survey team would not be allowed to see the audit reports and/or results. This also raises concerns as to whether audits are actually one to begin with.

Of those that have audits conducted (whether periodic or not), it was interesting that the most frequently made energy related recommendation as a result of those audits is the practice of "monitoring and follow up". This could be interpreted as monitoring and following up on behavior and practices within the enterprise; an objective that could be easily met with appropriate education and awareness among the tenants of the various consumers. This finding is quite important for the PAP project as it quantifies the need for improved awareness and outreach programs at the facility level to promote water and energy efficiency and conservation behaviors.

FIGURE 3: THE LATEST AUDIT DOCUMENTED IN THE ESTABLISHMENTS

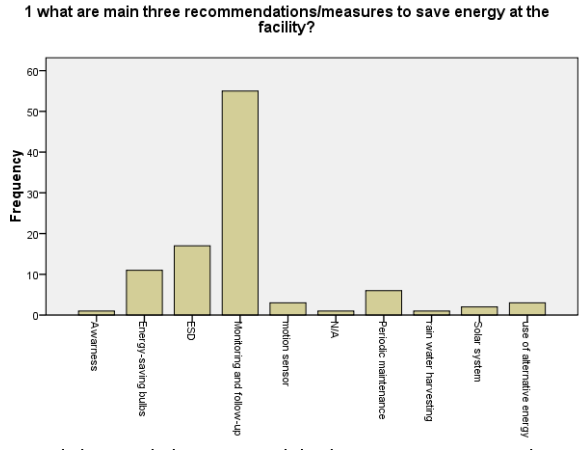


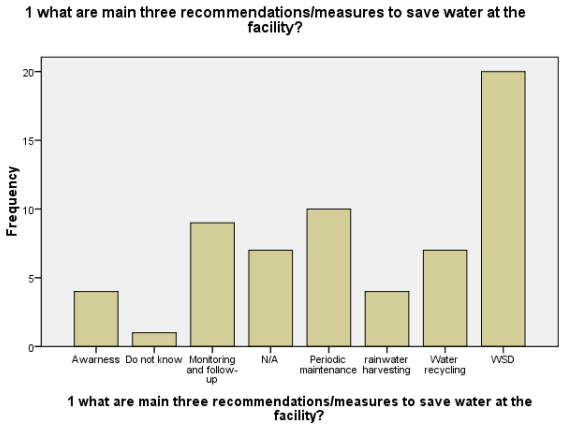
Other audit recommended practices included energy saving devices and energy saving light bulbs. For audit recommendation related to water, the results were a little different with the utilization of Water Saving Devices being the mostly recommended practice. This finding also indicates the need for improving awareness and promotion of water saving devices.

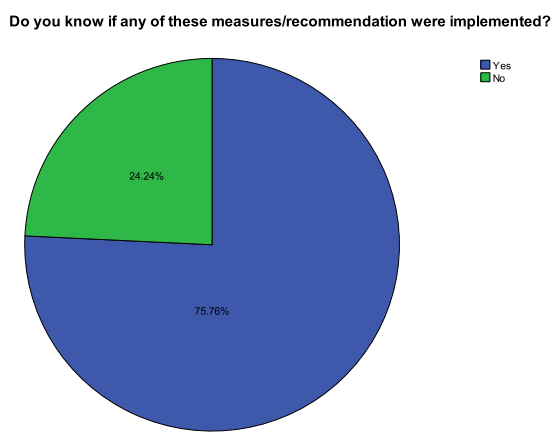
Other recommendations related to water include periodic maintenance and monitoring and follow, thus, also indicating the need for the PAP project to focus its efforts in that area in subsequent phases of the project. Such efforts would not only have to promote aspects of conservation and efficiency, they should also promote the concepts of periodic water and energy audits and the importance of conducting them. As can be seen in Figure 4 below, only 24% of the establishments that indicated that they have had audits indicated that

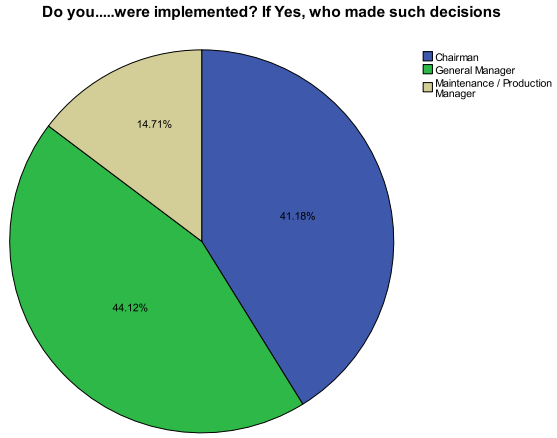
the recommendations of the audits are not implemented. The majority (85%) of those that indicated that the recommendations were implemented revealed that the decision to implement was made by the top management of the company rather than by the relevant technical staff such as the maintenance engineers.

FIGURE 4: EXTENT TO WHICH AUDIT RESULTS ARE IMPLEMENTED AND THE DECISION MAKING AUTHORITY



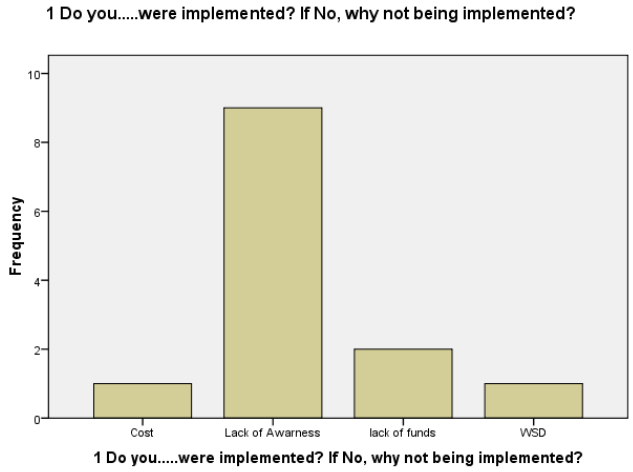






While the attitude of the top management at such entities is a preferred one, there is a desire to have relevant technical people at an establishment be able to make such a decision. Often times the top management may not have an engineering or technical background, which may be one of the deterrents to implementing audit results. This was confirmed by the responses given by establishments that have not implemented the audit recommendations where lack of knowledge and awareness was reported to be the main barrier.

FIGURE 5: REASONS FOR NOT IMPLEMENTING THE AUDIT



The responses given by establishments that have not implemented the audit recommendations included the lack of knowledge and awareness, and the high cost of implementing the recommendations and lack of funds. This is an area where the PAP program should attempt to address via increasing awareness amongst business owners on the importance of performing audits, implementing their recommendations, and enabling the relevant staff within an organization to make such decisions. The key incentives that were identified by the interviewees as a means to promoting such behavior included improving awareness and allocation of funds for this purpose.

The key incentives that were identified by the interviewees as a means to promoting such behavior included the following (in order of frequency):

- Allocation of funds,
- Providing financial incentives
- Improving awareness
- Provision of saving devices and reducing cost, and
- Training

At the sectors level, the trends for the aforementioned practices, behaviors, and attitudes were as follows:

TABLE 3: TRENDS FOR THE AFOREMENTIONED PRACTICES, BEHAVIORS, AND ATTITUDES

Criterion	Industrial	Hotels	Hospitals	Commercial
Practice of conducting audits	52%	40%	37%	53%
Audit implementation	100% in-house	100% in-house	66% in-house	95% in-house
Frequency of Audits	100% last year	40% do it yearly while the remainder does it more frequently	Evenly split between periodic, annual, and bi-annual	periodic
Documentation of Audits	70% documented	60% documented	66% documentation	25% documentation
Availability of Audits for review	40% availability	25% availability	100% availability	14% availability
Recommendations of Audit	M&E, maintenance, alternative energy, saving devices	Saving devices utilization for water and electricity	M&E, maintenance, recycling	M&E and saving devices
Implementation of Audit recommendations	88% rate of implementation	75% rate of implementation	66% rate of implementation	80% rate of implementation
Decision maker	Predominantly management	Predominantly management but maintenance has more say than in other sectors	100% management	90% management
Incentives for implementation	Majority sees no incentives, others views financial assistance as an incentive	Cost related incentives	Majority sees them as infeasible unless subsidized and funded	Financial incentives and awareness
Awareness on service providers	Less than half are aware	Less than half are aware	Less than half are aware	Less than half are aware

Looking at the above, the following conclusions can be drawn:

- The culture of conducting audits in the various sectors seems to be low across all four sectors, thus, there is a need to promote the importance of this concept. Not knowing what one's high consuming points are is the main reason for not implementing conservation measures at such points.
- However, the need for introducing an audit culture should be promoted as a practice that would yield the best results if implemented by a third party specialized in these types of services. This is especially true that the majority of the sub-samples are unaware that there are such service providers. The majority of audits are currently conducted in-house, and there are no information on the competency of staff to conduct such audits.
- The promotion of the importance of conducting audits should also focus on promoting the importance of documenting them and using them to benchmark savings as a result of implementing their recommendations. They are of no use unless they are documented, and always used as a monitoring tool for future reference. If an audit is not documented and referred to, then its recommendations will never be implemented. Although not identified by any of the interviewees as a barrier to implementation, this is a key barrier extracted by the study team. This should be promoted among all four sectors, with emphasis places on the commercial sector.

- Any awareness efforts should target management in order to promote the concept of empowering maintenance staff to make decisions as it relates to the implementation of audit recommendations, and any savings practice that they, themselves, identify. This seems to be less of an issue in the hotel sector, and is worst amongst the hospital sector, but in any case is another barrier to the implementation of conservation measures at large consuming establishments.
- Based on the responses, the majority of perceived barriers to implementation seem to revolve about financial commitments related to the implementation of savings practices. This could be partly attributed to the fact that management tends to make such decisions rather than relevant maintenance staff. One way to overcome such barrier is by increasing the capacity of maintenance staff to demonstrate to management the monetary value of savings versus the required investment costs might be an area that PAP should consider. Previous efforts under WEPIA demonstrated that once decision makers see the "monetary value" of savings versus the required cost, this is often an enough incentive to implement the change. Also, several companies that specialize in the conduct of audits, offer services and retrofits based on the concept of sharing savings, thus, no cost is incurred by the entity.
- Another concept that seems to have potential is to promote an incentive program for staff in different categories. A high frequency of the entities that reported on the recommendations of audits indicated that M&E was a main recommendation made. This, however, is not a one-person effort and would yield better results if institutionalized through offering incentives to staff to save and conserve water and energy consumption. The study team believes that a key reason for the non-success of M&E activity is that it is not implemented as a concept where every person within the establishment has a specific role. For example, previous efforts have shown that forming a "Team" with representatives from every department within an establishment to be a very effective tool, especially in hotels. Coupling such concept with some employee financial incentives could have more significant impacts.

4.1.2 Solid Waste Management and Recycling

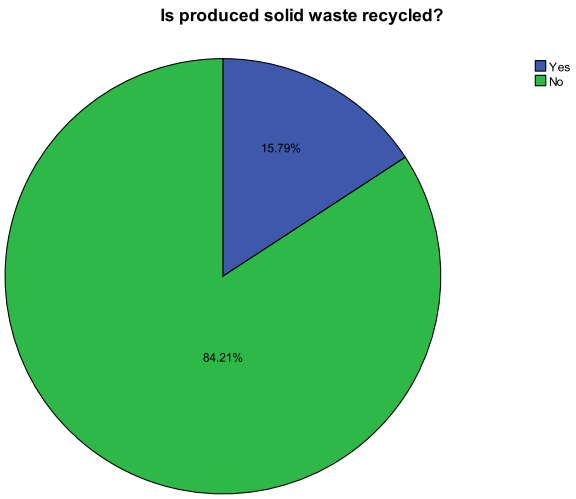
This section was one of the shorter sections of the survey tool that mainly attempted to gather information on current practices related to solid waste generation and solid waste management. Of the entire sample, only 15% indicated that solid waste is segregated. Almost half of those that do segregate indicated that the segregation takes place inside the facility.

This finding identifies 2 key areas where awareness and capacity building is needed; (1) promoting the concept of solid waste segregation and recycling, and (2) promoting the concept of in-house segregation. Both are areas that could be tackled by the subsequent phases of the PAP program.

This is of vital importance since the majority of the enterprises (84%) that do segregate indicated that the segregation process is conducted by their staff. Therefore, with the lack of information on the capacity of staff to perform such segregation, there might be a need for increasing awareness on the principles of solid waste handling and segregation.

The study team believes that this is an area that warrants further investigation by the PAP program. This is further confirmed by the finding that the majority of the enterprises that do not recycle solid waste indicated that there is no need for such practice or that there is a general lack of awareness on the subject.

FIGURE 6: BEHAVIOR RELATED TO RECYCLING SOLID WASTE



Similar trends were observed for recycling of solid waste where the majority of the sample (80%) indicated that there are no recycling activities in their establishments. Of those that indicated that there are recycling activities, 40% indicated that it was done inside the facility while 60% indicated that it was done outside. Awareness on the importance of recycling of solid waste seems to be rather low as the majority of respondents that do not recycle attributed that to low need for it. This also identifies an area that needs to be explored by the PAP program in order to address this issue via their upcoming awareness and education programs.

Only 8% of the sample indicated that incineration is used in their facilities. Of those, 40% use conventional systems, while 60% utilize advanced systems for incineration.

The main reasons given for the non segregation of solid waste were in the following order of frequency:

- The perception that there is no need for it
- The perception that there are no regulations for it
- The reportedly low levels of awareness, and
- The perceived infeasibility of it.

The main reasons given for not recycling solid waste were in the following order of frequency:

- The perception that there is no need for it
- The reportedly low levels of awareness,
- The perceived infeasibility of it, and
- The limited amounts of solid waste generated by the facility.

The above barriers/justifications highlight a few issues that could be addressed by the PAP program in its subsequent phases. First and foremost are the perceived low need for, and the infeasibility of, solid waste segregation and recycling. It is apparent that unless a practice has financial viability, requires no financial investment, or is associated with any sort of financial benefit then it is not taken seriously. This was evident in the previous section's practices where saving technology that has proven to be financially viable is not fully implemented given the required financial burden to install them. This finding identifies a core concept that

needs to be promoted which is that conservation of resources, handling of solid waste, etc. are not just about personal gain. They are part of the individual responsibility towards national resources and environmental protection which will help with the adaptation of the limited resources. An industry saving on its water consumption will benefit financially, however, a more important outcome is the preservation of a resource as whole for all various uses throughout the nation, and the fact that it is a nationalistic responsibility.

Attitudes towards solid waste segregation and recycling are somewhat understandable given the relatively low levels of national infrastructure and systems that promote and incentivize solid waste recycling and segregation. It is, however, an important concept that has to start "somewhere".

At the sectors level, the trends for the aforementioned practices, behaviors, and attitudes were as follows:

TABLE 4: TRENDS FOR THE AFOREMENTIONED PRACTICES, BEHAVIORS, AND ATTITUDES

Criterion	Industrial	Hotels	Hospitals	Commercial
Practice of segregation	50% segregation	25% segregation	50% segregation	30% segregation rate
Location and responsibility of Segregation	80-90% in facility by in-house staff	100% within the facility itself with only 50% outsourcing it to a specialized entity	Mainly inside the facility by in-house staff	Mainly inside the facility by in-house staff
Reasons for non segregation	Not needed	Lack of awareness, infeasibility, and lack of storage facilities	Cost associated with it	Low perceived need for it and lack of regulations
Practice of recycling	30% recycling	Only 4%	25% recycling rate	Only 5%
Location and responsibility of recycling	60% outsourced		Mainly inside the facility by in-house staff	
Reasons for non recycling	Not needed, infeasibility, lack of competent bodies	Primarily infeasibility of practice	Cost associated with it	Perceived low need for it and financial burden
Practice of incineration	Only 4%	None	Nearly 60% that use advanced systems (mainly for medical waste)	Generally none

Looking at the above, the following conclusions can be drawn:

- The practice of segregation is generally low with the hotels being the lowest, and is mainly practiced within the facility by in-house staff. Being an important and vital step towards a solid recycling program, it is important to promote the concept of segregation/recycling as important towards the environment as a whole, and its eventual inter-correlation with the water and energy resources. Although not necessarily financially feasible for the entities themselves, it is of great benefit to natural resources as a whole.
- The perception that segregation/recycling is not needed it high across all four sectors. This is an attitude that has to be changed, and in subsequent phases the actual practice of it promoted and facilitated. Incentives for increasing its implementation would mainly be the responsibility of the Government.

4.1.3 Knowledge and Awareness

As mentioned before, this section was intended to measure the levels of knowledge and awareness among the tenants/managers of large consuming entities on general water and energy related statistics and conditions in Jordan. Key observations from the analyses conducted for this section include the following.

Although more than half of the interviewed sample (55%) was able to guess the proportion of Kingdom's imports in terms of energy, an alarming 45% either underestimated those import proportions, or even worse, indicated that they did not know.

Unawareness on the extent to which Jordan relies on energy imports is considered serious and identifies an area was more education and awareness is needed. It is believed that consciousness about the situation could result in better behavior when it comes to the utilization of resources. Awareness on the value of such import was found to be even worse as shown in Figure 7 below.

Therefore, more awareness on the extent to which Jordan relies on energy imports, and the value of those imports as they relate to the national economy, are needed. This was confirmed by the levels of awareness on what proportion of demand is met through local resources. Less than half of the sample realizes that Jordan's local energy resources only contribute to about 4% of the overall demand, and nearly 25% of the respondents do not know.

Figure 7: Proportion of Large Consumers' Awareness on the Extent and Cost of Imported Energy

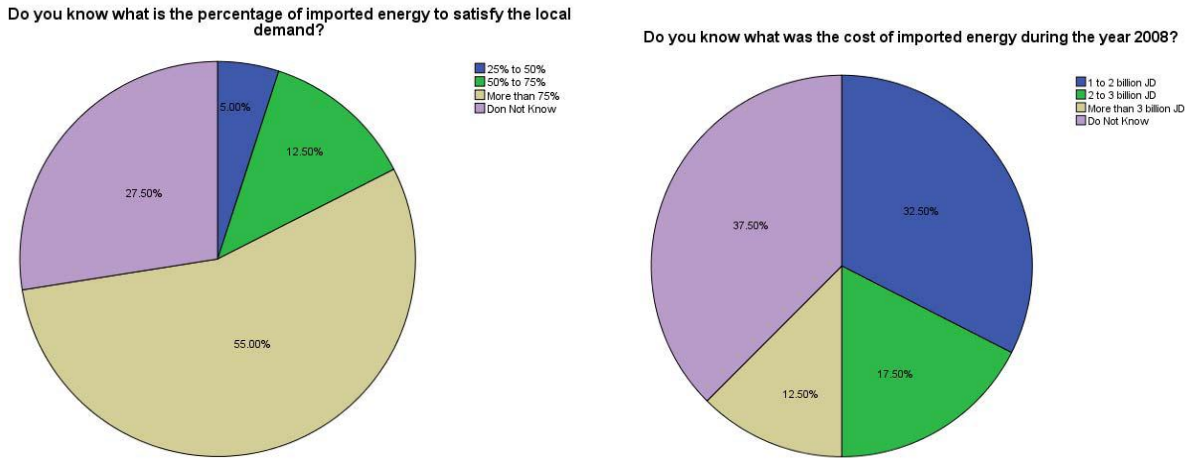


Figure 8 below shows the frequency of the responses received when asked to name the future sources of energy in Jordan. As can be seen in the Figure, the highest frequency of responses was for solar and wind energy (almost 75% and 50%). This is an encouraging finding and is indicative of the awareness, and the importance, of renewable as a vital source of energy in Jordan in the coming years.

FIGURE 8: FREQUENCY OF OPINIONS ON JORDAN'S FUTURE ENERGY ALTERNATIVES

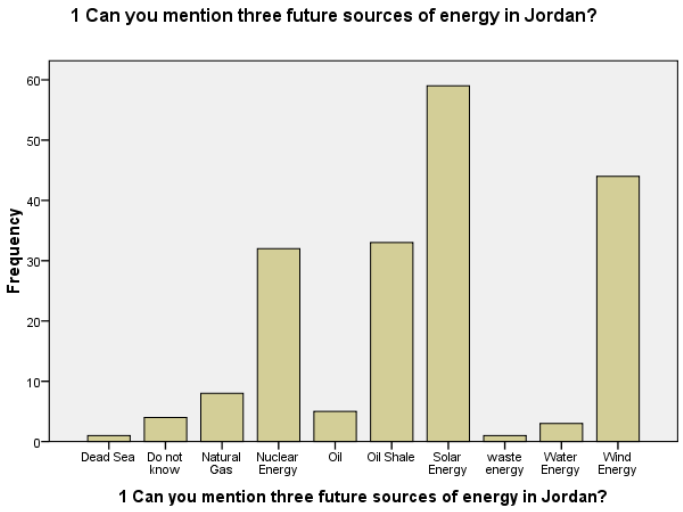
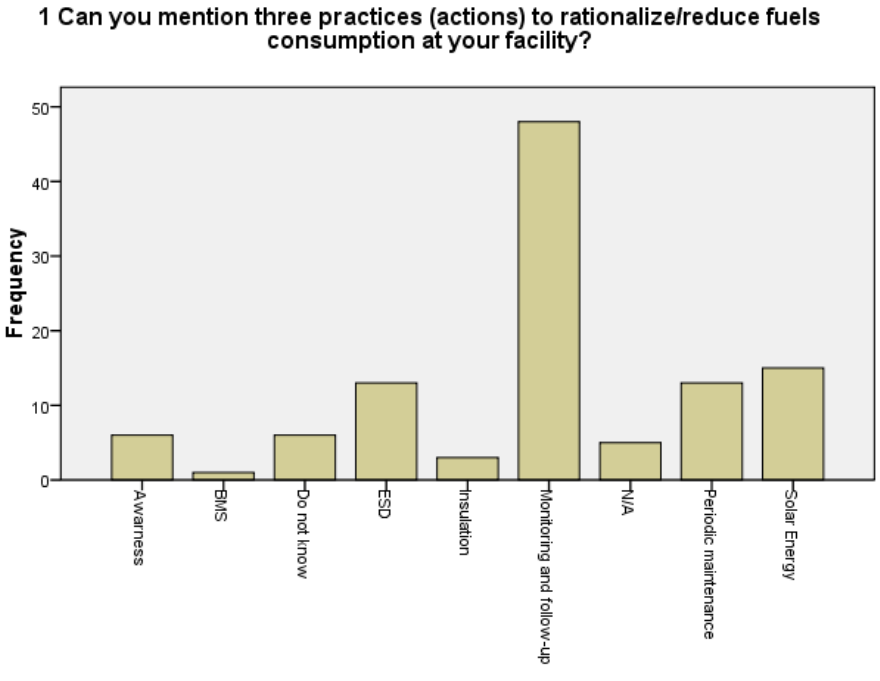
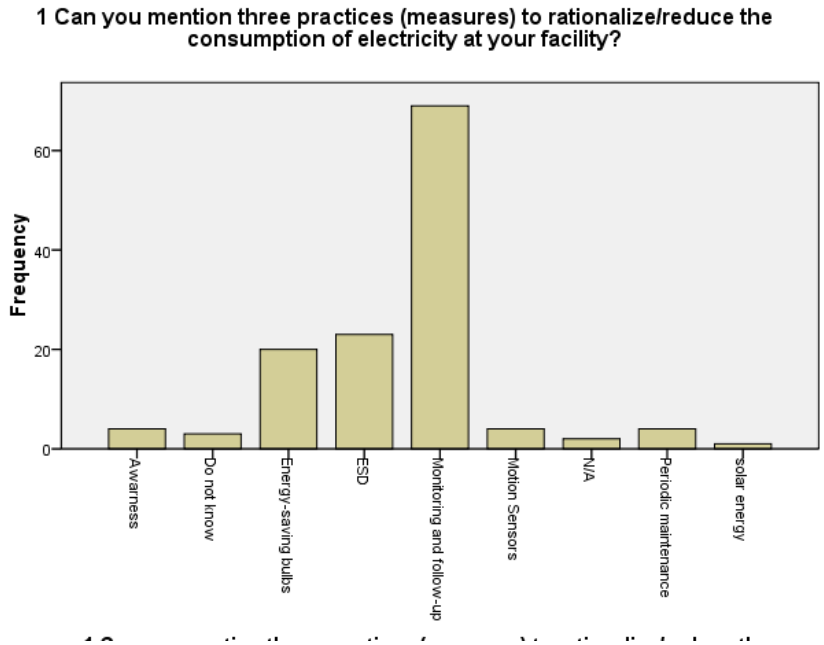


Figure 9bellow shows the frequencies of the different responses given when asked to name three practices for fuel conservation and three practices for electricity conservation.

FIGURE 9: FREQUENCY OF OPINIONS ON METHODS FOR CONSERVING ENERGY AND ELECTRICITY





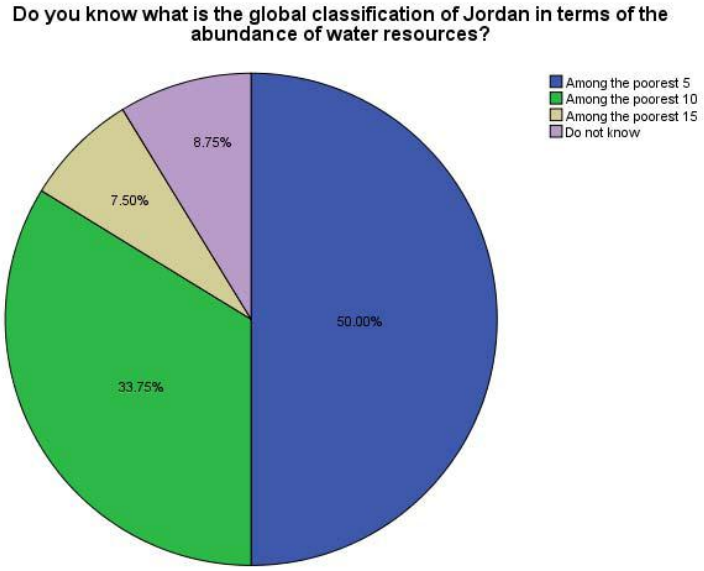
As can be seen in the Figure, the majority of respondents indicated that "Monitoring and Follow-up" were the best way to conserve energy and electricity. This finding is interesting especially that it is partially meant in the sense that consciousness and awareness of consumption are the best ways to increase efficiency and promote conservation. While this is psychologically almost always the case, this finding somewhat contradicts the finding that the majority of the sample doe not conduct sub-metering to monitor consumption not do they perform audits to identify the high consuming points. From the conservations in the field, this practice is also meant in terms of monitoring behavior of the tenants. While a positive practice, it is relatively infeasible to do so at large entities with a high number of tenants. It is safe to conclude that decision makers may realize the importance of monitoring via technologies of sub-metering, however, a number of barriers as identified earlier seem to hinder the process.

This trend also gives another area that the PAP project should explore in order to promote the concept of sub metering in order to identify high consuming points, and the periodic conduct of audits in order to remedy such high consuming point. Other practices that were identified by the interviewees included the use of electricity saving and energy saving devices. One would expect those frequencies to be higher in a Water and Energy Related Interviews for Large Jordanian Consumers Draft Final Report Interdisciplinary Research Consultants and GreenTech 20 country like Jordan, thus, identifying another area that the PAP project's efforts should also focus on.

Awareness in the area of water scarcity and water resources seems to be better than that in energy and power. This was evident from the higher proportions of correct answers given on general knowledge areas related to the sector. For example, while only 33% of the sample correctly identified Jordan as one of the ten poorest countries in terms of water, nearly 50% identified it as one of the poorest 5 countries. While the later is not the correct answer, but at least the extent of the problem of water scarcity seems to be well understood by people as shown in Figure 9. This finding was emphasized by the fact that the majority of the sample (82%) correctly answered regarding the annual per capita share of water. This is indicative that previous outreach and awareness efforts have had an effect in terms of increasing awareness on the problem itself.

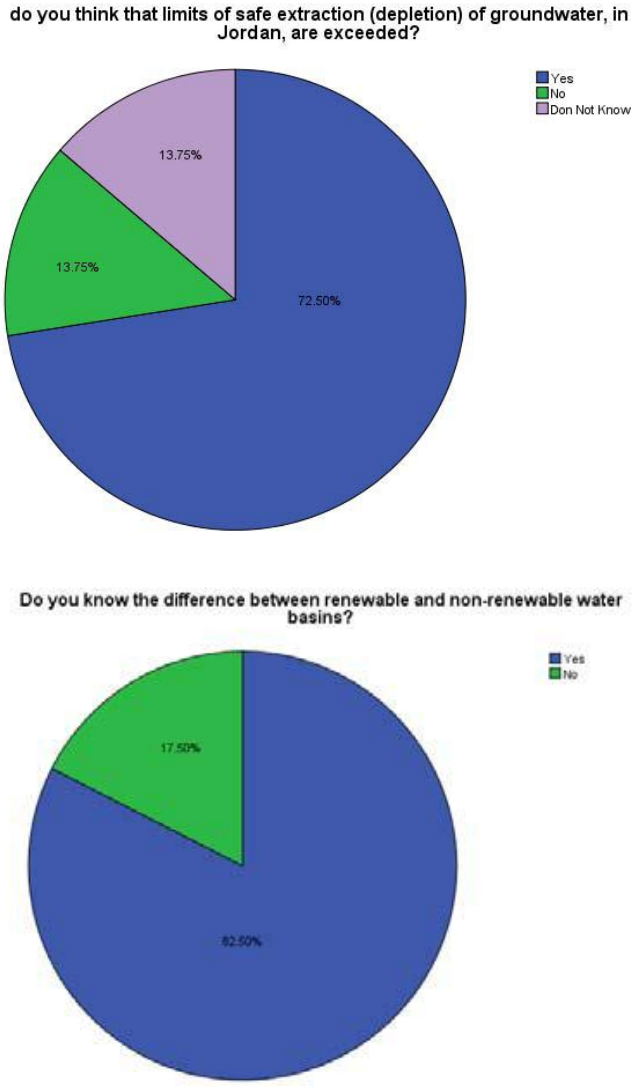
This was also evident in the frequencies of responses given by the interviewees when asked to name the main water resources in Jordan. Again, the majority of the sample interviewed was quite aware of what the main sources of water are and groundwater and wells were amongst the highest selected resources. For instance, the two highest frequencies were those of groundwater, wells, and dams (although dams are not really a resource of water rather a means for storage). An interesting resource reported by nearly 13% of the respondents was the Dissi water. Although the survey tool did not address at all the concept of the "value of water", it is believed that the concept of "expensive" should be further investigated.

FIGURE 10: RESPONSES RELATED TO JORDAN'S WATER POVERTY STANDING



Unlike the inquiry related to energy, the majority of respondents indicated that WSDs was the top practice for water saving, again emphasizing that previous awareness programs such as WEPIA have been successful in increasing awareness in this regards. "Monitoring and Follow up" is also viewed here as a means for conservation, but given the lower ratios of entities that perform sub-metering and audits, identifies an area that needs to be addressed in outreach efforts. Awareness on aspects of groundwater were quite impressive with over 70% of respondents indicating that the groundwater levels of safe yield are being exceeded, over 80% being able to tell the difference between renewable and on renewable ground water basins, and high frequencies of interviewees being able to identify at least one source of pollution for groundwater as shown in Figure 11 below.

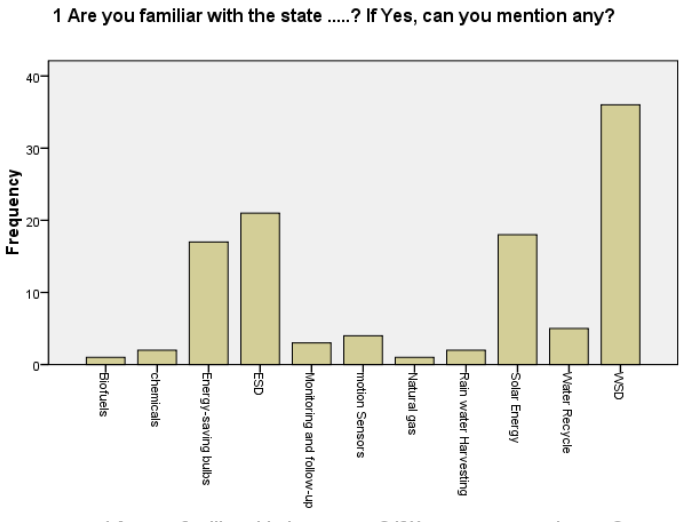
FIGURE 11: SOURCE OF POLLUTION FOR GROUNDWATER

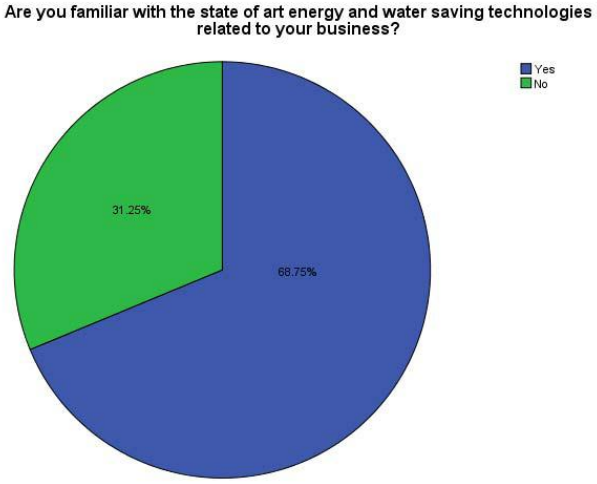


As can be seen in the Figure, the majority of the respondents is aware of the groundwater over abstraction issues and is familiar with the concept of renewable and on renewable ground water basins. There is also general awareness on the sources of pollution of groundwater in Jordan.

Respondents were asked whether they were familiar with state-of-the-art technologies for water and energy savings in their field, to which nearly 70% indicated that they were. Although relatively high, one would expect this ration to be higher in a country that is both water and energy poor. Therefore, this sets another area of emphasis for the PAP project in terms of raising education and awareness. Higher targets should be set for the people of Jordan in terms of increasing their awareness on advanced technology at all levels and in all sectors. When asked to name such technologies, the majority of the respondents chose WSD's, ESD's, and energy saving bulbs. Although all acceptable answers, it is desired to increase knowledge on more technologies and to increase awareness on sector specific technologies rather than general devices and equipment. Those results are shown in Figure 12 below.

FIGURE 12: FREQUENCY OF OPINIONS ON METHODS FOR CONSERVING ENERGY AND ELECTRICITY

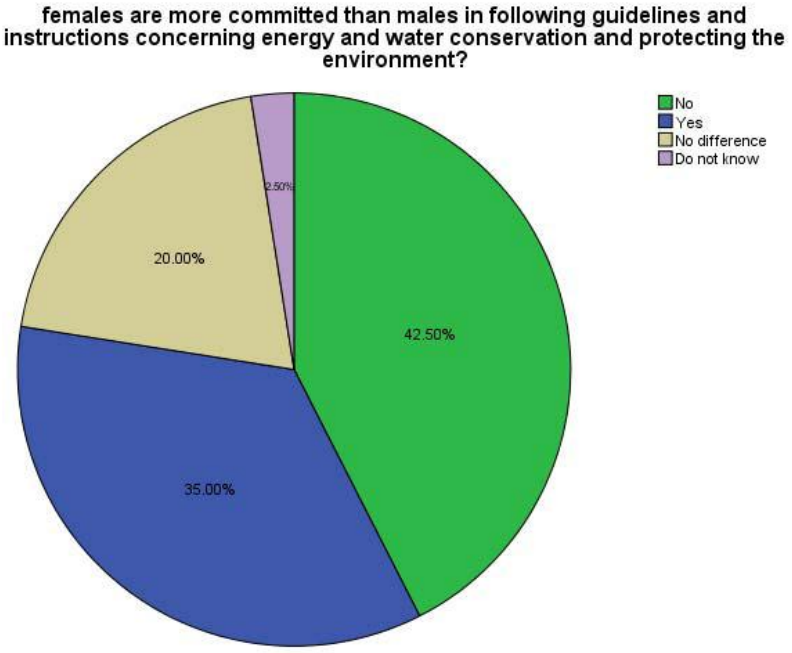




One question in this section attempted to measure whether there was a perceived difference in commitment to conservation practices related to gender. Generally, the highest single percentage (42%) perceived that females are not more committed to practices of conservation, while 35% perceived that they were. A mere 20% perceived no difference, while the remainder of the sample indicated that they did not know.

The study team does not see a strikingly obvious trend in the reported perception and recommends that this subject be further studied in order to decide whether gender issues should be taken into consideration in the design and implementation of an awareness and education program related to water and energy efficiency.

FIGURE 13: PERCEIVED GENDER DIFFERENCES RELATED TO COMMITMENT TO CONSERVE



At the sectors level, the trends for the aforementioned practices, behaviors, and attitudes were as follows:

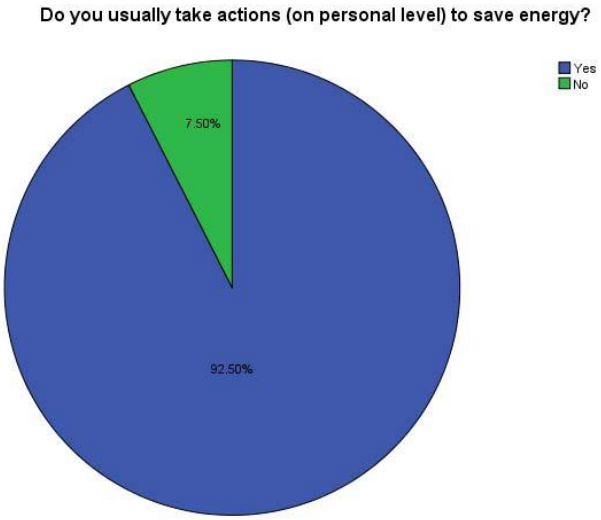
TABLE 5: TRENDS FOR THE AFOREMENTIONED PRACTICES, BEHAVIORS, AND ATTITUDES

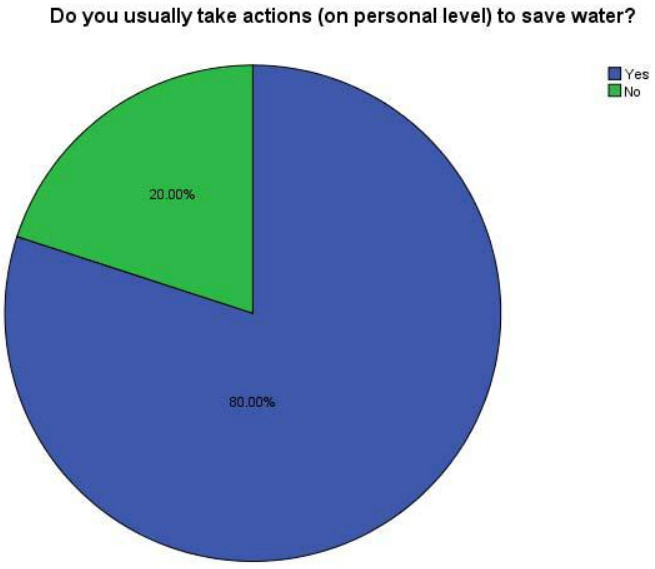
Criterion	Industrial	Hotels	Hospitals	Commercial
Awareness on energy imports	Nearly 25% indicated that they do not know	Nearly 25% indicated that they do not know	Nearly 40% indicated that they do not know	Nearly 30% indicated that they do not know
Awareness on the cost of energy imports	Nearly 40% indicated that they do not know	Nearly 30% indicated that they do not know	Nearly 40% indicated that they do not know	Nearly 40% indicated that they do not know
Awareness on local energy resources in meeting demand	Majority is aware but nearly 20% indicated that they do not know	Nearly 30% indicated that they do not know	Nearly 25% indicated that they do not know or chose a wrong answer	Nearly 30% indicated that they do not know or chose a wrong answer
Future energy resources	Solar, wind, and oil shale	Solar, wind, nuclear, and oil shale	Oil shale and solar energy	Solar and wind energy
Practices for fuel efficiency	M&E and maintenance	M&E and saving devices	M&E, insulation, and saving devices	M&E
Practices for electricity efficiency	M&E and saving devices	M&E and energy savings bulbs	M&E and energy savings bulbs	M&E
Awareness on water poverty ranking	Vast majority is familiar	Vast majority is familiar	All are aware	Majority is familiar but 12% did not know
Awareness on per capita water share	Vast majority is aware			
Awareness on resources of water	General levels of awareness are acceptable but dams are misperceived as a resource			
Practices for water conservation	M&E, savings devices and recycling	WSDs	WSDs and recycling	M&E and WSDs
Awareness on over abstraction of GW	20% thinks that withdrawals are within safe yields.	40% thinks that withdrawals are within safe yields.	0% thinks that withdrawals are within safe yields.	25% thinks that withdrawals are within safe yields or do not know.
Awareness on difference between renewable and on renewable water resources	Nearly 20% cannot explain the difference	Nearly 40% cannot explain the difference	All could explain the difference	Nearly 14% cannot explain the difference
Sources of Pollution	Wastewater and industrial waste	Wastewater and solid waste	Wastewater and industrial waste	Wastewater and industrial waste
Familiarity with state of the art technology for savings	Majority able to name WSDs and ESDs			

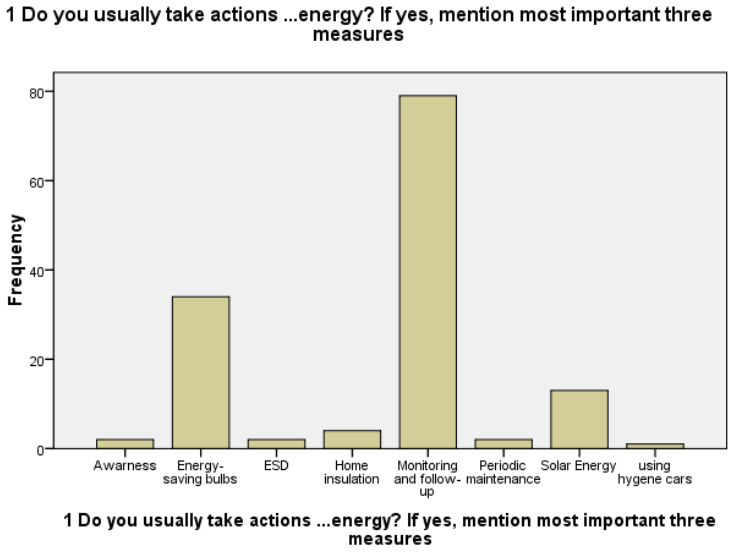
4.1.4 Current Practices and Barriers

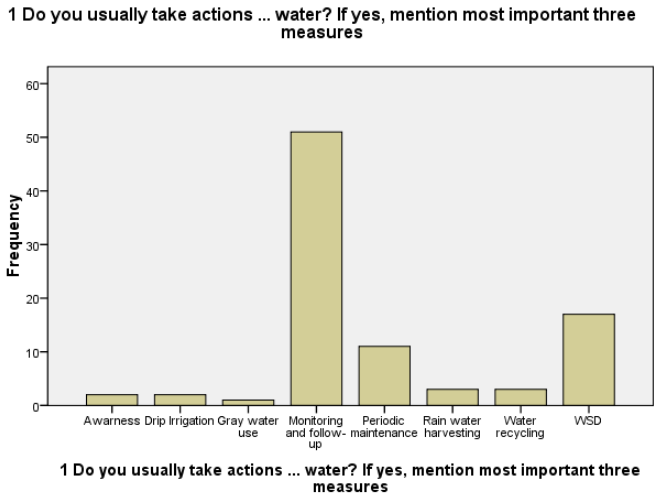
This section of the survey was targeted to the higher levels of maintenance and finance at the various buildings that were surveyed. The majority of the respondents indicated that they take personal action at their workplace related to energy and water savings. It is worth mentioning that the positive responses related to energy were higher than those related to water. Although not always necessarily the case, this could be attributed to the water tariff which is relatively lower than that for electricity, which pushes decision makers to focus more on electricity savings.

FIGURE 14: LEVELS AND TYPES OF PERSONAL INVOLVEMENT IN WATER AND ENERGY SAVINGS TECHNIQUES









As can be seen, the most common practice in "Monitoring and Follow Up". The context in which it is meant here is following up and monitoring behavior in "enforcement" like manner. While effective in smaller establishments, this is hard to implement in bigger establishments which are the focus of the effort at hand. This emphasizes previous findings and clearly identifies an area of awareness that the PAP program should focus on, which is to promote the concept of sub-metering to help decision makers continuously monitor consumption within different areas of an establishment, and the periodic conduct of water and energy audits.

This was also emphasized by the responses given to decision makers on what the main barriers to implementing conservation measures, whereby the majority indicated that there was a general lack of awareness, and the relatively higher process of saving devices which often pushes decision makers to purchase the cheaper less efficient devices. This also identifies another area of awareness that should be addressed by the PAP project, which is the concept of operating cost versus capital cost. While saving devices' initial cost may be higher, it has been proven that their operating cost is significantly cheaper and the additional cost in investment is recovered through savings in a relatively short period of time.

PAP should focus on this concept and promoting a better understanding of cost recovery and OPEX versus CAPEX analysis for decision makers at the larger establishments.

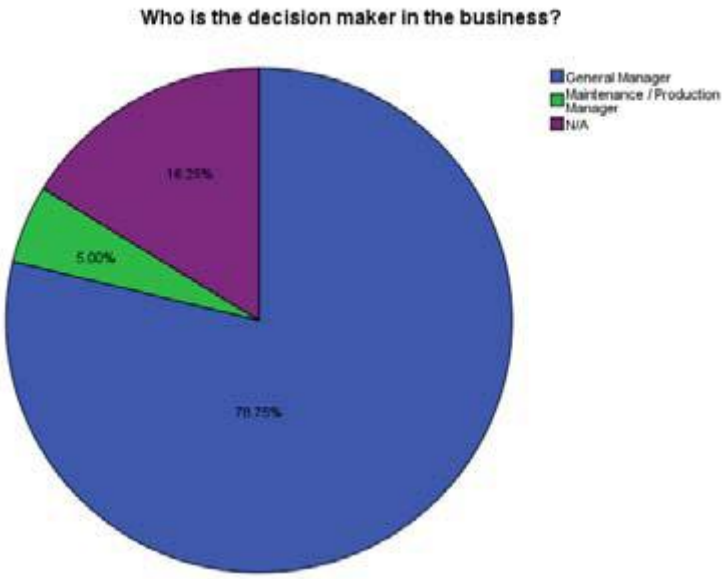
In terms of obstacles faced to implement the water and energy saving practices, the following obstacles were identified and were common amongst the four sectors:

- **Lack of awareness**: and what is meant here is the lack of awareness amongst the average employee within a facility rather than the specialized staff. This could be an area where the OUTREACH program could assist large consumers in the design and implementation of employee awareness programs that help promote energy and water efficiency in the various establishments. For example, awareness programs targeting housekeeping staff at hotels and hospitals could specifically address the utilization of water more efficiently in the cleaning process and so on.
- **The lack of incentive programs amongts employees**: the above awareness efforts can have a bigger and more significant impact if coupled with incentive programs for employees. For example, if housekeeping staff are given a salary or fringe incentives in exchange of savings in water consumption, then then skills learned through an awareness program would be more effectively utilized and applied. Competitive incentives programs between staff of different departments (e.g., housekeeping, catering, etc) have proven to be very effective.
- **The higher prices for the higher quality savings devices**: this is a problem faced with some of the lower quality and lower cost savings devices available in the local markets. As mentioned in an earlier section, financials are always an issue when it comes to investing in conservation equipment or services. Even when some decision makers decide to invest in conservation equipment, the choice of equipment is frequently price dependant. Again, the need to increase knowledge and capacity of the capital investment versus durability and cost recovery should be considered. For instance, it was reported that often times when a decision is made to purchase saving devices, the procurement process itself is undertakn by the financial manager rather than by the specialized technical staff, which often affects the quality of equipment purchased.
- **Lack of proper maintenance**: and reference here is made to the lack of preventative maintenance rather than periodic and complaints based maintenance. The need to preventatively maintain plumbing sustems, electrical systems, boilers, etc. is a topic that should be promoted amongst lareg consumers.

Another encouraging finding is that 90% of respondents indicated that in case they identify a potential for savings in an establishment, it is reported to the top management in an entity. While encouraging in the sense that it reflects a sense of wanting to save, it is discouraging that the middle management levels often does not have the authority to decide immediately on such action. This is emphasized by the finding that 75% of respondents indicated that the General Manager is the ultimate decisive authority as shown in Figure 15.

General Managers are not always necessarily technical people and may not always have the technical background related to such conservation strategies. It is, therefore, important to increase awareness on the importance of authorizing the relevant technical staff at an establishment to implement saving strategies. This could be approached form an angle of the potential savings that could be wasted during the time needed to obtain GM's approval for procure or implement a conservation strategy identified by the relevant technical staff at an establishment.

FIGURE 15: DECISIVE AUTHORITY ON IMPLEMENTING IDENTIFIED CONSERVATION MEASURES



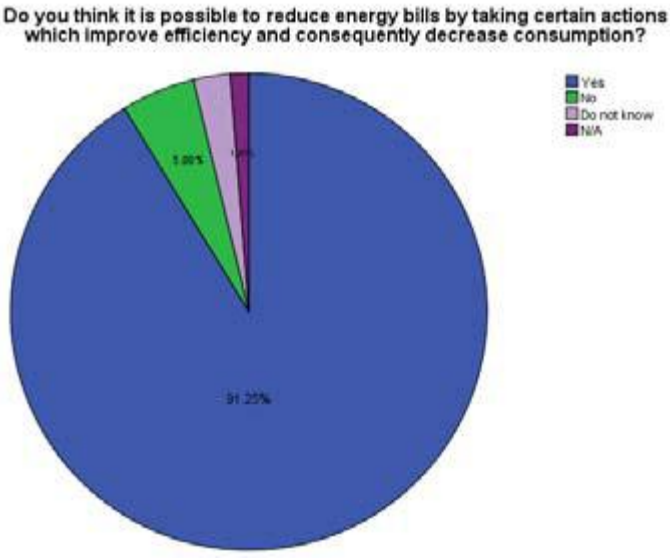
This is especially true that the majority of respondents (90%) indicated that management does take their recommendations seriously. However, it is believed that significant amounts of time could be saved if the technical staff were able to immediately decide on the implementation.

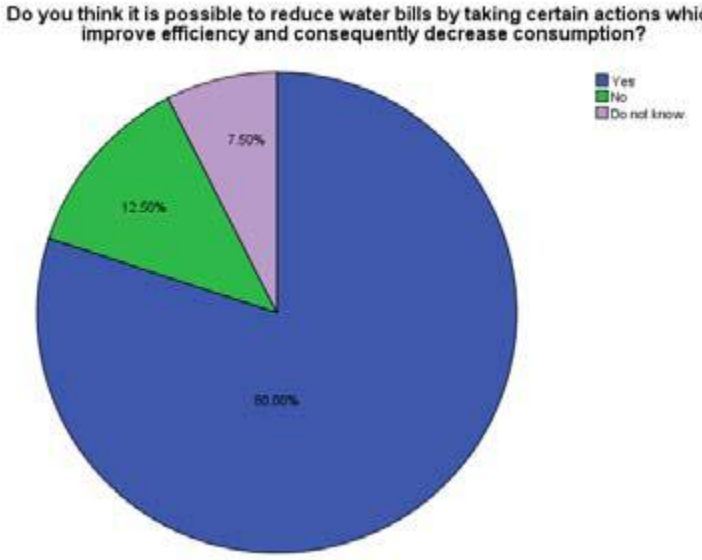
Unfortunately, the question on how long it usually takes for a manager to approve the idea was not asked; however, the majority of the larger establishments (both private and public) usually have procurement systems that could be lengthy. It is for this reason that promoting the concept of empowering maintenance managers on procurement related to the acquisition of saving technology and saving devices is recommended as a countermeasure.

4.1.5 Technology and Conservation Procedures

The purpose of this part of the survey was to gather information on the perceptions of the interviewees on the ability to reduce water and electricity bills, and what their opinions were on the best means for attaining such savings.

FIGURE 16: PERCEPTIONS IN THE ABILITY TO REDUCE WATER AND ELECTRICITY BILLS

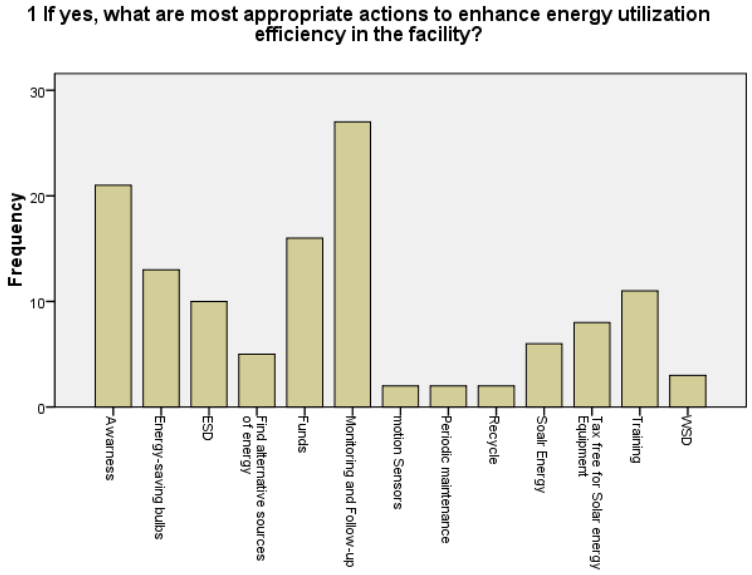


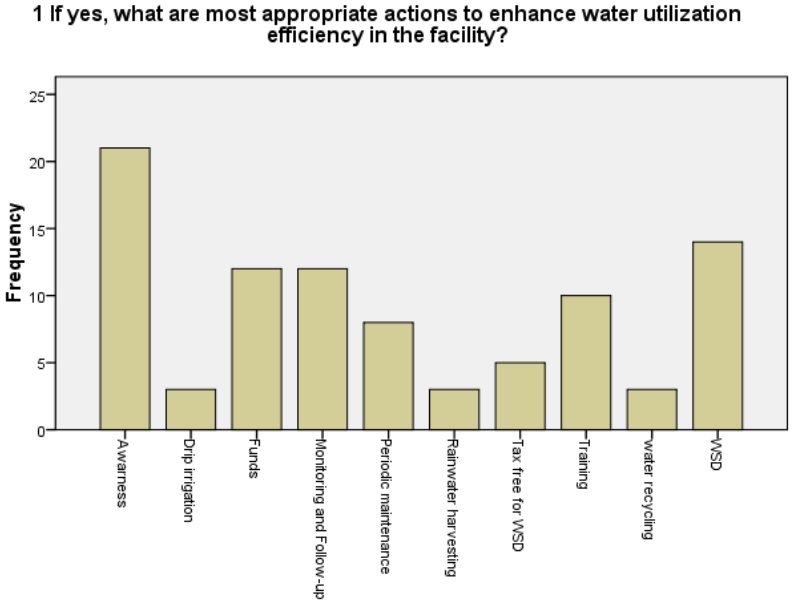


As can be seen in both charts, the vast majority of the interviewees believe that it is possible to reduce the water and electricity bills in their establishments. It is worthy to note that the perception for electricity cost reductions is higher than those for water. Over 90% of interviewees indicated that they believe electricity bills could be reduced, whereas 80% of the interviewees indicated that such savings could be achieved for the water bill. This is an encouraging result and also helps the PAP program on focusing in promoting the methods by which such savings could be achieved. In other words, significant portions of large consumers are convinced that savings could be achieved and only minimal efforts will be needed to "convince" large consumers of the possibility of cutting cost. The awareness effort has to be on helping them achieve those savings.

Figure 17 below shows the most appropriate actions as indicated by the interviewees on how they think such savings could be achieved. The most frequently identified actions are summarized below:

FIGURE 17: OPINIONS ON THE ACTIONS NEEDED TO ACHIEVE SAVINGS





Electricity Saving	Water Saving
M&E	Awareness
Awareness	Saving Devices
Funding	M&E
Training	Funding
Saving Devices	Training
Tax exemptions	Periodic maintenance

4.1.5.1 Perceived Actions Needed To Achieve Savings

M&E

This is meant more in the sense of "observing" consumption and usage behaviors amongst the various levels of tenants (i.e., employees and visitors). While effective in smaller establishments, it is hard to implement in the larger facilities. Promoting the concept of sub-metering not only helps meet this requirement, but also enables responsible staff to quantitatively monitor consumption, promptly detect changes in consumption, and easily identify problem areas. It also helps in benchmarking

Awareness

While acceptable portions of higher level staff were found to be aware of the problem, best behaviors and practices to curdle it, and technology applications available, the awareness is to be more geared towards the "regular" users of water within an establishment. Depending on the nature of the establishment, it would be mostly be targeting employees of an establishment and raising their awareness on how they could conserve energy as it relates to their job descriptions (e.g., housekeeping staff in hotels, lower category technical staff at industrial establishments, janitors at commercial facilities, etc.)

Funding

This was repeatedly reported as an obstacle on several occasions throughout the study. While finding a funding agency to assist large consumers procure/implement conservation measures, this solution is not sustainable. It may be more sustainable to invest in promoting the concepts of cost-recovery through savings in consumption that could be attained via investing in technology. Once the benefits and savings are presented in their monetary value, they have been found to be an effective catalyst in promoting favorable behavior and encouraging investing in saving technology and programs.

Training

This is correlated with awareness and should target both technical and non technical staff within large consuming entities on the measures they could undertake as part of their job responsibilities to conserve. Formation of in-house conservation teams, how to set and implement savings plans, self monitoring and enforcement are examples of such training needs.

Saving Devices

Water and electricity savings devices have been identified as means for achieving savings. The levels of awareness on such devices were found to be acceptable. However, the extent to which they are deployed are often related to funding and the willingness to invest. Again, using simple financial modeling to demonstrate the financial viability of such devices is an area where some capacity building could be useful and may help in further promoting a culture of deploying such technology.

Tax exemptions

This is something that would have to be taken up with the government, although certain exemptions are offered on certain equipment. An economic/financial assessment to be undertaken by PAP might be worthy as a tool to demonstrate the benefits of such exemptions versus the reduced revenues in customs charges. Such assessment would compare reductions in such revenues versus national savings in water and energy related expenditures.

Periodic maintenance

This had been previously identified as an obstacle and is meant from the context of raising awareness on the need for preventative maintenance schemes in large consuming facilities.

It should be mentioned that no significant responses were noted amongst the sectors; the key areas that were identified were the same, with some reported with different priorities by some sectors.

4.1.6 Policy Options

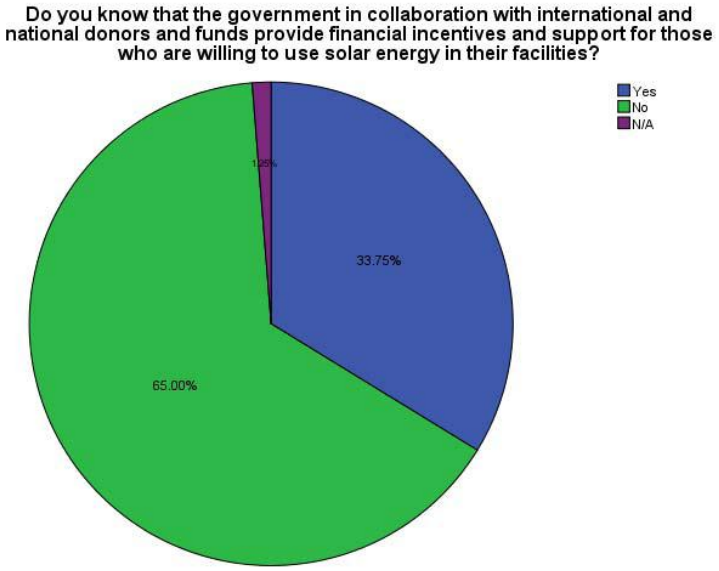
Only one third of the interviewed sample was aware of governmental programs in coordination with donors and other funds that finance and support the utilization of renewable energy such as solar energy. At first glance, there seems to be either a gap in the effectiveness of the government/donors in promoting those initiatives, or those large consumers (especially private sector ones) have limited outreach efforts in order to stay familiar with initiatives that they could benefit from.

However, only a third of those establishments indicated that they had benefited from such programs. In other words, despite familiarity with such programs, the level to which they are utilized is low. When asked, the majority indicated that they would like to utilize such programs. The reasons for non utilization of such programs is unknown, however, one possible reason could be the lack of capacity amongst staff to approach such programs and preparing proposals and/or concept notes or feasibility studies that would enable them to apply for funds.

This is another area that should be further explored by PAP in order to (1) assess the levels of knowledge on such programs, (2) assess the efforts undertaken by such programs to reach out to potential beneficiaries, (3) determine and necessary capacity building needs for large consumers that would enable them to utilize such programs.

Figure 18 below summarizes the responses that were given when asked to name the most suitable policy options that would enhance efficiency.

FIGURE 18: AWARENESS ON GOVERNMENTAL AND DONOR SUPPORT FOR RENEWABLE ENERGY



Key areas that were identified by the respondents include the following:

- Awareness
- Funding
- Training
- Incentives for efficiency and tax breaks on efficient equipment

4.1.7 Channels of Communication

This section was mainly intended to give the PAP project some guidance on what the most suitable channels of communication to convey information related to water and energy conservation are. It was designed to help PAP identify the most effective mode of communication that would be used once the subsequent phases of the project are implemented. The section had three main questions as follows:

- The best source for obtaining information related to water and electricity conservation in addition to protecting the environment,
- The respondents" opinions on the most appropriate communication channels that should be utilized by subsequent phases of the project in a manner that would incentivize the conservation,
- The respondents' opinions on what the most effective incentives for conservation at their establishments.

TABLE 6: CHANNELS OF COMMUNICATION TO CONVEY INFORMATION RELATED TO WATER AND ENERGY CONSERVATION

Area	Responses	Frequency
Best source for obtaining information related to water and electricity conservation in addition to protecting the environment	Public Service Offices)	36
	Vendors of energy/water saving equipment	10
	Catalogues, leaflets, books, standards, etc.	21
	Research institutions	21
	Specialized consulting companies	25
	Internet	54
	NGOs	5
Most appropriate communication channels that should be utilized by subsequent phases of the project in a manner that would incentivize the conservation	Internet (emails, newsletters, etc.)	39
	Material about local success stories	26
	Scheduled workshops, lectures, seminars, meetings	34
	Specialized training courses	42
	Conventional methods (mail, publications, etc.)	9
	Media (TV, newspapers, radio, etc.)	20
	Field visits to pilot projects and advanced energy/water schemes	31
Most effective incentives for conservation at their establishments	Financing schemes (e.g. Grants, Soft loans, etc.)	34
	Free/subsidized audits for energy/water consumption	40
	Low interest special loans for energy/water saving projects	16
	New laws/standards/regulations aiming to enhance efficiency	27
	Awards on national level	28
	Tax and customs exemptions projects for renewable sources	56

4.2 Results of Sector Specific Questions

The majority of the questions in the survey tool, especially those related to awareness, knowledge, and behavior were common to all the sub-sectors and the responses received for the entire sample, and the sub-sectors, were identified in the previous section. This section addresses the sector specific questions which were mainly centered on establishment demographics (e.g., staffing, areas, size, etc.) in addition to trends in consumption of water and electricity (e.g., amounts, processes, ratio from expenditures, etc.). This section of the report helps identify prevalent trends, in order to determine the most appropriate themes of outreach and awareness that would need to be targeted to each of the sectors. The results are presented as per the same order of questions in the survey tool as follows:

- Water and energy consumptions
- Main uses for water and energy
- Usage of renewable energy
- Cost of water and energy with respect to overall expenditures

4.2.1 Water and Energy Consumptions

Data were collected on the consumptions of energy (electricity and other forms) and water for the various enterprises that were interviewed. For a larger sample, analyzing such data in a standardized manner would have been very helpful. For instance, for the hotel sector, calculating the water consumption per guest or per room would have helped conduct meaningful comparisons within each of the four sectors. The same applies to electricity and other forms of energy. However, given the very small sample size, the even smaller sub-sample size (e.g., various categories of hotels), such data analyses is not meaningful at all. The data collected from the sites that were audited would be useful for calculating the quantities of potential savings in case certain countermeasures are applied as presented in the Site Rapid Audits Report, however, for the report at hand such data are not analyzed. That said, the following observations can be made about the data collection process itself:

Only 45%, 75%, 41%, and 71% of the surveyed samples gave water and electricity consumptions based on bills for the commercial, hospital, hotel, and industrial sectors, respectively. The remainder of the surveyed entities gave estimates on their consumption. The low levels of documentation seem to be worst in the commercial and hotel sectors.

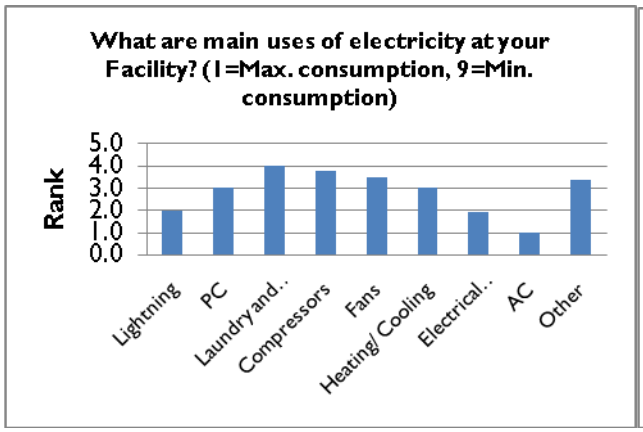
The reasons for not providing information based bills varied from the inaccessibility to bills, to the uncertainty on where historical data are stored, to simply not having the time to extract such information. Whatever the reason, the study team believes that such information should be readily available for staff such as maintenance staff that would be responsible for managing consumption. Without direct and instantaneous access to such data, monitoring of consumption (especially in the absence of sub-metering schemes) would be difficult, thus, the development of innovative measures for conservation would be difficult. In parallel with the promotion of sub-metering in large consumers, it is advisable that the OUTREACH program try to promote the concept of having internal databases managed by relevant staff (i.e., maintenance staff within an organization) built and maintained.

The above would have to be properly managed and maintained to enable such staff to conduct time based analysis and monitoring variations in consumption seasonally and in relation to certain milestones such as installing saving devices, starting company conservation policies, employee incentives programs for conservation. Such database would be vital tool for the documentation of progress and effectiveness of implemented measures.

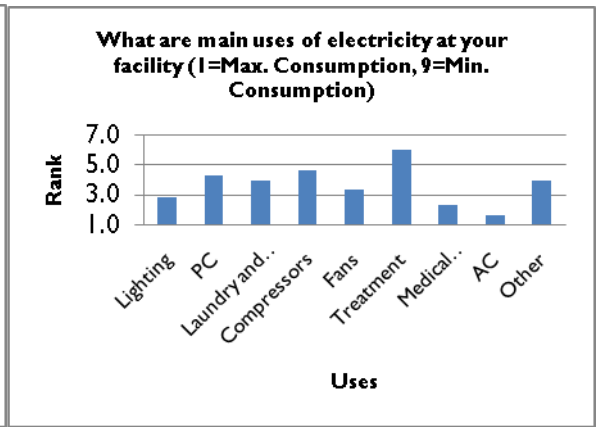
4.2.2 Main Uses for Water and Energy

Figure 19 below shows the distribution of the main uses for electricity at the various interviewed entities in the four sectors.

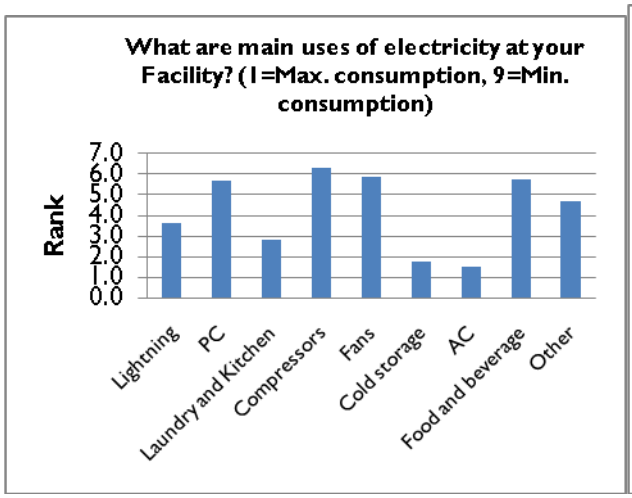
FIGURE 19: MAIN USE OF WATER AND ENERGY



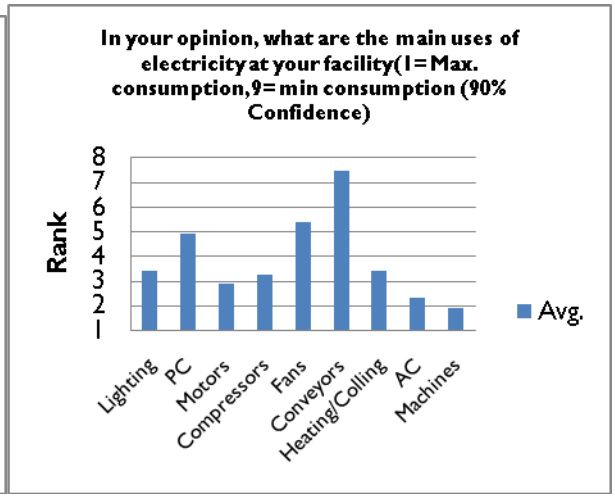
Commercial



Hospitals



Hotels



Industrials

As can be seen, there are significant differences in the opinions related to the uses that consume the most electricity with the different types of facilities. The highest users of electricity in each sector are shown below:

TABLE 7: THE HIGHEST USERS OF ELECTRICITY IN EACH SECTOR

Commercial	Hospitals	Hotels	Industrial
Laundry	Laundry	Food and beverage	Conveyors
Compressors	Compressors	Compressors	Fans
Heating/Cooling	Medical equipment	Fans	PCs
PC's	PC's	PCs	Heating and cooling
Lighting systems		Lighting systems	

In terms of water consumption, the trends were as follows

TABLE 8: WATER CONSUMPTION TRENDS

Commercial	Hospitals	Hotels	Industrial
Irrigation	Irrigation	Irrigation	RO
Cleaning and washing	Maintenance and cleaning	RO	Steam production
RO	Sterilization	Recreation	Cooling
Maintenance		Laundry	Maintenance
		Cleaning	

Although the above are only opinions of the interviewees and not based on actual measurements, some of those uses will be verified at sites that will undergo audits. However, a few observations are worthy of noting at this point:

- Laundry is considered a major consumer of electricity at some facilities, therefore, further investigation as to what type of washing machines are used, whether energy performance is considered at all when procuring, and what "laundry doing" behavior is followed is warranted. Some of those questions will be addressed at the sites to be studies, but further investigation is needed to gather more information on those issues.
- Some consumers of electricity are hard to be made less consumptive (e.g., compressors and AC units), however, associated practices to reduce waste may need to be promoted (e.g., not using ACs when not in room, or reducing the times fans are operational). Those are the types of activities that could be easily implemented through employee incentive programs or conservation teams mentioned earlier in the report.
- Lighting systems were repeatedly named as consumers, and although several interviewees named energy saving bulbs as a savings measure, there is still more need to promote their use.
- It was very interesting that several interviewees reported irrigation and cleaning to be major consumers of water in their establishments. However, very few respondents referred to either use when discussing means for savings at their establishment (with the exception of a few that mentioned rainwater harvesting and recycling). This observation is worthy of further investigation to attempt to quantify what portions of consumption irrigation constitutes in order to determine whether this is an area that needs to be addressed in future outreach programs or incorporated into employee training programs implemented in subsequent phases of the project.
- Laundry was also considered by many as a major consumer of water, therefore, the same recommendation made to electricity consumption of laundry apples here. Promoting concepts such as star energy ratings may be effective in curtailing consumption of both water and electricity.

4.2.3 Usage of Renewable energy

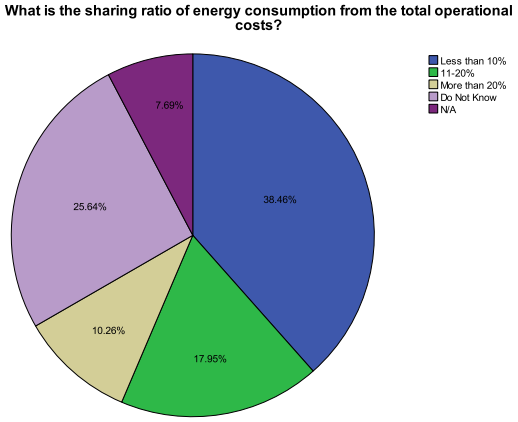
A limited number of interviewees in all four sectors indicated that solar energy was used. Those that did mainly used it for water heating. This is a very interesting finding especially in line of some of the uses that were reported to be large consumers of water and electricity. For instance, laundry which was reported as a major consumer of electricity could utilize water heated by solar panels. Although this may require a change of machines to those that do not heat water (i.e., the American versus the European washing machines), solar water heating has a great potential for reducing the electricity consumption for laundry. The same applies to some other uses that were reported to consume electricity such as cleaning, dishwashing, food and beverage,

etc. The study team believes that the promotion of solar water heaters could have significant impacts on some large consumers, especially given the climate in Jordan and the number of sunny days throughout the year.

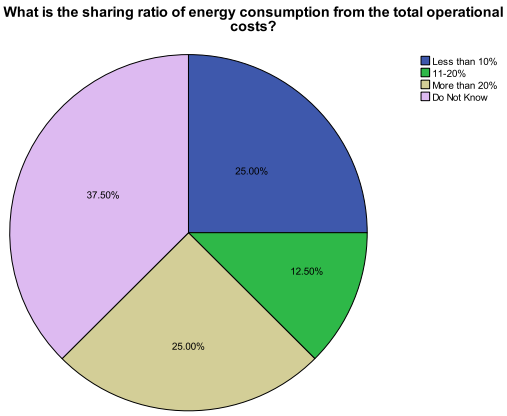
4.2.4 Cost of Water and Energy With Respect To Overall Expenditures

This section mainly asked for the interviewee to estimate the cost of water and energy as a proportion of the overall expenditures. The following pie charts summarize the responses that were given by the various sectors both for energy and water.

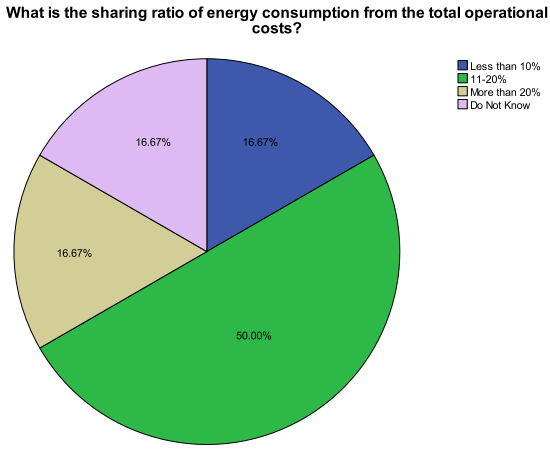
FIGURE 20: PROPORTIONAL COST OF Energy



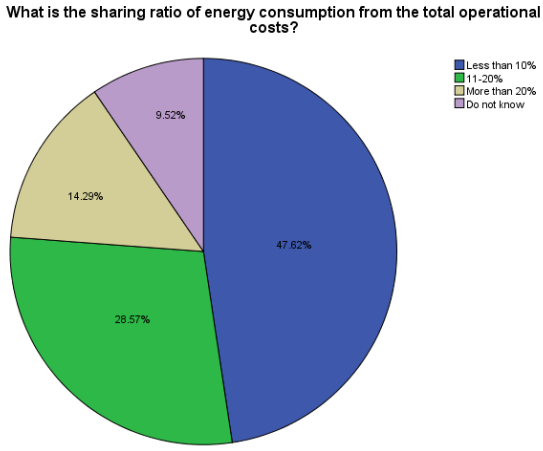
Commercial



Hospitals

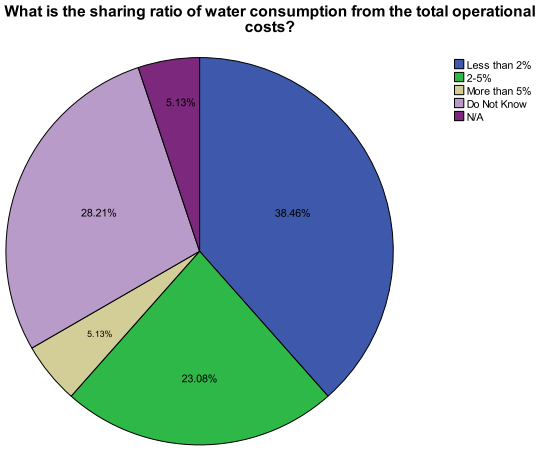


Hotels

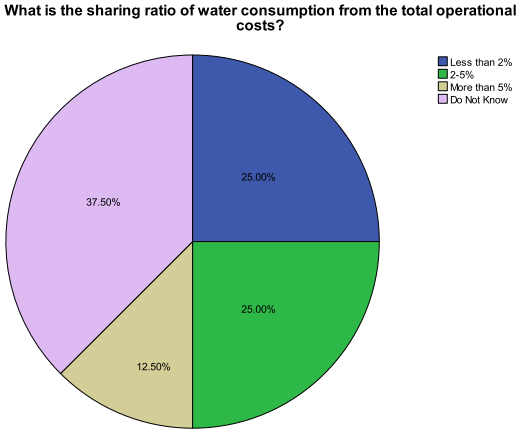


Industrial

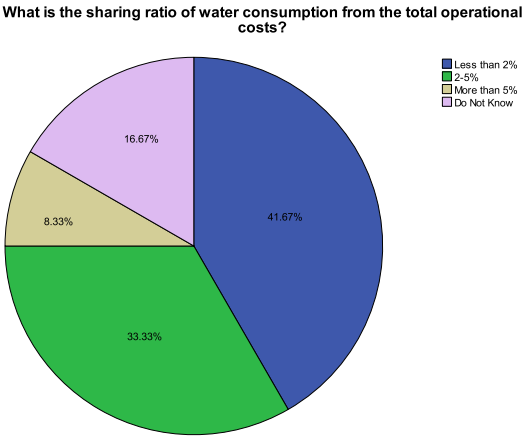
FIGURE 21: PROPORTIONAL COST OF WATER



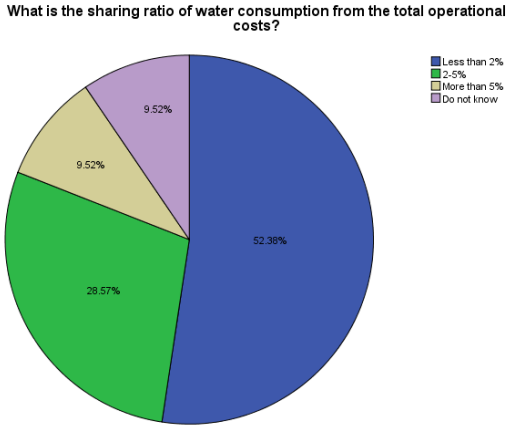
Commercial



Hospitals



Hotels



Industrial

5.0 CONCLUSION AND RECOMMENDATION

As mentioned before, the survey at hand is one of the activities under the PAP project to help better understand and quantify the attitudes and the levels of awareness amongst large consumers of water and energy. The findings and main conclusions of the survey are to be used to develop a clear idea on current knowledge, attitude, and practices related to water and energy. This would facilitate the design of a targeted outreach and communications program that helps improve awareness and knowledge as it relates to conservation.

The survey was conducted for a sample of 80 large consumers in four main sectors; hospitals, hotels, schools, and commercial/governmental buildings). Data were collected via a survey tool that was specifically designed for this purpose. Although mostly common amongst the four sectors, certain sections of the survey tool were sector specific as it relates to water and energy consumption behaviors, and awareness and attitudes towards saving and conservation.

All data were analyzed using frequency analysis which was done both or the entire sample and four each sector alone. The results presented in this report are for the entire sample, whereas the sectors results are included in the Appendix. The size of the sample is not large enough to make statistically significant inferences about the sectors; however, it does provide adequate information about general trends in behavior and practices.

5.1 Main conclusion

The main conclusions drawn from the results of the analysis can be summarized as follows:

Generally, the practice of metering consumption via sub-metering in order to identify the key consuming points/processes within an establishment is quite low with only a third of the sample performing such practice for water and/or energy consumption.

The conduct of regular (or even irregular) audit procedures does not seem to be a common practice amongst large consumers. Only half of the sample performs some kind of audits to identify potential for savings. Furthermore, the majority of those entities have the audits performed by in-house staff. With the lack of information about the qualifications of those staff it is hard to conclude whether the quality of those audits is up to standards and whether they are performed properly. The majority of the sample was not aware that there are entities that specialize in providing services related to water and energy audits.

Nearly two thirds of the sample indicated that audits are performed periodically, while the remainder of the sample indicated that they are conducted sporadically. Also, a significant proportion of the entities that do conduct audits do not document the results of the audits, thus, lack a reference for M&E activities.

Improving the monitoring and evaluation activities seem to be the most common findings of the audits conducted amongst large consumers. Recommendations related to technology and saving devices were found to be less frequent.

Almost one quarter of establishments have had their facilities audited indicated that the recommendations of their audits are not implemented, and when such recommendations are implemented, it is mainly based on the decision of the top management rather than the specialized technical staff.

Only a small percentage of large consumers practice solid waste segregation and/or recycling in their facilities. The attitude towards this was generally found to be discouraging with a significant portion seeing no need for it.

A little under one half of the sample underestimate the extent to which Jordan relies on imported energy or do not know the extent to which Jordan relies of imports on energy. However, encouraging proportions of the sample identify renewable energy as a main source of energy for Jordan in future years.

There is an acceptable level of awareness on conservation and related efficiency practices. The importance of behavior is relatively high; however; only general behavioral practices were identified rather than specific practices that could help promote conservation.

Awareness in the area of water scarcity and water resources seems to be better than that in energy and power. This was evident from the higher proportions of correct answers given on general knowledge areas related to the sector. This is indicative that previous outreach and awareness efforts have had an effect in terms of increasing awareness on the problem itself. This was also evident in the frequencies of responses given by the interviewees when asked to name the main water resources in Jordan. Again, the majority of the sample interviewed was quite aware of what the main sources of water are and groundwater and wells were amongst the highest selected resources.

Unlike the inquiry related to energy, the majority of respondents indicated that WSDs was the top practice for water saving, again emphasizing that previous awareness programs such as WEPIA have been successful in increasing awareness in this regards. "Monitoring and Follow up" is also viewed here as a means for conservation, but given the lower ratios of entities that perform sub-metering and audits, identifies an area that needs to be addressed in outreach efforts.

Awareness on aspects of groundwater was quite impressive with the majority realizing the issue of over abstraction and the main causes for pollution of groundwater resources.

There does not seem to be a strikingly obvious trend related to gender's relation to commitment to water and energy conservation.

Another encouraging finding is that a high percentage of respondents indicated that in case they identify a potential for savings in an establishment, it is reported to the top management in an entity. While encouraging in the sense that it reflects a sense of wanting to save, it is discouraging that the middle management levels often does not have the authority to decide immediately on such action.

Only one third of the interviewed sample was aware of governmental programs in coordination with donors and other funds that finance and support the utilization of renewable energy such as solar energy. However, only a third of those establishments indicated that they had benefited from such programs. In other words, despite familiarity with such programs, the level to which they are utilized is low.

The preferred modes of communication to provide information related to awareness and education in the area of conservation and efficiency are the internet and specialized training courses. The main incentive identified to promote the utilization of saving technology were subsidies on equipment and the performance of facility audits.

5.2 Recommendations

Based on the results of the analyses and the conclusions made above, the following presents the study team's main recommendations to the PAP program in terms of the key areas that have to be focused on in any outreach/education program that is development and implemented in the subsequent phases of the project. These recommendations do not attempt to identify activities to be undertaken by the project, rather, they identify the key areas that need to be focused on in any awareness and outreach activity.

There still is a need to promote and increase awareness related to saving devices both for water and energy. Such efforts should not only promote aspects of conservation and efficiency, they should also promote the importance of periodic water and energy audits and the importance of conducting them in order to keep relevant staff within a large consuming entity aware of their consumption trends and areas of high consumption. It is believed that awareness of the problem would trigger creative and innovative solutions to optimize consumption.

Increasing awareness amongst business owners on the importance of performing audits, implementing their recommendations, and enabling the relevant staff within an organization to make such decisions. The key incentives that were identified by the interviewees as a means to promoting such behavior included improving awareness and allocation of funds for this purpose.

Efforts are needed to promote the concept of sub metering in order to identify high consuming points within an enterprise, and the periodic conduct of audits in order to remedy such high consuming points.

Promoting the concept of solid waste segregation and recycling, and promoting the concept of in-house segregation. Both are areas that could be tackled by the subsequent phases of the PAP program. With the lack of information on the capacity of staff to segregation/recycling of solid waste, there might be a need for increasing awareness on the principles of solid waste handling and segregation. This warrants further investigation by the PAP program.

Awareness on the importance of recycling of solid waste seems to be rather low as the majority of respondents that do not recycle attributed that to low need for it. This also identifies an area that needs to be explored by the PAP program in order to address this issue via their upcoming awareness and education programs.

There is a need to increase awareness on the extent to which Jordan relies on imported energy sources, and more importantly, the economic and financial burdens that those imports place on the national economy.

Another area of emphasis for the PAP project is in terms of raising education and awareness related to technology and common applications to increase efficiency. Higher awareness targets should be set for the people of Jordan in terms of increasing their awareness on advanced technology at all levels and in all sectors.

Promoting the methods by which savings could be achieved. In other words, significant portions of large consumers are convinced that savings could be achieved, therefore; only minimal efforts will be needed to "convince" large consumers of the possibility of cutting cost. The awareness effort has to be on helping them achieve those savings.

Monitoring and Follow Up is seen as "enforcement" like manner. This clearly identifies an area of awareness that the PAP program should focus on, which is to promote the concept of sub-metering to help decision makers continuously monitor consumption within different areas of an establishment, and the periodic conduct of water and energy audits.

Promoting the concepts of operating cost versus capital cost when it comes to procurement of saving technology and devices. While saving devices' initial cost may be higher, it has been proven that their operating cost is significantly cheaper and the additional cost in investment is recovered through savings in a relatively short period of time. PAP should focus on this concept and promoting a better understanding of cost recovery and OPEX versus CAPEX analysis for decision makers at the larger establishments.

Increase awareness on the importance of authorizing the relevant technical staff at an establishment to implement saving strategies. This could be approached form an angle of the potential savings that could be wasted during the time needed to obtain a GM's approval for procure or implement a conservation strategy identified by the relevant technical staff at an establishment. This is especially true that the majority of respondents indicated that management does take their recommendations seriously. However, it is believed that significant amounts of time could be saved if the technical staff were able to immediately decide on the implementation.

There is a need to further explore the levels of knowledge on government/donor funded incentives to promote the use of renewable, assess the efforts undertaken by such programs to reach out to potential beneficiaries, and determine necessary capacity building needs for large consumers that would enable them to utilize such programs.