SEM-SEM

Co-funded by the Erasmus+ Programme of the European Union

Smart Control Systems for Energy Management

Erasmus + #: 561703-EPP-1-2015-1-UK-EPPKA2-CBHE-JP

A World Wide SURVEY

On

Existing Master Degrees and Courses offered in the field of

Smart Control for Energy Management

Automation Mechanical Systems, and Management and Control Systems.

Part 2

WP-2 (Training Course Survey + Industrial Questionnaire)

Prepared by

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1. Project Overview:

During the last few decades, the problem of energy saving is a worldwide theme. However, it is a new trend in MENA region as the energy cost is increasing rapidly due to the governments corrective actions for better economy. Most of the industrial, domestic and tourism societies are trying to reduce their energy consumption by managing their energy consumption behavior. Motivated by previous demand for energy management, we are proposing to introduce a new professional master degree to manage and control the energy consumption for smart environment, also to increase the presence of specialized cadres in the energy management branch. Smart environment may be integrated in Power Stations (thermal and renewable), Industrial Plants, hotels, houses...etc.

This project is to deliver three main objectives:

Firstly, a master program serving the area of energy management using smart environment, in addition to an embedded professional engineering degree. ***Secondly,*** establishment of a Transfer Technology Center (TTC) to transfer the knowledge triangle of education-innovation-research in area of energy as well as for develops engineering and technicians, and ***finally*** providing a group of training courses in the field of smart control systems and energy management that should serve engineers and technicians as well

New MSc program of energy management system will be between Egyptian, Jordanian and European Universities partners. MSc program is divided into two modules: **1) Automation Mechanical Systems,** and **2) Management and Control Systems**. The two modules will be designed for developing the top two levels of automation pyramids **(i.e. Manufacturing Execution System and Enterprise Resource Planning)** which are not available until now in any of other higher education programs at Middle East. The MSc degree curriculum shall be developed according with the Bologna Convention (3 cycle structure, ECTS, and degree recognition).

The **Automated Mechanical Systems** will deliver graduates with the skills of evaluating the performance and efficiency of current and future energy systems. They will be able to design and

construct new sustainable energy systems. They will have the skills to evaluate the integration of wireless communication, sensors, actuators and networking to updated equipments used at their working processes.

The **Management and Control systems** will develop engineers with knowledge of different control systems like: Intelligent control, automatic control, behavior modeling and behavior fusion. These graduated will be able to manage and optimize the operation between different control systems. The main aim of control and optimizing the industrial operation is to reduce the energy consumed by their working processes.

As a result, this master will provide a lifelong learning for research cooperation on PhD level between partners and improve the standard of research in the field of energy management.

The Transfer Technology Center (TTC) will be supporting the research and training cooperation between both the Egyptian partners and the well established technology center in Staffordshire University. **The center will train engineers and technicians to be efficient Energy Editors.** The center will be responsible for bridging the knowledge triangle of education-innovation-research between the academic and industrial societies.

2. Specific Project Objectives:

M.Sc program will be tackling a problem found and raised by the industrial society, which will be new and innovative.

1. The main aim is to reduce the energy consumed by their working processes.

M.Sc program is divided into two modules:

A- **Management and Control Systems**

- It will develop graduate engineers with knowledge of different control systems.
- These graduated will be able to manage and optimize the operation between different control systems.

B- **Industrial Mechanical Systems**

- It will deliver graduates with the skills of design and construct new sustainable energy systems.

- Graduates will be able to evaluate the performance and efficiency of current and future energy systems.
- Graduated will have the skills to evaluate the integration of sensors, actuators and networking to updated equipment used at their working processes.

2. Establishment of a Technology Transfer Centre (TTC) which supports the research and training cooperation between the Egyptian, Jordanian partners.
   - The centre will be responsible for bridging the knowledge triangle education-innovation-research between industry and academia.

3. Project Partners:

EU Partners:

- Staffordshire university (SU)(UK)
- University of OVIEDO (UNIOVI)(Spain)
- Instituto Superior Technico(IST) (Portugal)
- University of Cyprus (UCY)(Cyprus)
- Eurotraining Educational Organization (Greece)

EG Partners:

- Arab Academy for Science Technology and Maritime Transport (AASTMT)
- Ain Shams University(ASU)
- Nile University (NU)
- Helwan University (HU)
- Alexandria co. For Seeds Processing and Derivation (ALEXSEEDS)

JOR Partners:

- University of Jordon(UJ)
- Mutah University (MU)
- Jordon University of Science and Technology (JUST)

4. The Multi-Stage Approach:

The following table summarizes the project multi-stages which are divided into Work Packages (WP):

Title		Total Duration	
		Start date (Month/Year)	End date (Month/Year)
WP1	Conducting surveys on similar Regional and international master	M1/ One	M3/ One
WP2	Conducting a survey on national and regional industrial needs	M2/ One	M4/ One
WP3	Development and establishment of new master Courses	M4/One	M6 /Two
WP4	Tailoring of new professional training courses	M1/ Three	M6/Three
WP5	Development of Manuals for training and labs	M5/One	M12/Two
WP6	Training of EG and JOR teachers on the Masters courses	M12/One	M1/Three
WP7	Training of EG/JOR trainers on professional training program	M6/Two	M1/Three
WP8	Applying to Egyptian and Jordanian supreme council of universities for accreditation of the master program	M7/Two	M1/Three
WP9	Administrative work of the Double Degree	M7/Two	M12/Three
WP10	Dissemination of the Project	M1/One	M12/Three
WP11	Project Sustainability	M1/One	M12/Three
WP12	Monitoring and Quality Control	M1/One	M12/Three

WP13	Project Management	M2/One	M12/Three

5. WP2 survey report:

The objective of this survey is to check the availability of any training courses focusing on Smart Control Systems for Energy Management in Academic or training Institutions in the EU, Middle East, USA and Asia and gather as much as possible the available detailed information about such courses offered within these institutions.

The Academic partners will share the detailed information about similar courses implemented in their institutions and in the region they are responsible to survey. Each partner should also present detailed information about training courses offered within these institutions that may support the field of Smart Control Systems for Energy Management. The goal of this process is to help the consortium to define the topics and details of each of the training courses to be developed within the Erasmus project.

The contact persons are responsible for delivering the required information by December 30th, 2015 in order to prepare the full report before the deadline (February 20th, 2016) proposed for the kick-off meeting. AAST will be responsible for the compilation of the report as well as gathering similar information from non-partner institutions in its specified region.

6. Regions and Responsibilities:

The following table indicates the assignments of regions to partners in Consortium

Region	Responsible Partner
Africa	HU
North Africa	AASTMT
North of EU	SU
West of EU	IST
East of EU	EURO Training
South of EU	UCY
South America	UNIOVI
North America	NU, ASU

Asia	UJ, MU, JUST

7. WP2 Training Courses Survey Results:

WP2 was done using two performance indicators, first is a survey regarding any existing **training courses** in the fields of smart control, energy management and renewable energy. The second indicator is a **questionnaire** directed to industrial sector in order to investigate their needs for smart control in energy management.

7.1 Training Survey Results:

7.1.1 North Africa:

The first part for WP2 was a survey made for North Africa about training courses related to our topic. The survey has been done using mainly Internet sources and by the help of different companies and universities. The following table presents the training courses in North Africa region which are found to be related to the field of smart control and energy management.

Course Title	Provider	Country
Active Energy Efficiency Using Speed Control	Schneider electric	Egypt
Building Controls I: An Introduction to Building Controls	Schneider electric	Egypt
Building Controls II: Control Sensors	Schneider electric	Egypt
Building Controls III: Introduction To Control Loops	Schneider electric	Egypt
Building Controls IV: Two Position and Floating Responses	Schneider electric	Egypt
Building Controls V: Proportional and PID Responses	Schneider electric	Egypt
Building Controls VI: When To Use Each Response.	Schneider electric	Egypt

Building Controls VII: Interactive Illustration Of PID Response	Schneider electric	Egypt
Building Controls VIII: Controllers and Controlled Devices	Schneider electric	Egypt
Energy Efficiency with Building Automation Systems I	Schneider electric	Egypt
Lighting III: Lamp Families: Incandescent and Low Pressure Discharge	Schneider electric	Egypt
Lighting IV: Basic Lamp Families: High-Intensity Discharge & LED	Schneider electric	Egypt
Thermal Energy Storage	Schneider electric	Egypt
Strategic Energy Planning	Schneider electric	Egypt
ISO 50001:2011 EnMS Foundation Course Iso Training Nouakchott - Energy Management Systems Nouakchott	The Knowledge Academy	Mauritania
Effective Energy Management In New & Existing Buildings	The Knowledge Academy	Mauritania
Energy Management System (BS EN 16001/ISO 50001 Development and Implementation)	EuroTraining	Morocco

7.1.2 South Africa:

Regarding South Africa region, EIT was found to be one of the best institutes in Europe and global wise. It provides these services of training at South Africa Branch to those interested in Africa. These courses offered in South Africa region are listed in the following table.

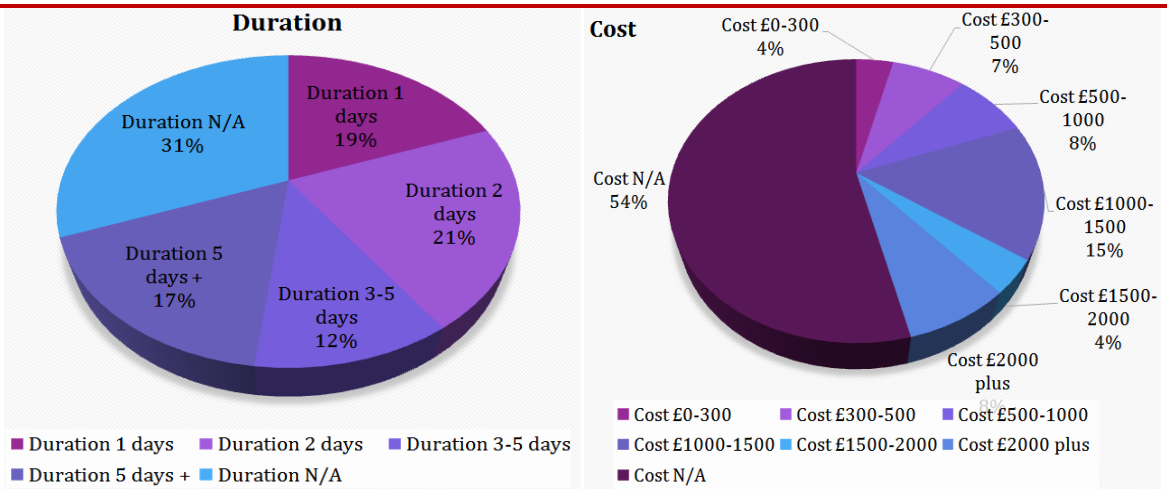
Course Title	Institute	Duration
Professional Certificate of Competency in Allen Bradley Controllogix / Logix5000 PLC Platforms	South Africa EIT	3 M/6h/d/12 Mod
Professional Certificate of Competency in SCADA/VIJEO	South Africa EIT	3 M/6h/d/12 Mod

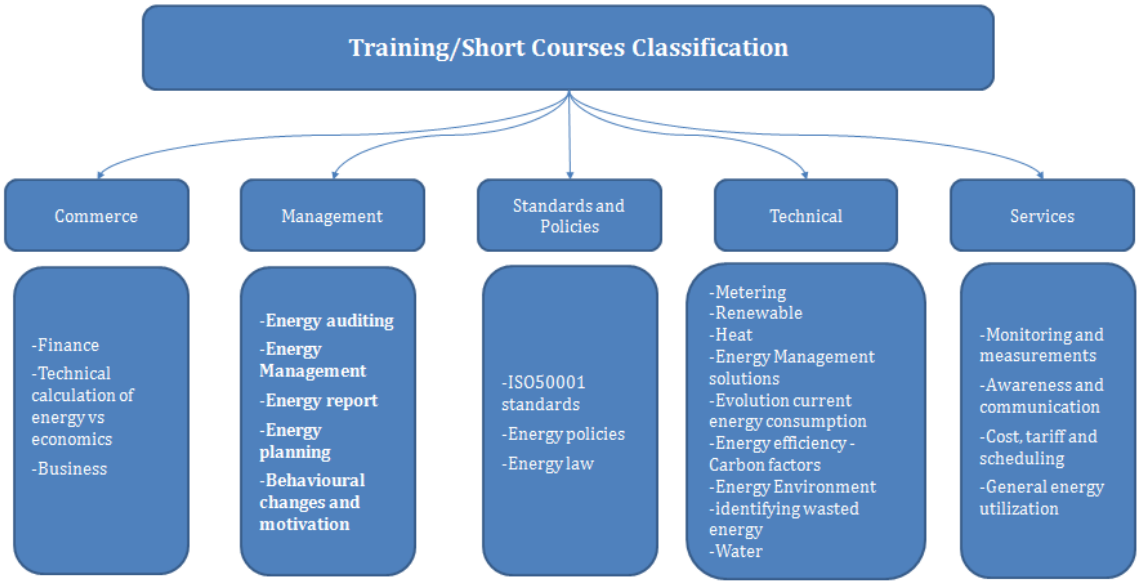
Professional Certificate of Competency in IEC 61850 Based Substation Automation	South Africa EIT	3 M/6h/d/12 Mod
Professional Certificate of Competency in Instrumentation, Automation and Process Control	South Africa EIT	3 M/6h/d/10 Mod
Professional Certificate of Competency in Machine Vision Applications in Industry	South Africa EIT	3 M/6h/d/12 Mod
Professional Certificate of Competency in Practical Boiler Control and Instrumentation for Engineers and Technicians	South Africa EIT	3 M/6h/d/12 Mod
Professional Certificate of Competency in Process Control Incorporating Loop Tuning and Advanced Control Strategies	South Africa EIT	3 M/6h/d/12 Mod
Professional Certificate of Competency in Programmable Logic Controllers (PLCs) & SCADA Systems	South Africa EIT	3 M/6h/d/12 Mod
Graduate Certificate of Renewable Energy Technologies	South Africa EIT	3 M/6h/d/12 Mod
Professional Certificate of Competency in EE (CEE)	South Africa EIT	3 M/6h/d/12 Mod
Professional Certificate of Competency (HVAC)	South Africa EIT	3 M/6h/d/12 Mod
Certificate program Solar Energy Engineering	S. Africa Freiburg Univ.	3 M/6h/d/5 Mod
Introduction to Industrial Automation and Control	South Africa EIT	4.5d/6h/d/12 Mod

7.1.3 Northern Europe:

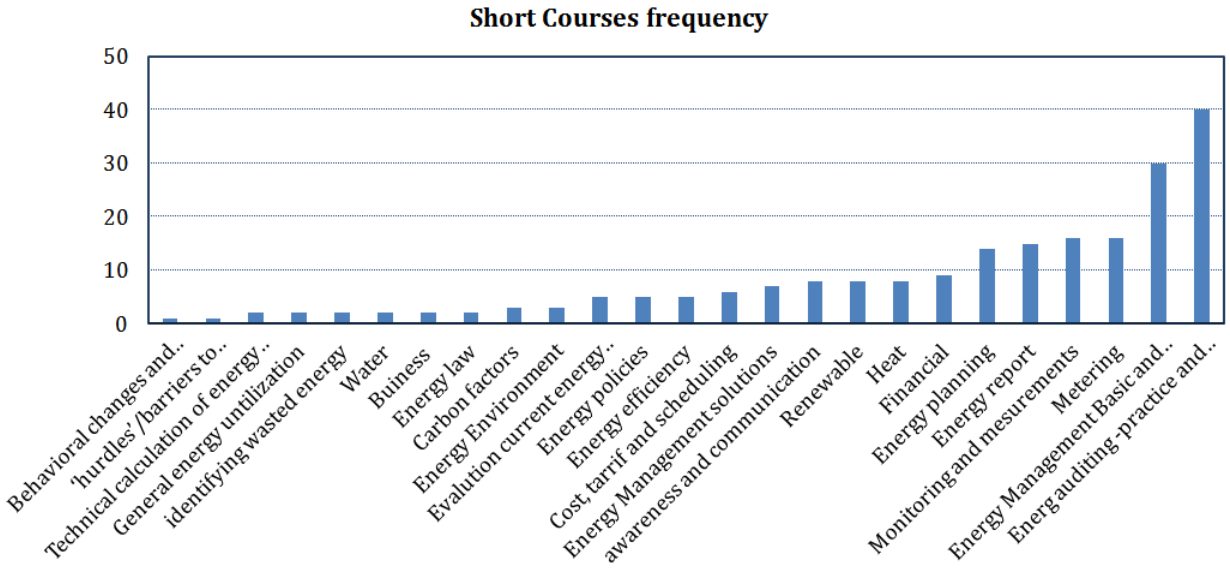
The following table presents countries providing training courses related to smart control systems and energy management. According to this survey all courses were found in only two countries in the region of Northern Europe which are United Kingdom and Ireland.

	Country	Courses			Total
		Classroom	Online	In House	
1	UK	36	7	2	45
2	Denmark	0	0	0	0
3	Estonia	0	0	0	0
4	Finland	0	0	0	0
5	Iceland	0	0	0	0
6	Ireland	7	0	0	7
7	Latvia	0	0	0	0
8	Lithunia	0	0	0	0
9	Norway	0	0	0	0
10	Sweeden	0	0	0	0
					52





The following bar chart shows the short courses frequency per academic year, as noticed the courses related to energy management and auditing show a high frequency > 20 times per year which represent the high demand of these fields.



7.1.4 Western Europe:

This section shows the training courses found in Western Europe region which are related to smart control systems and energy management.

Course Title: Introduction to smart grids & Communications in smart grids *"ABB university"*

- Understand the importance of development of smart grids in future energy.
- Know different areas of application of smart grids.
- Obtain technological vision of communications in areas of smart grids.
- Know most relevant security aspects.

Course Title: Smart Grids:

This course provides a complete view of the smart city, reviewing the concepts and models of intelligent city, rehabilitation of buildings and districts with low energy consumption, infrastructure and mobility, and the role communications systems and information. "*Spanish club of Energy*"

Course Title: Renewable Energy Training

This training course provides the participants with the latest analysis, trends in renewable energy, low-carbon energy policy and planning. Leading experts from the IEA and other institutions are presenting recent developments from the Latin America region and around the world. Participants will become familiar with a range of recognized methodologies and tools for analysis and policy-formulation at the national level for medium to long-terms. *"Structuralia"*

Another training program was found in **Portugal** where Participants should get a broad view of technical basics and learn how to facilitate this knowledge to create innovations. participants will also know how to develop potential business ideas, based on technology and research findings and use the skills which are needed to start and run an own business sustainably.

The topics provided in this training course are:

- Power Systems
- Liberalized Energy Markets
- Energy Informatics
- Communication and Security Mechanisms
- E-Mobility and Smart Metering
- Control Systems in Smart Energy
- Energy Storage
- Business Opportunities in Smart Energy Systems
- Technology Strategy
- Intellectual Property Protection
- Market Segmentation, Marketing & Sales
- Business Model Generation
- Financing & Investment
- Financial Planning
- Elevator Pitch Presentation

7.1.5 Eastern Europe:

The recast Directive on the Energy Performance of Buildings (EPBD) stipulates that by 2020 all new buildings constructed within the European Union after 2020 should reach nearly zero energy levels. This means that in less than one decade, all new buildings will demonstrate very high energy performance and their reduced or very low energy needs will be significantly covered by renewable energy sources.

Technically every architect should be able to build an nZEB (**Nearly Zero Energy Building**); however in practice that requires **keeping up with standards and requirements that have to be fulfilled to build at nZEB levels**.

Some attempts have already been made within the EU to develop training and certification schemes for nZEB professionals, all of them by NGOs and none of them has become official. Some countries have shown significant commitment to the EU targets and have focused on nZEB prior to the others (AT, CZ, DK, FI, FR, GE, CH, UK). **In most of the countries in South Europe though, there is still a lot to be done.** In EL, CY, ES, PO, for example, very few steps have been made even towards the definition of low energy buildings and their specifics.

The nZEB training modules are developed and delivered by EUROTRAINING in the context of the EU project : "*nZEB training in the Southern EU countries – Maintaining building traditions*"

- **Training modules:**

Ten (10) training modules:

Eight (8) training modules for Architects, Engineers and Municipality Employees in the South EU countries. The modules are based on recognized and successful professional development courses.

Two (2) special training modules for construction management and field supervision of nZEB as well as for training the decision makers in the preparation of appropriate funding schemes and other incentives for promoting nZEB.

- **Basic module:**

The basic module presents the South EU nZEB concept and the principles of a near zero energy construction: applied physics basics, thermal insulation, materials and construction. Furthermore, the basic module presents the requirement for the minimum percentage of renewable energy sources of nearly Zero-Energy Buildings (nZEB), according to existing EU definitions, standards and roadmaps (such as the Energy Performance of Buildings Directive-EPBD) or local regulations and guidelines. Active renewable energy supply systems are presented such as solar systems, PV systems, heat pumps solutions, biomass solutions, pellet boilers etc. Finally, a practical workshop for the trainees is included. The total duration of this module accounts to approximately 20 hours.

- **Advanced module**

The advanced module deeper develops on various arguments of nZEB design and building, including technical physics with respect to humidity, building materials, construction techniques, measurement techniques, ventilation and use of renewable energy sources. The passive use of renewable energy (e.g. passive solar gains) is also presented. It includes also a practical workshop for the trainees which will provide hands on experience on how to use instruments to perform energy audit in the nZEB design and building. The duration of this module is estimated in about 40 hours.

- **Thermal Performance of Building Envelope**

This module focuses on the drivers, benefits and assessment of the performance of building fabric– this includes information on the evaluation and calculation of thermal performance, with some practical exercises. Sub-modules will include:

- Subject overview
- U-values
- Thermal bridging
- Impacts of building fabric
- Fabric performance and ZEBs
- On-site issues
- Commissioning of building fabric

- **Thermal Comfort**

This module focuses on the thermal environment of buildings through presentation of concepts and practical exercises. It will include sub-modules on applicable standards; the definition of thermal comfort for a human body and how to model it; factors and values that form the perception of thermal comfort; different ways of thermal comfort assessment according to international standards; optimal value ranges for thermal comfort depending on the level (category) of the requirements of the space; the users' expectations and adaptation; adaptive models of thermal comfort; acceptable range of temperatures; thermal comfort models and temperature range and their effect on energy performance of buildings; thermal comfort monitoring and measurement.

- **nZEB framework module and local architectural regulations**

This module aims at presenting to architects, engineers and municipality employees the nZEB approach for the verification and certification of nZEB in the target countries. Emphasis will be given on the special provision for building traditions and local architectural regulations as well as the user acceptance of technical solutions to nZEB. The training duration is 30 hours. It is addressing the needs of engineers, architects and municipality employees.

- **simulation and design software module**

This module presents to the participants a simulation tool for the design of nZEB and energy efficient buildings. Building energy simulation tools provide the ability to consider energy efficiency measures in buildings by predicting their behavior under given climatic conditions and usage patterns. These tools help to predict building energy consumption and give the opportunity to compare different design options. The module includes exercises with different simulation tools.

7.1.6 Southern Europe:

Institution	Training Course	Description	Cost
Frederick University, Cyprus	Control, Quality and ISO	The importance of Control, quality and ISO Technics of use of control, quality and ISO and their structure	€ 450
The knowledge Academy (global)	ISO 9001	Training and testing on ISO 9001	€5095
University of Cyprus	PV System Inspection and Performance Testing according to EN 62446.	5 /2day long. Theory and hands on. Theoretical and practical aspects for documentation, commissioning and inspection of grid connected PV systems according to IEC 62446.	€600/ €300

Only three courses were found which may be related to smart control

7.1.7 South America:

NO institute or university was found to provide training courses related to the topic of Smart control systems for energy management in this region.

7.1.8 Northern America:

The assumption of the course duration mentioned in the following table is based on 3 to 5 hrs/day sessions.

Course Name	Duration	Institute
Renewable Energy Sources and the Smart Grid	4 days	The Energy Providers Coalition for Education
Operation Considerations for the Smart Grid	4 days	The Energy Providers Coalition for Education
Impact of the Smart Grid	4 days	The Energy Providers Coalition for Education
Design of Smart Grids and Their Integration into Electric Vehicle and Smart Building Infrastructure	4 days	Smart Grid Energy Research Center
Smart Grid 101	2 days	Energy Management Institute
Smart Grid Training Course	3 days	General Electric
Distribution Automation PDEC655	5 days	Siemens
Smart Grid Training	3 days	TONEX
Understanding Grids, Smart Grids & Micro-grids.	2 days	Green power academy

7.1.9 Asia:

The following table summarizes the training courses found in Asia Region, which found to be related to our ongoing project.

Course Title	Duration	Institution	Country

Energy Management ISO 50001 Lead: Auditor course	5-days	DNC	India
CEP Course on Energy Management	5-days	IITB	India
Energy Management Systems Auditor/ Lead Auditor	5-days	Intertek	Japan
Energy Management System Lead Auditor Course:	5-days	Excelledia	Qatar
Introduction to ISO 50001 Energy Management System	1-day	BSI	Indonesia

7.2 Conclusions of Training Course Survey-WP2:

7.2.1 South Africa

- In Africa, there are many training programs in the two areas dedicated to our survey study.
- Most of these courses are short intensive courses of 2-5 days.
- South Africa Country is dominating the training activities.
- EIT branch in South Africa is very powerful and offering professional Training Programs for all African Countries in many subjects related to SEM-SEM Objectives
- They are offered to engineers and non-engineers including managers in power management. Some courses are online courses.
- In industry, courses in smart energy management systems are more common. There are several organizations providing specialized courses in this field.
- Lake of training courses in the field of smart energy management

7.2.2 North Africa

- A variety of training courses were found in North Africa countries like Egypt, Morocco, and Mauritania.
- The courses are mainly related to control systems and energy management as separate topics.
- None of these courses is directly related to Smart control systems for Energy management.

7.2.3 North Europe:

- Few Organization run courses in multiple country. That count based on Headquarter
- 34 different organization offered 52 courses
- 26 courses are run in multiple country
- 1-3 days courses are offered more than 50%
- Most cost range are £1-1.5 K
- More than 50% cases, prerequisites not mentioned
- More than 80% cases Course topic are define
- More than 80% Training/Courses offered in classroom
- Target group are almost evenly distributed

7.2.4 Western Europe:

The training courses found are designed for people who need to increase their knowledge of concerning Smart Grids, renewable energy and energy management. In this sense it is a very attractive to technical staff for electrical companies (transmission, distribution and generation), telecommunications and information and economic organization and institutions.

There was a training course provided to Portuguese in **Karlsruhe, Germany**. The training title is Smart Energy System and Entrepreneurship Summer School. The training duration is 14 days and the contact hours are 9.5 hrs/day. The training is designed for master level, PhD students and all professionals interested in the field of smart energy systems and business development. The goal of the international summer school is to learn the basic knowledge in Smart Energy Systems (week 1) and Entrepreneurship & Business Development in the Smart Energy field (week 2).

7.2.5 Eastern Europe:

In Eastern Europe, EUROTRAINING is found as Vocational Training Center certified by the Greek Ministry of Energy that provides training and certification for energy auditors. EUROTRAINING has trained approximately 150 energy auditors.

In Greece obtaining the license of Independent Energy Auditor (IEA) requires an obligatory training and a qualifying exam. An energy auditor is a new job opportunity for all engineers.

Description of the training program:

- Training module 1: Introduction in the field of energy saving
- Training module 2: Study of energy efficiency at buildings
- Training module 3: Bioclimatic design of buildings
- Training module 4: Renewable energy resources
- Training module 5: Energy management and savings system s
- Training modules 6: Energy regulations in Greece
- Training module 7: Energy audits

7.2.6 Southern Europe:

Only three training courses were found to cover the southern Europe, which are related to our ongoing project of Smart control systems for energy management. This arise the need of more training courses in this field in order to cover the region of Southern Europe.

7.2.7 South America:

NO institute or university was found to provide training courses related to the topic of Smart control systems for energy management.

7.2.8 North America:

Most courses found are online courses which are not restricted by definite number of hours per day, but they are designed for about 12 to 15 total contact hours.

7.2.9 Asia:

Just five training courses were found in Asia region which are related to Smart Energy Management and control. This arise the need of more training courses in this field in order to cover the huge region of Asia.

8. Industrial Questionnaire Results (Market needs):

The following section describes the Smart Energy Management (SEM-SEM) questionnaire results. According to this questionnaire, there were 47 participants. Jordan has the largest participation with 57.4 %, Egypt in the second place with 36.2% and finally the other countries with 6.4%. This is shown in Figure 1

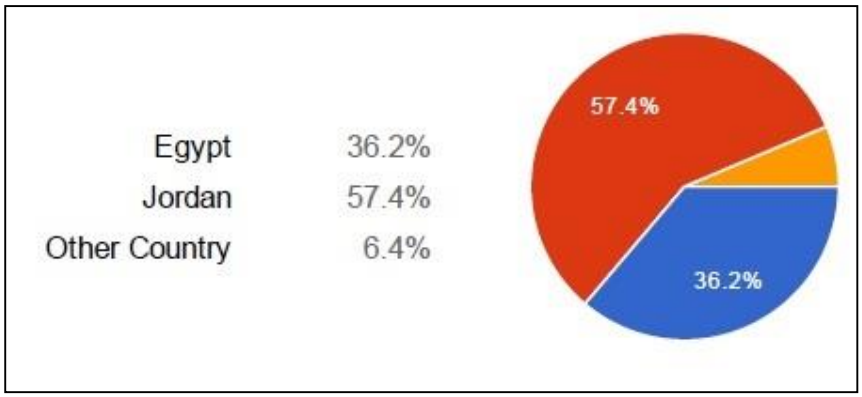


Fig. 1 shows percentage of participation in each country

These participants are coming from different industrial sectors with different facility sizes. 40.4% were working in a facility considered to be small in size (up to 50 employees), however, 17% claimed that their facility is considered to be medium in size (up to 250 employees) and 42.6 % said that their facility size is large (more than 250 employees). This is shown in figure 2.

Fig. 2 shows percentage of participation in each facility size

This questionnaire has showed that 40.4% of industrial sectors use the electricity as the only energy source. While, 38.3% and 21.3% go to Diesel and Natural gas. These percentages can be seen in figure 3.

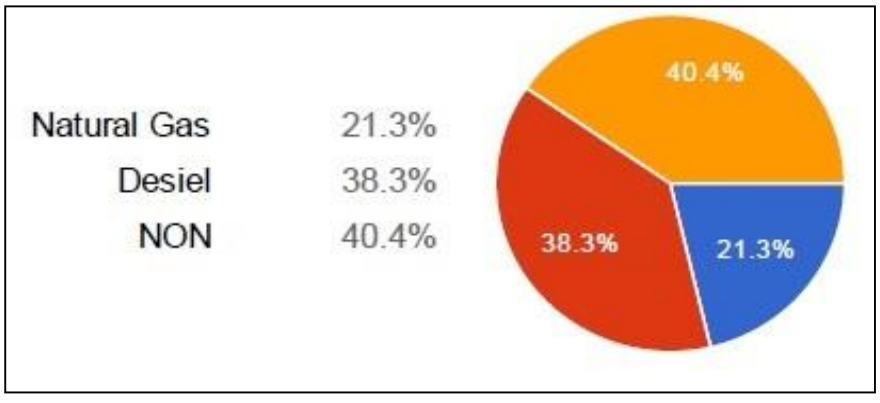


Fig. 3 shows the percentage of other the resources rather than the electricity

Figure 4 shows that only 53.2% of employees said that the facilities have an energy policy, but 44.7% of these facilities have energy policy objectives integration with building and refurbishment specifications as shown in figure 5.

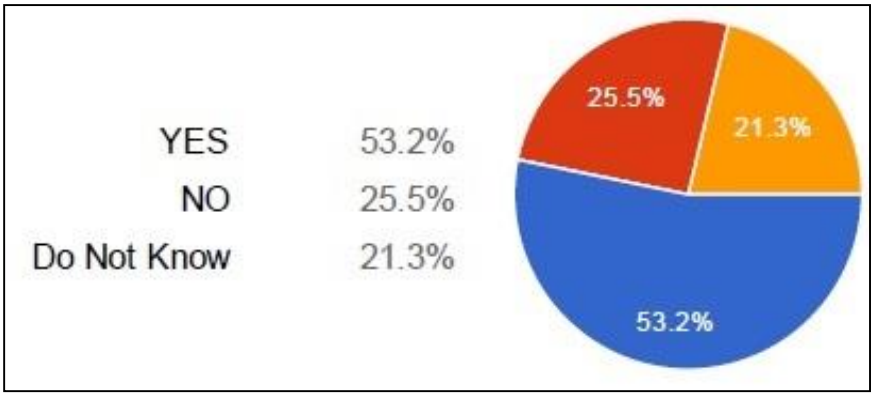


Fig. 4 shows the percentage of the facilities which have energy policy

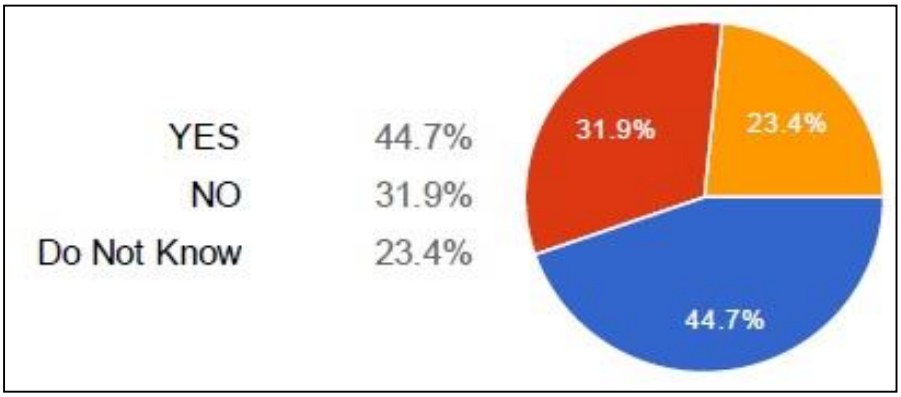
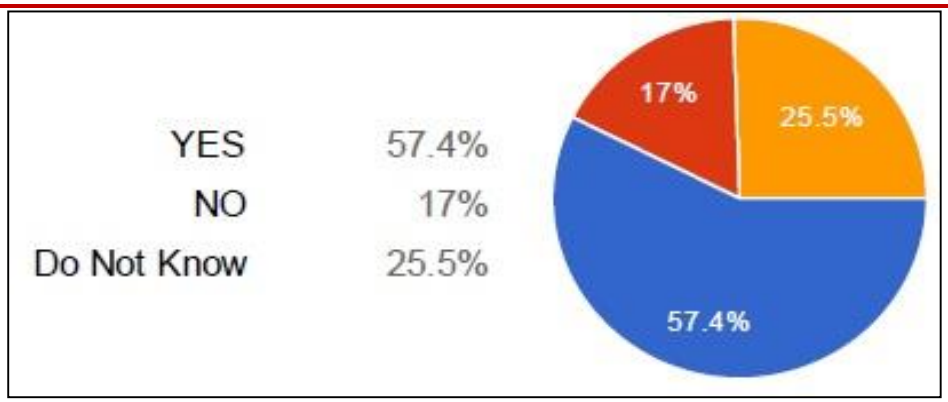
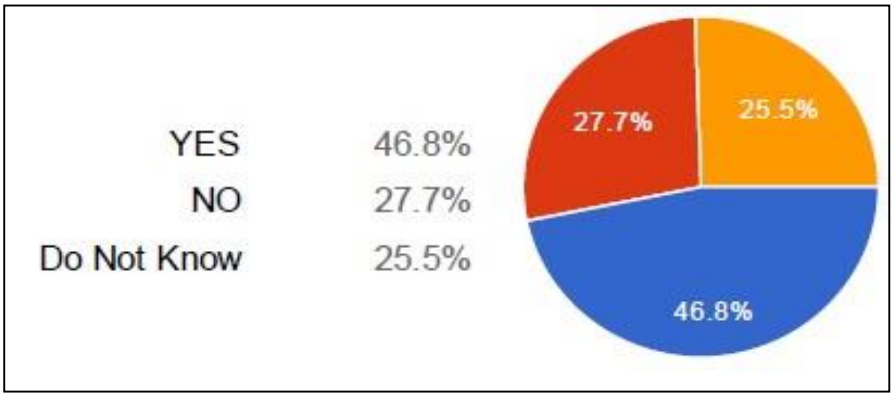


Fig. 5 shows the percentage of the facilities which have energy policy which integrates the building and refurbishment specifications.

In addition, 57.7% of employees claimed that these facilities integrate both the energy and purchasing policies, however, 17% said no and 25% said do not know. Concerning the integration between the energy policy objectives and the maintenance policy, 46.8% of the employees said yes, 27.7% said now and the rest said do not know. Figure 6 shows the integration between the energy policy of the facilities and purchasing policy. However, figure 7 shows the integration between the energy policy of the facilities and the maintenance.

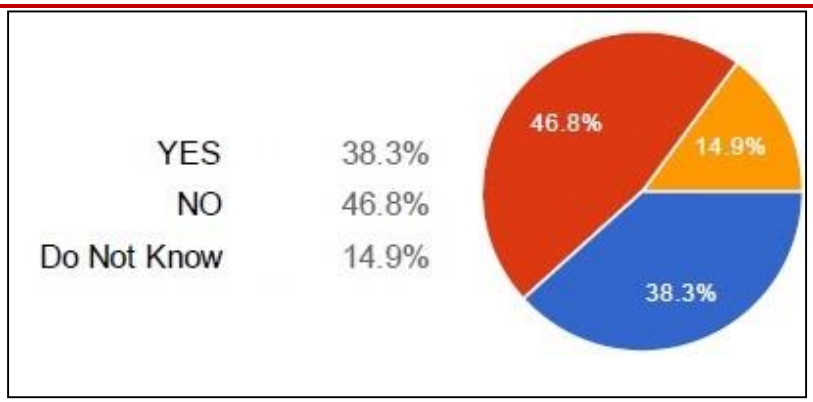


Figures 6 shows the integration between the energy policy of the facilities and the purchasing policy

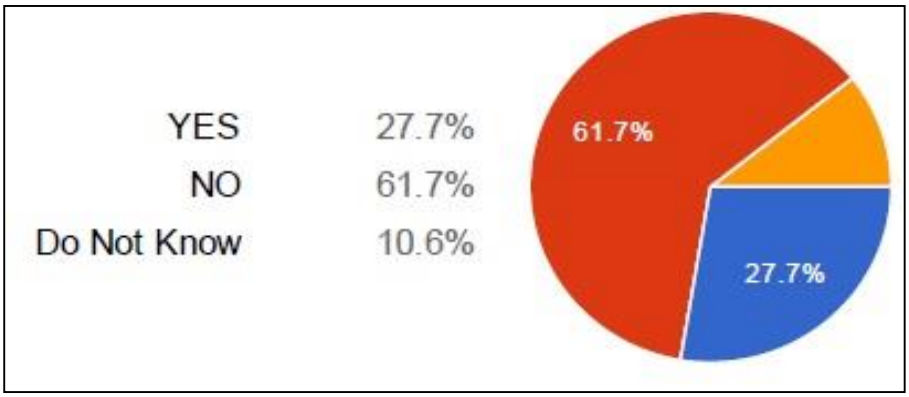


Figures 7 shows the integration between the energy policy of the facilities and the maintenance

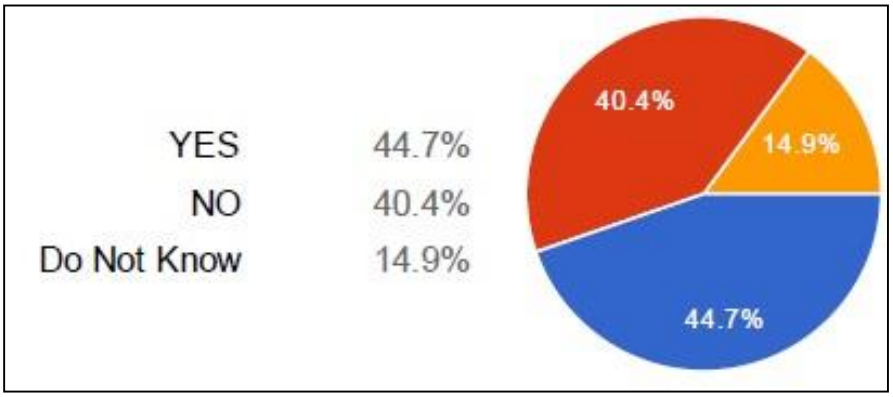
As for the energy committee for energy management 38.3% of the participants said that their facilities have this kind of committee, 46.8% said no and 14.9% said do not know. This is shown in figure 8 Also, when they were asked if there is a delegated energy manager for each sector in their facility, 27.7% answered yes, 61.7 % no and 10.6 % do not know. This is presented in figure 9. However, 44.7% of the employees claimed that there are energy audits in their facilities, 40.4% said no and 14.9% said do not know. Figures 10 shows percentage of facilities which have energy audits



Figures 8 shows percentage of facilities which got an energy committee for energy management

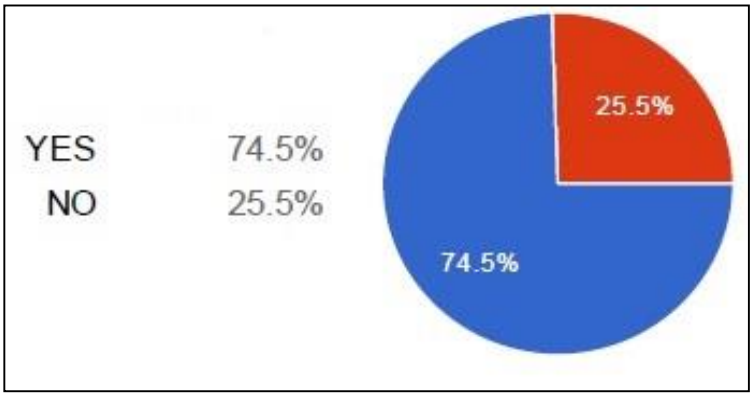


Figures 9 shows percentage of facilities which have a delegated energy manager for each sector

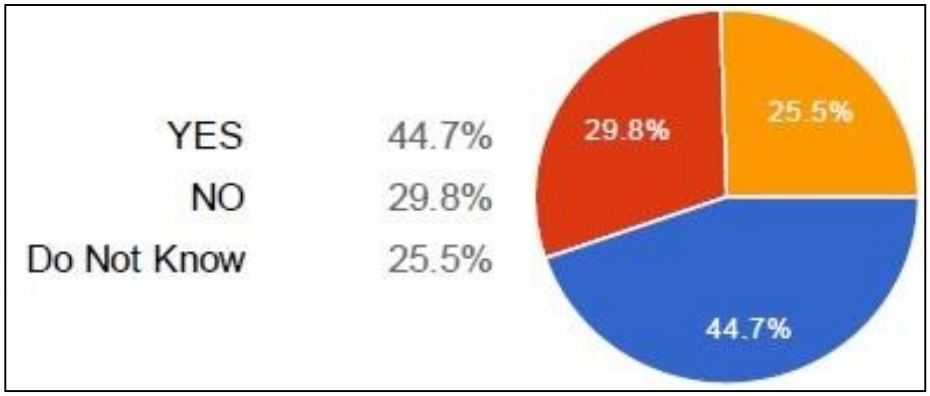


Figures 10 shows percentage of facilities which have energy audits

According to the data available, 74.5% of the participants monitor the trends in the energy consumption which is shown in figure 11. For the employment of the monitoring and targeting schemes, 44.7% of the employees answered yes, 29.8% no and 25.5% do not know. This is shown in figure 12.

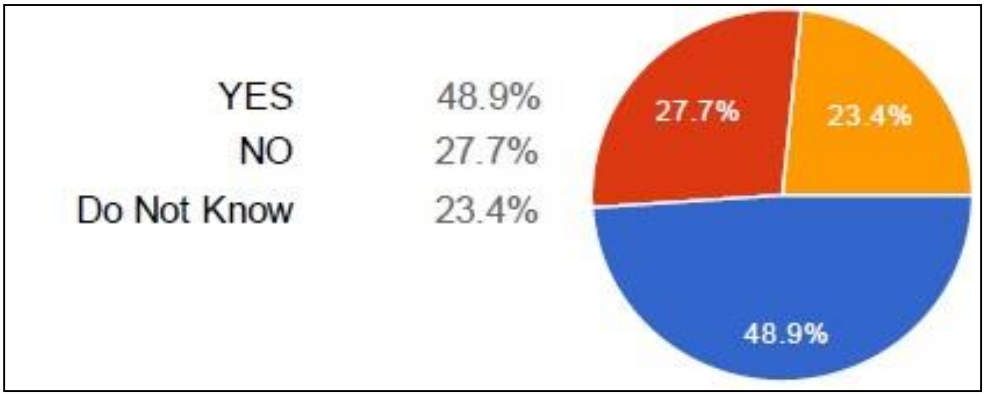


Figures 11 shows percentage of employees who monitor trends in energy consumption

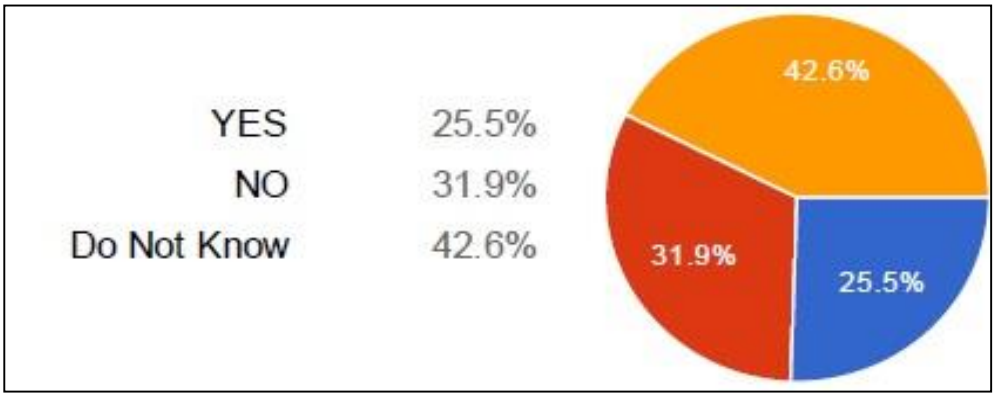


Figures 12 shows percentage of monitoring and targeting scheme employed

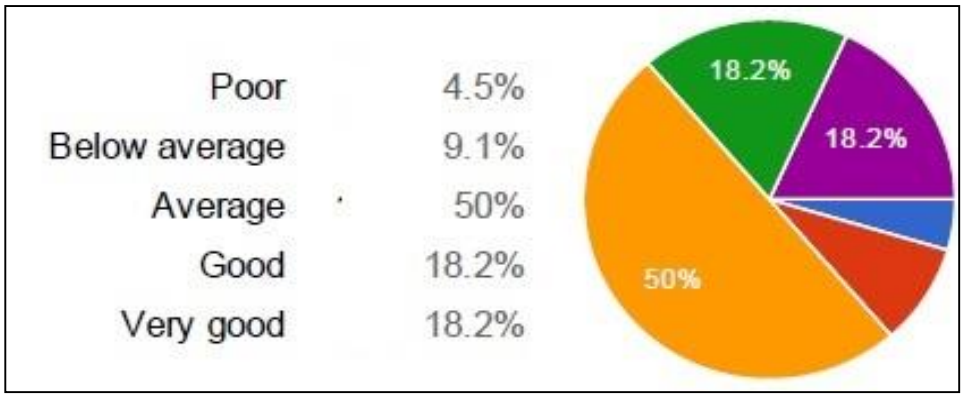
Moreover, 48.9% said that the energy consumption meet their targets in major buildings, 27.7% said no and 23.4% said do not know. This is seen in figure 13. In contrary, 25.5% claimed that the consumption is compared with sector benchmarks. This is shown in figure 14. While, 50% of those who claimed yes said that this is done with an average performance. Figure 15 indicate how well the institution performs on average.



Figures 13 shows whether energy consumption meet employee's targets in major buildings

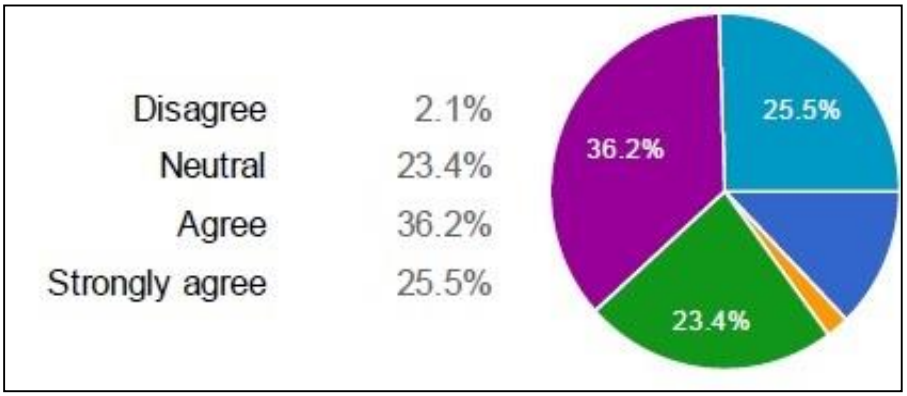


Figures 14 shows whether the consumption is compared with sector benchmarks



Figures 15 indicate how well the institution performs on average

Most of the Participants suggested that there are a wide range of energy efficiency measures that could be implemented in their facilities that would yield paybacks of less than four years at current energy prices. Only 2.1% of the participants disagreed with this statement. This could be seen in figure 16.



Figures 16 shows how much the participants agree or disagree with the suggested statement

The usefulness of each of the following information sources on energy efficiency opportunities is shown in table 1:

	Do not Use	Poor	Average	Good	Excellent
Personal within the facility	10.6%	6.4%	36.2%	38.3%	8.5%
Contacts in other facilities	6.4%	10.6%	42.6%	31.9%	8.5%
Energy manager groups/networks	8.5%	10.6%	31.9%	31.9%	17%
Professional association	12.8%	14.9%	34%	25.5%	12.8%
Technical conferences/seminars	12.8%	12.8%	36.2%	21.3%	17%

Energy supply industry	17%	4.3%	25.5%	34%	19.1%
Equipment suppliers	8.5%	4.3%	36.2	29.8%	21.3%
Other	34%	8.5%	46.8%	8.5%	2.1%

Each participant has indicated the extent to which his facility has implemented the measure by assigning them a number on a scale from 1 (not implemented) to 5(extensively implemented). This is shown in table 2:

	1	2	3	4	5
Power factor correction	25.5%	4.3%	29.8%	10.6%	29.8%
High efficiency office equipment	21.3%	19.1%	17%	14.9%	27.7%
High efficiency motors on motor replacement	15.6%	12.1%	21.3%	25.5%	25.5%
Use of variable speed drives (VSD) in pumps, fans and other applications	21.3%	12.8%	19.1%	23.4%	23.4%
Automatic switch off of fans & pumps when the equipment they serve is not in use	17%	17%	19.2%	17%	29.8%
Lighting controls integrated into Building Energy	14.9%	17%	27.7%	23.4%	17%
Use of photocell, acoustic or movement sensors	25.5%	19.1%	21.3%	17%	17%

Finally, the participants have identified the barriers to energy efficiency improvement. Table 3 shows the suggested reasons which prevent to have high energy efficiency opportunities.

	1	2	3	4	5
Technology inappropriate at this site	19.1%	27.7%	27.7%	27.7%	10.6%
Cost of identifying opportunities, analyzing cost	10.6%	12.8%	34%	29.8%	12.8%
Effectiveness and tendering	12.8%	8.5%	29.8%	27.7%	21.3%
Poor technology performance	14.9%	19.1%	27.7%	27.7%	10.6%
Other priorities for capital investment	6.4%	12.85	25.5%	25.5%	29.8%
Strict adherence to capital budgets	6.4%	8.5%	34%	23.4%	27.7%
Technical risk	17%	10.6%	31.9%	23.4%	17%
Lack of information/poor quality information on	12.8%	6.4%	36.2%	31.9%	12.8%
energy efficiency opportunities	2.1%	19.1%	27.7%	29.8%	21.3%
Energy consumption of purchased equipment	4.3%	12.8%	21.3%	36.2%	25.5%
Lack of technical skills	12.8%	10.6%	19.1%	29.8%	27.7%
Lack of staff awareness	8.5%	10.6%	25.5%	27.7%	27.7%
Departments not accountable for energy costs	14.9%	19.1%	19.1%	29.8%	17%
Energy objectives not integrated into Operating.	10.6%	6.4%	36.2%	34%	12.8%
Low priority given to environmental performance	10.6%	4.3%	27.7%	31.9%	25.5%
Lack of Energy manager	14.9%	14.9%	19.1%	27.7%	23.4%
Conflicts of interest within the organization	17%	8.5%	34%	23.4%	17%

9. General Conclusion of WP-2:

The report was conducted on two levels, firstly a worldwide survey about the energy management training programs, secondly an individual questionnaire to map the deficiencies and weakness related to energy management knowledge and awareness. More than 60% of the facilities do not have energy committee for energy consequently more than 70% do not have delegated energy manager. Around 55% of these facilities do not have energy audits. However, around 75 % of the employees in these facilities try to monitor their energy consumption at their facilities or individual homes. Such percentage reflects that these employees are ready for applying energy management systems at their facilities, on the other hand the facilities do not offer enough awareness or training courses for energy audit and consumptions. Half of the employees rated their facilities with AVERAGE in their energy performance.

Moreover, the questionnaire showed that the facilities do not hold enough technical seminars about energy management. In additional to the absence of communication between employees and energy managers regarding energy management issues, where it was rated below average.

Such results are matching the survey conducted about the offered training programs in Egypt and Jordan. The survey shows that there are only two organization, in Egypt and Jordan, offering training program towards industrial energy management systems programs with total sum of 18 courses. Such numbers reflects the lack for such training programs these two countries in comparison to Southern European countries.