ENERGY EFFICIENCY AND EMPLOYMENT: A WIN-WIN OPPORTUNITY

In the Southern Mediterranean

August 2013

MED-ENEC

Energy Efficiency in the Construction Sector in the Mediterranean

This project is funded by the European Union

Clay bricks and natural stone as used in Basata, Egypt are a cheap and energy efficient building material that can be locally sourced

Table of Contents

Energy efficient building techniques blended with traditional culture and style at Basata, Egypt

Water cooling tower, UAE:
An example of traditional solutions which can improve energy efficiency simply and cheaply

Introduction

Dr. Kurt Wiesegart
MED-ENEC Team Leader

Demographic growth – the need for jobs

The Middle East and North Africa (MENA region) face a significant economic and social challenge in the next decade. It must provide employment and opportunities for a rapidly increasing working-age population. This population group will be better educated and more ambitious than almost any previous generation. They will have greater expectations on quality of life than ever before. So not only will more jobs be needed but they will also need to be the right jobs, that meet new aspirations.

The energy challenge

The MENA region, like almost everywhere in the world, also faces huge energy and environmental challenges which will require massive investments and a complete transformation of existing energy systems. More energy will be needed, but with lower, or even zero, emissions. Higher prices for many fuels are likely and subsidy reform will become increasingly unavoidable. A way to balance these requirements needs to be found, to be able to provide affordable, clean energy for all while also keeping the lights on, and indeed, continuing to bring light to those without. Energy efficiency is one of the critical aspects of meeting the energy challenge, with over US$140 billion invested globally in 2011. The substitution of carbon-based energy by renewable energies is another.

A win-win with energy efficiency – jobs and energy savings

Investing in energy efficiency can help meet both the employment and energy needs, helping to contain and reduce energy demand while creating significant numbers of skilled jobs. Importantly, investments in energy efficiency tend to support more jobs per $ of equivalent alternative investments in renewable or fossil energy, and the jobs created are usually local. Harnessing this win-win is an effective way to rise to both challenges.

What is this brochure?

The brochure intends to support policy makers by:

- Providing evidence of the employment and energy needs of the MENA region
- Demonstrating the size and type of the employment opportunity through investments in energy efficiency
- Presenting the policies needed to overcome the barriers that exist
- Providing a range of practical examples from the MENA region, Europe and beyond to illustrate and inspire.

Why is MED-ENEC taking this initiative?

Part of MED-ENEC's mission is "to develop the markets for energy efficiency and renewable energy in the building sector". This brochure can support this mission and help to scale up the energy efficiency pliot approaches that MED-ENEC has successfully supported in the Partner Countries.

Energy efficiency can slow the increase in energy demand from economic growth, save money and provide jobs

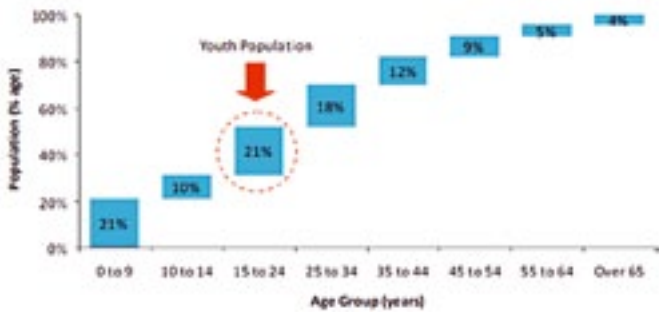
Kurt Wiesegart

Employment and energy in the MENA region

Most countries in the MENA region are undergoing a time of significant demographic change following the rapid population growth of recent decades. The babies from this boom are now starting to come of age. As shown in figure 1 the youth population of working age (15 to 24) are the joint largest population group, making up 21% of the population, and over 50% of the population in the MENA region are aged 24 or under.

Figure 1: Demographic profile of the MENA Region
Source: *LABORSTA, IMF, AL Masah Research*

This very youthful demographic profile brings significant opportunities for the MENA countries, with the rapid expansion of the working age population providing a large pool of labour and new consumers to fuel economic growth. But it also brings a significant challenge, in how to provide many more employment opportunities for the large numbers of people that join the workforce each year.



This youthful generation has strong aspirations and is among the healthiest and best educated of any generation that has gone before. The youth will demand good jobs and a better standard of living, or it will leave for places where these can be found. Indeed in the Arab Youth Survey (2013) the following items were among the top 10 findings:

- Belief that our best days are ahead of us
- Fair pay and unemployment are key issues
- Concerns over living standards
- The desire to be able to purchase their own property

All of these point to a desire for more and better paid jobs.

Rapid population growth in many MENA countries is an economic opportunity and employment challenge

But providing jobs is not a simple matter and is a challenge that the region has already been struggling with for decades. Although unemployment rates have fallen in most MENA countries over the past decade, by IMF comparisons it still has the highest total unemployment, at around 10%, and youth unemployment rates at 25%, of all global regions.

Unemployment is a crucial social issue, but there are important regional complexities to addressing it. Factors such as the use of guest workers (particularly common in the gulf states), underemployment in the informal economy, the public sector as the major employer and the role of women in the workforce all complicate how much can be read into official statistics. It is very difficult therefore to form a precise picture of the current situation, particularly when also adding the economic upheavals of the Arab Spring that are yet to be reflected in statistics. The data that is available, such as the ILO summary in figure 2, paints a clear picture of a region where employment is scarce and where unemployment is an important issue across all age groups but especially for the young generation.

Figure 2: Unemployment rates in selected MENA countries
Source: *ILO (2013)*

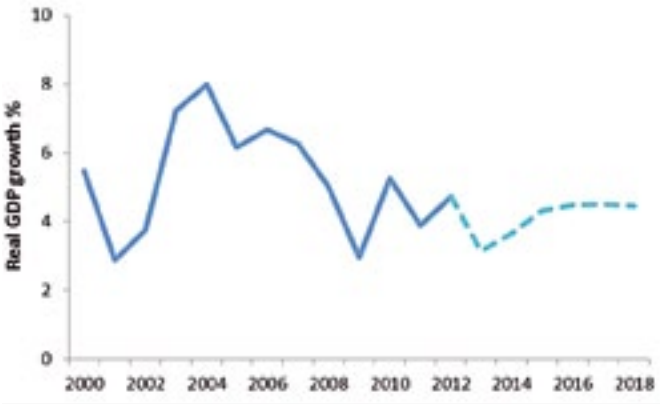
Estimations from institutions such as the OECD and World Bank indicate that between 25-76 million jobs will need to

be created in the MENA region over the next decade to keep unemployment at the same level as today, and to avoid major social unrest.. This will require annual economic growth to be sustained at over 5% and that every good employment creation opportunity is explored.

Rapid population and economic growth is also fuelling energy demand

Rising populations in the MENA region have been partly accompanied by rapid economic growth. Since 2000 real GDP growth rates have averaged over 5% per year (see figure 3), although per-capita GDP growth rates have been lower, signifying that population growth is outpacing economic growth in many MENA countries. GDP growth has been widespread, not only in resource rich energy exporters (see box 1) that have benefitted from rising prices, but also in resource-poor countries that have more diversified industries. The region was able to avoid falling into recession in the recent financial crisis, but economic activity has been hit by the Arab Spring and the upheaval and uncertainty this has caused.

Figure 3: GDP growth rates 2000-2018 for the MENAP region



Source: *IMF(2013), MENAP is MENA, Pakistan and Afghanistan*

Energy demand has mostly increased faster than economic growth. Between 2000 and 2009, primary energy consumption in the MENA region grew from 144 to 210 Mtoe (+46%). Over the same period electricity consumption grew even faster, from 154 TWh to 294 TWh (+91%). Beyond the fundamentals of population and economic growth the increased demand is also driven by a variety of other factors including: improved living standards and an increase in the ownership of electrical appliances such as computers, refrigerators, TVs and air conditioners, as well as by their extended use.

Energy demand is expected to continue its upwards trend across the region in the coming years. Total energy demand is expected to double and electricity demand to triple by 2030 with the logical consequence a resulting need for higher production and better grids. But the role of energy efficiency and renewable energy is still quite limited in the region, despite vast potential. As a result, the majority of new energy demand will be fossil-fuel based unless further steps are taken to promote energy efficiency and renewables.

Box 1: Energy resources in MENA countries

The energy resources a country has impacts strongly on its economy, trade and energy system. Countries in the MENA region can be grouped into three categories of energy resources:

- The first group of countries are the net energy exporting countries like Algeria, Libya and Yemen. They generally profit from this growing energy demand with a positive trade balance.
- A second group of countries have changed their status from being an exporter to being an importer of energy (e.g.Syria, Egypt and Tunisia). This transition is reflected in their trade balance.
- The third group of countries is fully dependent on imports for their energy supply e.g. Morocco, Lebanon, Jordan and Palestine).

Energy is a key economic sector and employer in the region – even in countries with few energy resources

For the energy exporting economies of the MENA region (see box 1) the energy sector is critical. As a source of income it helps them to register positive trade balances. It is estimated that the energy extraction (gas, oil, petroleum) sector employs at least 300,000 people across the MENA region, mostly in Algeria, Libya and Egypt. Jobs in the sector are often highly skilled and well paid, but also typically employ a high proportion of foreign workers.

The energy sector is also important in countries without major energy resources, as the utilities and related sectors create economic activity and employment. However, precise and reliable economic and employment data is scarce. As an example, in Egypt in 2012 the energy utilities sector (electricity, gas, steam & air conditioning supplies) employed over 260,000 people, or 1% of the total national workforce (CAPMAS, 2013). The Egyptian government also employs over

Al Taweelah A2 gas and steam power station and a connected desalination plant in the United Arab Emirates

220,000 civil employees in industry, petroleum and mineral abundance. In total, almost 2% of the Egyptian workforce is directly employed in the energy industry, before even taking into account related sectors and jobs such as in construction and professional services.

Energy systems will face a host of challenges in the coming years

Globally, the sector is facing a period of significant upheaval due to factors such as:

- Increasing energy demand for affordable energy;
- Increasing resource scarcity and rising prices;
- The requirement to reduce carbon emissions to limit global warming;
- Growing competitiveness of renewable energy.

The MENA region faces all these challenges to varying extents and beyond this also has its own specific energy challenges. The problem of limited energy access remains important in some MENA countries with the continuing need for expanded and upgraded electricity grids and energy networks in rural and remote areas.

Reform of energy subsidies is another critical challenge for the region, with subsidised prices leading to wasteful use, pollution, deficits in government finances and an inefficient economy. Moving the region to a more sustainable economic and energy pathway will require careful thought and planning.
For energy producers in the region a dilemma remains in relation to scarcity and prices: Is it wise to exploit and export reserves now? Or should they be kept for future domestic needs or higher returns on international markets? What if demand for such fuels collapses as an alternative is found?
In any case, action is needed and energy efficiency should play a vital role.

Investment in energy efficiency provides an opportunity for an economic and environmental win-win

The required investments in energy efficiency will not only provide benefits in reduced energy use, which will save money and increase overall economic efficiency, they will also create jobs and directly stimulate the economy.

Investing in transport and buildings to improve their energy efficiency through improved fuel economy, insulation, ventilation, heating and new appliances can all help to create jobs while tackling the energy challenges that countries in the MENA region face.

A combined approach, developing employment, economic and energy efficiency (and also using renewable energy) all at the same time creates a win-win-win situation. This approach is more and more recognised globally, as demonstrated by the priority given to it in the recovery plans of developed nations during the financial crisis (see box 2).

Box 2: Energy efficiency and renewable energy pave the way out of the economic crisis

According to the OECD (2011) Towards Green Growth report, "A number of governments have emphasised the sizeable impact on employment resulting from some of their green stimulus measures (OECD, 2010b). For example, the United States Council of Economic Advisers estimates that the US$ 90 billion placed in clean energy investment in the US Recovery and Investment Act will save or create about 720 000 job-years by the end of 2012. Likewise, the [...approx. € 35 billion] being invested as part of Korea's "Green New Deal" is expected to create 960 000 jobs from 2009 to 2012, including jobs in an environmentally-friendly transportation infrastructure, water management and river rehabilitation, clean energy, green information technologies, and waste-to-energy.
France's stimulus package totalled US$ 33.1 billion, 21% of which was designated for green measures, with an estimated net job creation of about 80 000 – 110 000 in the 2009 – 2010 period."

Countries in the MENA region can take advantage of this opportunity as a way to deal with the multiple challenges they face. The following chapters explain how this can happen.

New development needs to be balanced against costs and climate risks

How big is the opportunity for jobs through energy efficiency?

Energy efficiency policy in the MENA region

In recent years governments across the MENA region have started to put in place legislation, policies and plans to support energy efficiency. They have established the National Energy Efficiency Action Plans (NEEAPs) which are required under the Arab Energy Efficiency Guideline. Tunisia, Sudan, Libya and Egypt have developed NEEAPS, and, with the support of MED-ENEC, so have Lebanon, Palestine, Jordan and Algeria, demonstrating a clear policy commitment to energy efficiency.

NEEAPs can provide a sound policy basis to support investments in energy efficiency

The NEEAPs set out which energy efficiency activities are feasible and desirable, and which national policies and measures will be taken to increase energy savings. This can include measures such as promoting building codes, energy audits, and the diffusion of compact florescent lamps (CFLs) and solar water heaters (SWH).

These plans and their proposed measures provide a basis for achieving the economic, employment and energy wins within the MENA region.

Investment in solar water heating, a renewable and energy efficient technology, can create jobs and energy savings

An estimate of employment creation potential: the Lebanese NEEAP

In cooperation with MED-ENEC, the Lebanese Government and the Lebanese Centre for Energy Conservation, (LCEC) have developed and approved the Lebanese NEEAP. This action plan provides the basis for the energy strategy of Lebanon in the coming years. Based on the NEEAP, and by making some broad assumptions, rough estimates of job creation potential can be made. The figures are calculated by multiplying the estimated financial volume of the activities with the employment factors developed by Plan Bleu (2011a).

Energy efficiency measures in the Lebanese NEEAP are estimated to generate more than 15,000 jobs

The results (see table 1) show that between 2010 and 2015 a total of at least 15,000 jobs, and possibly more than 20,000 jobs, could be generated by investment in the initiatives outlined in the NEEAP. The majority of the employment would be generated by investments in energy efficiency measures in buildings. Investments in renewable energy and light bulbs also generate significant energy savings, although not as high as energy efficiency in buildings, and their employment effects are also very low in comparison.

Table 1: Rough estimate of employment effects of selected initiatives from the Lebanese NEEAP

Measure	Duration	Capacity	Saved energy	Jobs created
Energy efficient (CFL) light bulbs	2010 – 2012	160 MW	239 GWh/yr	50 – 100
Solar thermal water heaters	Sept. 2010 – 2012	190 000 m²	26.35 GWh/yr	100 – 150
Wind	2010 – 2014	60 – 100 MW	120 – 200 GWh/yr	5 – 15
Photovoltaic	2011 – 2015	100 – 200 MW	263 – 526 GWh/yr	150 – 250
EE measures in buildings	2010 – 2015		815 GWh/yr	15 000 – 20 000

Between 1.2 million and 1.6 million jobs in energy efficiency could be created by 2030 with the right policy support

Extrapolating these results from Lebanon to the whole of the MENA region is difficult, for the reasons set out in box 3, which means any answers are imprecise. But a study carried out by Plan Bleu (2011) has done this and the result (see figure 4) in a 'high' scenario is an estimate of total job creation potential from additional investments in energy efficiency of 1.6 million jobs in the MED-ENEC countries over the next 20 years. In a 'low' scenario job creation potential is still over 1.2 million jobs by 2030. The jobs are almost entirely created in improving the energy efficiency of new buildings and in the retrofit and energy efficient renovation of existing buildings.

The highest number of jobs would be generated in Egypt, with almost 700,000 jobs, followed by Algeria and Morocco with around 300,000 jobs each. In every country thousands of jobs would be created.

These scenarios require a few key measures to be taken:

1. **Mainstreaming of new building envelopes,** i.e. improved design, insulation and installation of efficient heating and cooling equipment;
2. **Thermal renovation of existing buildings,** related to measure 1, with similar measures but for existing buildings;
3. **Gradual replacement of incandescent lightbulbs,** by more efficient compact fluorescent or LED bulbs.

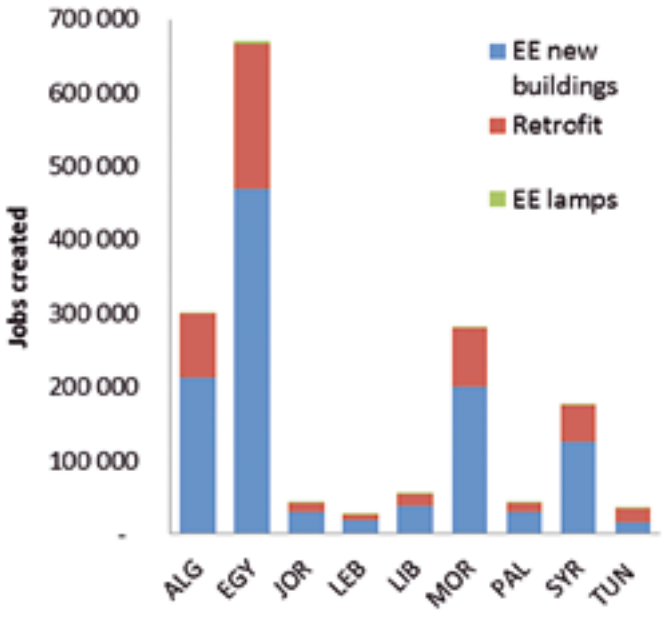
Box 3: How many jobs could be created?

Putting a figure on the impact of an energy scenario on employment requires a detailed understanding of the reality of the main industrial sectors affected in a country. So the potential employment effects per million invested will vary according to the local circumstances. The employment figures presented here cannot simply be transferred to other regions or contexts since investments in energy efficiency may create many more jobs in one country than in the other.
The jobs that are generated depend on the volume of purchases made from other sectors (equipment, goods, etc.), the work content of producing these goods and the proportion of equipment or services imported or provided locally.

Source: *PlanBleu 2011a*

New housing and renovated housing needs are significant in the MENA region. Plan Bleu estimates the need at 42 million new housing units by 2030

Figure 4: Job creation through building EE measures over the next 20 years – high scenario



Source: *PlanBleu 2011a*

Energy efficiency investments create jobs

EU efficiency policy as an indicator of potential

In the EU, energy efficiency policy has developed considerably over the last 20 years, with the key policies including:

- **The Energy Efficiency Directive (2012):** is the EU's most recent and leading policy document on energy efficiency. It addresses all sectors and sets out a variety of requirements, including for each country to prepare a comprehensive energy efficiency action plan, to prioritise energy efficient procurement, to renovate central government property and for energy suppliers to achieve required energy savings of 1.5% a year.
- **The Energy Performance in Buildings Directive (2002):** is the main EU policy to promote energy efficiency in buildings which sets EU-wide building energy efficiency performance standards. The 2010 recast also included a target for all new buildings to become nearly zero-energy over the next decade.
- **The Ecodesign Directive (2005):** under which implementing measures have been introduced to set minimum energy performance standards for household appliances.
- **The Energy Labelling Directive (1994):** which raises consumer awareness of product energy efficiency through mandatory product energy labels.

The impact assessments and other research accompanying these policies have estimated their economic and social impact. The direct combined employment benefits of these policies are estimated to be at least 280,000 to 500,000 new jobs in the EU by 2020. Indirect job effects by the financial savings from energy efficiency are taken into account.

EU energy efficiency policy is expected to generate at least 280,000 – 500,000 new jobs by 2020

The jobs are anticipated to be heavily concentrated in the buildings and construction sectors, with the Energy Performance in Buildings Directive (EPBD) the key policy driver. The investments required to meet the new standards under the EPBD are expected to account for between 280,000 and 450,000 of the estimated new jobs in the EU by 2020 (EC, 2011). These jobs will not only include general construction work but also work in energy services, certification, auditing and inspection of heating and air-conditioning systems.
In addition, it is estimated that the renovation requirement for government buildings within the Energy Efficiency Directive, i.e. that each national government must undertake an energy efficiency renovation of 3% of its total floor space each year, will create and maintain 39,000 jobs on its own.

Please note:

EU Directives are binding laws and standards to be adopted, implemented and enforced on national level in all 28 EU-Member States within 2 years

Why energy efficiency over other energy investments?

Investments in energy efficiency offer some important advantages in employment creation, over and above what is possible through other energy investments. Energy efficiency investments generate both more total jobs and jobs for local people than the alternative investments in fossil fuel plants or renewable energy. Although it will be necessary to invest in a mix of all three, the employment (and economic and environmental) advantages of energy efficiency make it a key part of any energy strategy.

More jobs are generated per million invested in energy efficiency compared to other energy technologies

Work on employment creation for the energy sector compares the impact of various energy investments. Research by GIZ (2012) in Tunisia, see figure 5, found that investments in energy efficiency, particularly in buildings and engine diagnostics, delivered the highest employment return, with 31 buildings energy efficiency jobs per million dinar invested. This rate is more than three times higher than the equivalent rates for renewable energy technologies such as solar thermal, solar PV and wind.

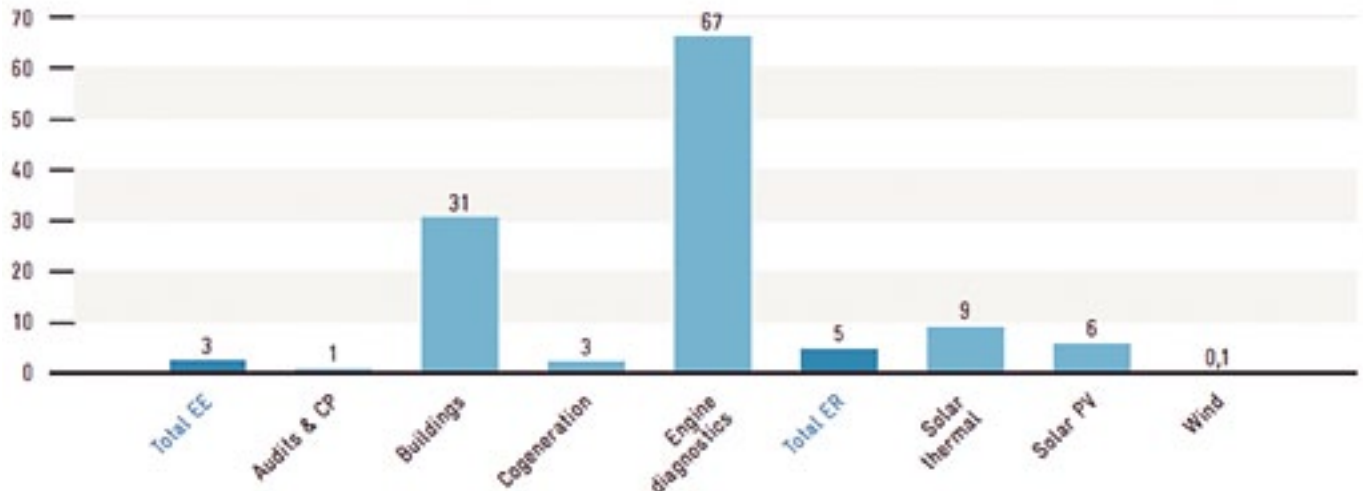
The other advantage of energy efficiency is that EE jobs are local, as they involve people on-the-ground employed in building, installing and maintaining buildings. This requires local expertise and know-how.

In addition, the majority of energy efficiency technologies can be manufactured locally: industries in building and insulation material, light bulbs and windows already exist in the region. These will be able to expand with a growing market. This is in contrast to renewable energy, which compared to fossil-fuels also generates more employment, but where the local facilities and know-how for developing these industries in the MENA region is weak.

Jobs from energy efficiency investments will be local and energy savings will spur further employment creation

Looking from the point of view of jobs it will be more effective to invest 1 million EUR in products that are produced locally and hence lead to local employment growth, than to spend 1 million EUR for high-tech products which are produced abroad and increase balance of trade deficits. In addition, the money saved from energy efficiency can also be invested in other sectors of the economy that are more labour-intensive than the energy industry, generating further indirect employment (WWF, 2009).

Figure 5: Economic employment potential of different EE and RE technologies, jobs per million Tunisian Dinar



Source: *GIZ 2012*

Greater use of energy efficient appliances such as compact fluorescent or LED light bulbs can save energy and money and create jobs in local industries

What types of jobs will energy efficiency investments create?

Energy efficiency investments are mostly related to buildings, creating jobs in:

1. **Construction, design** and **retrofitting** of energy efficient buildings;
2. **Installation** and maintainence of efficient photonic appliances (PV, lighting, sensor technology);
3. **Manufacturing** of energy efficient building materials including insulation and glass;
4. **Manufacturing of EE heating and cooling apliances;**
5. **Training** in energy efficiency for all related stakeholders in planning, production and services;
6. **Auditing and other energy efficiency services**, such as energy performance certification, consulting services and energy management services.

Figure 6 provides a summary of how these jobs relate to each other, the relative size of the employment creation opportunity and the level of qualification required. With the largest number of jobs in lower qualified construction positions and the smallest number of jobs in higher qualified auditing roles.

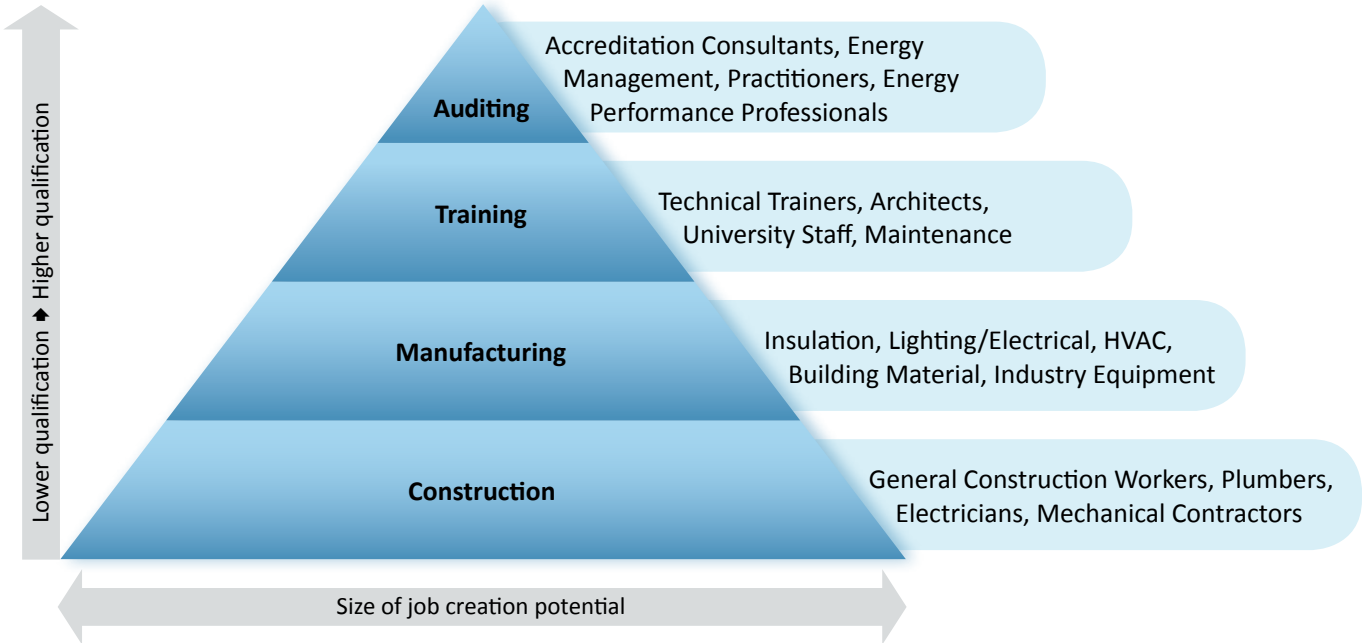
Figure 6: Types of jobs generated by energy efficiency in buildings investments

Construction jobs

The largest number of new energy efficiency jobs will be created in the construction sector. These jobs can be generated quickly. Enforcing energy efficiency requirements for new buildings, for example regulating insulation and glazing, will create demand for specialised energy efficiency products, lighting and cooling systems, all of which have high energy saving potential in MENA countries, demanding trained staff. Retrofitting of these, and other technologies, into existing buildings can also be an important area of employment growth. This needs to be driven by policies that spur energy efficiency investments in existing buildings.

Investments in energy efficiency in buildings will generate the most jobs in construction

The improvement in construction techniques that more efficient buildings need will mean that construction workers skills will also need to be developed from their relatively low current levels. Higher skilled construction workers such as plumbers and electricians will also need to update their knowledge and training to work with new, more efficient technologies.



Manufacturing jobs

Strong local industries already exist for many products, which can provide a strong basis to build upon with further development, innovation and investment. According to Gazzo et al (2011), the building products manufacturing industries that will benefit the most from energy efficiency investments include the following:

- Building materials, e.g. bricks, tubes, piping, glass, cables
- Insulation material
- Windows
- Lighting

Maturing glass and cable production capacities exist in most MENA countries, as well as other building material manufacturing such as bricks, insulation and piping. Traditional mud-bricks also have excellent energy efficiency properties at affordable costs and are an example of how traditional, local production can be harnessed and developed to create employment from energy efficiency investments.

Local manufacturers can benefit from energy efficiency investments – and by innovating they can develop and create new jobs

For manufacturing, mostly low-qualified workers are required. A smaller number of jobs can be forecast for higher qualified engineers who will be needed for product design and development, and also for supervision.

One relevant example from the region is from the Lebanese NEEAP, which foresees banning the import of incandescent lamps, which will increase business for all local producers of light bulbs, both incandescent and the more efficient CFLs, creating employment in this market segment.

Skilled and semi-skilled construction and maufacturing jobs such as welding will be created through investments in buildings energy efficiency

Training and Teaching

Investment in energy efficiency will entail demand for training at various levels, to ensure it does not become a bottleneck for further developments. Improved skills are not only demanded for construction and manufacturing workers, but also for building craftsmen, architects and skilled energy efficiency professionals such as building energy managers. The educational sector will also create jobs. This will begin with train-the-trainers education at technical schools, colleges and universities. The size of the employment creation and teaching/training needs in the other sectors will therefore also change and develop vocational training. Box 4 describes how MED-ENEC can support the training process for energy auditors.

Investment is needed to develop people and skills in energy efficiency – creating a demand for trainers

Box 4: MED-ENEC provides "energy audit in buildings" training

MED-ENEC is supporting MENA countries with Energy Auditing training courses. One-week courses with a final exam have already been given in Algeria, Egypt and the Palestinian Territories. This alone is insufficient to create highly qualified EE auditors, but is intended to provide a basis on which more diverse, and longer, training courses will be offered.

Training for the European EnergyManager (EUREM) is already conducted in Egypt. The energy managers guarantee company-wide energy savings and hence contribute to climate protection. MED-ENEC is closely cooperating with EUREM.

In 2012, training was also provided in Algeria and Palestine, offering basic concepts of energy audit for practitioners with a good knowledge in engineering. The training in Algeria was based on the need of APRUE (AgenceNationale pour la Promotion et la Rationalisation de l'Utilisation de l'Energie), the Algerian National Energy Agency, to qualify Algerian private sector consultants and the Ministry of Energy's staff to carry out energy audits in the building sector and to train-the-trainers for providing further teaching and follow up.

MED-ENEC will deliver such training to other beneficiary countries interested in MED-ENEC's support. Such training could evolve in the near future into a regional certification program in cooperation with regional entities under the umbrella of the council of the Arab Electricity Ministers of the League of Arab States.

Auditing and other energy efficiency services

As the advantages of energy efficiency become better understood, both companies and private households will ask for support to achieve higher efficiencies and thus reduce costs – providing a growing market. Related energy services will grow alongside investments in energy efficiency. To successfully extend such services it will be important to have good governance based on a sound financial, legal and energy price framework. This requirement will create demand for highly-qualified experts and professionals.

> Highly qualified auditors and other energy professionals will be needed to ensure energy efficiency is implemented effectively and efficiently

So-called "Energy Service Companies" (ESCOs) and auditors, will undertake energy audits which identify areas where production processes, buildings and systems can be more energy efficient. Their business model is based on funding through the savings client organisations make on their energy bills. MED-ENEC has explored "ESCOs - advantages and challenges" (MED-ENEC brochure to be printed H2 2013).

Not only will jobs be created within ESCO type organisations, but also in independent or public organisations responsible for the oversight, accreditation, monitoring and verification of services and of wider building energy efficiency. For example new building codes as a first step towards buildings energy efficiency, and which already exist in most MENA countries on paper, typically require energy auditing for all new buildings. Enforcement will demand trained state auditors who give building permissions. In Tunisia the government has already introduced laws and policies for mandatory energy audits in industry leading to job creation for energy auditors.

Highly qualified energy professionals will need to be trained

Hassi R'mel, Algeria:

Energy efficiency and innovative solutions in industry, such as this hybrid solar-gas power plant, can reduce costs and improve international competitiveness

Barriers to energy efficiency investments

Despite the various employment and financial advantages of energy efficiency investments they are not widespread. This is a fact, not only in the MENA region, but globally.

Barriers to EE

There are a variety of obstacles due to laws, technical availability, behaviour and political barriers which make it difficult to spur investments in energy efficiency in the short term. According to the IEA World Energy Outlook (2012), three of the most important global barriers to energy efficiency investments are:

- Firstly, the **visibility of the benefits** is limited, because efficiency improvement is often not measured. Regulation, monitoring, verifcation and awareness raising can help to overcome this barrier.
- Secondly, the **financial benefits only occur in the long term,** while upfront costs are often considered a risk. Financing support mechanisms and tax incentives can reduce this barrier.
- Thirdly, **insufficient local capacity** can impede successful deployment of efficient technologies. This barrier can be overcome through capacity building programmes and shifting government priorities.

Unblocking the path to energy efficiency investments will require governments to act

Global barriers to energy efficiency include poor understanding by decision makers, up-front costs and a lack of skilled people

In addition to these generic barriers there are also barriers specific to countries in the MENA region. The participants at the MED-ENEC symposium in Istanbul in 2008 highlighted the following region specific barriers:

- **Highly subsidised energy prices** – as present in most MENA countries - create very little incentive for energy efficiency. They encourage wasteful behaviour and seriously weaken the financial case for energy efficiency measures. This issue is explored further in the MED-ENEC brochure “Energy Subsidies – A Road Map for Reform”.
- **The lack of financial incentives for energy efficiency investments** – which results in long payback periods, weakening the financial case for investments.
- **Lack of public awareness of the need to save energy** – a lack of information and low energy prices make for a ‘hard-sell’ to the public.

An additional problem highlighted by the IEA is the lack of capacity. As even some professionals and politicians prove to have low awareness of the need for energy efficiency, this leads to weak enforcement systems that are undermining the effectiveness of regulations

In the MENA region, subsidised energy prices and a lack of incentives are important financial barriers to energy efficiency investments

Policies to spur energy efficiency investment

The spark to ignite the job motor through energy efficiency lies in the hands of the government. Overcoming the barriers to energy efficiency investment requires policy intervention. A range of policy instruments are available to tackle the barriers, including:

- **Regulations and legislation** – such as building codes and appliance standards;
- **Financial incentives** – such as grants and subsidised loans;
- **Supporting policies and information** – improved job market regulations and services, vocational training and adequate/improved academic education; and
- **Awareness raising.**

Figure 7 demonstrates how these policies can work together in the short and long term to generate conditions favourable to energy efficiency investment and jobs.

A clear government commitment is the starting point for good energy efficiency governance. Also, the support of key stakeholders is essential and the phasing over time should be right.

Increasing investments in energy efficiency requires determined regulation, flanked by financial incentives, information and other support measures

Regulations and legislation

Investments are a result of a push and pull process, similar to a stick and carrot game. Good governance can push firms and people to comply with legal requirements. This can act as a spur (stick) to stimulate energy efficiency investments, both requiring and, when well designed, incentivising the development and use of greener technologies, products, and services—and thus green employment. The most important regulatory tools which have proven to be effective in advanced countries include:

- Revised building standards/codes – requiring higher levels of energy efficiency for new buildings and/or introducing energy efficiency requirements for building renovations;
- Appliance standards – banning appliances with the worst performance;
- Energy performance labels – providing easy to understand information, raising awareness and encouraging innovative and better products;
- Energy performance audits – requirements for auditing for certain building types;
- Smart metering – clearly indicating energy use and cost, incentivisingconsumerstosaveenergyandbuyEEproducts; and

Figure 7: Examples of energy efficiency policy measures and their effects

Measure	Short term	Long term	Creates jobs in…
Building codes	Introducing the code	Stringent code enforcement	Manufacturing Construction Auditing
Appliance standards	Common standards for comparability	Regular updating, communication	Manufacturing Installation
Grants and subsidised loans	Subsidies/loans for holistic retrofits	Support for zero net energy buildings	Manufacturing Construction Auditing
Auditing	EE building inspections (structural checks)	Regular mandatory audits, recognised and accurate	Manufacturing Construction Auditing

- Revised procurement regulations – as the government is the largest purchaser of products, requirements for green procurement provide a strong signal to the market and work as an example to the public. (see box 6)

All of these policy measures will require enforcement to be effective. It is not sufficient to simply introduce the regulation. There must also be a system that backs it up. This will require investment in government inspection, testing and auditing agencies (see box 5).

Enforcement of regulation is necessary for it to be effective – this means additional resources for relevant government agencies, such as inspectors

Box 5: MED-ENEC support on building standards development

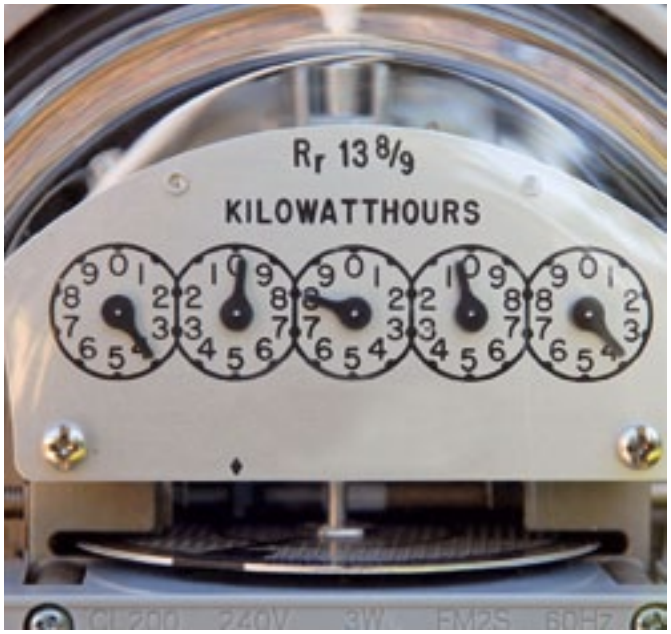
MED-ENEC supports the development of energy efficient building codes in the MENA region. Building codes have proven to be highly effective, if enforced carefully, to increase energy efficient building development. For example, the German heating law illustrates that a rigid enforcement of a building code gives strong signals to the local manufacturing industry to develop more efficient products.

Economic and financial incentives

Alongside the push of regulation, the use of economic and financial incentives can act as the pull (carrot) for energy efficiency investments and market development. These are policies that alter the financial aspects of an investment decision. Successful economic and financial incentives that governments can provide include:

- Grants – providing money directly to people, firms or organisations;
- Subsidised loans – providing loans with lower than market interest rates for capital borrowing, or other measures to reduce the overall costs; and
- Tax reductions or exemptions – reducing the tax on efficient products or allowing investments in energy efficiency to be tax deductible.

Each of these measures improve the financial calculations for purchasers and investors.



Measurement and monitoring is essential not only for improving awareness and understanding but also for goverments, to make regulations more effective

Grants, subsidised loans and tax measures can all make energy efficiency investments more attractive

Government expenses can be funded by national budgets in a cost neutral way by reducing energy subsidies and other spending on energy intensive industries. Funds may also be raised by accessing international funding opportunities tied to economic and social development and/or environmental protection. Regional development banks, the World Bank, the Global Environmental Fund and the global carbon markets, accessible through the Clean Development Mechanism, each provide a potential route to finance such measures.

Box 6: Algeria local manufacturing

Inefficient incandescent lamps will be prohibited by 2020 in Algeria. However, more efficient lamps are hardly produced within the country and thus the policy would have negative effects on the trade balance and local manufacturing. Therefore the Algerian programme encourages and supports the local production of low consumption lamps through partnerships between local and foreign producers. Thus, local know-how will be enhanced and attractive jobs in manufacturing are created.

Box 7: National Institutions for financing, information and training in selected countries

- Tunisia: www.anme.nat.tn
- Lebanon: www.lcecp.org.lb
- Jordan: www.nerc.gov.jo
- Palestine: www.nerc.gov.jo/
- Algeria: www.aprue.org.dz/
- Egypt: www.nrea.gov.eg/
- Turkey (only in turkish): www.eie.gov.tr/

Supporting policies and Information

Other barriers to more energy efficiency jobs are a lack of supporting policies and information. Information, training and support are essential to address capacity barriers to investment and develop new skills in the workforce. Educational reforms are required to support standardised implementation.

Supporting accreditation and registration of professional groups, training courses and enforcement of standards can all go a long way to growing local capacity. People will then see the benefit of investing in their skills. Finally, potential stakeholders must be well informed by internet, brochures, newsletters and other media about all planned measures long before they start. This will help to get the public and businesses on board.

Awareness raising

Awareness raising will have to go deeper into details and to be convincing, as there will be many questions and doubts at the beginning of policies which tackle a complex issue such as energy efficiency.

Communication campaigns which target efficiency education and key messages can help improve the understanding of energy efficiency. Good examples and testimonials are important as well, examples such as voluntary energy audits.

Highly skilled craftsmen and other workers will need to be trained to overcome capacity barriers to investment

How to do it successfully

When deciding what to do and the specific programme to implement, two key factors must be considered for successful policies:

Involvement and support of key stakeholder groups

Government policy will influence the behaviour of all other stakeholders, the two following groups will have an important role in the success of the changes.

Investors, suppliers, manufacturers and entrepreneurs will play a key role in success as they will decide on whether to take the risks to invest or not. The upfront costs and market risks and uncertainties will be foremost in their thinking. They are also likely to take a long-term view, and expect policy stability to protect their investment and returns. It will be crucial to engage with these groups to see what is hampering them from investing and which policies and changes they think could change the situation. When this group is "on board" and investing then employment creation will take off

Engagement with investors and buildings professionals is crucial to successful policies to stimulate energy efficiency investment and jobs

Developers, architects, auditors and inspectors are essential to successful implementation. It can be sensible to involve these stakeholders in the development of any new standards and regulations as they will have expert knowledge on the appropriateness and relevance of proposals. They will also have a stake in the outcomes and successful implementation of standards when implemented. Even when not directly involved in the process it is important to keep these groups well informed so that they can quickly adapt to the changes.

Quick wins and longer term change

Experience indicates that large energy savings can be realised relatively simply and will pay back quickly – the low hanging fruit, which in many MENA countries remains to be picked. Simple, cost effective measures that can be quickly implemented can generate significant goodwill and raise

Governments need to build up policies piece by piece to address the barriers to energy efficiency investments and reap the economic, employment and energy benefits

awareness. For example, free distribution of energy saving light bulbs could quickly reduce energy costs for people and firms and could be communicated as a measure to reduce the risk of power outages in summer – an annoyance for every citizen. This 'quick win' is unlikely to have large job effects, but will raise awareness and pave the way for more complex measures and long-term change.

Larger measures, that require more work for public acceptance or to build the local capacity to implement, should be phased in over a longer period. For example, changes to building standards should be phased over multiple years, enabling arhitects, builders and inspectors to train and adapt to the new requirements.

Quick wins can kick-start change and investment – longer term changes should be phased over time

Ambitious energy efficiency policies in the EU and in other countries, regions and cities have been used to drive economic growth, employment and energy savings. The MENA region can learn from the successes of these policies to achieve its own win-win on energy efficiency and jobs. The following pages provide examples of successful policies and the lessons that can be learnt.

It is important to get architects and other professionals on board with the drive for energy efficiency

Best practice example 1: Efficient building in Turkey creates jobs

Energy demand in Turkey has been growing rapidly in recent decades due to economic and population growth. Turkey is now a net importer of energy. Greater imports, rising international prices and energy subsidy reforms have all contributed to energy price increases for consumers. These, in turn, have led to a growing awareness and demand for energy efficiency, particularly insulation.

The MED-ENEC pilot project RMI Turkey Scientific Research and Development Centre is an example of best practice where more than 65,000 jobs have been created over the past 10 years. The project involved the building of the scientific research and training centre, located in the Gebze Organized Industrial Zone near Istanbul. This building became a training hub for energy efficiency and insulation installation in Turkey.

A MED-ENEC project supported a national buildings centre in Turkey – the building is a showcase for efficient technologies

The building itself meets high efficiency standards, using 34% less energy than the average building in Turkey, because of its orientation towards the sun for solar heating and 8 cm thermal insulation of the building envelope. Most prominently (but also most costly), the building is fitted with a geothermal heat system with 27 boreholes drilled to a depth of 100 m. These investments pay back in 12 years, against a building lifetime of 50 years or more.

Its special features have enabled the centre to be used very intensively for technical testing of building materials and training. In the past ten years, over 10,000 craftsmen were trained at the centre. The training offered at the centre includes two-day energy efficiency trainings, targeted at construction workers. The first day focuses on the theory of insulation, systems and specific product details. The second day is for practice: Each craftsman works on a 4m^2 wall to apply the insulation materials. The RMI Turkey Centre covers all the costs related to the training, including transportation, accommodation and food. Each year approximately €400k is spent on training.

In terms of insulated facade area, Turkey is one of the biggest markets in Europe

The building is used as a training centre and has played a key role in growing the national insulation industry – creating more than 65,000 jobs

The project won the Turkish ENERGY GLOBE Award in 2008, which was also advantageous in making savings more visible and credible to construction workers, craftsmen and developers.

As the primary national insulation training centre, the centre has played a key role in supporting the estimated 65,000 jobs in the insulation sector in Turkey.

In terms of insulated facade area, Turkey is one of the biggest markets in Europe. New legislation in the building sector increased sales of insulation material by 230% between 2001–2005. In 2012, more than 50 million m^2 insulation material was applied to building facades.

Best practice example 2: KfW programmes in Germany

The German development bank KfW, provides a range of grants targeted at energy efficiency in buildings which are highly effective at removing financial barriers, leveraging private investment and creating jobs. As a respected national institution it has the reputation, credit rating and 'pull' to attract investors and projects.

Energy efficiency investment and employment impacts

KfW provides funding to building owners for both renovation projects and new buildings. The financial measures are soft loans (13%) and grants (87%). The higher the efficiency level an investment will achieve the more finance is granted.

Credit of over 6 billion euros has been provided via KfW, resulting in a total of over 18 billion euros being invested, when private money 'leveraged-in' was also counted. This is estimated to have resulted in over 250,000 new jobs being generated, with around 13.5 man-years generated per million EUR invested (Diefenbach et al, 2012).

Minimum insulation requirements in the EU are significantly improving the energy efficiency of new buildings

Financial support and incentives in Germany have helped to create over 250,000 jobs in buidlings energy efficiency

Supporting policies

The KfW subsidies and financial incentives are supported by national regulatory instruments such as the Energy Saving Ordinance (EnEV) and the Renewable Energy Heat Act (EEWärmeG). They are flanked by a market incentive programme, education and outreach.

Lessons learned

Lessons were learnt from the scheme (Boermans et al, 2012) that can also be instructive in the MENA region. These include:

- The regulation needs to be updated according to technical progress;
- Awareness raising campaigns improve the uptake of the schemes, and also allow more efficient delivery;
- Concepts like the 'KfW 40 house' (with a certain efficiency standard) became well-known and could be used by banks or construction companies to advertise their offers;
- Incentives flanking the regulation. A regulation is more effective — also in job creation — if it is accompanied by awareness campaigns and financial support schemes;
- Local banks handle the grants and loans more effectively, as they are better equipped to assess and the creditability of clients; and
- Low interest rates and long loan durations are most compatible with the typical income of the target groups.

Best practice example 3: Building Retrofit Programme in Hungary

Hungary is working hard on its energy-inefficient building stock through an ambitious "deep" renovation programme.

A national renovation programme

Deep renovation is labour-intensive and requires a high level of investments. This cannot be mobilised by regulation alone, therefore financing measures are also provided by the programme, in the form of:

- Allocations from the general consumption budget;
- Loans and grants; and
- "Pay as you save" schemes.

The renovation programme is expected to generate over 130,000 new jobs by 2020. This includes both direct and indirect employment gains and is after the expected small net job losses in the energy supply sector are taken into account. Hungary has the second highest unemployment rate in the EU and the OECD, so the good news is that the new employment will be long-term and distributed across the country.

Pay-as-you-save schemes can be particularly effective in supporting building renovations and jobs

The "Pay as you save" schemes are expected to prove especially effective at generating employment from the investments. This is because the upfront costs are paid by a third party and repayments are linked to the energy bill of the renovated property, not the owner directly. Therefore the costs are tied to the building lifetime, avoiding the burden being placed on homeowners who may wish to move before an investment pays back. The programme gives the owner the chance to oppose such measures.

The overall benefits

Deep renovation activities create five times more jobs than investments in road construction. In Hungary they anticipate multiple benefits of the programme, including:

- An 85% reduction of energy use and corresponding carbon emission reduction;
- Energy security enhancement by reducing annual import needs of natural gas by up to 39%; and
- Wide economic benefits, with an additional 38% of the expected value of the investments being induced in sectors other than construction.

This provides a good potential example to follow in the MENA region.

Renovation of heating and air conditioning systems can also radically improve the energy efficiency of existing buildings

Construction is labour intensive — energy efficiency investment will create new jobs in sustainable construction (Basata)

Conclusions

The MENA region faces an economic and environmental challenge

Rapid population growth poses an economic opportunity, employment and energy challenge. With the need to address climate change it is a time of significant change. Yet, this time of change also also offers a way to face the economic and employment challenges. Investing in energy efficiency, and to a lesser extent renewable energy, can save energy, money and emissions while generating new jobs, a win-win-win situation.

Energy efficiency could generate between 1.2 and 1.6 million jobs in the MED-ENEC countries by 2030

With the right policy support energy efficiency investments and EE markets can be brought forward and will generate jobs. The NEEAPs provide a basis to start acting. Simple estimates in Lebanon anticipate that the NEEAP measures there should generate more than 15,000 jobs in the next few years.

Energy efficiency jobs are local and will spur growth in other sectors

Energy efficiency investments and EE markets have other advantages besides environmental protection, cost savings and employment creation. Energy efficiency requires people on-the-ground and many of the materials and some technologies can be manufactured locally. Employment impacts are the highest in the building sector. The jobs range from relatively low skilled construction and manufacturing work to higher skilled work in training and professional buildings services.

Governments need to act to address the barriers and take advantage of the energy efficiency opportunity

Globally, energy efficiency is hampered by poor understanding by decision makers, up-front costs and a lack of skilled people. n the MENA region additional barriers are created by subsidised energy prices and a lack of financial incentives for efficiency.

To successfully overcome these problems governments are recommended to take a four pronged approach:

- **Regulations and legislation** – such as improved building codes and appliance standards. Taking note that credible and effective enforcement is important to success;
- **Financial incentives** – such as grants and subsidised loans, that offer investors security concerning financial risks and returns;
- **Supporting policies and information** – price and subsidy reform and training are all critical to support the success of the other policies;
- **Awareness raising** – will improve understanding and underpin support of the policies and investments.

To ensure the actual policy measures are well adjusted to local circumstances it is essential to engage with investors, building professionals, developers and purchasers. The timing of policy changes should also be considered. Quick wins can be identified and should be implemented to generate momentum, but more complex changes will need to be phased over a longer, but limited, time period.

MED-ENEC is available and poised to support on many of these issues, if you would like further information please contact us and visit our website.

Government policies can support investment in energy efficiency – creating an energy and employment win-win

Reference List

I. ACEEE Factsheet (2013) www.aceee.org

II. AEA and Ecofys (2012) Analysis of Member States actions to implement the Effort Sharing Decision and options for further community wide measures. Buildings sector – policy case studies. A report for DG Clima

III. Amer, M. (2007) Transition from education to work.Egypt country report. ETF working document

IV. Boermans, T.,Grözinger, J. et al. (2012) Next phase of the European Climate Change Programme: Analysis of Member States actions to implement the Effort Sharing Decision and options for further community-wide measures. A report for DG Climate Action. Buildings sector – Policy case studies report, available: http://ec.europa.eu/clima/policies/effort/studies_en.htm

V. CAPMAS (2013) Labour Force: Egypt, Central Agency for Public Mobilisation and Statistics

VI. Diefenbach, N., Gabriel, J. et al. (2012) Monitoring der KfW-Programme „Energieeffizient Sanieren“ und „Energieeffizient Bauen“ 2011. IWU und Bremer Energie Institut. Gutachten im Auftrag der KfW-Bankengruppe.

VII. European Commission (2011) SEC 277 final Impact Assessment

VIII. EC Eurostat (2011) Pocketbook on Euro-Mediterranean statistics.2011 edition.

IX. Fraunhofer ISI et al. (2012) Employ Country Fact Sheets

X. Gazzo, A., Kost, C. and Ragwitz, M. (2011) Middle East and North Africa Region Assessment of the Local Manufacturing Potential for Concentrated Solar Power (CSP) Projects. Comissioned by The World Bank and ESMAP.

XI. GIZ (2012) Renewable energy and energy efficiency in Tunisia – employment, qualification and economic effects.

XII. HSBC (2009) A Climate for Recovery. The colour of stimulus goes green. HSBC Global Research.

XIII. IEA / OECD (2011) Evaluating the co-benefits of low-income energy-efficiency programmes. Workshop Report

XIV. IRENA (2011) Renewable Energy Jobs

XV. Lebanese Ministry of Energy and Water, LCEC (2011) The NationalEnergy EfficiencyAction Plan for Lebanon2011-2015

XVI. Luciani, G. (2012) Energy Efficiency policies in the MENA countries. Princeton University http://www.princeton.edu/~gluciani/pdfs/Energy%20efficiency%20policies%20in%20the%20MENA%20countries.pdf

XVII. OECD (2011) Towards Green Growth

XVIII. OECD (2013) Renewable Energies in the Middle East and North Africa: Policies to Support Private Investment. OECD Publishing.

XIX. OECD/IEA (2012) World Energy Outlook

XX. Page, John (2012) Youth, Jobs, and Structural Change: Confronting Africa’s “Employment Problem” Working Paper Series N° 155 African Development Bank, Tunis, Tunisia.

XXI. Plan Bleu (2011a) Impact on employment and trainings of development in rational use of energy and renewable energy sources in SEMCs. Conducted by Fondaterra and Syndex for Plan Bleu, Regional Activity Center UNEP/MAP.

XXII. Plan Bleu (2011b) Energy, Climate change and the Building sector in the Mediterranean: Regional Prospects.

XXIII. UNEP, ILO, IOE, ITUC (2008) Green Jobs: Towards decent work in a sustainable, low-carbon world. www.unep.org/labour_environment/features/greenjobs.asp

XXIV. Union for the Mediterranean (2011) Regional employability review. The challenge of youth employment in the Mediterranean.

XXV. Ürge-Vorsatz, D. et al. (2010) Employment Impacts of a Large-Scale Deep Building Energy Retrofit Programme in Hungary. Center for Climate Change and Sustainable Energy Policy (3CSEP) Central European University on behalf of the European Climate Foundation

XXVI. World Bank (2012) Implementation Completion And Results Report (Tf-54398). Grant From The Global Environmental Facility (GEF) In The Amount Of Us$ 8.5 Million Equivalent To The Republic Of Tunisia For An Energy Efficiency Program/Industrial Sector.

XXVII. WWF (2009) Low carbon Jobs for Europe. Current Opportunities and Future Prospects

Photo Credits:

Title: Construction in Basata, Egypt © Marcel Seyppel
Page 2: Construction in Basata, Egypt © Marcel Seyppel
Page 3: Photos 1, 2 and 3: Construction in Basata, Egypt © Marcel Seyppel
Page 4: Asif Akbar @ www.sxc.hu
Page 5: Photo 1: Dr Kurt Wiesegart, Photo 2: FSG777 @ www.sxc.hu
Page 8: Siemens press picture @ Siemens AG
Page 9: Ian Beeby @ www.sxc.hu S
Page 10: Econcern (Ecofys)
Page 11: Craigbcn @ www.sxc.hu
Page 12: Patrick Nijhuis @ www.sxc.hu
Page 14: Claudio Jule @ www.sxc.hu
Page 16: Philk0731 @ www.sxc.hu
Page 17: TBC @ Marcel Seyppel
Page 18: Hassi R’mel, Algeria, Siemens press picture @ Siemens AG
Page 19: Econcern (Ecofys)
Page 21: Linder6580 @ www.sxc.hu
Page 22: Construction in Basata, Egypt © Marcel Seyppel
Page 23: Construction in Basata, Egypt © Marcel Seyppel
Page 24: Lotus Head @ www.sxc.hu
Page 25: Training of craftsmen, RMI Gebze © Günes Inan
Page 26: Econcern (Ecofys)
Page 27: Econcern (Ecofys)
Page 28: Construction in Basata, Egypt © Marcel Seyppel
Page 29: Econcern (Ecofys)

BASATA PICTURES: *We would specially like to thank Maria and Sherif el Ghamrawy, the owners and managers of the «ecolodge» and Basata village at the Golf of Aqaba, for the kind support of illustrating this brochure. The pictures were taken in June 2013 constructing and finishing the new entrance building according to the principles of the Egyptian architect Hassan Fathy who died in 1989. The building will become a museum for bedouin and sinai culture.* ***http://www.basata.com***

List of Abbreviations

€	Euro (currency)
ALG	Algeria
APRUE	Agence Nationale pour la Promotion et la Rationalisation de l'Utilisation de l'Energie (Algeria)
CFL	Compact Fluorescent Light bulb
EC	European Commission
EE	Energy efficiency
EGY	Egypt
EPBD	Energy Performance of Buildings Directive
ESCO	Energy Service Company
EU	European Union
EUR	Euro (currency)
EUREM	European EnergyManager
FTE	Full time equivalent
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für international Zusammenarbeit
GWh	Giga Watt hour
HVAC	heating, ventilation and air conditioning
IEA	International Energy Agency
ILO	International Labour Organisation
IMF	International Monetary Fund
JOR	Jordan
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
LEB	Lebanon
LED	Light Emitting Diode
LIB	Libya
m	million
MENA(P)	Middle East and North Africa (Pakistan and Afghanistan)
MOR	Morocco
MW	Megawatt
NEEAP	National Energy Efficiency Action Plan
OECD	Organisation for Economic Co-operation and Development
PAL	Palestinian Territories
PV	Photovoltaic (solar)
RE	Renewable energy
SWH	Solar water heating
SYR	Syria
TUN	Tunisia
yr	Year

List of Figures and Tables

List of Boxes

Imprint

This is a brochure of the MED-ENEC Project

Project ID: *ENPI/2009/224-969*

Date of publication: *August 2013*

Authors: *Dr. Kurt Wiesegart, Team Leader MED-ENEC*
Dr. Marcel Seyppel, Communication Expert, MED-ENEC
Daniel Becker, Manager Policy Evaluation, Ecofys
Matthew Smith, Economy Expert, Ecofys
Riadh Bhar, Energy Expert, Ecofys

Printed by: *Integrity, Cairo, Egypt*
Design by: *Christof Paschedag, Jana Weiz*

Contact: *MED-ENEC II Project Office*
7 Tag El-Din El-Soubky Street, 11631 Heliopolis, Cairo, Egypt
Email: info@med-enec.eu
Phone: (+20 2) 24 18 15 78/9 (Ext.107)

Consortium Partners:
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, ECOFYS Germany, ADEME France

This project is funded by the European Union.

Contact
MED-ENEC II Project Office
7 Tag El-Din El-Soubky Street, 11631 Heliopolis, Cairo, Egypt
Email: info@med-enec.eu
Phone: (+20 2) 24 18 15 78/9 (Ext.107)