MAKE THE SWITCH

MELA Vision For The Deployment of Efficient, Human Centric Lighting Across The Middle East Region

Middle East Lighting Association

Version 1603

CONTENTS

Introduction

At a time when depleting resources and global warming call for lower energy consumption, the Middle East is facing an unsustainable increase in energy demand.

Some of the most energy intensive countries in the world are based in the Middle East and North Africa (MENA) region. Growing populations, urbanisation, and an expanding middle class are resulting in increased energy usage and waste production. Statistics from the Organisation for Economic Cooperation and Development (OECD) predict that the aggregate MENA energy demand will continue to expand well above the world average, at around 3 % per year between 2010 and 2030, with electricity demand growing at a rate of 6 % a year over the same period.

Research from Frost & Sullivan[1] suggests that the demand for energy resources is likely to triple over the next 25 years in the Middle East alone. To meet this demand, over USD 200 billion in planned investments will be channelled into the MENA region's power sector by 2020.

Lowering carbon emissions and finding a solution for energy security are an urgent concern for the region as a whole. Increased energy efficiency is essential to achieving more sustainable energy usage, lowering carbon emissions, increasing affordable standards of living, and supporting business. In this context, boosting energy efficiency is of key significance to the region's environmental and economic strategy.

One of the main pillars of sustainability and energy efficiency worldwide is lighting. A transition to new efficient, human centric* lighting technologies offers a tangible opportunity to improve the Middle East's performance in this area. By pursuing progressive policies in this sector, countries in the Middle East can save money and help the environment.

Industry estimates indicate that the global lighting market will grow at a CAGR[2] of 13 % until 2018, propelled by the increased use of energy-efficient LED lighting across public and private sector projects. Global forecasts for the total LED market predict an annual growth of 5 % till 2016, and 3 % thereafter until 2020. With the popularity of LED lighting for both indoor and outdoor lighting on the rise, the region is set to experience tremendous growth, with a market that is potentially worth USD 350 million by 2017.

The Middle East Lighting Association (MELA) and its members have the relevant policy expertise to ensure effective outcomes in both energy efficiency and human centric lighting resulting in increased uptake of environmentally sound practices and products.

MELA is proud to share its vision for energy efficient and human centric lighting across the Middle East, and it is determined to be the driving force that turns this opportunity into a reality.

[1] *Jenarthanan Vekram, 'Assessment of the Middle East LED Lighting Market; focus on energy efficiency will spur growth in the long term', Frost & Sullivan, 9 December 2014.*

[2] *Combined Annual Growth rate*

**Human centric lighting is intended to promote a person's well-being, mood and health. It can improve concentration, safety and efficiency in workplace or educational environments. It can support healing processes and prevention of chronic diseases among persons with irregular daily routines or in elderly care. An outstanding growth trajectory is expected for this market, which has not been the focus of customers, industry and policy makers so far. For further reading see http://www.lightingeurope.org/uploads/files/Market_Study-Human_Centric_Lighting_Final_July_2013.pdf*

1.1. A 'Light-bulb Moment' for the Middle East!

The use of energy efficient lighting is a natural and necessary way to reduce carbon emissions. Lighting accounts for 22% of the Middle East's electricity consumption[3], compared to 14% in the EU and 19% globally. New energy efficient lighting can reduce energy consumption by as much as 80 %, and can last up to 15 times longer than conventional lighting. In fact LED lighting is fast becoming the norm on the roads and in the urban landscapes of the United Arab Emirates (UAE) and the Gulf Cooperation Council(GCC) member countries at large. From colour-changing facades to LED-lit pedestrian tunnels, bridges and roads, both the private and public sectors are embracing the benefits of new lighting technology, governments in the region are actively promoting it and other efficient lighting technologies such as induction & metal halide lighting for specific applications.

Human Centric Lighting is intended to promote a person's well-being, mood and health. It can improve concentration, safety and efficiency in workplace oreducational environments. It can support healing processes and prevention of chronic diseases among persons with irregular daily routines or in elderly care. An outstanding growth trajectory is expected for this market, which has to date not been the focus of customers, industry and policy makers so far. This growth is fueled by the technology transition from conventional light sources to LED modules. While the energy efficiency and durability of LED modules is widely known in the market, little attention has been paid to their advanced controllability and related applications. MELA member companies are well positioned to take a leading role in this sector if policy makers and industry players work hand in hand to leverage the regions native strengths, including its innovation capabilities, increasing integration competence and solution-oriented understanding of customer requirements. Future updates of this Make The Switch paper will chart the ongoing development of this fascinating subject.

1.2. Our Efforts to Help the Middle East 'Make the Switch'

The Middle East Lighting Association (MELA) and its member companies have taken the lead in encouraging an ambitious and wide-ranging approach to the challenge of 'Making the Switch' to efficient lighting across the region. We are active across the Middle East and North Africa, working to date in six countries with our regional industry partners to identify obstacles to change, and tackling them.

Our efforts include overcoming the reluctance of consumers to invest in light sources that are initially more expensive. Even though the cost of energy efficient light sources over their lifecycle is much lower, convincing consumers of the importance of investing in energy efficient options has proven one of the key challenges to change. We also help governments ensure that low cost, low quality products are kept off the market.

[3] Gelil, Ibrahim Abdel, 'Regional report of efficient lighting in the Middle East and North Africa', November 2011, enlighten..

We are active throughout the region as policy experts and advisors, working as advocates for cleaner, more efficient lighting by:

- Helping governments to develop lighting policy that recognises the unique importance of lighting;
- Finding ways to deliver improvements in energy efficiency for lighting;
- Identifying barriers to energy efficient lighting and helping to overcome them;
- Getting the message out to consumers to help them save money – and the planet.

This paper is our roadmap for helping the Middle East to 'Make the Switch' to energy efficient lighting. It outlines our vision for how the region can encourage the uptake of more energy efficient lighting technologies.

We hope that you will find it a useful introduction to our activities in this area, and we hope it will encourage you to join us in our objective to harness the potential of energy efficient lighting across the Middle East

2. The Case for Energy Efficient Lighting

Energy efficient lighting is a quick, practical, and cost-effective way for countries to start saving energy. Phasing out inefficient light sources in residential lighting applications in the MENA region could save[4] 32Twh of electricity per year and cut CO2 emissions by 10Mt, the equivalent of 5 million vehicles on the road. This figure is before the additional savings that will be possible if other inefficient technologies are phased out in commercial and outdoor lighting.

In Egypt and Oman, street lighting is currently responsible for 3 –7 % of total end use energy consumption. This is radically higher than in the EU, where street lighting accounts for 1 %. The energy savings potential for some countries in the region is therefore relatively large.

Attention to lighting could radically reduce costs, lower CO2 emissions and improve living standards. The direct and knock-on effect of improved lighting efficiency goes far beyond profit for investors and an improved environmental image. *Figure1* shows a chart drawn up by licht.de, a cooperative marketing organisation for the luminaire and lamp industry, illustrating the broad spectrum of advantages to choosing more sustainable lighting.

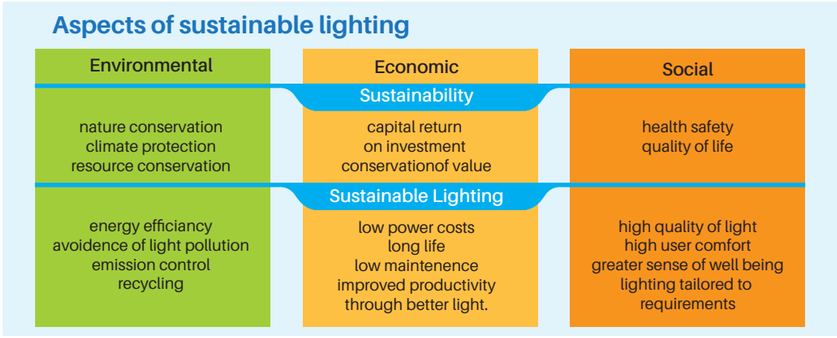

Figure 1

Aspects of Sustainable Lighting

[4] Regional report on EL in the Middle East & North Africa – I. A. Gellil 2011

2.1. National initiatives

More and more countries of the MENA region are taking steps to realise the potential of efficient lighting solutions. A number of countries[5] have set target dates for phasing out the least efficient light sources and are making energy efficient lighting a high priority topic in the fight to increase overall end use efficiency. Right across the Middle East, pioneers are driving the changes necessary to reap the rewards of smarter lighting solutions.

Middle East Lighting Association

	Responsible Regulatory Authority	Regulatory Scope	Entry Into Force Date
	Bahrain Standards & Metrology Directorate	Non-directional light sources used in residential lighting	5 September 2015
	Egyptian Standards Organisation	Non-directional light sources used in residential lighting	28 July 2015
	Jordanian Standards & Metrology Organisation	Non-directional household light sources initially - followed by directional light sources	1 January 2016
	Qatar Ministry of Environment	Non-directional light sources used in residential lighting	Not yet known
	Saudi Arabia Standards Organisation & Saudi Energy Efficiency Program	Non-directional & directional light sources used in residential lighting	1 May 2016 - Phase 1 1 May 2017 - Phase 2 1 May 2018 - Phase 3 tbc
	Emirates Standards & Metrology Authority	Non-directional light sources used in residential lighting	1 January 2015

[2] http://www.luxreview.com/article/2015/07/5-signs-the-next-smart-city-will-be-in-the-gcc
[3] Source G. Strickland MELA – July 2015

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Figure 2
Middle East Lighting Policy Forecast

- Already, six countries in the region have distributed approximately 100 million Compact Fluorescent light sources. A number of LED distribution programs are being planned across the region.
- LED is becoming the standard specification for most public lighting projects in the UAE, and the government's plan to upgrade all public lighting to LED has been underway since 2011. State-of-the-art luminaires have been rolled out on major streets, roads and pedestrian zones in the UAE.

[5] Source G. Strickland MELA 2015.This will be updated regularly and displayed on the MELA website www.middleeastlighting.ae (.org)

- 'With LED lighting systems in place in Abu Dhabi and Dubai, there is no end to the possibilities these cities can now offer their citizens: free Wi-Fi; USB access to charge phones; CCTV surveillance; loudspeakers. All of this as part of an integrated solution where lighting is only one of the components.'

In order to make an allowance for other equally sustainable lighting technologies, Abu Dhabi Municipality (ADM) has also issued a policy on alternative luminaires to LED as follows:

Another equally sustainable lighting technology to LED can be proposed for any Department project, but these must both be only whole-luminaire solutions and also cannot include any filament, fluorescent or discharge lighting technologies, nor any technologies containing mercury, other hazardous substances or any lighting/lamp technologies/materials prohibited under UAE ESMA Lighting/Lamp Standards.

Any alternative technology luminaire proposed to The Department on projects must be able to prove equal or better illumination performance, energy efficiency and long-term (minimum 15-year) full life cycle cost analysis comparison to current LED luminaire marketplace performance and always based on full luminaire data. Cost analysis must be undertaken to ISO 15686-5:2008 or comparable International standard and which fully meets the requirements of this Specification for the relevant project Part/Section and specific fixture criteria therein.

The relevant Department may have officical proceedures for approving LED alternative luminaires; in the case of Abu Dhabi City Municipality, this is formal submission through the ADM IST Department. The relevant Department should be contacted to establish procedures. It is The Department's decision on what constitutes an equally sustainable luminaire technology to LED through their process and their decision is final.

- The broad acceptance of LEDs has fuelled the next phase of the growth plan in most GCC countries. This phase involves the installation of smart controls and integrated solutions as part of their Smart Cities development aimed at further reducing energy consumption.
- In Bahrain and Jordan, incandescent light sources and other inefficient forms of lighting have already been or are due to be phased out.
- The Qatar Ministry for the Environment is considering a ban on tungsten light sources.
- Saudi Arabia has launched an ambitious Saudi Energy Efficiency Programme (SEEP) which is drafting legislation to ensure more efficient lighting in both residential and professional lighting applications.
- The United Arab Emirates has committed itself to an energy efficient future by imposing a phase out of inefficient incandescent and other light sources used in residential lighting applications and launching an ambitious Demand Side Management programme.
- The Dubai Demand Side Management Strategy[6] is part of the Dubai Integrated Energy Strategy 2030. The program sets high level demand side (30% reduction in energy consumption) and supply side (energy mix) targets. As shown in Figure 3, the outdoor lighting program aims at saving over 50% of lighting related energy consumption through switch-off measures and the introduction of LED technology. In the UAE and the Kingdom of Saudi Arabia, further measures have recently been taken by the Emirates Authority for Standardization and Metrology and the Saudi Standards, Metrology and Quality Organization to regulate residential lighting.

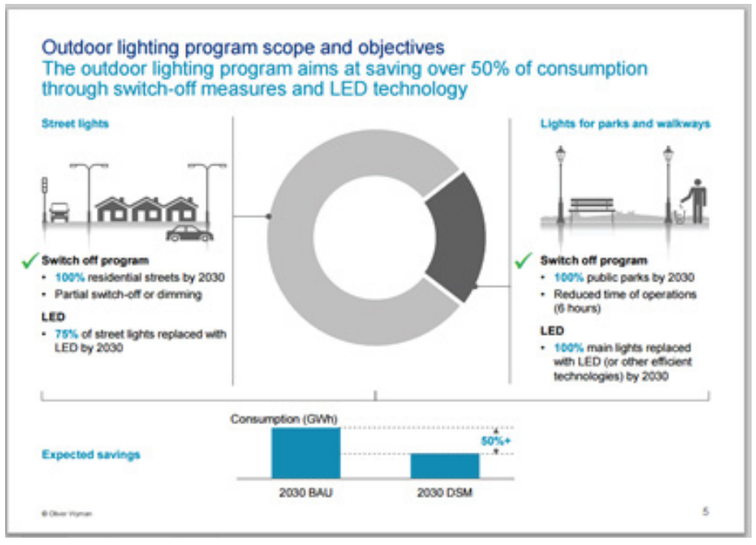


Figure 3

Outdoor Lighting Program Scope & Objectives (UAE)

[6] Dubai Demand Side Management Strategy, May 29, 2014, Government of Dubai

The environmental and financial benefits of energy efficient lighting speak for themselves. However, anecdotal evidence suggests that many energy saving light sources, particularly those distributed at no cost, are never installed. Furthermore, a householder who buys and uses one compact fluorescent (CFL) or Light Emitting Diode (LED) light source does not automatically repeat that purchase for every light fitting in their home.

As illustrated in Figure 4, a striking number of householders in the region are still using inefficient products to light their homes.

Lamp Technology	% of Total		
	UAE 2014	EU 2007	US 2010
Incandescent	50.1	54.1	62
Halo	7.8	23.7	4.4
CFL	21.8	14.7	22.8
LF	20.1	7.5	9.9
LED	0.2	0	0.9
Total	100	100	110

Source, Baseline assessment RTI/UAE

Figure 4

Baseline lighting assessment RTI/UAE 2014

3.Mediating the obstacles

Lighting is one of the few markets where out-dated, inefficient products are still easily accessible despite the availability of more efficient technology. The adoption rates to smart lighting differ widely between one country and another in the region.

3.1. Barriers to change

One of the most difficult aspects of changing energy performance, is ensuring that the change is incorporated into the habitual behaviour of citizens. Predicting the tastes, preferences and responses of a population is not easy, and understanding behavioural attitudes to lighting is a complex task.

Despite increasingly lower prices and wider availability of high-performing energy efficient light sources, particularly over the past few years, all the behavioural evidence suggests that the higher initial outlay is the main factor which negatively influences purchasers.

This is true of individual consumers, public administrations, and private companies despite the clear evidence that the total cost of an energy efficient lighting system is many times lower than its traditional equivalent.

✦ Individual consumers have been using incandescent and halogen light sources for over 100years. Changing this purchasing habit is one of the greatest barriers to change. A poor understanding of the functional and aesthetic developments in new energy efficient lighting technologies and of the shortcomings of existing lighting systems is hindering the progress of energy efficiency in the region.

✦ Public purchasers are also slow to change. Those responsible for choosing and maintaining public lighting are often not responsible for purchasing decisions. The high initial cost of investment is often a deterrent to public authorities with small budgets, even when the environmental and economic benefits are understood. Energy service companies (ESCO) haveproven very effective in mediating this barrier.

✦ Often, private sector organisations, in particular small and medium enterprises (SMEs) do not directly pay for buildings' energy use. They do not feel responsible for switching to energy efficient lighting, even if it makes financial sense.

✦ Poor market surveillance means that consumers are too often disappointed by bad products. Many supposedly 'energy efficient' lighting products on the market are not only non-compliant with basic standards – of safety, functionality, and marking – they also have very short lifetimes.

So how are we responding to these challenges?

3.2. Our Strategy

Our strategy is simple. We aim to ensure that governments in the Middle East support all end users, professional and residential in their decision to switch to energy efficient lighting technology.

Approach to Regulation

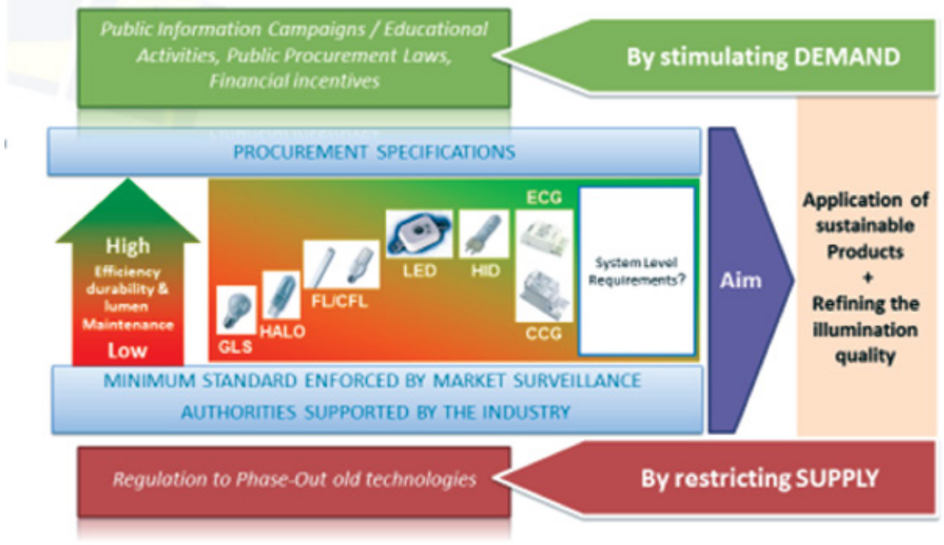


Figure 5
Regulatory measures

One of the keys to making this happen is to work on an administrative level to put in place regulatory measures specifying minimum efficiency levels acceptable for products. This will restrict the supply of inefficient products and ensure the availability of high performance, quality products. It will encourage manufacturers to increase the efficiency of existing products or replace less efficient products with new models. We hope to ensure that regulations are put in place to restrict the supply of inefficient light sources, control gear[7] and systems.

There are three key steps that must be in place for these measures to be effective:

- ✦ Monitoring to verify product efficiency and quality
- ✦ Verification conformance by lighting suppliers
- ✦ Enforcing actions by programme administrators against suppliers of non-compliant products

MELA is taking the following steps to establish this change:

- ✦ Cooperation and collaboration with national market surveillance authorities on monitoring, verification and enforcement actions to prevent substandard products from entering the market and thus prevent end-user disappointment;
- ✦ Facilitating international and regional cooperation in the sharing of test capacities, programmes and test data through the Global Lighting Association[8] and the Gulf Standards Organisation (GSO)[9];
- ✦ Developing regulations with governments across the region and supporting the implementation of existing regulations to enable enforcement actions to be carried out.

Changing habits

Stimulating demand for energy efficient products at regional, national, and local levels is also of primary importance. In addition to legislative tools setting mandatory efficiency standards for light sources, control gear and luminaires. we are working on policies and measures that encourage the use of efficient lighting products at regional, national, and local levels. There is compelling evidence to indicate that when trying to promote a lower carbon lifestyle, it is more effective to encourage positive change than penalise existing behaviour. We are also working to encourage policy makers right across the Middle East to assist the market transformation to more energy efficient lighting products.

As illustrated in Figure 5, there are a number of approaches that will need to be simultaneously adopted in order to achieve this:

- ✦ Controls such as building codes and green procurement directives.
- ✦ Economic and market-based instruments such as bulk procurement and private sector loans for energy efficiency; fiscal instruments and incentives such as rebates or subsidies;

[7] means a device located between the electrical supply and one or more lamps, which provides a functionality related to the operation of the lamp(s), such as transforming the supply voltage, limiting the current of the lamp(s) to the required value, providing a starting voltage and preheating current, preventing cold starting, correcting the power factor or reducing radio interference. The device may be designed to connect to other lamp control gear to perform these functions.

[8] The Global Lighting Association is a grouping of peak national and regional lighting associations representing over 5,000 lighting manufacturers and US $75 billion annual sales. See http://www.globallightingassociation.org/

[9] Standardization Organization for the Cooperation Council for the Arab States of the Gulf (GSO). See http://www.gso.org.sa/gso-website/gso-website/about-gso/about/bylaw

Lighting Policy

In order to harness the benefits of sustainable lighting solutions, the right information and practice is needed. MELA aims at establishing programmes to ensure the environmentally sound management of lighting products to minimize health and safety risks (Hg, ODS, PCBs, etc.) and to decrease pollution of natural resources (water, air, soil).

This part of our approach involves the provision of the necessary support and expertise to regulatory authorities in the development of legal frameworks for the environmentally sound management of electronic and hazardous waste, the establishment of collection and recycling service organisations (collection channels and recycling facilities) for end-of-life lighting products and advice on end-user education and communication campaigns.

The aim of this work is to establish the following throughout the Middle East region:

- Environmental sustainability legislation that emphasises producer responsibility
- Reduction of mercury levels in light sources (i.e. Minamata convention on Hg)
- Collection, recycling, and disposal of waste from products at end-of-life (i.e. Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal)

4.Getting there

We are already seeing results from our work with regional and national regulators to develop mandatory minimum efficiency and quality requirements for lighting products. Right across the Middle East, pre-market measures are already coming into force to ensure that all new public street-, office- and domestic-lighting products (light sources, control gear and luminaires) comply with strict energy efficiency and performance criteria — but there is plenty still to do.
Currently, we are -:

- Working to ensure that legislators set strict minimum criteria for safety, performance, functionality and environmentally sound management of lighting products for professional (outdoor, office, hotels, retail) and residential lighting applications*.
- Urging governments across the region to ensure that only products that satisfy the requirements set out in the various national regulations should be allowed to enter the market.
- Examining ways to support the 'value chain' – especially SMEs – and give them the information they need in order to mobilise their customers to purchase and correctly install energy efficient lighting technology.
- Continuously working with consumer and environmental groups, as well as retailers, to make sure that the public is informed about energy efficiency.
- Exploring ways to convince the national regulators in the MENA region to unite around a single label design.

4. 1. In focus: Labelling

A short-to-medium-term priority for MELA is to try to convince the national regulators to unite around a single label design. This is an important step towards helping the public across the region to understand the importance of efficient lighting.

A number of different energy labelling schemes are currently in use across the region. These labels are mandatory and must currently be shown on all packaging for products destined for residential lighting applications. This is a practice which can be adopted by all countries in the Middle East.

Public awareness depends on accurate and reliable knowledge. A single, recognisable and clear label will allow more transparency for consumers. It will also better facilitate the trade of lighting products around the region and reduce the cost to the consumer by cutting cost of compliance for MELA member companies.

As well as boosting customer confidence, the energy label gives an accurate indication of the carbon footprint of a lamp, which differs from that of other products, particularly those which require energy or electricity to function. Whereas for most products, the greatest environmental impact occurs during resource use – production, transport and disposal phase – light sources create most of their greenhouse gas emissions during their use phase[10], i.e. when they are switched on.

4.2. In focus: 'Greening' buildings in the Middle East

We want to act as a catalyst to 'green' buildings in the region by:

- Encouraging governments and regional institutions to improve existing lighting technology in their buildings and to show the public the benefits of making the switch.
- Supporting governments to ensure that future green building regulations apply to all buildings.
- Ensuring that all buildings in the region comply with strict daylight control criteria for rooms with daylight penetration, and presence control criteria[11].
- Ensuring that architects, designers, contractors, real estate professionals, and other businesses and organisations involved in sustainable design, building, and development have the right information about the choices, functionality, and savings potentials of energy efficient lighting.

4.3. In focus: Encouraging public purchasers to lead by example

We encourage public purchasers across the Middle East to set an example by adopting green procurement standards. This will not only send a strong signal to others but also make a significant contribution towards advancing the cause of efficient lighting.

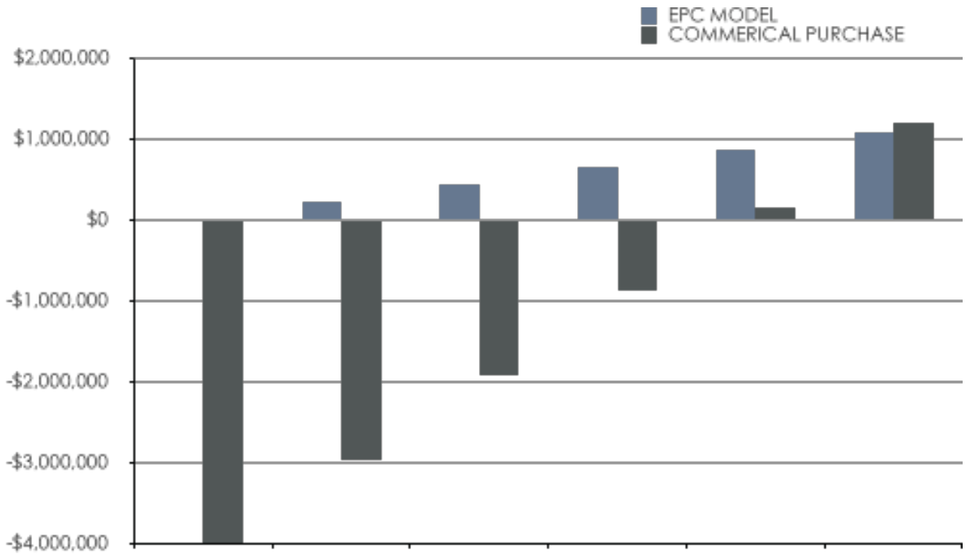
We call for governments right across the region to include energy efficiency and installation criteria for new and existing lighting systems in all national procurement specifications for public buildings and public street lighting systems. This must also include mandatory energy performance criteria.
We are seeking assurances that all existing street and office lighting systems will be audited, and that non-compliant lighting systems will be renovated in line with newly established standards. We will also look forward to supporting municipalities as they overcome the administrative and cost barriers of upgrading or renovating to energy efficient technologies such as lighting through:

- Assisting communication between local government and energy service companies (ESCOs);
- Promoting public financing initiatives (PFIs) or public-private partnerships (PPPs) to encourage financing mechanisms and energy efficiency initiatives;

*For up-to-date details on the regional policy readiness please check our website, **middleeastlighting.ae***

[10] *Up to 90 %, depending on the lamp type.*

[11] *These 'presence controls' are for rooms where people are not permanently present, and switching controls are for rooms which have a specific function over a predefined period.*



- 'The setting up of PPP type projects requires experience and necessary skills to deal with multidisciplinary issues including those that are legal in nature, guarantees, conducting feasibili ty studies, implementation, monitoring and evaluation. Potential investors need time to redesign financial models to meet the challenges caused by financial fluctuations, or additional security required in form of loan guarantees. UK, which is the largest PPP market so far, has estab lished a Treasury Infrastructure Finance Unit (TIFU) to provide funds to PFI /PPP projects to ensure that infrastructure projects go forward as planned despite financial market conditions thereby supporting jobs and the economy. Many countries are considering Guarantee funds to support PPPs. Korea lunched an Infrastructure Credit Guarantee Fund (KICGF) to facilitate private participation in infrastructure. According to the IMF, Korea's package includes measures to reduce financial burdens on PPPs, smooth interest rate changes, and shorten project imple mentation. The measures introduce: (i) lower equity capital requirements on concessionaires (5–10 percent); (ii) for large-scale projects, higher ceilings on guarantees provided by the Infra structure Credit Guarantee Fund (50 percent); (iii) help in changing equity investors for some projects; (iv) compensation for the preparation of proposals to encourage more vigorous com petition during bidding; (v) sharing of interest rate risks with concessionaires; (vi) compensation for the excess changes in base interest rates through grading of risks at the time of the concession agreement; and (vi) shorter periods for readjusting benchmark bond yields.
- Providing practical information on how to make energy efficiency improvements through lighting.

4.4. Closing the investment gap

Finally, we want to ensure that fiscal instruments – including reduced tax rates and subsidy mechanisms – are used to complement the efforts outlined above in order to increase the uptake of energy efficient lighting.

Experience from around the world shows that the most effective way to enable consumers to make better choices is to phase-out least efficient products.

Awareness campaigns, energy labelling, and positive fiscal measures like reduced rates of import or value added tax on the most efficient products could provide an incentive for consumers to make the switch to efficient lighting. These measures should be applied in a coordinated way across the Middle East, to avoid both distortions to the internal market and unnecessary additional administra- tive costs on the supply chain.

5. Conclusion

The Middle East has the potential to greatly boost its energy efficiency. However, enormous quanti- ties of light and energy are squandered every year because of old, wasteful lighting systems.
As standards of living rise so will demand for lighting, further increasing the threat of accelerated climate change. Switching to smart lighting solutions can help to mediate this threat.

MELA is committed to helping all relevant stakeholders across the region to make the switch to more efficient lighting. We believe that the only way to change consumer behaviour to a lower carbon lifestyle is through a combination of measures at a regional, national, and local level.

We will achieve this by supporting the development of mandatory efficiency standards for street, office, and domestic lighting that will, in time, restrict the supply of the least energy efficient products to the market.

We will ensure our member companies' commitment to increasing their energy efficient product ranges, providing alternatives for all existing applications, and further investing in innovative lighting solutions.

And we will help support efforts to stimulate the demand for energy efficient products at all levels (regional, national, and local) through:

- improving awareness of the environmental, aesthetic, and economic benefits of energy efficient lighting through targeted communications campaigns;
- 'greening' buildings across the Middle East. To do this we are encouraging governments to lead by example and ensure that all buildings comply with strict daylight and presence control crite ria; and that other businesses and organisations involved in sustainable design, building, and development have the right information about energy efficient lighting;
- helping administrations to include energy efficiency and installation criteria for new and existing lighting systems in their procurement specifications, and to audit and renovate non-compliant lighting systems;
- ensuring that fiscal instruments, such as reduced import or value added tax rates or subsidy mechanisms, are used to complement the efforts outlined above.

  We believe that measures such as the ones indicated in this roadmap could be undertaken quickly and effectively, and could make a real and lasting difference to the uptake of energy efficient products.

These measures constitute a small investment today for an incalculable return tomorrow.

GE Lighting

PHILIPS

OSRAM

FAGERHULT

Forest Lighting

AMKO SOLARA

RUUD LIGHTING

CREE

SYLVANIA

uniled

TRIDONIC

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