



Policy Brief

# UAE REGULATION ON LIGHTING PRODUCTS AND RECOMMENDATIONS TO FACILITATE ITS IMPLEMENTATION

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## Background

The Emirates Wildlife Society in association with WWF (EWS-WWF) has developed this briefing for policy makers. It includes details on the following:

- Role of demand side management policies in the UAE,
- Research results conducted by the UAE's Ecological Footprint Initiative (EFI) to support the Emirates Authority for Standardization and Metrology (ESMA) in the development of the "UAE Regulation on Lighting Products ('the regulation')",
- Details of key components included in 'the regulation' and recommendations on a supporting policy framework that would facilitate its implementation.

This document is intended for the organisations represented on the EFI Steering Committee, government and regulatory bodies involved in energy policy work, energy and water utility companies, environmental authorities, municipalities, producers of lighting products, standardisation bodies, organisations that provided data for the research and that were involved in roundtables and workshops. Please direct any enquiries to EWS-WWF, the secretariat of the EFI.

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<sup>1</sup> 'UAE Cabinet Decision Number 34 – "UAE Regulation for Lighting Products" (December 31, 2013) includes the details of a performance standard for indoor lighting products based on safety, energy efficiency, functionality, and hazardous chemical limits, product certification and labelling, product testing, safe disposal, surveillance and market monitoring.

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## Executive Summary

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Demand side management (DSM) in the UAE is more important than ever before. With demand for energy beginning to outstrip supply, there is a growing need for the country to invest in policies and measures that manage the population's consumption patterns and help to avoid the 'energy crunch'. While the UAE has been investing in energy supply measures such as nuclear and renewable energy, implementation of DSM has fallen behind. DSM measures could contribute to almost half of the UAE's potential to reduce carbon dioxide emissions and moreover at much lower costs than many measures to increase energy supply (Masdar Team Analysis 2009).

In 2007, the UAE's EFI was established through a partnership with the Ministry of Environment and Water (MoEW); the Environment Agency – Abu Dhabi (EAD);<sup>2</sup> the Emirates Wildlife Society in association with the World Wide Fund for Nature (EWS-WWF); and the Global Footprint Network (GFN) to manage the UAE's Ecological Footprint (EF) through research, policy and awareness. To address the 'energy crunch', the second phase of the EFI began in 2012, with Emirates Authority for Standardization and Metrology (ESMA) joining the partnership, in order to develop a policy demonstration cycle for an energy-efficiency standard and labelling system for indoor lighting in the UAE. To support ESMA in the development of 'the regulation', EWS-WWF conducted research to understand the technical, economic and sustainability impacts of the proposed lighting regulation.

The results show that implementing DSM measures, particularly energy efficiency lighting standards in the UAE, can help to reduce energy consumption, with substantial co-benefits for the economy and the environment. Energy efficiency standards for indoor lighting can save an estimated 2,046 GWh of electricity in the UAE, over 90% of which will be from replacing inefficient incandescent lights (based on the 2011 UAE population). These energy savings are the equivalent of avoiding investment in approximately 340-500MW of power generation capacity, or avoiding capital costs of AED 100-146.3 million annually for 20 years, which is a typical period over which power station investments are financed (see section 3 for full details).

The UAE will also save an estimated AED 668 million per year after full adoption of Energy Efficient Lights (EELs), which is comprised of AED 459 million dirhams of savings to households from reduced electricity bills and AED 216 million for the government in terms of reduced subsidies. If all inefficient lights were replaced by high quality Compact Fluorescent Lights (CFLs), the initial investment cost would be AED 732 million, which would be repaid in 1.1 years due to the cost savings. Different emirates will also save different amounts. For example Dubai households will make the biggest economic savings as they pay higher tariffs and Abu Dhabi government will make the largest subsidy savings as they provide the highest subsidies to electricity consumers. By implementing this

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<sup>2</sup> EAD was also representing its subsidiary body, the Abu Dhabi Global Environmental Data Initiative (AGEDI).

regulation, the UAE will also reduce almost one million tonnes of CO<sub>2</sub> emissions per year, equivalent to removing over 165,000 cars off the road.

The process has shown that openly engaging with stakeholders from the government, private sector and civil society can help secure robust data, support for implementation and facilitate the development of partnerships for effective implementation of policies. The UAE lighting regulation has buy-in and support from stakeholders and was developed with substantial input and dialogue with government bodies across the UAE, the Middle East Lighting Association (MELA<sup>3</sup>) and civil society. The regulation was informed by assessing international best practices and is comprised of product requirements for indoor lighting, including safety, energy efficiency, functionality and hazardous chemical requirements, and specifies that all lighting products need to be certified, labelled and monitored for their compliance with the standards and that they should be disposed of safely. Since the standard has been published in the Official Gazette and officially announced in February, suppliers<sup>4</sup> are required to comply with the regulation by having the products to be approved and have the Energy label no later than 180 days after the publication of the regulation in the Official gazette (Article 12.1, UAE Regulation on Lighting Products, 2013). Also non-registered products already in the market are allowed to be traded for a period of no more than one year after the publication of the regulation (Article 12.2, UAE Regulation on Lighting Products, 2013). This timescale was proposed by MELA as feasible. By the end of 2014, only compliant products will be allowed on the market, and all the inefficient products cannot be traded and will have to be removed from retail stores.

In order to facilitate the smooth transition to EEL in the UAE, there needs to be a concerted effort across government agencies, civil society, utilities, producers, retailers and the general public. The implementation of the following recommendations would support such a transition:

- An effective market surveillance and monitoring system is needed for lighting products entering the UAE.
- Additional policy instruments such as rebate schemes or exchange programs would help to accelerate the implementation of the regulation.
- There is a need to develop a safe disposal and waste management system for the lighting products entering the UAE as many EEL products contain mercury which is a hazardous substance; either government run or private sector schemes, such as Extended Producer Responsibility, would be possible solutions.
- Ideally, a federal awareness campaign about the regulation should be run by a federal government entity. This campaign should target the general public, traders, retailers and customs officials, informing them of the regulation, and the safety procedures for lighting products containing mercury.
- Financial assistance will be needed for the implementation of the above recommendations, but the benefits would far outweigh the costs.

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<sup>3</sup> A trade association for lighting producers comprised of some of the largest brands such as Philips, Osram, General Electric and others, including a locally based manufacturer G Lux.

<sup>4</sup> As per the regulation, the definition of supplier is the manufacturer, importer, including storage operator, wholesale and retail, and any other relevant processes or each professional of the supply chain who may have an impact on the product or any commercial or legal representative for import product subject to provisions of the Regulation. (Article 1: Terms and Definition, UAE Regulation on Lighting Products, 2013)

- Further environmental, economic and energy benefits would be realised by implementing a second phase of the regulation for commercial and public lighting.

## The Role of Demand Side Management in the UAE

The UAE along with other countries in the GCC is projected to experience further economic growth and development, resulting in an increase in energy consumption patterns over the next two decades. According to the Energy Security Initiative, ‘GCC consumption has grown 74% since 2000, and is projected to nearly double its current levels by 2020’. The demand for energy in the UAE is projected to exceed supply by 57% in 2020 (EAA, 2009). The UAE will continue to face economic and environmental challenges as it is a country that relies almost 100% on hydrocarbons for energy supply. Although it imports around 90% of its gas from Qatar, in the summer peak months, the UAE needs to use domestic oil reserves in order to sustain national power consumption, which results in the loss of national revenue.

The UAE is also ranked as having one of the highest per capita Ecological Footprints in the world, with 57% of its Footprint attributed towards household consumers, mostly due to energy consumption (Abdullatif & Alam, 2010). The residential sector also accounts for 29% of electricity usage in Abu Dhabi (EAA & RTI, 2009). According to the Masdar Team Analysis (2009) cost abatement curve, implementing DSM and energy efficiency measures could result in about 48% of the total carbon abatement potential and also generate income for the UAE per tonne of CO<sub>2</sub> saved. These reasons, along with the fact that some emirates in the UAE have a highly subsidized electricity market where the population pays less than production costs, make the case for UAE policy makers to reduce energy demand, by putting in place DSM measures. DSM measures, as demonstrated by the “UAE Regulation on Lighting Products” (see below), have the ability to reduce energy demand and carbon emissions at low cost, particularly if they are targeted towards the household consumers.

### ***2.1 The need for energy efficiency standards in lighting***

The emerging role of energy efficiency standards in the UAE and GCC are proving to be very promising; for example the UAE can reduce 9 Mt of carbon emissions with positive economic savings of more than AED240<sup>5</sup>/tonne CO<sub>2</sub> if standard appliances, electronics, lighting and water heaters are replaced by high efficiency versions (Masdar Team Analysis, 2009). These standards are a key element of DSM, particularly in Gulf countries and offer a quick way of promoting efficiency where other policy instruments, like tariff increase, might take additional time to implement. Energy efficiency standards are mechanisms that impose minimum energy performance levels on products entering the country ensuring energy efficiency and not allowing inefficient products to enter the market place.

Energy efficiency standards for indoor lighting are particularly applicable for the UAE. For example, replacing incandescent lights, which are the most prevalent indoor lighting technology, with more efficient lights offers the second highest technical potential (after cooling) to reduce energy demand in the UAE (EAA & RTI, 2009). Such a replacement will

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<sup>5</sup> Approximately US\$65

also help to reduce cooling<sup>6</sup> load as incandescent lights generate heat nearly equal to the number of watts consumed, which is what makes them particularly energy inefficient. Depending on location, lighting can also account for as much as 20% of the electricity consumed by the residential sector (IEA, 2006) and thus, an increased emphasis is being placed on establishing energy-efficient lighting (EEL) and associated policy measures. Globally, many countries are taking action to promote EEL which is evidenced by the UNEP En-lighten toolkit, which documents experiences from various countries on implementing lighting standards (UNEP, 2012). Additionally, the Masdar Team Analysis (2009) highlights that there is a 50% savings potential in lighting systems in new buildings, assuming that all incandescent and CFL's are replaced with LEDs. The UAE also has the necessary institutional capacity through ESMA, and the industry has been very supportive through MELA.

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<sup>6</sup> Cooling is the largest consuming activity in the UAE, but is already being tackled by the Executive Affairs Authority (EAA) through the comprehensive cooling plan project and by ESMA through its federal standard for air conditioners.

## The Potential for Energy Efficient Lighting in the UAE

Based on the aforementioned reasons in section 2, during 2012, the EFI partners conducted research to assist ESMA to develop 'the lighting regulation' in the UAE.

The objective of the research was to identify the energy, environmental and economic impacts of a transition to EELs in the UAE residential sector. Research was focused on the residential sector and included an international best practice review, development of a comprehensive residential lighting assessment for the UAE, benchmarking of a UAE lighting standard based on its economic and technical potential, assessing sustainability impacts, and the identification of a policy and regulatory framework. In order to conduct the study, data was obtained both internationally and locally from various organizations across the UAE including utilities, statistical bodies, municipalities, environmental authorities, MoEW and MELA as well as through household surveys. Extensive engagement through technical roundtables and workshops with these stakeholders and other experts also helped to secure data and political buy-in of the research<sup>7</sup>.

The study showed that energy usage from lighting is estimated to be 2,446 GWh per year, which represents 6-7% of total residential energy use (RTI, 2012a). Abu Dhabi accounts for 35% of usage, followed by Dubai and Sharjah, with 25% and 15%, respectively, and the remaining Emirates accounting for 25% of the baseline lighting energy usage<sup>8</sup>. With regards to the specific technologies, Incandescent lamps account for the majority of lighting energy usage, totaling 78%, CFLs account for 8% of the lighting energy consumption, and LFLs and halogens account for only 7% each, with minimal penetration of LEDs. Also, through stakeholder engagement, it was assessed that there are currently abundant low quality lighting products in the UAE market, misleading consumers to purchase fake energy efficient technologies that don't reduce energy consumption and/or have high levels of hazardous substances like mercury.

The annual technical potential for energy savings from upgrading the lighting technologies to energy efficient lighting (EELs) is estimated to be 2,046 GWh based on the 2011 UAE population (RTI, 2012b). This is equivalent to almost 940,000 tonnes of CO<sub>2</sub>-eq emissions, or taking 165,000 cars off of the road each year (RTI, 2012c). This also represents a 65% reduction in direct indoor residential lighting electricity use and a 28% cooling bonus due to reduced air conditioning demand.

These energy savings are the equivalent of avoiding investment in approximately 340-500MW of power generation capacity. To put these savings in perspective, the investment required for the Shuweiwat 3 power plant is estimated to be about AED 3.1 million/MW and the effective implementation of the lighting regulation would be the equivalent of AED

<sup>7</sup> EWS-WWF contracted RTI International to conduct the technical research and analysis

<sup>8</sup> All calculations are based on a conservative estimate of approximately 2 hours per day usage of lighting based on a study conducted by the U.S. Department of Energy, using real logged data. ESMA conducted a study for its employees, which estimated 7 hours per day usage. If the daily usage figure is increased, all results such as baseline consumption, technical and economic potential will also increase proportionally. Therefore these results present a very conservative analysis. In all situations, the case for developing lighting standards is even more environmentally, economically and technically viable.

1.4-2.1 million/MW. This is the equivalent of avoiding the capital costs of AED 100-146.3 million annually for 20 years<sup>9</sup>. These numbers highlight the benefits of DSM measures for the UAE, due to their cost effectiveness.

The research highlighted in **Table 1** shows that the transition to EEL is economically viable for both households and the government in the UAE, with total social benefits estimated to be approximately 668 million AED per year after full adoption. Even with higher upfront costs, the longer life expectancy and lower energy consumption of EELs results in large economic benefits, where households are estimated to save 459 million AED per year after full adoption of EELs. **Table 1** shows that households in Dubai will realize the largest share of benefits because they face the highest tariff rate across Emirates. The economic potential is also evaluated from the government's perspective which takes into account the difference between the tariff rate in each emirate and the full cost of power generation (i.e. the level of subsidy being provided by the government). Subsidy reductions to the government are estimated to be 216 million AED per year, with Abu Dhabi realising the greatest subsidy reductions because it has the lowest consumer tariffs.

**Table 1: Net Household Benefit by Emirate (1,000 AED)**

Emirate	Annual Increase in Lamp Expenditure (a)	Annual Savings From Reduced Electricity Bills (b)	Net Household Savings (b-a)	Benefit/Cost ratio (b/a)
Abu Dhabi	2,807	73,707	70,900	26.3
Dubai	1,757	166,646	164,889	94.9
Sharjah	1,143	57,130	55,988	50.0
Ajman	301	23,703	23,402	78.9
Umm Al Quwwain	139	13,882	13,743	100.0
Ras Al Khaimah	860	87,263	86,403	101.4
Fujairah	407	36,949	36,542	90.8
<b>Total</b>	<b>7,413</b>	<b>459,280</b>	<b>451,867</b>	<b>62.0</b>

Over 92% of the economic benefits to households and governments are associated with the phase-out of incandescent lights. **Table 2** shows the savings/benefits associated with each technology phased out.

<sup>9</sup> The Shuweihat 3 plant will cost AED 5 billion to produce 1.6GW (The National, 2010), which corresponds to a cost per MW of about AED 3.1 million. The effective implementation of the lighting regulation would result in savings of AED 716 million (calculated by 2046GWh x 0.35fils/KWh). The lighting regulation savings of 2046GWh corresponds to 340-500MW of electricity demand reduction, which equates to a cost per MW of AED 1.4-2.1 million. Multiplying the 3.1m/MW (for Shuweihat 3) with 340-500MW, means the equivalent of investing AED 1054-1550 million. If this was financed over 20 years at 7% interest – the annual payment would be AED 100-146.3 million per year for 20 years.

**Table 2. Incremental Annual Social Benefit by Technologies Phase-Out (1,000 AED)**

Technologies Phased Out	Total Annual Energy Savings (GWH)	Annual Increase in Lamp Expenditures (a)	Annual Household Savings from Reduced Electricity Bills (b)	Annual Government Savings from Subsidy Reduction (c)	Full Annual Social Benefits (b+c-a)
Incandescent	1,875	2,268	420,840	198,072	616,644
Halogens	151	3,097	33,967	15,868	46,738
Low-efficiency CFLs	20	2,048	4,473	2,104	4,530
<b>Total</b>	<b>2,046</b>	<b>7,413</b>	<b>459,280</b>	<b>216,044</b>	<b>667,911</b>

A sustainability impact assessment was also conducted to provide insight into the types of social and environmental impacts that may be associated with adopting EEL compared to the baseline. **Table 3** summarizes the energy savings and associated reductions in GHG from electricity production, making the implementation of high-efficiency lighting an attractive solution from the environmental stand point.

**Table 3. Summary of Emissions Savings and Mercury Pollution from Lighting Upgrades**

	GHG Emission Savings (MT CO <sub>2</sub> -eq)	SO <sub>x</sub> Emission Savings (MT SO <sub>2</sub> )	NO <sub>x</sub> Emission Savings (MT NO <sub>x</sub> )	Particulate Matter Emission Savings (MT PM)
Incandescent	861,669	18,001	4,659	41
Halogens	67,960	1,420	367	3
Low-efficiency CFLs	9,139	191	49	0.4
<b>Total</b>	<b>938,768</b>	<b>19,612</b>	<b>5,075</b>	<b>44</b>

<sup>a</sup> Applies to a CFL-based replacement strategy only for the purpose of the study.

## Key Parameters Included in the UAE Lighting Regulation and Timeline

The purpose of a lighting regulation is to put in place requirements that ensure that low quality products not meeting specifications cannot reach a country's market. The UAE federal lighting regulation was developed based on best practice review from the EU and other international sources, along with research conducted by the EFI on the assessment of the UAE residential lighting profile, and feedback from the lighting industry and key stakeholders across the UAE.

The regulation includes the four main product requirements for indoor lighting, used mostly in UAE households, including electrical safety, energy efficiency, functionality and hazardous chemical requirements. The regulation also specifies that all lighting products need to be certified, labelled and monitored for their compliance with the standards and that they should be disposed of safely with any waste managed according to guidelines that will be developed by ESMA's board in coordination with relevant stakeholders. The lighting regulation specifies that these guidelines will be based on Federal Law 24 of 1999 for the Protection of the Environment and the Cabinet Order 37 of 2001 for the handling of Hazardous substances, Hazardous waste, and Medical Wastes and the UAE's commitments under the Basel Convention (Article 7, UAE Regulation on Lighting Products, 2013)

Following the official publication of the regulation in the Official UAE Gazette, suppliers will have to import only efficient products starting July 1<sup>st</sup> 2014, Products that do not meet the standards specified in the regulation will also not be allowed to enter the UAE for retail after January 1<sup>st</sup> 2015. ESMA is also in discussions with the GCC Standardization Organization (GSO) to roll out the standard at the GCC level. This would facilitate the implementation of the standard for lighting manufacturers and traders as the size of the market following the same standard would increase, and the labelling requirements might be unified.

The sections below provide details on the product requirements and what is included in the UAE regulation for lighting products.

### ***4.1. Lighting product requirements: electrical safety, energy efficiency, functionality and hazardous chemical limits***

#### ***4.1.1 Electrical Safety***

Electrical safety requirements are important to ensure that products entering the country meet all international regulations, including limits on hazardous substances, and requirements for equipped high quality electrical systems, ensuring the safety of consumers that are using the lighting products. Electrical safety requirements are for all indoor lamps under the scope of the regulation, and are based on International Electrotechnical Commission (IEC) standards.

#### *4.1.2 Energy Efficiency*

Minimum Energy Performance Standards (MEPSs) are energy performance limits imposed in the regulation that are used to phase out inefficient products from the market. This is done by setting energy efficiency requirements for different energy classes or stars that products must meet in order to be used in the country. The purpose of MEPSs with regards to a lighting regulation are to set minimum energy requirements which can then be adjusted and increased to a higher energy star with a higher energy efficiency requirement over time. Lighting products that already meet a higher energy performance level will be labelled with the corresponding energy star to inform consumers that it is a higher quality product, and raise awareness and demand for EEL.

The UAE regulation specifies that lighting products that do not meet the MEPS of 1 star energy class will not be allowed to enter the country and sold in the market through all retail stores, including those within the free zone authorities. The regulation also includes an exemption list based on industry feedback where certain incandescent lights below 16W that have specific applications are still permitted. This also may be part of the Restriction of Hazardous Substances (RoHS) Directive. Products that do not meet the lighting regulation requirements include the 40W, 60W, and 100 W incandescent, along with the 50W Halogen light bulbs. However, the lighting regulation also includes an exemption list for certain products that have specific uses to enter the country.

#### *4.1.3 Functionality*

Functionality requirements in the regulation are to ensure that lighting products are of good quality, have a long lifetime, with a high level of 'colour rendering'. Determined by international best practices and industry recommendations, this should result in warmer coloured and longer lasting products entering the market, making the lights more acceptable to the public. For example, products marketed as LEDs that don't meet the functionality requirements in terms of usage hours and colour rendering, will also be removed from the market.

#### *4.1.4 Hazardous chemical limits*

Lighting products contain hazardous substances such as Mercury, Lead, Cadmium, and other toxic heavy metals, and therefore need to be handled with care and treated as hazardous waste. Hazardous limits, which meet international standards, should also be established in a lighting regulation in order to prevent low quality products from entering the country. The UAE regulation includes limits for hazardous substances, based on international best practice review and the European Union Restriction of Hazardous Substances (EU RoHS Directive) which limits the level of hazardous chemicals, particularly Mercury in lighting products. With the current requirements, all low quality products which may meet the energy efficiency and safety requirements but have higher contents of hazardous chemicals will not be allowed to enter the UAE. This ensures that manufacturers do not develop higher efficiency as a result of increasing mercury limits in the lamps, as is apparently the case for many low efficiency CFLs in the UAE.

#### ***4.2 Product certification and labelling***

Procedures for certification and labelling need to be established that take into account the different requirements of the regulation, and revised as the MEPS becomes more stringent and increases the level of energy efficiency of products entering the country.

Lighting products that are to be sold in the UAE market will need to follow the Emirates Conformity Assessment Scheme (ECAS). ECAS requires manufacturers, traders, and suppliers to provide third party test reports of their products proving that they meet the requirements of the lighting regulation, in order to receive a certificate of conformity and obtain the UAE energy efficiency label. Lighting products that are coming into the borders will need to be registered by ESMA before being allowed entry by the Federal Customs Authority.

#### ***4.3 Product testing, surveillance and market monitoring***

Third-party product testing will be needed to verify performance and certify the Star Ratings, as well as other requirements in the regulation and should ideally be conducted by independent testing laboratories. Ongoing surveillance and market monitoring is also essential for achieving a lasting and fair market transition to EELs and ensure that any claims made by lighting producers on labels and certificates are independently verified. Laboratory facilities will be needed to conduct random testing of lighting products on the market to ensure that there is compliance to the requirements in the regulation.

According to the regulation, ESMA, in coordination with different local government authorities, is responsible for market monitoring of products to ensure compliance to this regulation which will occur continuously through random sampling of products at retail outlets to verify the compliance of products to this regulation. Market monitoring should be rigorously enforced to secure the proper transition to EEL. ESMA should work closely with relevant municipal authorities, standardization bodies, like Abu Dhabi Quality and Conformity Council (QCC), and the federal Customs Authorities to guarantee market monitoring and surveillance.

#### ***4.4 Safe disposal and waste management***

Another key area to address is safe disposal of spent light bulbs and waste management. While CFLs are considered to be cost-effective and provide significant energy savings, they do contain mercury, which is recognized as a hazardous substance that can lead to health and environmental impacts if not handled and disposed of correctly. LEDs are also very energy efficient and do not contain mercury, but they cost 5-7 times more which result in a greater financial burden to consumers.

In order to minimise any negative impacts from the use and disposal of mercury containing lamps, limits on mercury-based on the EU standards have been introduced into the regulation. Also, safe disposal should be maximized through proper handling, collection, storage, transportation, treatment, recycling or disposal of waste from spent

mercury-containing light bulbs so the least amount goes into general waste. As per the lighting regulation, safe disposal of the light bulbs will be regulated by a special order that the board of ESMA will produce in coordination with the relevant federal and local emirate stakeholders (Article 7, UAE Regulation on Lighting Products, 2013).

Currently, recycling of mercury-containing lamps is non-existent in the UAE, and all lighting products are disposed in landfills as general waste of which only a select number have modern environmental controls, such as double liners, to prevent the leaching of hazardous materials such as mercury into the soil and groundwater. Although the mercury in a single CFL is relatively low, the large number of potential CFLs disposed due to the increase in usage of the lighting technology as a result of the implementation of the standard runs the risk of mercury being released into the environment. The replacement of incandescent and halogen lamps with CFLs will eventually lead to increased mercury in the waste management system of approximately 26 kilograms per year. However, with CFLs having an average life expectancy of about 9 years, the bulk of these new units will not fail until approximately 2025 (including the 1/2-year grace period).<sup>10</sup> While this could allow time for the UAE to mobilize a sustainable waste management system capable of processing the spent CFL lamps, it is important to note that CFLs currently occupy 35% of the UAE market and hence a waste management system should be implemented as soon as possible.

The UAE lighting regulation currently states that ESMA will coordinate with the different authorities on the safe disposal of mercury-containing lamps. The regulation also indicates that mercury-containing light bulbs should also be supplemented with an instruction manual, which provides the user information on: environmental and health impacts of using these products, proper usage, handling, and disposal of these products should they break, how to properly collect the products and separate them from general waste, and finally how to reuse and recycle the lighting products.. The regulation also states that Mercury containing light bulbs (CFLs and LFs), electronic waste light bulbs (LEDs) and any new lighting technology containing mercury or other hazardous substances should be classified as hazardous waste and therefore treated differently from general waste (Article 6.2, UAE Regulation on Lighting Products, 2013). The MOEW is currently addressing this issue along with the waste authorities in the different emirates by putting in place waste management strategies.

The roles and responsibilities of the waste management will need to be in accordance with the UAE Federal Law 24 of 1999 for the Protection and Development of the Environment, Cabinet Order No. 37 of 2001 for Executive Order of Law 24 on Handling Hazardous Substances, Hazardous Wastes and Medical Wastes and the UAE's commitments under the Basel Convention (Article 7.2, UAE Regulation on Lighting Products, 2013).

The regulation also indicates that ESMA will develop guidelines issued by their Board that will specify the safe disposal of lighting products containing hazardous waste, with respect

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<sup>10</sup> Actual failure rates will have a probability distribution around the average. Usage rates will vary, and some lamps will fail earlier and some later.

to their collection, collection, transportation, recycling by waste management authorities' materials. These guidelines should follow the guidance document on safe disposal of light bulbs in the UAE which was developed by the sustainability working group created during the development of the regulation. Stakeholders in the sustainability working group included municipalities, MOEW, environment organizations, waste authorities and lighting industry representatives.

## Conclusions and Recommendations to Facilitate the Implementation of the UAE Lighting Regulation

A lot of effort has been undertaken to develop a strong and effective indoor lighting regulation for the UAE. This section lists key conclusions and recommendations to ensure further development of DSM policy measures (see 5.1-5.3). While the UAE lighting regulation is the main policy instrument to introduce higher quality indoor lighting products to the UAE, it does require a number of other supporting policy measures and activities to facilitate the smooth transition to EEL in the UAE (see 5.4-5.9). All recommendations will require a concerted effort across government agencies, NGO's, utilities, producers, retailers, and the general public.

### **5.1 Implementing DSM measures in the UAE can help to reduce our carbon footprint, curb energy consumption and benefit the economy**

- The research has shown that the country stands to save annually almost 940,000 tonnes CO<sub>2</sub>, 2046GWh (corresponding to 340-500MW avoided capacity) and 668 million dirhams.
- We recommend that all emirates in the UAE develop and support DSM measures as a core part of their energy policy and plans.

### **5.2 When designing DSM measures, it is important to conduct holistic research that assesses the potential impacts on energy, economic, environmental and social issues:**

- Conducting holistic research on energy, economic, environmental and social impacts of regulations can help to identify key issues that need to be addressed for the effective implementation of any policy or regulation.
- By conducting such a holistic assessment, the lighting regulation was able to incorporate key parameters such as electrical safety, quality, energy efficiency and environmental standards.
- This not only helps to identify and manage any unintended consequences and trade-offs, but moreover helps to identify strategies and key stakeholders that can ensure more effective implementation of policies.

### **5.3 Continual engagement of stakeholders from government, private sector and civil society in an open and transparent process builds trust and effective implementation of policies**

- The process of regulation development is crucial, especially ensuring that provisions are made to engage stakeholders from government, private sector and civil society across the country.
- Effective and continued stakeholder engagement not only enables good quality local data to be sourced and information to be verified, but moreover, it helps to identify implementation plans and develop partnerships between organisations to facilitate this.

- For the lighting regulation, this took the form of workshops, roundtables, one to one meetings as well as review of drafts of the regulation. It will be important to continue this dialogue and engagement for effective implementation of the regulation.
- For example, ESMA has started a series of workshops to engage with the relevant stakeholders. ESMA held an Industry meeting to discuss the requirements of the regulation and answer any questions from the industry, in particular the manufacturers and the retailers. Later they will hold a meeting with the relevant governmental entities required to discuss enforcement of the regulation.

#### **5.4 The regulation requires market monitoring and testing to ensure products entering the UAE are compliant**

- Efforts should be made to support the compliance of the lighting regulation, particularly through regular testing conducted at official or independent testing laboratories.
- It is recommended that the UAE invests in an in-country testing facility to certify if EELs and other products meet the requirements; such testing and monitoring should be done regularly.
- Esma should work closely with QCC on the implementation of the lighting regulation, as well as the federal Customs Authority.

#### **5.5 There is a need to develop a safe disposal and waste management system for lighting products in the UAE**

- Emirate level waste management authorities and the MOEW are requested to ensure recycling plans for hazardous materials are included in their current long term strategies.
- Municipalities across the emirates are requested to work with relevant federal entities on centralized collection of spent light bulbs.
- EPR (Extended Producer Responsibility) programs that require the manufacturer to take responsibility for the management of spent light bulbs should be considered as a viable option in supporting the country with waste management. MELA is interested in pursuing this, which could set an important precedent for private sector involvement in waste management in the UAE.
- Esma should emit the guidelines mentioned in article 7 regarding safe disposal as soon as possible.
- The implementation of modern sanitary landfills with liner systems consistent with the Basel Convention and the UAE Federal Law No. 24 is encouraged in order to prevent hazardous chemicals from spent light bulbs and other products from entering the soil.

#### **5.6 There is a need for a government run federal awareness campaign about the regulation, targeting the general public, traders, retailers and customs officials**

A key component of the market transformation process will be developing and implementing educational and informational campaigns to increase awareness among households, retailers, customs authorities and others involved in the whole chain of

custody of lighting products that are used in the UAE. For example, customs authorities need to know how to identify correctly labeled products and not allow the entry of any non-conforming products. Similarly, households need to understand the benefits of EELs. Thus any awareness campaign(s) should be designed with different audiences in mind and address the specific barriers associated with the adoption of EELs such as identification of products, price concerns, environmental and health concerns along with appropriate clean up procedures for broken CFLs, performance issues with low quality EELs, and aesthetics of EELs.

- Before and after any awareness campaign, surveys should be conducted in order to better understand and measure any changes in public perception. This would enable key barriers and issues to be identified and campaign strategies to be more targeted.
- It is important that these campaigns follow a unified message to consumers and other stakeholders to ensure consistency throughout in order for an effective result.
- Efforts should be made to run a federal awareness campaign targeted towards the general public with a centralized message ensuring consistency and supporting a smooth transition to EEL.
- The campaign should be led by one federal entity (for example, ESMA) that manages the communication plan and stakeholder engagement in order to disseminate the campaign messages across the different Emirates.
- Key stakeholders that should be involved in the dissemination of the campaign include those that are already running relevant awareness campaigns as well as utilities, ministries, industry, regulators, waste management authorities, and environmental authorities.
- EPR (Extended Producer Responsibility) programs that require the manufacturer to provide information to consumers on the environmental, economic, social and health benefits of using EEL products, along with procedures for dealing with mercury-containing lamps should be considered. The industry has also expressed their interest in supporting the awareness efforts around the regulation, and could therefore be a good partner for this sort of activity.

### **5.7 Additional policy instruments such as rebates and incentives should be implemented to accelerate implementation of the lighting regulation**

Some 73% of incandescent lamps are expected to fail in any given year, which means that households will need to replace almost all of their incandescent lamps with EELs within the first year of implementing the regulation. While the pay back for the transition to EELs is only 1.1 years, there will be up front financial costs for people. Thus additional policy instruments that facilitate the implementation of the regulation and minimize the financial burden should be considered, including financial incentives, rebate schemes, giveaways and exchange programs.

- There is the case for putting in place these schemes within the first year or two to support the public, because with EEL's longer life expectancy, only a fraction of the lamps in the household will need to be replaced in subsequent years.
- The direct cost of a 2-year rebate program covering 50% and 100% of the cost of CFLs would range from 400 to 800 million AED. The rebates would most likely be applicable for all CFLs purchased, including purchases to replace incandescent/halogens, as well as purchases to replace existing CFL lamps.

- Rebate schemes will be most effective if they are at a retailer level and centralized and implemented over 1 to 2-years with centralized distribution. This would not only provide financial assistance to consumers to purchase EELs, but also an opportunity for education and information dissemination, all of which would increase acceptance of EELs and help with implementation of the regulation.
- The CFL exchange programme announced by the Dubai Carbon Centre for Excellence could be one example of an activity that may benefit from such support<sup>11</sup>

#### **5.8 Effective implementation of the UAE lighting regulation will require financial assistance, but the benefits far outweigh the costs**

- The implementation of these recommendations will require up front financing but the economic savings that will accrue to households and UAE government will far outweigh these costs.
- Different emirates may want to employ different strategies for implementation. For example, the Government of Dubai may need to spend longer convincing households of the economic benefits of switching to EELs, whereas the Government of Abu Dhabi may want to consider financing a rebate or exchange programme for households.
- Financing will also be needed for awareness activities, waste management, laboratory testing facilities and incentive programmes. If the UAE government makes strategic decisions to redirect funds towards these areas, it would help ensure that the lighting regulation is a resounding success.

#### **5.9 Further environmental, economic and energy benefits would be realised by implementing a second phase of the regulation for commercial and public lighting**

- The current regulation covers indoor lighting products that are found mostly in households.
- Expanding the scope of the regulation to also include lighting products found in the commercial and public areas would result in further environmental, economic and energy savings. The technical, environmental and economic viability should be assessed before developing a standard.
- ESMA and the lighting industry plan on working together to expand the regulation in the future.

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<sup>11</sup> Further information online at:  
<http://cdm.unfccc.int/Projects/Validation/DB/UBE8AoGA1PEBLR9FCZW68HCQKM8Q6M/view.html>

## Further Information

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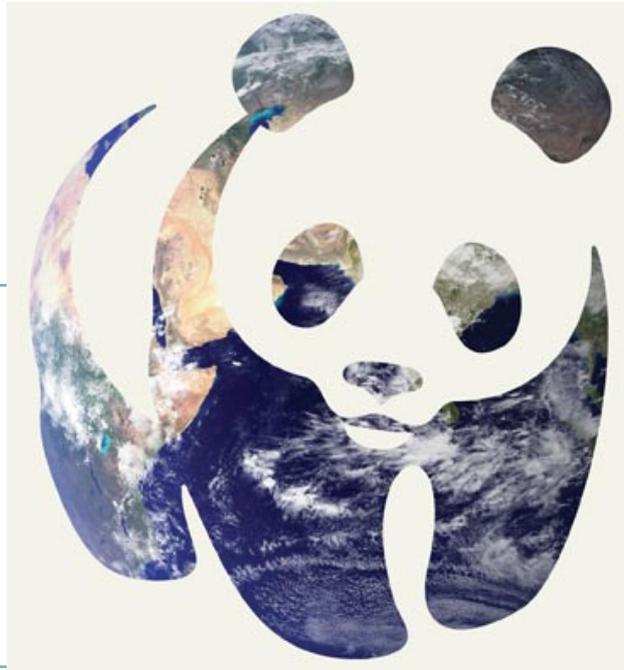
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