

Energy Efficiency Policies for the SEMED-Arab Region

An Energy Efficiency Experts' Roundtable Report

Background

The International Energy Agency is working with regional partners throughout the developing world to develop energy efficiency policies tailored to regional energy savings opportunities and policy needs. These regional energy efficiency policy recommendations will build on the IEA's 25 Energy Efficiency Policy Recommendations (EEPs), which have found widespread application since 2008 (Pasquier and Saussay, 2011). The IEA is working with multi-lateral development banks (MDBs), networks of energy efficiency experts, and national governments to develop EEPs that reflect regional energy savings opportunities, barriers, and conditions. Developing these EEPs is done through regional roundtables that bring together regional institutions and national experts from government, industry, development agencies, and non-governmental organizations.

The first of these regional roundtables, intended to develop regional energy efficiency policy recommendations for the Southern and Eastern Mediterranean (SEMED)-Arab region, was held April 15-16 in Amman, Jordan. This Roundtable was funded through a voluntary contribution from the European Bank for Reconstruction and Development (EBRD), co-hosted by the League of Arab States and the Regional Center for Renewable Energy and Energy Efficiency (RCREEE), and held under the patronage of H.E. Malek Kabariti, Minister of Energy and Mineral Resources, Kingdom of Jordan.

More than thirty energy efficiency experts from public, private, international and inter-governmental institutions took part (see Annex 1). The Roundtable featured presentations on regional energy efficiency initiatives and national energy efficiency policy implementation, as well as discussion sessions on regional energy efficiency market opportunities and barriers.

The core of the Roundtable was a half-day policy development session. This session featured small groups organised by sector (e.g., industry, buildings, transport, appliances) and tasked with identifying energy efficiency policies responsive to regional market opportunities, barriers, and needs. The EEPs developed through these small group discussions are presented here.

Barriers to scaling-up energy efficiency in the region

Scaling up energy efficiency requires energy consumers and business managers to modify their consumption and investment behaviour. Consumer and investor behaviour is governed by complex interactions of relative prices of competing goods and services, consumer habits and preferences, rules and regulations, decision making practices, and cultural considerations. Only by influencing consumer and investor behaviour will energy efficiency improvements take place. However, changing behaviour is often hampered by market, financial, information, institutional, and technical barriers. For example, investment decisions by households and businesses are often made based on the purchase price of an appliance, rather than the sum of the purchase and operating costs over the lifetime of the device. In the SEMED-Arab region, subsidized energy prices cause extensive market distortions that prevent consumers and businesses from investing in energy efficiency.

SEMED-Arab countries face additional barriers that are regionally specific. These include:

- Low capacity for manufacturing or servicing energy efficient products, including vehicles, appliances, efficient lighting, and equipment
- Highly subsidized energy prices in most countries, approaching 90% in some countries
- Very rapid energy demand growth, well over 5% in some countries
- Lack of accredited equipment testing laboratories
- Low capacity for enforcing regulatory policies, such as building energy codes
- Low private sector capacity for identifying, developing and implementing energy efficiency projects
- Institutional coordination across sectoral ministries (e.g., energy, construction, industry)
- Providing a stable stream of funding for energy efficiency policies.
- Demanding climactic conditions, with extremely hot conditions during summer months
- Lack of capital for infrastructure projects such as street lighting and public buildings.
- For energy-importing countries (Jordan, Tunisia), energy price volatility and supply disruption issues

Energy efficiency policy recommendation efforts in the region

Energy efficiency policies in the SEMED-Arab region have not been adopted as widely as in other regions of the world. Although two-thirds of SEMED-Arab region countries have some form of an energy efficiency lead institution, fewer than five countries in the region have appliance labelling programmes. Only one-third of SEMED-Arab countries offer financial incentives, compared to two-thirds or more in other regions. About 1/3 of countries in the region have some form of regulation on industrial energy consumption, compared to three-quarters or more in other regions (Bossebouef, et al 2013).

Several initiatives have emerged to promote regional cooperation and encourage development of national energy efficiency policies. The Arab Ministerial Council for Electricity (AMCE), a principle institution within the framework of the League of Arab States, has adopted a Guideline for Improving Electricity Efficiency and Rationalizing its Consumption at the End User (Khosny, 2013). Under the Guideline Arab League states are encouraged to work towards comprehensive energy efficiency policies, taking a national energy efficiency action planning approach.¹ RCREEE, an independent not-for-profit regional organization focused on increasing the adoption of renewable energy and energy efficiency practices in the Arab region, partners with the League of Arab States and the AMCE to build renewable energy and energy efficiency planning and implementation capacity throughout the SEMED-Arab region.

Other efforts promoting regional cooperation and development of national energy efficiency include the energy efficiency policy suggestions contained within the Secretariat of the Union for the Mediterranean's (UfMS) Mediterranean Solar Plan Master Plan (UfMS 2013), cooperation on energy efficiency strategies carried forward under the Plan Bleu programme, and EU-supported cooperation under the banners of MED-ENEC (Energy Efficiency in the Construction Sector in the Mediterranean) and MEDENER (Association of Mediterranean Agencies for the Management of Energy).

¹ This approach has proven successful for European Union member states, who have developed National Energy Efficiency Action Plans (NEEAPs) in response to EU-wide requirements contained in the 2006 Energy Services Directive

Formulating energy efficiency policies

Governments develop energy efficiency policies to overcome market failures and barriers which otherwise prevent the desired level of energy efficiency investment and savings. Most of the barriers encountered elsewhere in the world are also encountered in the SEMED-Arab region (see Table 1). Over the years and through the work of many institutions and governments, a consensus has emerged on policy approaches proven widely effective in overcoming different market failures and barriers. This consensus is constantly evolving, as new policy ideas are tried and proven policies are adapted and modified to suit changing markets, new technologies evolving consumer preferences, and country conditions.

Policies can be categorized according to how they influence consumers, markets, and the political economy. Most energy efficiency policies fall into one of four categories – information, economic, regulation, or institutional (Table 1).

Table 1: Energy efficiency policy categories

Type of policy	Examples
Information and promotion	Education curricula; advertising
Economic and market instruments	Tax incentives; grants; special funds and facilities; pricing
Regulation	Minimum energy performance standards for equipment, buildings, and vehicles
Institutional arrangements and enabling frameworks	Legal frameworks; energy efficiency agencies

Developing an energy efficiency policy recommendation proceeds in four simple steps:

- Policy driver: articulate the national policy objectives to which energy efficiency contributes;
- Market analysis: identify economical energy and demand savings opportunity;
- Analyse barriers: understand why consumers and investors are not realizing these savings;
- Develop policy alternatives: identify policy options and compare them based on relevance, potential, effectiveness, cost, ease of implementation, and risk

Many governments in the SEMED-Arab region have already adopted policies designed to overcome specific barriers to scaling-up energy efficiency. Algeria, Bahrain, Kuwait, Tunisia and Egypt regulate the thermal performance of new buildings, to reduce the peak demand that new buildings place on the electricity grid. These building energy codes ensure that developers do not under-invest in energy efficiency due to highly-subsidized electricity prices. Algeria, Jordan, Lebanon, Morocco, and Tunisia have dedicated funds or funding portals for energy efficiency, some featuring concessional terms. These economic instruments make available affordable and accessible project financing that would otherwise be crowded-out by other investments, and encourage the development of a private energy efficiency industry.

Additional examples of barriers, policy recommendations and the SEMED-Arab regional situation can be found in Table 1.



Table 2: Barriers and energy efficiency policy recommendations for the SEMD-Arab region

Barrier	Policy recommendations	SEMED-Arab region situation
Consumer and investor awareness	Energy performance standards and labelling for appliances; consumer awareness and promotion campaigns	Appliance labelling requirements in Algeria and Tunisia. Consumer awareness and conservation promotions via energy efficiency agencies in Algeria, Morocco, Tunisia, Jordan, and Lebanon
Long payback periods	Financial and tax incentives for energy efficiency purchases; regulations on minimum energy performance for buildings and appliances; public investment	Customs exemptions for Compact Fluorescent Lamps (CFLs) and Solar Water Heaters (SWH) in Jordan and Palestine. Tunisia provides incentives for industrial EE including Combined Heat and Power (CHP) as well as SWHs.
Perceived risk of energy efficiency	Guarantee facilities	Jordan Renewable Energy and Energy Efficiency Fund includes a partial risk guarantee facility
Access to affordable financing	Revolving funds, dedicated credit lines, accreditation of private companies	Algeria, Jordan, Lebanon, Morocco, and Tunisia have dedicated funds or funding portals for energy efficiency, some featuring concessional terms
High transaction costs	Project preparation facilities; public investment	Tunisia and Jordan provide support to project identification, especially for large energy users
Energy price and market distortions	Graduated price reforms with safeguards built in for vulnerable populations; regulations on minimum energy performance for buildings and appliances.	Energy subsidies remain in almost all countries. Some governments (Jordan) are taking slowly raising oil and electricity prices towards market levels. Algeria, Bahrain, Kuwait, Tunisia and Egypt have mandatory energy buildings codes. Algeria, Egypt, Lebanon, and Tunisia have mandatory energy performance standards for refrigerators and air conditioners.
Technology and capacity shortfalls	Build delivery capacity by creating dedicated public and private entities	ESCO industry largely nonexistent ; however, energy efficiency agencies exist in about half of SEMED-Arab region countries
Low public and private sector capacity; Institutional bias.	Institutional arrangements and enabling frameworks for energy data collection, energy efficiency planning, and policy development and implementation	Regional cooperation on data collection is underway. Several countries – Egypt, Lebanon, Sudan, and Tunisia – have adopted action plans. In Algeria, Jordan, Libya, and Morocco plans are under development. Several countries including Algeria, Lebanon, Morocco, and Tunisia have dedicated energy efficiency institutions.

Source: IEA (2010)



Ranking the policy recommendations

The energy efficiency experts convened for the Amman Expert's Roundtable identified a total of 20 regional recommendations across four consuming sectors (Table 2). These policy recommendations may be ranked based on criteria such as *relevance*, *energy savings*, *ease of implementation*, and *timeline*. They can also be considered based on the likelihood that their adoption will result in the desired outcome across a range of countries as diverse as those in the SEMED-Arab region.

Energy efficiency policies recommended for immediate adoption throughout the SEMED-Arab region would have very high regional relevance, very high potential energy savings, low level of difficulty in implementation, and a short lead time. Unfortunately none of the 20 policy recommendations can meet this exacting standard. However, two policy recommendations come close. There two policy recommendations, both regulatory, are therefore put forward for **immediate adoption by all governments in the region** – *Minimum Energy Performance Standards for Appliances* (10), and *Mandatory Adherence to Energy Management protocols by Large Energy Users* (17).

Governments should adopt policies which promote energy efficiency investments across consuming sectors, address technical and market barriers, and create the public and private sector capacity needed to scale-up energy efficiency. Considering the context of the SEMED-Arab region, six additional recommendations are put forward for **strong consideration by all governments in the region and immediate adoption in most countries**. These include: *Facilitate Private Investment in Energy Efficiency* (3); *Establish Lead Energy Efficiency Institutions* (4); *Mandatory Energy Efficiency Building Codes* (6); *Phase-out Inefficient Lighting* (9); *Monitoring, Verification and Enforcement of Standards* (11); and *Encourage Light Duty Vehicle Fleet Renewable* (14). These policies will promote a balanced approach across consuming sectors, encourage energy efficiency in the buildings and transportation sectors, and create much-needed institutional, technical, and financial capability for all consuming sectors.

Two of the policy recommendations cannot be ranked in the same fashion as others, as they do not directly produce energy savings. However, *Establishing Energy Data Collection Capacity* (1); and *Developing National Energy Efficiency Plans* (2) are **strongly recommended as they provide a strong foundation for national energy efficiency strategy**.

Two policy recommendations may not be workable in all countries due to technical or political difficulty. Although these policies rank very highly on regional relevance and energy savings, they are **recommended but require special attention and additional consideration before adoption**. These include *Progressive Removal of Energy Subsidies* (5) and *Mandatory Fuel Economy Standards for Light Duty Vehicles* (13).

The remaining 8 policies complete a comprehensive portfolio of energy efficiency policies worthy of consideration by governments, depending on country considerations such as market potential, barriers to energy efficiency investment. They also address certain efficiency opportunities that have special needs or requirements, e.g., small and medium enterprises. They are all **recommended for consideration and adoption by government in the SMED-Arab region**.



Table 3: Summary of Energy Efficiency Policy Recommendations advanced during the SEMED-Arab Region Energy Efficiency Expert's Roundtable in Amman, Jordan, April 15-16 2013

Recommendation	Policy type	Sector	Relevance	Savings	Ease of implementation	Timeline (yrs)
1. Establish energy data collection capacity	Institutional	All	High	N/A	Less difficult	1-2
2. Develop national energy efficiency plans	Institutional	All	High	N/A	Less difficult	1-2
3. Facilitate private investment	Economic	All	High	Large	Can be complicated	2-3
4. Establish lead energy efficiency institutions	Institutional	All	High	Large	Can be complicated	2-3
5. Progressively remove energy price subsidies	Economic	All	Very high	Very large	Very difficult	3-5
6. Mandatory energy efficiency building codes	Regulatory	Buildings	High	Large	Enforcement complicated	2-3
7. Encourage energy efficient building renovations	Economic	Buildings	High	Significant	Less difficult	1-2
8. Encourage use of high-efficiency building components	Economic	Buildings	Significant	Significant	Less difficult	1-2
9. Phase-out of energy-inefficient lamps	Regulatory	Appliances	High	Very large	Can be complicated	2-3
10. Minimum energy performance standards for appliances	Regulatory	Appliances	High	Very large	Less difficult	1-2
11. Monitoring, verification and enforcement of standards	Institutional	Appliances	High	Large	Can be complicated	2-3
12. High efficiency street lighting	Economic	Appliances	Significant	Large	Less difficult	1-2
13. Mandatory fuel economy standards for vehicles	Regulatory	Transport	Very high	Very large	Very difficult	3-5
14. Encourage light duty vehicle fleet renewable	Economic	Transport	High	Large	Can be complicated	2-3
15. Promote eco-driving	Information	Transport	Significant	Significant	Less difficult	1-2
16. Promote public transit development	Economic	Transport	Large	Very large	Difficult	5-10
17. Mandatory adherence to energy management protocols	Regulatory	Industry	High	Very large	Less difficult	1-2
18. Minimum energy performance standards for equipment	Regulatory	Industry	High	Large	Difficult	2-3
19. Promote energy efficiency for small/medium enterprises	Information	Industry	High	Significant	Less difficult	1-2
20. Complementary industrial energy efficiency policies	Economic Information	Industry	High	Significant	Less difficult	2-3



Cross-sectoral policy recommendations (applicable to all sectors)

Many of the barriers preventing investments in energy efficiency are common across the several consuming sectors. Participants noted a number of pervasive barriers, including limited know-how of policy makers, little awareness of energy efficiency by consumers, lack of technical capacity to develop and implement energy efficiency projects, access to affordable financing, subsidised energy prices, and organisational and institutional gaps and overlaps. Governments can often improve energy efficiency policy making by taking a cross-sectoral approach to some barriers, for example lack of private sector capacity or governmental leadership. The following cross-sectoral recommendations emerged from a small group discussion between SEMA-Arab region energy efficiency experts.

1. Energy efficiency data collection and analysis

Reliable and detailed data on energy end uses, markets, technologies, and efficiency opportunities are vital when developing energy efficiency strategies, action plans, and policies. Participants in the energy efficiency Expert's Roundtable noted recent improvements in developing energy statistics and calculation of EE indicators thanks to regional cooperation through Plan Bleu, League of Arab States, and other networks.² Common barriers include overlapping responsibilities for collecting energy data, lack of statutory authority, and unstable funding for data collection activities. Although this policy does not directly deliver energy savings, it provides an enabling framework for development of other policies with high savings potential. Given regional progress on establishing data protocols and analysis methods, implementing this policy would be relatively straightforward with minimal lead time required.

Recommendation: Governments in the SEMED-Arab region should establish stable energy data collection regimes, including adequate data collection and analysis resources and the authority to command data submittals. Governments should also engage in regional cooperation to establish data collection frameworks, build data collection capacity and, where appropriate, reference international data collection regimes (e.g., IEA Energy Efficiency Manuals and Sustainable Energy for All Global Energy Efficiency Tracking Framework).

Barrier addressed	Low public and private sector capacity; institutional bias			
Type of policy	Institutional arrangements and enabling frameworks			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	N/A	Less difficult	1-2 years

2. National Energy Efficiency Action Plans

Developing a national energy efficiency action plan serves several purposes. It is a proven method for building policy-making capacity within government, collecting information, engaging

² RCREEE supported the two projects of the indicators and the database and is now working to develop a metadata base including all renewable energy and energy efficiency related data in the Arab region.



stakeholders, building consensus and adopting energy efficiency policies. The Energy Efficiency Action Planning process established within the European Union (EU) under the 2006 Energy Services Directive is just one example of the effectiveness of this approach. Several countries in the SEMED-Arab region have already embarked upon national energy efficiency action planning, supported by the Executive Office of the Arab Ministerial Council of Electricity (AMCE). The AMCE adopted a resolution in 2010 encouraging League of Arab States (LAS) member held governments to formulate and regularly update strategies and action plans for improving energy efficiency throughout their economies. The LAS collaborates with the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) and EU-funded regional projects (MED-EMIP and MED-ENEC) to carry forward this activity. Using a template developed by RCREEE and the LAS Working Group on Energy Efficiency, five LAS members – Egypt, Lebanon, Palestinian Authority, Sudan and Tunisia - have adopted NEEAPs. Another six countries – Syria, Jordan, Bahrain, Libya, Algeria and Morocco – are well advanced in their energy efficiency action planning process (see Table 3). Each NEEAP follow a well-established template and contains indicative savings targets together with detailed plans for the policies, institutional frameworks, and legal measures needed to overcome barriers and realize savings targets.

Table 4: Adoption of energy efficiency strategies and action plans in SEMED-Arab region

Country	National Energy Strategy with long-term quantitative objectives	National Energy Efficiency Action Planning (NEEAP)
Algeria	National Program for Renewable Energy and Energy Efficiency by 2030 adopted in 2011.	NEEAP under preparation
Bahrain	Bahrain Economic Vision 2030	Conceptual stage
Egypt	None	NEEAP adopted (2012-2015)
Iraq	None	Conceptual stage
Jordan	Jordanian National Energy Plan 2007-2020	NEEAP under preparation
Lebanon	Policy Paper for Electricity Sector (2010)	NEEAP adopted (2011-2015)
Libya	None	NEEAP under preparation
Morocco	National Energy Strategy adopted in January 2013 (2012-2020)	NEEAP under preparation
Palestine	National Energy Strategy (2012-2020)	NEEAP adopted (2012-2014)
Syria	None	NEEAP under preparation
Sudan	None	NEEAP adopted (2013-2016)
Tunisia	Triennial program (2005-2007) Quadrennial program (2008-2011) New quadrennial energy program for 2013-2016 is currently under development	Triennial (2005-2007) and quadrennial (2008-2011) programmes adapted by government to NEEAP template.
Yemen	National RE and Energy Efficiency Strategy adopted (2009)	none

Source: Regional Centre for Renewable Energy and Energy Efficiency, 2013



Although energy efficiency action planning does not directly deliver energy savings, it provides an enabling framework for identifying and developing policies that do have high savings potential. Given the efforts of the LAS and RCREEE, and the many energy efficiency action plans adopted or in process, implementing this policy would be relatively straightforward with minimal lead time required.

Recommendation: Governments in the SEMED-Arab region should apply best region practices for developing strategies and national energy efficiency action plans. These plans should describe the barriers to efficiency investments, set clear objectives and timelines including savings targets, and identify specific policy measures and programmes to realize energy efficiency objectives. Governments should take advantage of regional cooperation and capacity-building opportunities to further the planning process and to develop a means to track implementation progress. These plans should be updated regularly, or at least every five years.

Barrier addressed	Low public and private sector capacity; institutional bias			
Type of policy	Institutional arrangements and enabling frameworks			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	N/A	Less difficult	1-2 years

3. Private investment in energy efficiency

Encouraging private investment is critical to scaling-up energy efficiency in the SEMED-Arab region. Several governments in the region have established credit lines at commercial banks that are supported by national and multi-lateral development banks such as the EBRD and the World Bank. Some governments have also developed policies which directly encourage private investment in energy efficiency, such as Jordan's exemption of energy efficient equipment from customs duty. Promoting the establishment of Energy Services Companies is one way to promote private investment in energy efficiency; however, the ESCO industry is faced with many challenges, including long project payback periods (due to subsidized energy prices), lack of access to affordable financing, insufficient Measurement and Verification (M&V) protocols, absence of a framework to regulate ESCOs, and insufficient contractual and legal vehicles for energy performance contracting.³ Dedicated energy efficiency funds can help remove some of the financial barriers to developing energy efficiency projects and creating an energy efficiency industry.

Table 5: Energy efficiency funds in the SEMED-Arab region

Country	Type of fund	Funding source
Algeria	National Fund for Energy Side Management (FNME)	Surcharge on gas and electricity bills + public funds
Jordan	Jordanian Renewable Energy and Energy	Public funds + donors

³ According to RCREEE there are fewer than 40 ESCO entities in the entire SEMED/Arab region. Only Egypt, Lebanon, and Tunisia have any appreciate number of ESCO-type entities



	Efficiency Fund (JREEF)	
Lebanon	National Energy Efficiency and Renewable Energy Account	Donors
Morocco	Energy Development Fund	Hassan II Fund plus funding from UAE and Saudi Arabia
Palestine	Revolving fund for EE projects	Donors + reflows from energy savings
Tunisia	National Fund for Energy Management	

Source: Regional Centre for Renewable Energy and Energy Efficiency, 2013

Providing the private sector with access to affordable financing is fundamental to scaling-up investment in energy efficiency. Private investment will always be larger than public spending on energy efficiency. Therefore the energy savings potential from this policy are huge. This policy is particularly relevant in the SEMED-Arab region, as commercial lending for private energy efficiency projects is costly and difficult to obtain. The establishment of dedicated energy efficiency funds in several countries, the entry of new MDBs such as EBRD into the region, and increasing attention to the needs of the ESCO industry, should make implementation of policies supporting private energy efficiency investment progressively easier in the coming years.

Recommendation: Governments in the SEMED-Arab region should facilitate private investment in energy efficiency by providing dedicated credit lines for energy efficiency project developers through commercial or development banks; supporting development of the pillars of an ESCO industry, including standardised contracting vehicles, measurement and verification protocols, and accreditation procedures; and promoting public-private partnerships whereby energy efficiency projects for public buildings are tendered to private ESCOs.

Barrier addressed	Access to affordable financing; low public and private sector capacity			
Type of policy	Dedicated energy efficiency funds and other ancillary policies to promote private sector investment			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Large	Can be complicated	2-3 years

4. Lead institutions for planning, implementing and monitoring energy efficiency policies and programmes

Implementing energy efficiency policies is facilitated by institutions that have legal authority and technical, administrative, delivery and oversight capacity. A proven way to build implementation capacity and wield legal authority has been to create responsible institutions. Governments including Tunisia, Algeria, and Morocco have established public authorities which have proven



effective in developing and implemented energy efficiency policy as well as mobilizing development assistance.⁴ Creating institutional authority often requires a decree or law (see Table 5).

Table 6: Legal frameworks and institutional arrangements for energy efficiency in the SEMED-Arab region

Country	Energy efficiency laws	Dedicated institutional arrangements
Algeria	Law No. 1999-09 on Energy Conservation	APRUE
Egypt	Electricity Law including EE in draft	
Jordan	Law No. 13 (2012) on Renewable Energy and Energy Efficiency	National Energy Research Centre
Lebanon	Energy Conservation law (in draft)	Lebanese Centre for Energy Conservation
Morocco	Law No. 47-09 (2009) on Energy Efficiency	ADEREE
Syria	Law No. 3 (2009) on Energy Conservation	
Tunisia	Law No. 2004-72 (2004) on Energy Efficiency further amended by Law No. 7 (2009)	ANME

Source: RCREEE, 2013

Legal frameworks and institutional arrangements are fundamental building blocks of national energy efficiency policies and programmes. Several SEMED-Arab region countries, notably Algeria, Jordan, Lebanon, Morocco, and Tunisia, have or are taking the necessary steps to establish these institutional and legal pillars for their energy efficiency efforts. Regional experience shows the effectiveness of these pillars, and their contributions to realizing energy savings from energy efficiency policies. However, passing legislation, promulgating decrees, and establishing new institutions requires engaging stakeholders and building consensus. Therefore, implementing these policies can be complicated and time-consuming.

Recommendation: Governments in the SEMED-Arab region should consider establishing lead institutions responsible for carrying forward energy efficiency action plans or strategies, including specific policy measures. Governments should consider the best way to establish such new institution, which may be through legislation. Government should also consider whether an independent institution or capacity is needed to monitor and evaluate the implementation of energy efficiency action plans or strategies. Monitoring and evaluation, with baseline assessments and periodic review and reporting, should be established whenever new policies and measures are implemented.

Barrier addressed	Low public and private sector capacity; institutional bias			
Type of policy	Establishing legal frameworks and institutional arrangements for energy efficiency			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Large	Can be complex	2-3 years

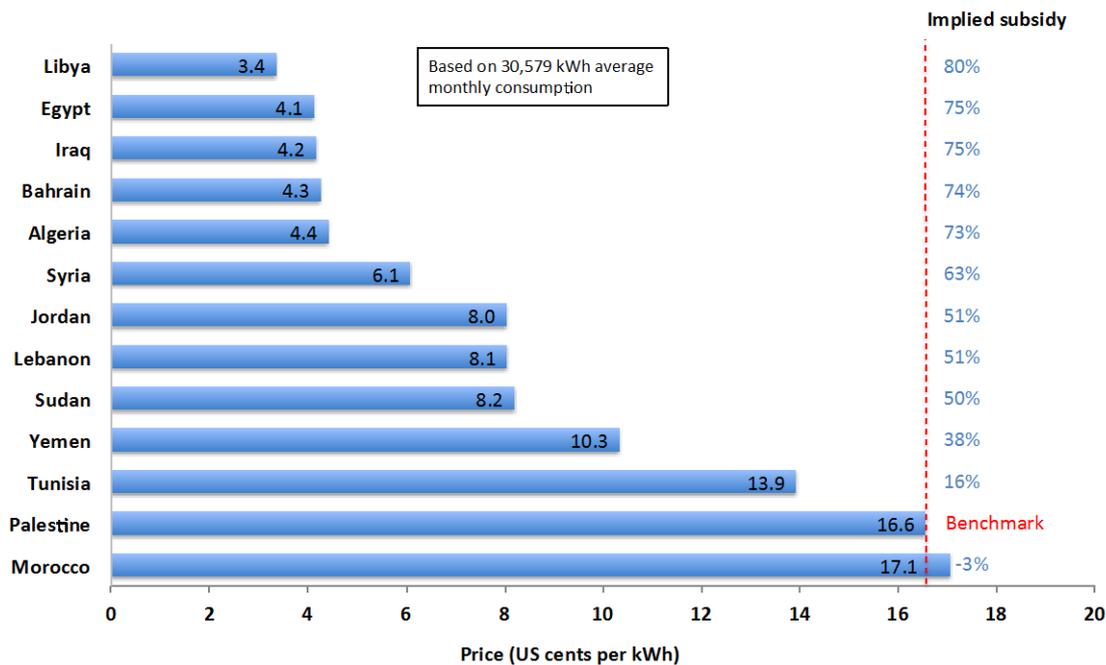
⁴ Agence National pour la Maitrise de l'Energie (ANME) in Tunisia ; L'Agence Nationale pour la Promotion et la Rationalisation de l'Utilisation de l'Energie (APRUE) in Algeria ; L'Agence Nationale pour le Développement des Energies Renouvelables et de l'Efficacité Énergétique (ADEREE) in Morocco



5. Remove energy subsidies from the energy prices for all consuming sectors, except where they contribute to social welfare policies (e.g., low-income households)

The IEA is one of many international organizations advocating the phase-out of energy price subsidies which do not meet standards of economic efficiency or are not designed for equity or social welfare needs (IEA 2010). The IEA has estimated that 2010 government –funded subsidies to reduce energy prices totalled over \$400 billion, two-thirds of which was in the SEMED-Arab region. Less than 10% of these subsidies were distributed to the bottom two deciles of household incomes. The cost of subsidies are not only a fiscal drag but also impede economic growth, reduce the funding available for development needs, and skew the consumption decisions of consumers. At 10% of GDP or more, subsidies weigh heavily on the economies of Algeria, Iraq, Libya and Egypt (See Figure 1). It is also clear that the high energy demand growth (6-8% annually) in countries including Kuwait and Saudi Arabia is at least partly driven by fossil-fuel price subsidies. By distorting the true price of energy, energy price subsidies also create another barrier to energy efficiency investment.

Figure 1: Electricity prices subsidies in SEMED-Arab region countries



Source: Arab Union of Electricity (2011)

Energy prices are subsidized in almost all SEMED-Arab region countries. Some governments, such as Jordan, are taking incremental measures to raise oil and electricity prices towards market prices. In 2011 Iran began a five-year phased effort to eliminate subsidies to energy products and replace them with a programme of cash compensation, graduated according to household incomes, to offset rising energy prices. Such a subsidy reform policy is very ambitious, and the outcome of the Iranian effort is yet unclear. Nonetheless, energy price reform is needed to unlock the potential of energy



efficiency in the SEMED-Arab region and is recommended here. Although this policy recommendation has high regional relevance, and high energy savings potential, its implementation will be very difficult except in countries where the fiscal drag of public spending on subsidies has become unsustainable. In any event a progressive implementation will likely take several years even in favourable circumstances.

Recommendation: Governments in the SEMED-Arab region should progressively remove subsidies on energy prices, with the objective of allowing prices to reflect domestic and international market conditions and the relative price of different forms of energy. Targeted subsidies which serve social welfare objectives should be retained where they can be justified, and where leakage to non-means-tested recipients can be minimized.

Barrier addressed	Energy price and market distortions (as a result of uneconomic price subsidies)			
Type of policy	Graduated price reforms with safeguards for vulnerable populations			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	Very high	Very large	Very difficult	3-5 years

Buildings

Buildings account for about 1/3 of total final consumption of energy across the region, but quite a bit more of primary energy consumption. The IEA estimates that 40% of world-wide primary energy consumption takes place in buildings. More importantly, the buildings sector in the SEMED-Arab region is one of the fastest growing (after transport), as a result of rising populations, increased urbanization, and household energy consumption that matches or exceeds GDP growth. Regional analysts have forecast 25 million new housing units will be constructed over the next 15-20 years, requiring new building investment of as much as EUR 250 billion (Pouffary, 2011).

The buildings sector is perhaps the most complex consuming sector, and certainly the most difficult to address via energy efficiency policies. Market failures abound, notably the principal agent problem, and low energy prices result in very long payback periods.⁵ There are also significant differences in the practicality of energy efficiency policies for buildings in the SEMED-Arab region compared to other parts of the world (e.g., near-zero energy buildings). Presented below are several recommendations which were vetted by a small team of SEMED-Arab region building efficiency experts.

⁵ The principal agent problem occurs when the self-interests of a tenant in a building and the owner of a building are not aligned. In the context of energy efficiency the tenant pays the energy bills but the owner of the building must implement the efficiency improvements. However, the owner has no financial incentive to make the energy efficiency investments because the savings would accrue to the tenant. Similarly, the tenant has no incentive to make the investment as they will not necessarily remain a tenant for long enough to recoup the investment.



6. Mandatory energy efficiency building codes (EEBC)

Building energy codes were among the first energy efficiency policies considered for the SEMED-Arab region. Some form of thermal regulations for new buildings has been established in many countries in the region, including Algeria, Egypt, Iraq, Jordan, Kuwait, Lebanon, Morocco, Palestine Territories, Saudi Arabia, Syria, and Tunisia (see Table 2). These are for the most part the Prescriptive type of building code; only Tunisia has a performance component which allows for trade-off between heating, cooling, and other building energy loads. However, the establishment of a mandatory EEBC is only the first step towards actually achieving energy savings in new buildings. Capacity building, code enforcement, and monitoring are all essential to realizing the potential of stringent building energy codes.

Table 7: Adoption of energy efficiency building codes in the SEMED-Arab Region

Country	Regulation	Status
Algeria	Thermal regulations for new buildings	Mandatory since 2005
Bahrain	Thermal insulation for buildings above 4 stores	Mandatory since 2000
Egypt	EE code for residential, commercial and government buildings	Mandatory since 2006
Syria	Building thermal insulation code	Mandatory since 2007
Tunisia	Minimum EE specifications for public and residential buildings	Mandatory since 2008
Iraq	Voluntary reference EE specifications	Voluntary since 2012
Jordan	EE building code	Voluntary since 2009
Palestine	Voluntary EE building code	Voluntary since 2004
Morocco	Technical specifications for thermal regulations in building	Voluntary since 2010
Lebanon	EE building code	Under preparation
Morocco	Technical specifications for passive and active components	Under preparation
Tunisia	Minimum performance specifications for hospitals and hotels	Under preparation

Source: RCREEE, 2013

Significant capacity in the buildings sector has developed at the national and regional levels. The MEDE-ENEC programme entitled *Energy Efficiency in the Construction Sector* and development of NEEAPs have both contributed to building capacity in all aspects of building code development and enforcement. The availability of an energy efficiency building code road map especially developed for the region should further assist countries which are currently considering or preparing their building codes. Model building codes SEMED-Arab region countries have also benefitted from partnerships with donors and energy agencies such as GIZ and ADEME. The result of these developments should be a relatively straight-forward path to adoption of mandatory EEBCs throughout the region. Developing the capacity and institutions needed for implementation and enforcement will be more difficult and take longer.

Recommendation: Governments in the SEMED-Arab region should establish require all new buildings to meet mandatory energy efficiency building codes (EEBC) that aim to minimise the life-cycle costs of buildings energy use. EEBCs should take a holistic approach that includes the building envelope



and active systems within the building. Governments should support the capacity building and institutional set-up required for implementation and enforcement of EEBC and monitoring of the resulting savings. Governments should take advantage of regional cooperation, such as through the MED-ENEC activity, on setting EEBC, building design and inspection capacity, and monitoring results.

Barrier addressed	Energy price and market distortions; long payback periods; high transaction costs			
Type of policy	Minimum energy performance regulation			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Large	Enforcement is complicated	2-3 years

7. Improving the energy efficiency of existing buildings

Governments face a particular challenge in improving the energy consumption of existing buildings. These buildings are costly to operate but expensive to renovate. Owners have little incentive to save energy, as tenants pay the bills. Tenants have little incentive to invest in saving energy, as the payback period may be longer than the lease. Implementing an EEBC for existing buildings might be overly disruptive in economic terms. However, governments can take some concrete actions that will demonstrate the potential of building renovations to save energy and lower bills. A policy of packages is recommended, as financial and energy performance conditions in the built environment can vary greatly according to ownership, vintage, climate, usage, and type of construction. Policies that have proven effective include pilot projects to demonstrate particular renovation approaches and technologies, government leadership and energy renovation market creation through renovating public buildings, and incentives including grants and concessional lending for project preparation and renovation investments. Most of these policies involve public spending or development assistance. As a result, even though regional relevance and energy savings potential are both high, ease of implementation will be difficult and time requirements substantial.

Recommendation: Governments in the SEMED-Arab region should consider a package of policies to encourage energy efficiency improvements in existing buildings, including programmes to improve the efficiency of public-sector buildings, grants or other assistance to energy audits for existing buildings, and dedicated credit lines with concessional terms that can encourage investment in energy savings measures with longer payback periods.

Barrier addressed	Energy price and market distortions; long payback periods; high transaction costs			
Type of policy	Direct procurement of goods and services and assistance to pilots and projects			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Significant	Less difficult	1-2 years



8. Improved energy performance of building components, especially glazing, air conditioning, and solar water heating

A few building components account for most of the buildings energy consumption in the SEMED-Arab region. Taking a measure-specific approach to buildings efficiency improvements, using technologies such as reflective coatings and shading for windows and roofs, high-efficiency air conditioners, high-efficiency lighting, and solar water heaters, could be more than attractive whole-building renovations. Such an approach would cost less, have a shorter payback period, and be more practical for tenants and owners. It would be responsive to the regional relevance of high electricity demand in summertime, capture much of the high energy savings in the buildings sector, be less difficult to implement with a shorter preparation period.

Recommendation: Governments in the SEMED-Arab region should consider the potential for measures-based building system efficiency improvements, especially windows, and heating, ventilating and cooling systems, and solar water heating in order to improve the overall energy performance of existing buildings. A package of policies might include customs duty exemptions for imported high-efficiency buildings systems, incentives for installation of approved equipment, and procurement and installation of high-efficiency systems on public buildings.

Barrier addressed	Energy price and market distortions; long payback periods; high transaction costs			
Type of policy	Direct procurement of goods and services and assistance to pilots and projects			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	Significant	Significant	Less difficult	1-2 years

Appliances, equipment and lighting

Appliances, equipment and lighting drive much of the residential and commercial energy consumption in the SEMED-Arab region. Along with transport and buildings, this is also a fast-growing consuming sector. Considerable progress has already been made in regulations and consumer awareness efforts for this sector. The 2012 World Energy Council (WEC)-ADEME survey of energy efficiency policies found some form of standards or labelling for appliances and equipment in most of the SEMED-Arab region countries (Bosseboeuf 2013). Algeria, Tunisia, and Syria have adopted systems of mandatory standards and labelling requirements for refrigerators and air conditioners, while Lebanon and Egypt apply efficiency standards on a voluntary basis (MEDENER 2011). Jordan, Libya and Morocco have not yet developed performance standards for appliances, but an energy efficiency law under discussion in Morocco will likely result in a mandatory labelling system. There is certainly a strong potential for additional policies in this sector, and the group of experts convened to discuss this sector came up with several recommendations for appliances, equipment and lighting relevant to the SEMED-Arab region.



9. Phase out incandescent lamps

Incandescent lamps (ILs) are the most inefficient form of lighting and have affordable and available substitutes in the form of fluorescent tube lamps (FTLs), compact fluorescent lamps (CFLs), and solid-state lamps (LEDs). In 2013 CFL, global LED and halogen lamp sales surpassed incandescent lamp sales in the pivotal 60 W lamp market, and incandescent lamp market share is forecast to decline towards zero over the next decade (Gelil, 2011). The WEC/ADEME survey notes that incandescent lamp bans are planned or in effect in 70% of the countries surveyed (Bousseboef, 2013). This global market transformation on efficient lighting makes it possible for countries in the SEMED-Arab region to move quickly towards banishing inefficient lamps in the region.

Lighting accounts for around one-third of the electricity consumption in the SEMED-Arab region.. The En.Lighten consortium estimates that phasing out ILs in the region would save almost 38 Twh of electricity, about 6% of total regional electricity consumption (Gelil, 2011). Efficient lighting initiatives are underway in several countries, including Egypt, Lebanon, Morocco, and Tunisia (see Table 7). Since much of this electricity consumption is subsidized, it makes sense for governments to consider subsidizing the extra cost to purchase efficient lighting instead. Incentives to support efficient lamp purchases together with a phase-out policy for inefficient lamps would overcome the main barriers to lighting market transformation - customer inertia, product quality concerns, split incentives, and perceived risk. Such a phase-out policy should be comprehensive and integrated, and include financing schemes and fiscal arrangements to lower initial high cost, labelling schemes to disseminate information and promote efficiency, and government leadership through early procurement of efficient lighting technologies in public buildings.

Table 8: National efficient lighting initiatives in the SEMED-Arab region

Country	CFL replacements (millions)	IL phase-out target date
Egypt	17	2020
Lebanon	3	2012
Morocco	6	None
UAE	1	None
Tunisia	N/A	2013

Source: Gelil (2011)

The successful implementation of large-scale CFL replacement programmes in recent years together with regional initiative such as En.lighten have created a favourable climate for taking the next step in efficient lighting policy initiatives. A ban on manufacturing, import, and sale of ILs would have to be accompanied by safeguards for lower-income consumers facing high initial costs as well as safeguards against illegal importation. Overall such a policy would have high regional relevance, very high savings, and manageable implementation challenges if implemented with sufficient lead time.



Recommendation: Governments in the SEMED-Arab region should phase out the manufacture, import and sale of inefficient incandescent bulbs as soon as commercially and economically viable. Governments should take advantage of regional cooperation, through networks such as MEDENER, RCREEE, and the League of Arab States, to ensure a smooth incandescent lamp phase-out process. Governments should take into account any economic disruption, especially as regards local lamp manufacturers, in implementing the phase-out. Phase-out policies should be comprehensive and integrated, and include provisions for sound management of used lamps as well as arrangements to reduce the high initial costs of efficient lighting, especially for lower-income consumers.

Barrier addressed	Consumer and investor awareness; perceived risk of energy efficiency; high transaction costs; price and market distortions			
Type of policy	Ban on importation and sale of low-efficiency products			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Large	Product quality, recycling, and high CFL prices must be addressed	2-3 years

10. Minimum energy performance standards (MEPS) and labels for appliances

The combination of minimum energy performance standards and mandatory efficiency labelling has proven effective all over the world. The most-recent WEC/ADEME survey of energy efficiency policies reported that two out of the top five most commonly adopted policies were mandatory labelling and minimum energy performance standards for refrigerators (Bousseboef 2013). Early efforts by Algeria, Egypt, Lebanon, and Tunisia on standards and labelling for refrigerators and air conditioners can be considered as a starting point for similar efforts throughout the SEMED-Arab region (see Table 8). There are ample opportunities for cost-saving regional cooperation on issues associated with standards and labelling, including harmonizing labels, establishing certified testing procedures, and compliance and enforcement efforts.

Table 9: Adoption of appliance minimum energy performance standards in the SEMED-Arab region

Appliance	Algeria	Bahrain	Egypt	Iraq	Jordan	Lebanon	Libya	Morocco	Sudan	Tunisia	Palestine	Yemen
Refrigerators	X		X							X		
Washing machines			X									
Air conditioners	X		X							X		

Source: RCREEE, 2013



Appliance standards and labelling have already taken hold in key SEMED-Arab countries, and there is no reason why the design and success of these policies cannot be quickly replicated in other countries in the region. Appliance labelling and MEPS have very high regional relevance, very high savings potential, are straightforward to implement, and can be accomplished quickly.

Governments in the SEMED-Arab region should adopt mandatory MEPS and labels for the appliances and equipment in most-common use in households and businesses, beginning with refrigerators and air conditioner, and taking into account proven international practices. Governments should allocate resources to monitoring compliance, verifying accuracy of claimed performance and enforcing mandatory MEPS for covered appliances regardless of whether they are imported or locally-manufactured.

Barrier addressed	Consumer and investor awareness; perceived risk of energy efficiency; high transaction costs; energy price and market distortions			
Type of policy	Minimum energy performance regulation and consumer information			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Large	Less difficult	1-2 years

11. Monitoring, verification & enforcement (MVE) protocols for appliance MEPS and labelling

To be effective, appliance MEPS and labelling policies must be accompanied by standards setting, laboratory testing, market sampling, and compliance enforcement. Monitoring, verifying and enforcing are all actions that support the objectives of standards and labelling (S&L) programmes. The goal of MVE activities is to ensure the integrity of MEPS and labelling programmes by minimising non-compliance. Monitoring allows for measuring efficiency claims against a standard in a consistent manner, using accurate instrumentation applied by qualified staff in controlled conditions. Verification allows transparent mechanisms to confirm the efficiencies claimed by appliance and equipment suppliers. Enforcement is the action taken by programme administrators against suppliers of noncompliant products, based on monitoring or verification. An MVE programme requires regimes for standards-setting, testing procedures, testing infrastructure, and monitoring markets.

MVE protocols are essential to realizing the energy savings of appliance S&L policies in the same way the code enforcement is essential to realizing the energy savings of building energy codes. Setting up these protocols can be time-consuming and expensive, as new testing and verification capacity must be created. There are opportunities for regional cooperation that can potentially reduce the cost-incidence on any one country in the region. Overall, MVE protocols have high regional relevance, high savings (realization) potential, but are somewhat complicated and time-consuming. However this policy is an investment in making sure the other appliance policies deliver results.



Governments in the SEMED-Arab region should ensure that appliance and equipment standards and labelling activities are supported by a framework of monitoring, verification, and enforcement. Governments should take advantage of regional cooperation, especially for building MVE capacity and jointly developing product testing infrastructure.

Barrier addressed	Consumer and investor awareness; Perceived risk of energy efficiency; Technology and capacity shortfalls; Low public and private sector capacity			
Type of policy	Institutional arrangements and enabling frameworks; technical capacity building			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Large	Can be complicated	2-3 years

12. High-efficiency street lighting

Street lighting is a relatively small but potentially important sector for saving energy in the SEMED-Arab. Switching out standard street lights for high-efficiency or even solid-state (e.g., LED) lighting can create significant savings both in energy (over 60% lower energy consumption for LEDs compared to High Pressure Sodium lamps) and operations and maintenance expenses (LED lifetime three times longer than HPS with lower failure rates). Since street lighting is usually publicly-owned, it is a ready opportunity for early and vigorous investment by central and local governments, aided by bilateral and multilateral donors.

This policy recommendation has lower regional relevance and lower savings potential than other recommendations, but it also serves the purpose of literally increasing the visibility of energy efficiency investments. LED lighting installations, for example, have proven an effective consumer awareness building tool in many settings around the world. More moderate-priced efficient street lighting solutions may make sense in most situations. Another valuable contribution of this policy is the creation of public-private partnerships as a business model to mobilize investment and expertise needed to undertake large-scale street lighting replacement programmes.

Governments in the SEMED-Arab region should support the early deployment of high-efficiency street and public lighting, including cooperation with municipalities and development agencies to mobilize the necessary investment costs.

Barrier addressed	Long payback periods ; Perceived risk of energy efficiency ; Access to affordable financing ; High transaction costs			
Type of policy	Mobilizing EE Investments via public-private partnerships and donors			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	Significant	Significant	Less difficult but costly	1-2 years



Transport

Transport is the fastest-growing consuming sector in the SEMD-Arab region, as is true in most of the developing world. Transport ranges from a little over one-quarter to almost one-half of total final consumption across the region, with oil providing almost all of transportation energy consumption. No region of the world has a transport sector that is more energy intensive (Missaoui, Ben Hassine and Mourtada, 2012). Measures to bring down SEMED-Arab region transport sector energy intensity could include demand management, greater investment in public transport, measures to improve vehicle fuel economy, and integrated transport and urban planning, and, of course, reducing fuel price subsidies. Sector consumption is driven by rapid urbanization as well as rising living standards and of course the presence of transportation fuel price subsidies in many countries. Transportation policies are evolving quickly, reflecting technology development for both vehicles and mass transit. It should also be noted that the structure and dynamics of transportation energy consumption varies dramatically across the region, driven by energy prices and energy export-import patterns. However, rapid growth of transportation energy demand in oil exporting countries has attracted the policy-making attention of all governments in the region. A small group of energy efficiency and transport experts developed the following energy efficiency policy recommendations for the transport sector.

13. Mandatory vehicle fuel efficiency standards

The SEMED-Arab region is the fourth largest regional market for new and used vehicles. According to Focus2Move, light duty vehicle sales into the SEMED-Arab region topped 3.5 million in 2012 (Focus2Move 2013). Saudi Arabia alone accounted for over 700,000 light duty vehicle purchases in 2012. Despite this market volume, and the importance of vehicle fuel consumption to total final consumption, no country in the region has yet enacted vehicle fuel efficiency standards.⁶ Implementing vehicle fuel efficiency standards in the region will be challenging for many reasons - consumer preferences for larger cars with big engines, a preponderance of older vehicles, compatibility of transportation fuels difficulties with high-efficiency gas and diesel engines, lack of automotive manufacturing infrastructure in general and lack of fuel economy testing infrastructure. On the positive side, there have been significant advancements in fuel economy standards in the countries where vehicles are manufactured – Europe, Japan, China, Korea, and the US.

Vehicle fuel economy standards may be the single most important energy efficiency policy for the region, especially for energy-exporting economies. It is the only transportation sector policy that can impact the price and market distortions created by fossil fuel price subsidies. Accordingly, its regional relevance and potential energy savings are both very large. However, implementing a vehicle fuel economy standard will be a daunting task for any SEMED-Arab region country. Fuel price subsidies together with weather, long distances and population demographics make it difficult to create demand for smaller, less powerful vehicles.. Although fuel-efficient large vehicles are available (e.g., hybrid SUVs), there is a large purchase cost differential which may create a consumer backlash among price-sensitive customers. There are also technical and capacity issues which must be addressed with some high-efficient vehicle technology strategies, such as dieselization. Finally,

⁶ Saudi Arabia may be farthest along, as they are developing



vehicle fuel economy standards should be implemented as part of a suite of other supporting policies, such as tax and fiscal incentives, consumer awareness through vehicle economy fuel economy labelling, creating market demand for high-efficiency vehicles through public and private sector lead-by-example programmes, non-price incentives such as car pool lanes, expedited vehicle registration, and others. In sum, implementing vehicle fuel economy standards are as important as they will be difficult for countries in the region, especially GCC countries.

Governments in the SEMED Arab region should adopt and regularly update fuel-efficiency standards for road vehicles.

Barrier addressed	Consumer and investor awareness; Long payback periods ; Perceived risk of energy efficiency; Price and market distortions			
Type of policy	Minimum energy performance regulation for vehicles			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	Very high	Very large	Very difficult	3-5 years

14. Policies promoting light duty vehicle fleet renewable

The vehicle fleets in many SEMED-Arab region countries are dominated by older cars. Consumers have a preference to keep their existing vehicle on the road rather than purchase a new vehicle. This preference is supported by networks of small auto repair shops and availability of inexpensive but poor-quality replacement parts. Consumers need to be encouraged to scrap their older, inefficient vehicles and purchase new, more-efficient models. Several policies – vehicle inspections focused on combustion and ignitions systems, incentives to scrap older vehicles, and incentives to purchase high-efficiency new vehicles - can be combined to encourage accelerated process of renewing the light duty vehicle fleets in the SEMED-Arab region.

This policy could provide a starting point for more-ambitious fuel economy standards. Interim regulatory steps such as banning importation of older cars plus introduction of fiscal policies such as taxes on high-displacement vehicle engines and incentives encouraging fleet renewal can pave the way towards more expansive vehicle fuel economy regulations. Because light duty vehicles in the region are often kept for many years, this policy has high regional relevance and large potential savings. It's implementation will be less difficult than more-expansive policies.

Governments in the SEMED-Arab region should adopt a mix of regulatory and incentives policies encouraging more rapid turn-over of the light duty vehicle fleet. These measures should include a ban on importing vehicles more than five years old, national policies to encourage fleet renewal, vehicle fuel economy labels, reform of national fuel prices to foster fuel efficiency, vehicle taxes to encourage the purchase of more fuel-efficient vehicles, incentives to encourage fuel switching, infrastructure support and incentive schemes for fuel-efficient vehicles and regular vehicle inspection to include combustion and ignition systems.



Barrier addressed	Energy price distortions; long payback periods			
Type of policy	Direct procurement of goods and services and assistance to pilots and projects			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	High	Large	Can be complicated	2-3 years

15. Improve vehicle operational efficiency through promotion of eco-driving

Significant fuel efficiency improvements can be gained simply with more attention to how existing or new vehicles are operated. Studies have shown that raising driver awareness of on the principle of eco-driving⁷ can achieve efficiency improvements of 5-10%. Promoting eco-driving is particularly useful in the context of fleet management and for publicly-owned vehicles. Awareness building can be combined with regular training to establish and sustain adoption of eco-driving techniques. Another form of eco-driving is the promotion of carpools and ride-sharing, especially for commuters.

In IEA countries this policy has proven effective both as a broad-based consumer awareness-building policy and as a targeted fleet management and operations policy. Outcomes of its application in developing economies are less well known. However, due to the importance of vehicle fuel consumption it would have significant regional relevance and the potential for significant savings. It could also serve as dual-purpose as a consumer awareness policy regarding the need to conserve transportation fuels.

Governments in the SEMED-Arab region should promote the concept of eco-driving, e.g., increased efficiency in operating light- and heavy-duty vehicles, as a matter of policy. Governments should require eco-driving as part of driver training for passenger vehicles, taxis, buses and large fleets, and encourage private companies with large vehicle fleets to do the same. Governments should also develop policies to encourage carpooling and high-occupancy vehicles, especially for commuters and for urban areas. Finally, governments should encourage private companies to optimise capacity of heavy-duty vehicles and put in place guidelines for fleet management.

Barrier addressed	Consumer and investor awareness			
Type of policy	Information, awareness-building and promotion			
Policy score	Regional relevance	Savings Potential	Implementation	Timeframe
	Significant	Significant	Less difficult	2-3 years

16. Public transport system efficiency

⁷ Principles of eco-driving include anticipating traffic flow, maintaining a steady speed at low RPM, shifting up early, check tyre pressures at regulator intervals, and avoid aerodynamic drag.



The potential of improved public transportation is very large in the urbanized areas of the SEMED-Arab region. To help encourage its development, governments can adopt policies that support or directly provide the planning, construction, and operation of public transport infrastructure. Any investment in public transport infrastructure will be expensive; fortunately, there is a widening array of different public transport modalities and business models that can be financed and built, even by cash-strapped governments. From inter-city BRTs in Amman to a new underground Metro in Cairo, public transport infrastructure is being steadily expanded..

Providing public transport infrastructure in urban areas falls astride municipal, regional and national policy domains. Improved and cleaner access to transportation contribute to economic development, quality of urban life, local and global environmental quality objectives, mobility, and a host of other government objectives. Policies promoting or delivering public transport improvements are highly relevant across the region, can contribute very large energy savings as well as air quality improvements – but are very difficult and time-consuming to implement. Within the transport sector this is the second most-important policy recommendation, after vehicle fuel economy standards.

Governments in the SEMED-Arab region should promote public transport development, notably by developing policies that led to public transport infrastructure alternatives to private vehicle use, promoting development of more-efficient transportation alternatives for passengers and freight, and improving the efficiency, accessibility, and comfort of existing public transport.

Barrier addressed	Long payback periods; access to affordable financing; high transaction costs; technology and capacity shortfalls			
Type of policy	Government leadership in improving existing infrastructure and developing new infrastructure			
Policy score	Regional relevance	Savings Potential	Ease of implementation	Timeframe
	High	Very large	Very difficult	5-10 years

Industry

The industrial sector makes up about 30% of total final consumption throughout the SEMED-Arab region. Industrial consumption can be as much as 50% of Total Final Consumption (TFC) in some GCC countries. Energy-intensive manufacturing industries in the region include cement, steel, fertilizers, and glass, all of which contribute significantly to GDP and employment. Comparatively, the industrial sector in the SEMED-Arab region has higher energy intensities (10-25%) when benchmarked against comparable industries in the EU (Missaoui, Hassine and Mourtada, 2012). There is some variation across the region in the importance of the industrial sector to overall energy consumption. There is also variation in the degree of industrial concentration. In Tunisia, some 55 energy intensive companies alone account for more than 40% of the whole industry sector. Such concentration makes it possible for energy efficiency policies to take effect.

Industrial operators in the SEMED-Arab region are subject to many competitive and technical pressures when taking investment decisions. It is thus not surprising that investments in energy



efficiency are often crowded out by other spending priorities, such as expanding operations or complying with environmental regulations. Furthermore, the ESCO industry in the region is not yet sufficiently developed to provide the services needed to develop industrial energy efficiency projects – identifying energy savings opportunities and mobilizing investment. Accordingly, there are large opportunities to save energy in the industrial sector which governments can encourage through appropriate policies.

Industrial energy saving has knock-on effects in addition to saving energy. Industrial energy efficiency investments improve industrial productivity, create jobs, and reduce pollution. Industrial energy savings opportunities in the SEMED-Arab region include heat recovery and cogeneration, process optimization/automation, and improved energy management systems and procedures.

Only a handful of SEMED-Arab region countries have implemented industrial energy efficiency policies (see Table 9). The most-common policy is requirements for facility energy audits, adoption or implementation of energy management systems, energy reporting, and new project consultations with the lead energy efficiency agency. There is considerable scope for additional industrial energy efficiency policies for those countries with existing policies, and replication of existing and new policies in other countries across the region.

Table 10: Industrial energy efficiency policies in the SEMED-Arab region

Country	Regulation	Status/Coverage
Algeria	Executive Decree No. 05-495 (2005)	For industrial facilities consuming more than 2000 toe: <ul style="list-style-type: none"> • Mandatory energy audits • Mandatory energy management systems • Mandatory energy reporting every three years
Lebanon	Mandatory energy audits for facilities consuming more than 40 toe may be established	
Morocco	Mandatory energy audits for large industrial facilities may be introduced	
Syria	Energy Conservation Law	Mandatory energy audits for state-owned industries
Tunisia	Decree No 2144 (2004) as amended by decree No 2269 (2009)	For industrial establishments with annual energy consumption exceeding 800 toe: <ul style="list-style-type: none"> • Mandatory energy audits • Mandatory energy management system • Mandatory energy reporting every year

Source: RCREEE, 2013

17. Industrial energy management

Energy savings projects are often divided into two categories – low cost/low savings, and higher cost/higher savings. Industrial energy management falls into a third category, where modest investments in sensors and energy management systems can result in large total savings. In some cases the investment is in energy management protocols, such as the recently-released consensus



standard ISO-50001. However it is often the case that industrial energy management is not a priority for private operators, or that the capacity for designing energy management systems is low. For this reason it makes sense for governments to place compulsory targets or rules on industry in order to focus management attention on the potential for energy savings.

Placing energy management requirements on large energy users has proven effective throughout the world, including SEMED-Arab region countries such as Algeria and Tunisia. Analysis of industrial energy intensity in these countries demonstrates that this level of regulation results in lower energy intensity across industrial sub-sectors (Lihidheb 2013). Such policies have high regional relevance, can accomplish large energy savings, and are relatively less difficult to implement. Other countries in the region should move to replicate the industrial energy management policies that have proven effective in Algeria and Tunisia.

Governments in the SEMED-Arab region should require large industrial energy users to: conform to ISO 50001 or an equivalent energy management protocol; implement actions to deliver cost-effective energy savings; and periodically report on their efforts. Energy management measures should include assessing energy saving opportunities by measuring energy consumption and comparing to benchmarks, acting on identified energy-saving opportunities deemed to be economical, and reporting the energy-saving opportunities identified and the actions taken to capture them.

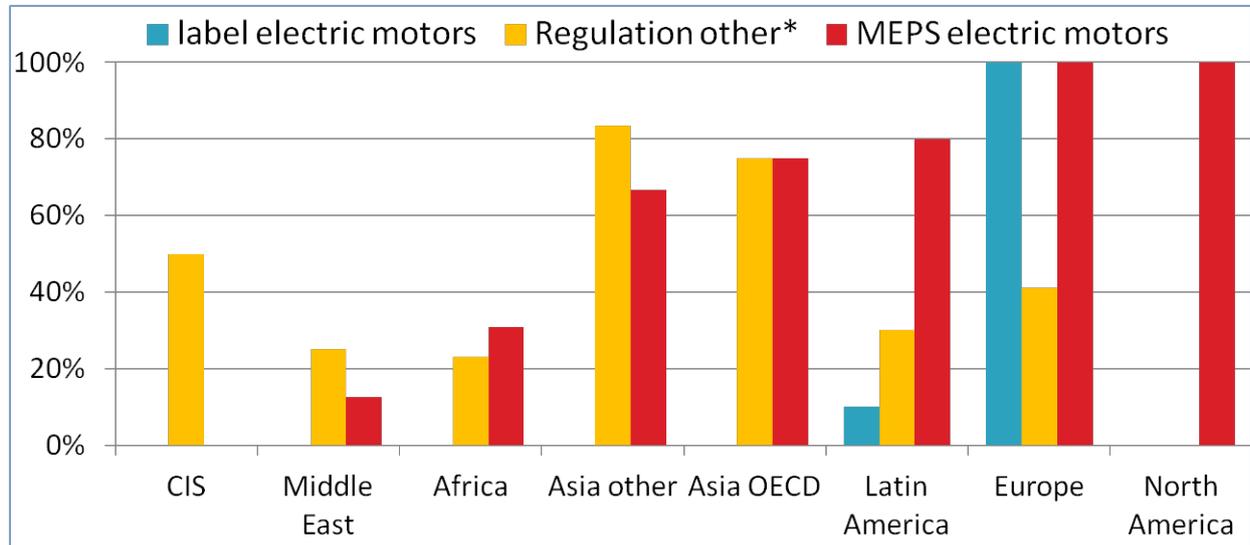
Barrier addressed	Perceived risk ; high transaction costs; price and market distortions; low capacity; institutional bias			
Type of policy	Regulatory requirements placed on large energy users			
Policy score	Regional relevance	Savings Potential	Ease of implementation	Timeframe
	High	Very high	Less difficult	1-2 years

18. High-efficiency industrial equipment and systems

Certain categories of industrial equipment are in common use in similar industries around the world. As with household appliances, there is scope to introduce mandatory minimum energy performance standards for industrial equipment. According to the most-recent WEC/ADEME survey, minimum energy performance standards have been adopted in nearly all IEA countries and many other countries in Asia and Latin America; however, such industrial equipment standards have only been adopted in a handful of SEMED-Arab region countries (Bousseboef, et al, 2013).



Figure 2: Comparison of energy efficiency regulatory policies across regions



Source: Bousseboef, et al 2013

The industrial sector consumes from one-third to one-half of energy in SEMED-Arab region, and much of this is consumed by industrial machinery – pumps, fans, blowers, and compressors. These equipment classes can be codified and restrictions placed on importation or procurement of low-efficiency models. A MEPS policy for standard classes of industrial machinery would have high regional relevance, deliver large amounts of energy savings, and be relatively straightforward to implement

Governments in the SEMED-Arab region should adopt MEPS for industrial-scale electric motors and consider MEPS for other categories of industrial equipment in common use, e.g., compressors, pumps and boiler, consistent with international best practices. Governments should take advantage of regional cooperation, through networks such as MEDENER or RCREEE, to jointly consider international best practices and set a MEPS regime suitable for the region.

Barrier addressed	Consumer and investor awareness; perceived risk of energy efficiency; high transaction costs; energy price and market distortions; institutional bias			
Type of policy	Minimum energy performance regulation of industrial machinery			
Policy score	Regional relevance	Savings Potential	Ease of implementation	Timeframe
	High	Large	Difficult	2-3 years



19. Energy efficiency services for small and medium enterprises (SMEs)

The small and medium enterprise (SME) sector is critical in driving economic development and jobs creation. This sector is also particularly difficult to target for energy efficiency improvements. Targeted policies are needed to help engage SME operators, provide the technical resources needed to identify saving opportunities, and mobilize the financing needed to make the necessary investments.

The private sector is estimated to account for 90% of new job creation in SEMED-Arab region, and is thus an important engine of economic growth and improved livelihoods. However, SMEs are typically not well prepared to make complex technical or financial analyses, such as sizing or trading-off the first-cost and life-cycle-cost of equipment. This is where the development of specially designed policies, focused on information, advice, and assistance can make a real difference.

Governments in the SEMED-Arab region should develop specially designed policies and measures to promote energy efficiency in Small and Medium Enterprises (SMEs). Complementary policies should include supporting energy audits on a voluntary or mandatory basis, access to information on proven energy efficiency practices relevant to SME operations, and access to affordable financing, as appropriate to each business sector.

Barrier addressed	Consumer and investor awareness; perceived risk of energy efficiency; high transaction costs; low public and private sector capacity; access to affordable financing			
Type of policy	Policy package providing information, consumer awareness and promotion plus financial and tax incentives			
Policy score	Regional relevance	Savings Potential	Ease of implementation	Timeframe
	High	Significant	Less difficult	1-2 years

20. Complementary policies to support industrial energy efficiency

The industrial sector is large and diverse across the SEMED-Arab region. The structure of the industry sector varies considerably, according to the degree of industrial diversification, reliance on hydrocarbon extraction, processing, and export, and presence of other resource extraction industries. The economic value added of the industrial sector also varies greatly – from very high in energy producing countries like Libya and Algeria (over 60%) to quite low in service-oriented economies like Jordan and Lebanon (less than 25%). The major industrial sectors include cement, steel, oil and gas, and phosphate extraction. Given this diversity, it makes sense for governments to consider policies which have broad application across industrial classes and process types. One advantage of the industrial sector is its relatively high concentration – policies implemented in hundreds or thousands of large energy-users can have a significant savings result (Table 10).



Table 11: Number of industrial establishments in several SEMED-Arab countries

Country	Number of industrial consumers
Egypt	42 000
Algeria	28 350
Morocco	8 000
Tunisia	5 700
Yemen	3 700

Source: UNIDO

Source: Missaoui, Hassine and Mourtada (2012)

Many of the specific policy prescriptions in this recommendation duplicate those offered in earlier policy recommendations – providing incentives where needed, encouraging private sector investment in energy efficiency projects, raising awareness, and helping establish an energy efficiency industry. However the particular focus on the industrial sector is worthwhile. Thus, and as with the other industrial sector recommendations, this recommendation has high regional relevance, very large energy savings potential, and will not be as difficult to implement given somewhat greater concentration of ownership in the sector.

Governments in the SEMED-Arab region can further strengthen industrial energy efficiency by:

- a) Encouraging industrial energy efficiency programmes by putting in place targeted financial incentives, particularly tax incentives, fostering private finance of energy efficiency upgrades in industry through risk-sharing or loan guarantees with private financial institutions and enabling the market for energy performance contracting.
- b) Raising awareness among relevant stakeholders.
- c) Improving the market for energy service companies and/or energy performance contracting.

Barrier addressed	Consumer and investor awareness; perceived risk of energy efficiency; high transaction costs; low public and private sector capacity; access to affordable financing			
Type of policy				
Policy score	Regional relevance	Savings Potential	Ease of implementation	Timeframe
	High	Large	Less Difficult	2-3 years



References

Arab Union of Electricity (2012), Electricity Tariffs in the Arab World.

Bosseboeuf, Didier, Bruno Lapillonne , Carine Sebi and Karine Pollier (2013), “Energy efficiency policies implementation: A world wide perspective - The WEC energy efficiency 2012-13 survey”, ADEME-World Energy Council-MEDENER-ENERData Initiative,
<http://www.iea.org/media/workshops/2013/sememenarroundtable/Session4DidierBosseboeuf.pdf>.

Focus2Move (2013), <http://focus2move.com/component/k2/item/479-saudi-arabia-car-market-in-2012-hit-new-record-sales>.

Gelil (2011), Draft Regional Report on Efficient Lighting in the Middle East and North Africa,
<http://www.enlighten-initiative.org/portals/94/documents/draft%20report%20on%20efficient%20lighting%20in%20middle%20east%20and%20north%20africa.pdf>

IEA (2010a), Energy Efficiency Governance, IEA: Paris, France,
<http://www.iea.org/papers/2010/eeg.pdf>.

IEA (2010b), Analysis of the Scope of Energy Subsidies and Suggestions for the G-20 Initiative, IEA, OPEC, OECD, World Bank Joint Report, prepared for the G-20 Summit Meeting, Toronto (Canada), 26-27 June 2010,
http://www.worldenergyoutlook.org/media/weowebiste/energysubsidies/G20_Subsidy_Joint_Report.pdf.

Khosny (2013), Energy Efficiency Policy Activities of the League of Arab States,
<http://www.iea.org/media/workshops/2013/sememenarroundtable/Session1KhalidHosny.pdf>.

Lihidheb (2013), National Energy Efficiency Strategy in Industrial Sector in Tunisia : Policy, Instruments & Achievements,
<http://www.iea.org/media/workshops/2013/sememenarroundtable/Session2Kawtherlihidheb.pdf>.

MED-ENEC (20120), Energy Efficiency in the Construction Sector in the Mediterranean - Energy Efficiency Building Code Road Map, ENPI/2009/224-969, http://www.med-enec.com/sites/default/files/user_files/downloads/MED_ENEC_EEBC%20Road%20Map%20Draft%20October%202012.pdf.

Mediterranean Association of the National Agencies for Energy Conservation (MEDENER) (2011), *Energy Efficiency in the Southern and Eastern Mediterranean Countries: Overview of Policies and Good Practices*

Missaoui, R, H. Ben Hassine and A. Mourtada (2012), *Energy efficiency indicators in the Southern and Eastern Mediterranean countries*, Joint Report of Plan Bleu, RCREEE, and MED-ENEC, October,
http://planbleu.org/sites/default/files/publications/ee_indicators_report.pdf



Pasquier and Saussay (2011), Progress Implementing the IEA 25 Energy Efficiency Policy Recommendations: 2011 Evaluation, IEA: Paris, France,
http://www.iea.org/publications/insights/progress_implementing_25_ee_recommendations.pdf.

Plan Bleu, http://planbleu.org/sites/default/files/publications/rapport_energie_tourisme_en.pdf

Pouffary, Stéphane (2011), “The building sector in the Mediterranean: Regional prospects”, from *UNEP-SBCI Symposium on Sustainable Buildings*, Leverkusen, BayKomm,
http://www.unep.org/sbci/pdfs/Symposium_2011/2011_MaySBS_Session2_2.3_SP.pdf.

Regional Centre for Renewable Energy and Energy Efficiency (2013), Arab Energy Efficiency Index (unpublished draft)

UfMS (2013), Mediterranean Solar Plan Master Plan - Energy efficiency, unpublished draft.

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**Annex 1 - List of Participants - Regional Roundtable on EEPs
Amman, Jordan, April 15-16, 2013**

COUNTRY	NAME	TITLE	AFFILIATION
Bahrain	Dr. Ibrahim Abdel Gelil	Director, Energy and Environmental Management Programme	Arabian Gulf University
	Majeid Haddan	Regional Climate Change Coordinator	United Nations Environment Programme (UNEP) Regional Office For West Asia (ROWA)
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	Dr. Tareq Emtairah	Executive Director	Regional Centre for Renewable Energy and Energy Efficiency
	Jamila Matar	Head of Energy Department	League of Arab States
	Khalid Hosny	Officer, Energy Department	League of Arab States
	Dr. Ibrahim Yassin	Managing Director	UNDP GEF Lighting & Appliance Efficiency Improvement Project
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	Ashraf Kraidy	Programme Manager	Regional Centre for Renewable Energy and Energy Efficiency
	Noha Gamal	Programme Manager	Regional Centre for Renewable Energy and Energy Efficiency
	Nurzat Myrsaliev	Policy Analyst	Regional Centre for Renewable Energy and Energy Efficiency
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	Sara Bryan Pasquier	Energy Efficiency Programme Manager	International Energy Agency
	Didier Bosseboeuf	Senior Energy Efficiency Expert	World Energy Council/MEDENER
Iraq	Amer R. Salih Al-Rawi	Programme Manager	Ministry of Electricity
Jordan	Mohammed Dabbas	Director of Energy Efficiency & Energy Conservation Dept.	Ministry of Energy and Mineral Resources
	Muawiyah Faydi	Head of Energy Efficiency Section	Ministry of Energy and Mineral Resources
	Eng. Ziad Jebril Sabra	Director of Renewable Energy Department	Ministry of Energy and Mineral Resources
	Dr. Muhieddin Tawalbeh	Head of Rational Use of Energy & Solar Thermal Division	National Energy Research Centre



	Walid Shahin	President	National Energy Research Centre
	Herve Breton	Amman Office Manager	Agence Francaise du Development
	Ahmed Attiga	Amman Office Manager	IFC
	Jamal Jaber	Professor	Al-Balqa Applied University
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	Heike Harmgart	Head of Amman Office	EBRD Jordan
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	Ziad Zein	Project Manager	Lebanese Centre for Energy Conservation
	Dr. Walid Deghaili	Independent Consultant	UN ESCWA Sustainable Development and Productivity Division
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Palestinian Territories	Imad Al-khatib	Professor	Palestine Academy for Science and Technology
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Tunisia	Kawther Lihidheb	Director, Industrial Energy Efficiency	Agence National pour la Maitrise de l'Energie (ANME)
UK	Andreas Biermann	Senior Manager, Energy Efficiency and Climate Change Unit	European Bank for Reconstruction and Development (EBRD)