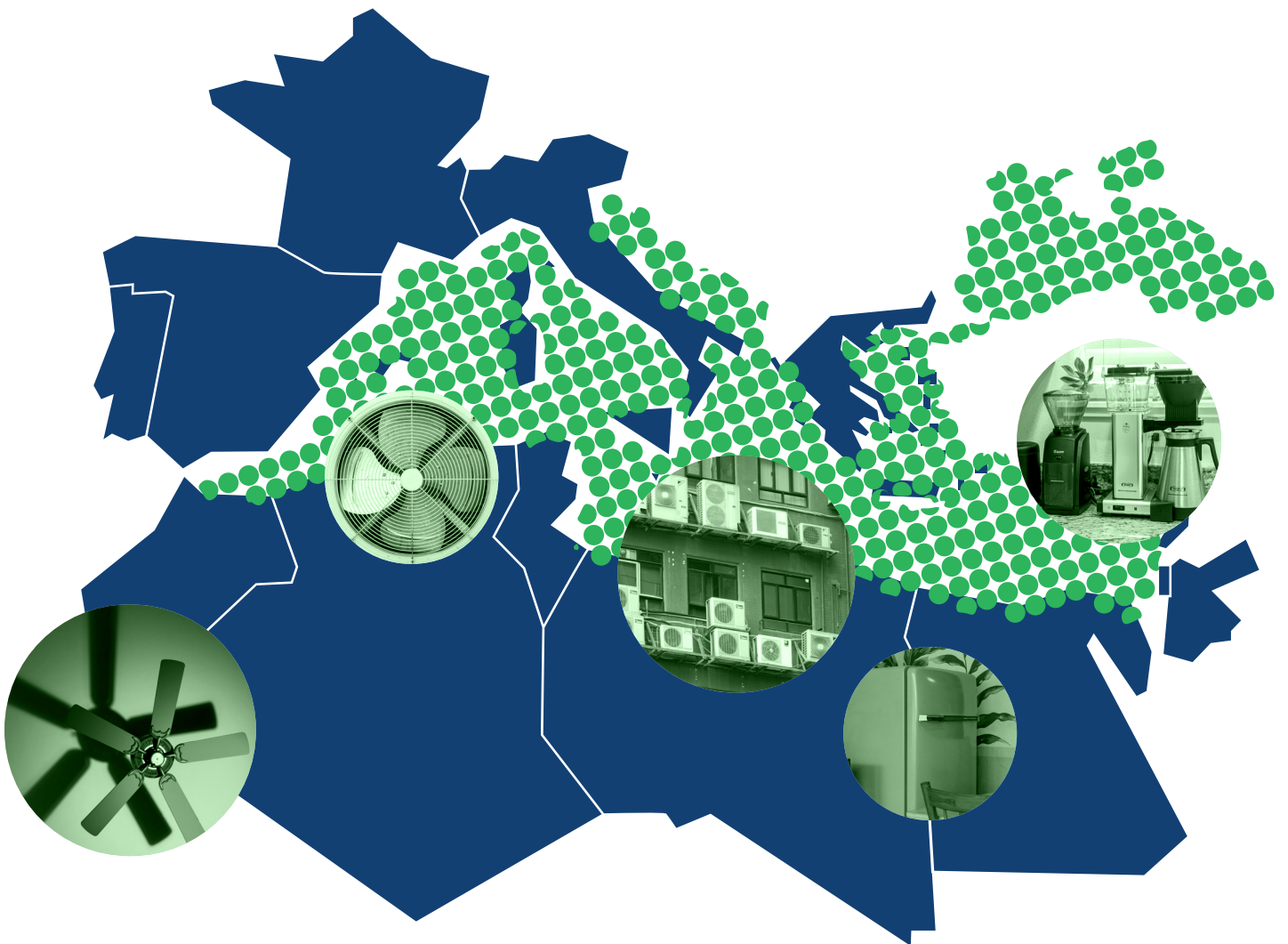




Mitigation Enabling Energy Transition in the MEDiterranean region
Together We Switch to Clean Energy

ENERGY EFFICIENCY FOR APPLIANCES WITH A FOCUS ON AIR-CONDITIONING



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The meetMED project is a two-year project funded by the EU and jointly carried out by the Mediterranean Association of the National Agencies for Energy Management (MEDENER) and by the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE). Its main goal is to reinforce regional cooperation aimed at fostering the energy transition in Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestine and Tunisia under the umbrella of the UfM REEE platform.

The meetMED team in Brussels coordinates the project partners and experts in implementing the project activities, in the following areas of work: assessing EE and RES strategies and policies; advancing vocational training and public awareness; attracting sustainable RE and EE investments; supporting the UfM Renewable Energy and Energy Efficiency Platform.

The meetMED activities target and benefit a wide range of stakeholders, including policy makers, public authorities, investors and financial institutions as well as local communities and final customers. meetMED supports regional cooperation by building the technical capacity and raising the public awareness necessary to implement RE and EE projects and solutions, while creating synergies with other initiatives targeting energy transition in the Mediterranean region.




















MEDENER is an international non-profit organization gathering agencies from the northern and southern Mediterranean countries in charge of implementing public policies on energy efficiency and the promotion of renewable energy sources, by implementing regional projects facilitating the sharing of know-how and best practices among its members and international partners, as well as accelerating the transfer of skills, methods and technologies in the field of energy efficiency and renewable energy.



RCREEE is an intergovernmental organization aiming at enabling the adoption of renewable energy and energy efficiency practices in the Arab region. **RCREEE** brings together regional governments and global organizations to initiate and lead clean energy policy dialogues, strategies, technologies and capacity development in order to increase Arab states' share of tomorrow's energy. Its key work areas are capacity development and learning, policies and regulations, research and statistics, and technical assistance.

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The report and the workshop were coordinated by the RCREEE experts with the support of the MEDENER agencies, of the meetMED project and of the UfM Secretariat.

List of Abbreviations and Acronyms

ADEME	French Environment and Energy Management Agency
ADENE	Portuguese Energy Agency
ALMEE	The Lebanese Association for Energy Saving & for Environment
ANME	Tunisian National Agency for Energy Conservation
APRUE	Algerian National Agency for Energy Conservation
CRES	Greek Centre for Renewable Energy Sources and Saving
EE	Energy Efficiency
EEBC	Energy Efficiency Building Codes
ENEA	Italian National Agency for New Technologies, Energy and Sustainable Economic Development
EU	European Union
FTE	Energy Transition Fund
GDP	Gross Domestic Product
GEFF	Green Economy Financing Facility
GHG	Greenhouse Gases
GWP	Global Warming Potential
IDAE	Spanish Institute for Diversification and Energy Saving (Spain)
LEED	Leadership in Energy and Environmental Design
MEDENER	Mediterranean Association of National Agencies for Energy Management
meetMED	Mitigation Enabling Energy Transition in the Mediterranean Region
meetMED REN	meetMED Regional Experts Network
MEPS	Minimum Energy Performance Standards
MICR	meetMED Investment Country Reports
NEEAP	National Energy Efficiency Action Plan
NEEREA	National Energy Efficiency and Renewable Energy Action
NERC	Jordanian National Energy and Research Centre
NREA	Egyptian New and Renewable Energy Authority
NREAP	National Renewable Energy Action Plan
OME	Observatoire Méditerranéen de l'Énergie
PV	Photovoltaic
RE	Renewable Energy
RES	Renewable Energy Sources
REN	Renewable Energy Network

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RCREEE	Regional Center for Renewable Energy and Energy Efficiency
RSS	Royal Scientific Society (Jordan)
SEMCs	Southern Eastern Mediterranean countries
SME	Small and medium sized enterprises
SWH	SOLAR WATER HEATER
UfM REEE	Union for the Mediterranean Renewable Energy and Energy Efficiency Platform
VAT	Value added tax

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Executive Summary

The meetMED project aims to support regional cooperation and to build the required technical capacity for energy transition in Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestine and Tunisia. The project was officially launched in May 2018 at the headquarters of the Union for the Mediterranean (UfM) in Barcelona, Spain. Its main goal is to foster energy transition in the meetMED target countries, by enhancing the share of Renewable Energy Sources (RES) in their energy mix and embracing Energy Efficiency (EE) best practices.

In support of the meetMED activities, the EU brought together a group of experts from UfM countries on Energy Efficiency for Appliances in Brussels in October 2018 during a seminar dedicated to the policies for energy efficient products: the case of air-conditioning in the EU and the challenges facing the Mediterranean region.

Upon the initiative of the EU, with the support of the UfM Secretariat and in coordination with the meetMED project, this group of experts was crystallized with a specific mission to take action towards designing and implementing a Euro-Mediterranean common policy aiming at making air-conditioning energy efficient. The establishment of a working group in the framework of the UfM Platform on renewable energy and energy efficiency is a first step towards such common policy.

In December 2019, the meetMED project in coordination with the EU commission and the UfM secretariat organized a meetMED UfM workshop on EE appliances with a focus on air conditioning and lighting technologies in Barcelona, which set up the Working Group on Air Conditioning within the Union for the Mediterranean (UfM) Platform for Renewable Energy and Energy Efficiency. 23 participants from 16 Mediterranean countries attended the workshop and contributed to the discussion. Experts from RCREEE designed and distributed in advance a country survey to help in the evaluation of the EE appliances programs and initiatives in the Mediterranean region, whose results were presented during the workshop.

This report analyzes the results of the country surveys and of the debate held during the workshop on EE policies for appliances with a special focus on air conditioning. The analysis focuses on the MEPS and labeling policies as well as on scrapping/replacement programs.

The country experts from the UfM REEE Platform Working Group on Air Conditioning highlighted - in their response to the questionnaire and during the workshop - the main incentives and barriers to the development and implementation of efficient measures, such as S&L. The country papers also include examples of successful projects and recommendations. In total, the national experts prepared 11 country papers: Egypt, France, Greece, Italy, Jordan, Lebanon, Morocco, Palestine, Portugal, Spain and Tunisia

The sector with the highest electricity consumption is the residential sector. In this contest, appliances have the largest share of consumption in residential sector. In some cases, the consumption share for appliances represents nearly 100% of the consumption in the residential sector, as it is the case in Tunisia. Well-designed policies can help reduce electricity consumption of appliances and promote the use of highly energy efficient ones.

MEPS are in place in the majority of the Southern and Eastern Mediterranean countries. However, not all appliances fall under the scope of existing MEPS policies. Furthermore, MEPS are not mandatory in all the countries. Table 4 shows which countries have MEPS policy and their associated level. All countries have labeling policy, except for Libya.

Air conditioning is one of the appliances with the highest electricity consumption. In some cases, electricity consumption for A/C reaches more than 10% of the total electricity consumption. The number of installed air conditioning units in the region has been growing at a fast pace in recent years and is expected to keep growing in the future. Usually the use of air conditioners coincides with the peak load of the electricity grid, thus a situation (requiring more investments in generation and increasing the cost of kWh at peak load). The energy performance of air conditioning appliances tends to be poor and not in compliance with prevailing standards, with an average age of around 10 years in most of the target countries. Energy inefficient air conditioning appliances need to be replaced by efficient appliances in order to reduce electricity consumption. Scrapping programs for old air conditioning appliances include disassembling and recycling the scrap metals, like copper and alumi-

num, motors and wires as well as removing correctly freon and refrigerant oils (the latter requiring highly skilled and licensed professional license because freon used in old ACs has high Global Warming Potential).

Regulation on scrapping programs for energy inefficient ACs - absent in all target countries with Tunisia- hosting a specialized center – is required to develop clear procedures for the disposal, recycling and destruction of components including refrigerants.

The implementation of best practices in the field of energy efficient appliances faces three types of barriers. Barriers that hinder implementation, barriers during implementation, and barriers that reduce the expected outcomes. For the first type, the predominant barrier is the availability of data to set baseline. For the implementation phase, barriers are the lack of resources, accredited labs, and public awareness, surveillance of markets need and regular policy updating. The last type of barriers includes certification issues and informal market design.

Air conditioning appliances face peculiar barriers when it comes to replacement programs aimed to encourage customers to substitute their old appliances and replace them with more efficient equipment, which usually have high sticker price. Any replacement program should be complemented by a scrapping program that recycle some parts and -most importantly- capture high GWP gases and oils and dispose of them according to international standards.

The report proposes three sets of recommendations for designing a regional program aimed at the harmonization of the standards for energy efficient appliances in the target countries:

1. Strengthening human resources and building strong institutions that will lead to have better implementation of EE policies through knowledge exchange programs. Regular updating for the standards and labels is highly recommended to get along with the advancement of the technology and development in international standards.
2. Market control and supervision is essential to ensure the conformity of local and imported appliances to the market standards. Better market control will help to avoid appliances with low quality and invalid certification. This will require highly equipped testing facilities and laboratories

to facilitate testing procedures and verification of appliances' compliance with the MEPS and applicable regulations.

3. End users carry the responsibility for the purchase and use of energy efficient appliances. Therefore, customer awareness is one of the key elements for the success of any programs for advancing energy efficiency in appliances. Awareness and information campaigns addressing mainly the end-users for behavioral change and rising awareness in order to facilitate a market transition towards more energy efficient appliances should be combined with incentives to encourage the end user to buy efficient appliances and create an enabling environment for the business sectors.

Regional cooperation is essential to strengthen the national tools that support the implementation of energy efficient appliances at the country level. Mutual recognition of labels and the set up of unified EE standards and labelling schemes for appliances across the Mediterranean countries is essential for a successful regional cooperation. The report recommends also to:

- Implement unified testing procedures of appliances and to recognize accredited laboratories at the regional level;
- Develop a regional portal and to create an energy labelling regional networks to exchange best practices and information;
- Establish a regional program to accelerate the replacement of old air conditioners.

1. Introduction: The Issue at Stake and Taking Action

Air conditioning is (one of) the main driver of the booming consumption of electricity in the Euro-Mediterranean region. The number of installed air conditioning units in the region has been growing at a fast pace in recent years and is expected to keep growing in the future. The energy performance of these air conditioning appliances tends to be poor because they usually do not comply with modern standards. This may be the consequence of several factors, including weak regulatory frameworks, inappropriate taxation, parallel or black markets generated by lack of policy coordination and of borders controls among countries.

The massive deployment of energy inefficient air conditioning units increases electricity demand (peak demand) and therefore requires huge additional investments in new generation capacity needed to satisfy peak demand. If sound energy efficiency policies are implemented, it would be possible to avoid new investments in additional capacity. The potential benefits of making air conditioning energy efficient are huge. They include savings of end-use electricity, savings of primary energy, gains in the energy bill, avoided emissions, avoided investments.

The costs entailed by the current state of the air-conditioning market and the potential benefits generated by sound energy efficiency policies targeting air-conditioning are sizeable. In order to guarantee these benefits, appropriate policies are needed, not only at the national but also at the regional level. Actually, the absence of regional harmonization of energy and tax regulations and weak border controls are among the main barriers to the development of successful energy efficiency policies for air conditioning. A regional approach would enable coordination and harmonization of national policies, as well as exchanges of experiences and best practices.

1.1. The meetMED project and the meetMED REN

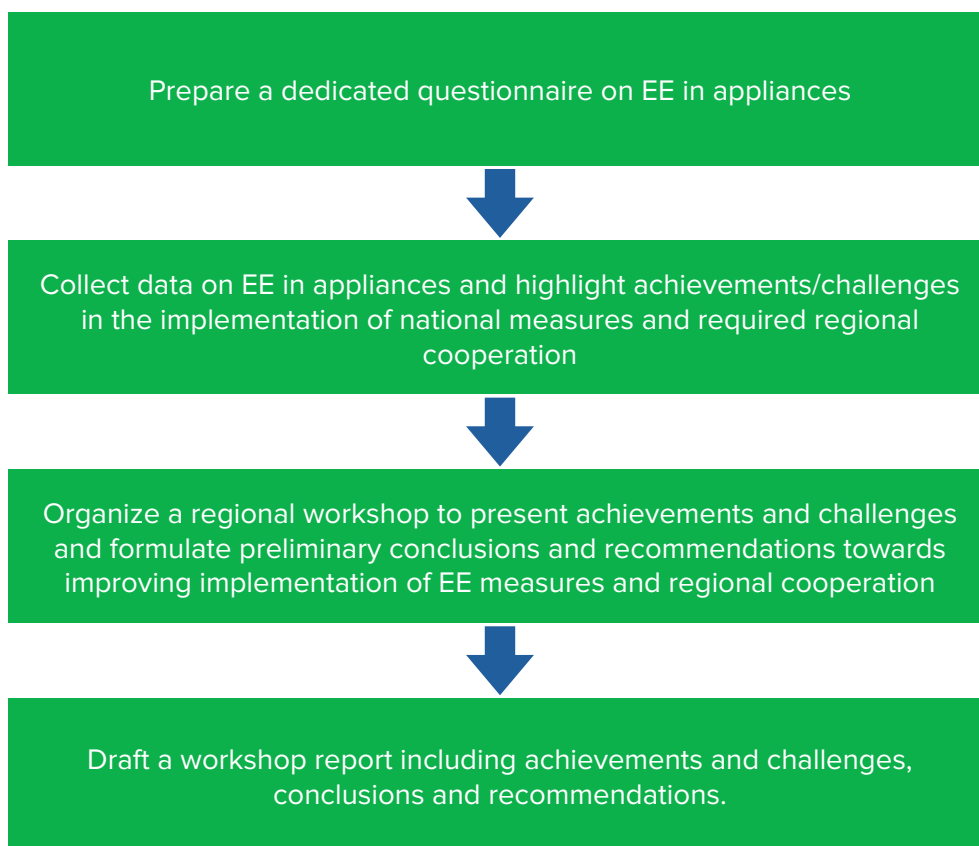
The EU-funded meetMED project aims to support regional cooperation and build technical capacity fostering energy transition in Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestine and Tunisia.

Among the project activities, the project contributes to assessing EE and RES strategies. The establishment of a network of more than 60 experts coming from 13 Mediterranean countries within the meetMED Regional Experts Network (meetMED REN) is central to support national governments in developing and implementing EE and RE policies. The meetMED experts work in taskforces, namely on energy efficiency in the building and in the appliances sectors, and on monitoring. They are responsible for elaborating country policy briefs and regional reports, which they discuss during their meetings.

Project activities include also vocational training and public awareness, facilitation of sustainable investment and support to the regional cooperation under the umbrella of the UfM REEE Platform.

1.2. Methodology and approach of the meetMED Report on EE in Appliances

This report analyzes the implemented EE in appliances policies in the meetMED target countries. The analysis focuses on the MEPS and labeling policies, as well as on the existence of scrapping and replacement programs. The required data were collected through a questionnaire filled by the REN experts. The collected data were analyzed, and country papers were drafted accordingly; then, a set of recommendations is proposed. The report presents also the discussion and exchange outputs of the meetMED workshop on EE in appliances that took place in Barcelona in December 2019. The graph below summarizes the adopted methodology.



1.2.1. meetMED Questionnaire and Country Papers

In order to evaluate the situation in the targeted countries, the meetMED REN experts were asked to provide the information below and review Country Papers that summarize the energy efficiency policies for appliances implemented in their respective countries.



The REN highlighted the main existing incentives and barriers to the development and implementation of efficient measures, such as S&L. The Country Papers also include examples of successful projects and recommendations. In total, the REN experts prepared 11 Country Papers, including Egypt, France, Greece, Italy, Jordan, Lebanon, Morocco, Palestine, Portugal, Spain and Tunisia. All Country Papers are available in Annex 1 of this report.

1.2.2. meetMED Workshop on EE in Appliances

The experts from the meetMED REN taskforce on EE in appliances met in a regional workshop on energy efficiency in appliances on 4 and 5 December 2019 in Barcelona, Spain together with experts from other UfM countries. The workshop was coordinated by the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE), the Portuguese Energy Agency (ADENE), the French Agency for Environment and Energy Management (ADEME) and the Lebanese Energy Management and Environment Association (ALMEE), as part of the activities of the meetMED project, funded by the EU and jointly implemented by the Mediterranean Association of the National Agencies for Energy Management (MEDENER) and RCREEE.

The workshop established the UfM REEE Platform Working Group on energy efficiency (EE) in appliances – as recommended by the UfM in January 2019 during the annual meeting of the UfM Energy platforms.



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23 participants from 16 Mediterranean countries presented the progress on EE in appliances in their countries and exchanged experiences and best practices on developing standards, on monitoring and evaluation, on removing barriers for a regional market. Participants also discussed the Terms of Reference for the Working Group. The sessions had different specific focuses on: regulatory and institutional aspects, monitoring and evaluation processes and structures, energy efficient air-conditioning systems, possible replacement and appliances' scrapping programs, and barriers to trade and investments in energy efficient appliances with the contribution of experts from CLASP, UNEP, U4E, SEforAll, Copenhagen Centre for Energy Efficiency, UNIDO, ECONOLER, FRESH and APPLIA.

2. Overview of the meetMED Target Countries

Target countries have a wide gap among them with respect to socio-economic numbers. GDP numbers can be taken as an indicator of the development of the country. Table 1 shows that Northern Mediterranean countries have a high GDP and GDP per capita compared to Southern Mediterranean countries

Table 1: meetMED target countries socio-economic numbers

	Egypt	France	Greece	Italy	Jordan	Lebanon	Morocco	Palestine	Portugal	Spain	Tunisia
GDP (Billion) (2018)	250.9	2,777.5	218.0	2,073.9	42.3	56.6	118.5	14.62	238.0	1426.2	39.9
GDP/capita current US\$ (2018)	2,549	41,463	20,324	34,483	4,241	8,269	3,237	3,198	23,407	30,370	3,447

Sources: World Bank and Palestinian Central Bureau of Statistics.

Energy supply and consumption numbers in targeted countries are consistent with GDP numbers. We can find that countries with the highest GDP levels are also those with the highest energy supply and consumption. Despite their huge potential for renewable energy, these countries still depend on fossil fuels, such as oil and natural gas, to respond to their needs. Table 2 presents the main energy data and indicators for the targeted countries.

Table 2: meetMED target countries energy numbers (2017)

	Egypt	France	Greece	Italy	Jordan	Lebanon	Morocco	Palestine	Portugal	Spain	Tunisia
TPES (Mtoe)	92.764	247.08	23.283	153.44	9.269	9.035	20.515	1.8577	22.770	126.01	11.311
TFC (Mtoe)	60.858	154.29	16.588	118.93	6.590	5.468	16.090	1.6244	16.420	83.538	8.356
TEC (Mtoe)	13.701	37.563	4.641	25.10	1.501	1.470	2.790	0.46328	4.010	20.169	1.385

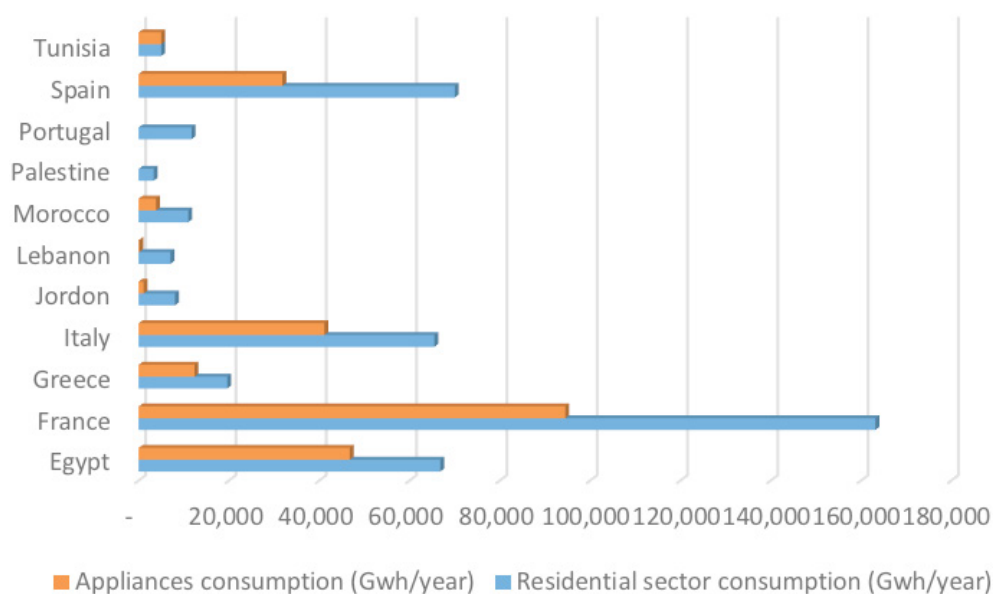
Sources: IEA and Palestinian Central Bureau of Statistics.

TPES: Total Primary Energy Supply, TFC: Total Final Consumption, TEC: Total Electricity Consumption

2.1. Residential sector and Appliances in the meetMED target countries

The residential sector in most of the target countries is the largest energy consumer. Furthermore, appliances have the largest share. Figure 1 depicts the consumption for appliances compared to the consumption of the residential sector in the target countries. Tunisia has the highest share of appliances consumption related to residential consumption with 100% share. Tunisia is followed by Egypt with 70% then France with 57.9%. The lowest share belongs to Lebanon with 2.3%, followed by Jordan with 13.7%. Data for appliances consumption in Palestine and Portugal are not available.

Figure 1: Residential and appliances energy consumption



As appliances are among the largest electricity consumers, and considering the rapid demographic growth and urbanization, the appliances are one of the main targets of the existing National Energy Efficiency Action Plans (NEEAPs) that promote stakeholders' engagement and contribute to the development of the energy sector legal framework. NEEAPs establish indicative energy savings targets for each country, as well as policies and measures that should be implemented to overcome barriers and help reach these goals. Among others, NEEAPs depend on the strategic development of the countries, which

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means that they can differ significantly one from another. While some countries like Libya have no EE action plans in place (Under preparation), the majority of the meetMED target countries have already implemented them and they are currently either developing or implementing their second NEEAP, with a strong focus on the appliances. Next table shows the NEEAPs current status in the target countries.

Table 3: NEEAP for target countries

Egypt	2 nd NEEAP 2017-2020
France	3 rd NEEAP 2017-2020
Greece	4 th NEEAP 2017-2020
Italy	2 nd NEEAP 2017-2020
Jordan	2 nd NEEAP 2017-2020
Lebanon	2 nd NEEAP 2016-2020
Morocco	National Energy Efficiency Strategy 2030
Palestine	2 nd NEEAP 2020-2030
Portugal	3 rd NEEAP 2017-2020
Spain	NEEAP 2017-2020
Tunisia	The Action Plan to accelerate Energy Efficiency Programs, EE Strategy horizon 2050

3. Energy Efficiency in Appliances

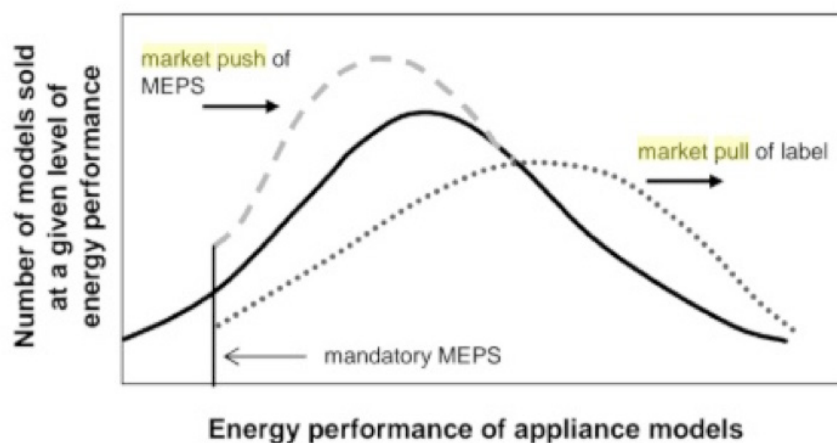
Strong regulatory frameworks are vital for the implementation of energy efficiency measures, as they establish guidelines on technical issues for different sectors and can also be used to create funds, which are essential to the development of EE policies.

As we have seen in figure 1, appliances are among the most energy intensive consumers in the meetMED target countries and can reach 100% of residential sector electricity consumption, as in Tunisia. In addition, due to the growing population and urbanization rate, it is essential to implement energy efficiency measures in appliances. The most important policies in appliances are the Minimum Energy Performance Standards (MEPS) and Energy Labeling. All meetMED target countries have implemented policies with different degrees to promote energy efficiency in appliances.

Energy efficiency standards and labels are used to lower the energy requirements of new appliances for a given service. That is done either by forcing inefficient appliances out of the market or by increasing transparency in the market, so that the users will presumably choose to buy relatively more efficient models.

These effects caused by using MEPS and labeling are sometimes referred to as market push and market pull respectively. Figure 2 shows the effect of these policies on the market.

Figure 2: Push and pull market effects



3.1. Minimum Energy Performance Standards

Minimum energy performance standards (MEPS) are essential policy tools to promote energy efficiency in home appliances by banning the worst-performing appliances from the market, and thereby forcing manufacturers towards innovation and consumers towards the adoption of more energy-efficient technology (Sachs, 2012; Siderius, 2014). For the EU, MEPS set under the overarching Eco-design Directive, are estimated to deliver 991 TWh of energy savings in the residential sector alone by 2020 (VHK 2016). For the Southern and Eastern Mediterranean countries (SEMCs), MEPS are implemented in most of them. However, not all the appliances are under a MEPS policy. Furthermore, MEPS policy is not obligatory in all SEMCs. Table 4 shows the countries that have MEPS policy and their associated level.

Table 4: MEPS policy in target countries

Country	Appliances covered	Mandatory/ Voluntary
Algeria	Lighting, Refrigerators, Freezer, Air conditioning	
Egypt	Air conditioning, Lighting, Refrigerator/ Freezer, Washing machines, TV, Vacuum cleaners, fans, dish washer, electric heaters, electric ovens, laundry dryer	Mandatory
France	Air conditioning, lighting, refrigerators/freezer, dryer, washing machines, cooker, boilers, coffee machines, computers, industrial fans, standby, TVs and displays, vacuum cleaners	Mandatory
Greece	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, cooker, heaters, vacuum cleaners, TV, computers, lamps, fans, ventilation unit, boilers, pumps	Mandatory
Italy	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, cooker	Mixed
Jordan	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, TV, dish washer, fans	Mandatory
Lebanon	Air conditioning, refrigerators/freezer, lighting, solar water heater, electric water heater	Planned
Morocco	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, TV, dish washer, fans, vacuum devices, electric oven, water heaters	Mandatory only for AC, refrigerator/freezer, lighting
Libya	No MEPS policy	N/A
Palestine	MEPS does not exist as mandatory activity in Palestine	Voluntary

Country	Appliances covered	Mandatory/ Voluntary
Portugal	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, cooker, TV, boilers, vacuum cleaners and ventilation systems	Mandatory
Spain	No MEPS set, except when public funds authorize the substitution of inefficient appliances.	
Tunisia	Air conditioning, Refrigerators/freezer	Mandatory

3.2. Labeling policy

Energy-efficiency labels are informative labels affixed to manufactured products in order to describe the energy performance of the product (usually in the form of energy use, efficiency, or energy cost). These labels give consumers the necessary data to make informed purchases. Two types of labels are widespread: endorsement labels and comparative labels.

Endorsement labels are essentially “seals of approval” given according to specific criteria. Comparative labels allow consumers to compare performance among similar products by using either discrete categories of performance or a continuous scale.

Energy labels can stand alone or complement energy standards. Besides giving information that allows consumers who care to select efficient models, labels also provide a common energy-efficiency benchmark that makes it easier for utility companies and government agencies for energy-conservation to offer consumers some incentives to buy energy-efficient products. The effectiveness of energy labels is heavily dependent on how they present information to the consumer and on how they are supported by information campaigns, financial incentives, and other related programs. Table 5 shows the countries that have labeling policy and their associated level.

Table 5: Labeling policy in target countries

Country	Appliances covered	Mandatory/ Voluntary
Algeria	Lighting, refrigerators, freezers, air conditioning	
Egypt	Air conditioning, lighting, refrigerator/ freezer, washing machines, dryer, TV, vacuum cleaners, fans, dish washer, electric heater, electric ovens, laundry dryer	Mandatory
France	Air conditioning, lighting, refrigerators/freezer, dryer, washing machines, cooker, boilers, ovens and hoods, dishwashers, TVs and displays, vacuum cleaners	Mandatory
Greece	Air conditioning, lighting, refrigerators/freezer, dryer, washing machines, cooker, boilers, ovens and hoods, dishwashers, TVs and displays, vacuum cleaners	Mandatory
Italy	Air conditioning, refrigerators/freezers, lighting, dryer, washing machines, cooker, other	Mixed
Jordan	Air conditioning, refrigerators/freezers, lighting, dryer, washing machines, TV, dish washer, fans	Mandatory
Lebanon	Air conditioning, refrigerators/freezers, lighting, washing machines, electric motors, transformers	Planned
Morocco	Air conditioning, refrigerators/freezers, lighting, dryer, washing machines, TV, dish washer, fans, vacuum devices, electric oven, water heaters	Mandatory only for AC, refrigerator/freezer, lighting
Libya	No labeling policy	N/A
Palestine	Labeling in Palestine is voluntary and is attached to the EU label through Israel testing laboratories	Voluntary
Portugal	Air conditioning, refrigerators/freezers, lighting, dryer, washing machines, cooker, TV, boilers, vacuum cleaners and ventilation systems	Mandatory
Spain	Air conditioning, lighting, refrigerator/freezer, dryer, washing machines, dishwashers, electric ovens, range hoods, boilers, heat pumps	Mandatory
Tunisia	Air conditioning, refrigerators/freezers, washing machines	Mandatory

3.3. Air Conditioning in Target Countries

3.3.1. Air conditioning consumption

The residential sector is the largest electricity consumer in most of the target countries. Furthermore, appliances have the largest share of consumption. Air conditioning is one of the appliances with the largest electricity consumption.

In some cases, AC electricity consumption reach more than 10% of the total electricity consumption. Table 6 shows the share of AC consumption in the target countries.

Air conditioning is one of the main drivers of the booming of electricity consumption in the Euro-Mediterranean region. The number of installed air conditioning units in the region has been increasing at a fast pace in recent years and is expected to keep growing in the future. Usually the use of air conditioning coincides with the peak load of the electricity grid. This situation requires more investments in power plants and an increase in the cost of kWh because the newly built power plants (to fulfill the peak load) are used for few hours.

Table 6: Air condition consumption share of the total country consumption

	Algeria	Egypt	France	Greece	Italy	Jordan	Lebanon	Libya	Morocco	Pal.	Portugal	Spain	Tunisia
AC Cons. %	*9.6	*5	8.7	1	0.7	4	12.4	*7.5	3*	NA	NA	NA	7

* = Estimated value

3.3.2. Air condition life and COP

The energy performance of these air conditioning appliances tends to be poor because they usually do not comply with modern standards. In addition, the questionnaire responses indicated that in most of target countries the average age of air conditioners is around 10 years. Nevertheless, the questionnaire showed that the COP is above 3.

Energy performance of AC does not depend only on the lifetime or COP. It can result also from weak regulatory frameworks that allow low or bad energy performance of AC. Inappropriate taxation on low-performant appliances as well as black markets generated by the lack of policy coordination and of borders controls among countries are among the main barriers hindering the AC performance.

3.3.3. Air conditioners' end of life

Over time, air conditioners need to be replaced due to several reasons, including end of the equipment life, the obsolescence of spare parts, and/or environmental reasons like banning the refrigerant used in air conditioners. After analyzing the questionnaire data, all SEMCs use R22, which is prohibited in the EU and to be banned in USA in 2020. R22 has a high global warming potential (GWP) and poses a threat to the environment.

Countries need to design scrapping programs for old air conditioners. ACs are easy to be disassembled and the scrap metals inside them, like copper and aluminum, need to be recycled. In addition, motors and wires can be useful materials. However, the most important part is to remove freon and refrigerant oils. This part of the job requires professional skills and need to be licensed because freon used in old ACs has a high GWP.

Thanks to the existence of scrapping programs, replacement programs for old inefficient ACs can be started. Old air conditioners should be collected from consumers and sent to scrapping centers for dismantling and recovery of the refrigerants. The program can be mandatory or voluntary. The most important part of the program is making sure that the old ACs coming from the participating households did not continue to be used or sold on the secondary market.

All SEMCs have no regulation regarding ACs scrapping. Only one country -Tunisia- has a specialized center for scrapping AC. SEMCs need to set regulations and develop clear procedures for ACs disposal, recycling, and refrigerants removal and destruction. This regulation should encourage users to send their old ACs to the certified scrapping centers and ban any other way of disposal.

3.4. EE policies Enforcement

Establishing policies, such as MEPS and labeling, is not enough to ensure the improvement in energy efficiency levels of appliances. Their enforcement is crucial in order to ensure their implementation. Furthermore, different actors may bear the responsibility for implementation and enforcement. This can be

done by the government, third-parties or mixed model. In the first model, the government is responsible for the implementation and/or enforcement of the policy. In the second model, a third party is responsible for the whole process. For example, the third party can test the appliance to verify it is compliant with the standards. The last model, instead, is a mix between the government and third-party ones. Table 7 gives a preview of the implementation and enforcement actors in the target countries.

From the table, it is clear that the government has the widest role among the target countries. Egypt and Tunisia entrust a third party for the enforcement of the policies, while Palestine is the only country with a mixed model.

Table 7: S&L implementation and enforcement responsibilities

	S&L implementation responsibility	S&L enforcement responsibility
Egypt	Government	Government
France	Government	Government
Greece	Government	Government
Italy	Government	Government/ Self-certification
Jordan	Government	Government
Lebanon	Government	Government
Morocco	Government	Government/Third party
Palestine	Mixed model	Government
Portugal	Government	Government
Spain	-	-
Tunisia	Government	Third party

3.5. Testing facilities

Testing facilities are a crucial part of any labeling and MEPS program. Appliances should be tested to verify its compliance to standards. In addition, testing facilities -after testing- will disseminate the results to certification bodies so the labels and certificates can be issued. Next table summarizes testing facilities role and relationships in each country.

Energy Efficiency for Appliances with a Focus on Air-conditioning

	Does the government establish any of the MV&E requirements for appliances labeling program?	Relationships with third party verification or certification	Market surveillance	Verification testing
Egypt	Existing	Existing	Existing	Existing
France	Existing	Existing	Existing	Existing
Greece	Existing According to the aforementioned legislation and the respective testing standards for each type of appliance (e.g. EN 153 on Methods of measuring the energy consumption of electric mains operated household refrigerators, frozen food storage cabinets, food freezers and their combinations, together with associated characteristics)		Existing REGULATION (EC) No 765/2008 setting out the requirements for accreditation and market surveillance, Law 4072/2012. Usually the market surveillance conducted by the responsible authorities involves primary and secondary level of control (documentation) and less tertiary level of control (testing in laboratories).	Existing May be done in accredited laboratories according to the standard involved. Unknown if all necessary laboratories exist at the national level.
Italy	Existing Market surveillance is described in EU Regulation 765/2008 and in new Regulation 2019/1020	Existing The conformity assessment by the manufacturer is based on self-declaration. Only for gas appliances a third-party certification is requested	Existing Market surveillance is described in EU Regulation 765/2008 and in new Regulation 2019/1020	Existing Market surveillance is described in EU Regulation 765/2008 and in new Regulation 2019/1020
Jordan	Existing RSS/NERC has started testing the appliances to support JSMO in verifying the energy efficiency class of the following appliances: refrigerators lab, air conditioning lab, lighting lab and washing machine lab.	Existing	Existing	Existing
Lebanon	Planned	Planned	Planned	Existing For lighting and solar water heater at IRI (Industrial Research Institute)
Morocco	Planned	Existing	Planned	Existing

	Does the government establish any of the MV&E requirements for appliances labeling program?	Relationships with third party verification or certification	Market surveillance	Verification testing
Palestine	Not Existing	Not Existing	Not Existing	Not Existing
Portugal	Existing They must comply with European norms and be tested by independent laboratories	Existing EUROVENT is the most well-known because it started to test HVAC equipment	Existing There are European entities that do Market surveillance like EHI for heating equipment but there are others	Existing EUROVENT is the most well-known because it started to test HVAC equipment, and other test facilities
Spain	Existing	Existing	Existing	Existing
Tunisia	Existing	Existing	Planned	Existing

3.6. Lesson Learnt

Several successful projects were implemented in different countries. Countries can observe and learn from other countries' successful stories and try to benefit from their experiences. The report presents some successful projects and experiences that can be duplicated and implemented, by respecting the specificity of each country.

3.6.1. Egypt

The Ministry of Electricity and Renewable Energy in cooperation with the Energy Efficiency Improvement Project for Lighting and Home Appliances (EEIL&A) initiated a program for replacing inefficient lamps by LED lamps. 280,000 lamps were replaced by LED Lamps by EEIL&A Project in many types of buildings (Governmental, Hotels, Banks, Residential, commercial). In addition, the Ministry of Electricity and Renewable Energy through its distribution companies has already distributed more than 12 million CFLs with a capacity of 20-23 W, mainly in the residential sector. Furthermore, a Program for replacing the sodium lamps for street lighting with LED lamps is in progress. The statistics show that about 84.4 million LED lamps were used in Egypt until 2018. The project made a strong impact on the conservation of energy resources and GHG emissions reductions, while reducing energy consumption costs for individuals and institutions in multiple sectors in Egypt.

3.6.2. Italy

The main goal of the **Atlete** project (June 2009 - September 2011) was to increase the implementation and control of energy labelling and eco-design implementing measures for appliances in Europe. The developed methodology was applicable with very minor adaptations for any Energy-using Products (EuP). Energy labels are a crucial driver for market transformation, because they help orient consumers' choices towards more energy efficient appliances and thus realizing the potential of the available technologies. Unfortunately, not all Member States (MS) apply a responsible policy for controlling the correct labelling implementation. Without a concerted effort, the same is likely to happen for the forthcoming eco-design implementing measures for household appliances. **Atlete** demonstrated that market surveillance and testing could be done in a systematic, effective and cost-efficient way, thus helping to transform the market to ensure the highest benefit for consumers, manufacturers and the environment. **Atlete** identified and promoted the crucial steps to enhance the effectiveness of energy labelling. Key stakeholders were engaged in the project including the EU institutions, Government organizations, manufacturers, retailers, associations, consumer groups and NGOs, the media and general public.

- Five project partners from four European countries worked with key stakeholders in the MS and the wider international arena in order to:
- Test the compliance of Energy labelling and Eco-design requirements;
- Inform National authorities in case of non-compliance;
- Identify effective enforcement of existing legislation through national market surveillance;
- Provide the first pan-European testing results on many household appliances;
- Give concrete guidance to the EU and the National Authorities for an effective labelling and implementation of future eco-design requirements;
- Set a shared procedure for the verification of the manufacturers' labelling/eco-design declaration, including a methodology for laboratories accreditation and models selection;
- Raise National Authorities' awareness of the effectiveness of the energy labelling on national energy efficiency.

4. Barriers to EE in Appliances

The region faces important challenges related to the deployment of EE in appliances. There are barriers that hinder the implementation EE measures, barriers linked directly to the implementation process and barrier that lessen the effect of the MEPS and labeling programs. The country questionnaires highlighted the following challenges:

Barriers hindering the implementation of EE measures

- Availability of market data to set a baseline for energy consumption of appliances. This step requires extensive market survey assignment to collect data on all available appliances.
- Lack of regulation and absence of a dedicated framework.
- High investment in new production lines; in fact, it is difficult for local manufacturers to upgrade their production lines due to its high costs. In addition, the local manufacturers are not fully aware of the market dynamics after the upgrade and the payback of this investment.
- Market resistance to the new regulations and changes.

Barriers in the implementation phase

- Lack or limited resources and competences on EE in appliances due to the absence of staff with adequate experience and information, along with the absence of public authorities with an appropriate knowledge to monitor and track the market and enforce new legislations.
- High costs of efficient appliances compared to conventional equipment's ones. In addition, there are no incentives schemes or financing mechanisms to replace the old appliances with the efficient ones or to encourage the customers to buy efficient alternatives.
- The lack of accredited testing labs. In fact, even if there are several testing laboratories in the region, few of them are accredited. Laboratories' accreditation will help new labels endorsement and accelerate regional programs for the promotion of EE in appliances.

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- Lack of public awareness of MEPS and labeling programs. The end users do not know how much they will save from using efficient appliances nor the social and environmental impacts and benefits.
- Electricity subsidies that increase the payback period of efficient appliances and hinder end users engagement.
- E-shops selling appliances do not display energy performance labels of the offered appliances and the product performance information are ignored, thus possibly limiting the dissemination of efficient products.
- MEPS and labeling need to be updated regularly. The updating process always face resistance to change the standards. Insufficient market surveillance and lack of information and satisfaction measures will slow down required standards updates.

Barriers lessing the outcomes for program implementation

- Some products have fake certifications. The energy performance of these products is well beyond the standards and distorts the end users' expectations without having an impact on the electricity bills.
- The secondhand and informal markets represent cheap and inefficient alternatives for the legal market and offer inefficient equipment.

Barriers for Air Conditioning Appliances

- Absence of programs aimed at replacing old air conditioners with new efficient ones. This kind of programs should cover the aspect of AC disposal according to international standards, including the capture and destruction of Freon.
- Limited financial incentives to guide the end user towards the efficient AC.
- Lack of specialized centers for AC disposal and recycle. These centers should be equipped with the required tools to extract and dispose Freon (that has high GWP).

5. Recommendations

This section provides a set of recommendations aiming to reduce energy consumption of households' electric appliances through the promotion of EE measures as well as actions that increase quality of the products and information efficiency. The following recommendations will help overcome current barriers, thus leading to a higher efficient appliances market share as well as to a better implementation of MEPS and labeling programs.

- Human resources are the main driver for the implementation of EE programs. Capacity development and knowledge exchange programs are fundamental to increase the expertise of local stakeholders as well as the implementation and control of energy labelling and eco design setting measures for appliances. This kind of trainings should also expand and include, among others, retailers, manufacturers, salesmen. The trainings should cover a wide range of aspects, such as technical aspects, legislative framework, and legal requirements.
- Capacity development and knowledge exchange for Market assessments shall be conducted by identifying the market structure, key actors' needs, potentials and status of energy efficient appliances.
- Awareness and information campaigns should be carried out, by addressing mainly the end-users to boost behavioral change and raise awareness that could facilitate the market transition towards more energy efficient appliances. The campaigns should also be designed to increase the available information about labeling and standards and make end users able to take cost effective decisions.
- Strong institutional set-up is required for rigorous implementation. In addition, enforcement decrees for the programs should be considered and updated to include implementing agency/ies and enforcement tools.
- Standards and labels need to be regularly updated to get along with the advancement of the technology and development in international standards. This updating process should be done by involving all the stakeholders, like manufacturers, retailers, and exporters, in order to elaborate the most suitable standards and action plans.

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- Market control and supervision are essential to ensure the conformity of local and imported appliances to the market standards. Better market control will help exclude appliances with low quality and invalid certifications.
- Highly equipped testing facilities and laboratories are needed to facilitate testing procedures and verification of appliances' compliance with the MEPS and issued regulations. These facilities should work towards being accredited.
- Updated energy databases shall be developed to facilitate the processing of household appliances' data. Issuing periodic studies focusing on pathways to improve energy consumption patterns in the country could promote programs on EE in appliances and enhance such energy consumption patterns.
- Set up incentives scheme to encourage the end user to buy efficient appliances and create an enabling environment for the business sector (i.e., manufacturers, importers, distributors, etc.) to become a driving force for the implementation of EE in appliances.
- A harmonized program to unify S&L in the SEMCs shall be developed. This program will encourage manufacturers and suppliers to upgrade their product lines towards more efficient appliances for a broader market.

Recommendation for AC appliances

- Development of replacement programs entailing financial incentives, such as tax exemption to shift end users' choices towards more efficient AC. Scrapping centers with the adequate equipment to capture refrigerant oils and gas are expensive to build. Hence, a regional center can be the solution, and this will also benefit from the economy of scale.
- Harmonization of S&L for AC can be the first step of the harmonization program. This will foster high performance AC adaption.

5.1. Regional Cooperation

Regional cooperation and knowledge exchange among countries is essential to strengthen the national tools that support EE implementation. Mutual recognition of labels and set up unified EE standards and labeling schemes for appliances across the Mediterranean countries is essential for a successful regional cooperation. The study recommends also to:

- implement unified testing procedures for appliances and recognize accredited laboratories at the regional level,
- develop a regional portal and create energy labelling regional networks to exchange best practices and information,
- set up a regional program to accelerate the replacement of old air conditioners.

A well-defined Road Map is required to achieve harmonization in the SEMCs. The following draft proposal suggests the basic steps that should be included in the road map:

1. Preliminary stage

A Technical Harmonization Committee (THC) will be responsible for proposing the AC harmonization to the management committee. THC will work with the representatives of the standardization bodies in the SEMCs on the proposal that will be delivered to the EE in appliances task force.

2. Proposal stage

The EE in appliances Task force will receive and scrutinize the proposal and either accept it with/without comments or ask for further adjustment.

3. Preparatory stage

A project lead will be appointed at this stage and a Working Plan Draft will be developed.

4. Committee stage

After accepting the draft proposal, a working plan will be elaborated based on the comments received by the member states' working group and their eventual consensus.

5. Revision stage

The working plan will be disseminated to the national standardization bodies to review, comment, and send their feedbacks.

6. Approval Stage

After considering the standardization bodies comments, a revised working plan will be drafted and sent back for final approval.

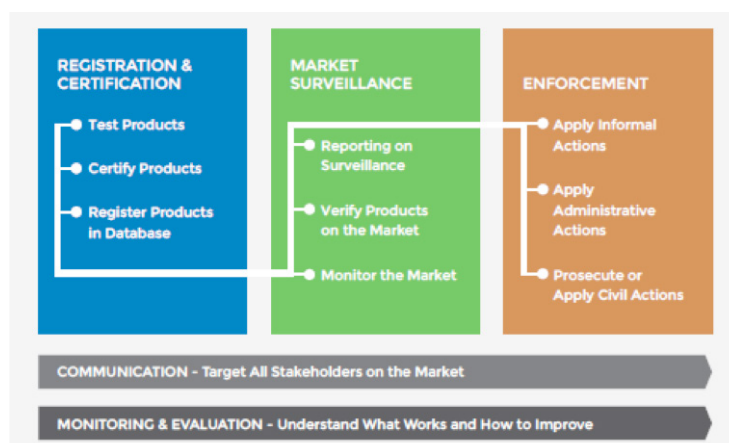
6. Conclusions

Household electrical appliances represent one of the fastest growing segments of energy use, with increasing share of electricity consumption, hence the importance to promote EE in appliances programs and to adopt standards and labelling. The study aims to assess the context for EE in appliances in the meetMED countries, to provide recommendations to boost EE in appliances with special focus on air conditioning, and to remove barriers to a regional market for energy efficient goods and services.

The outcomes of the study clearly show that the countries involved in the meetMED project have been working on improving the energy efficiency in appliances. Not all meetMED countries have MEPS and labelling policies: for instance, Libya, Lebanon and Palestine have no S&L policies in place yet; Morocco is developing them, and they will shortly be officially adopted. However, in most of the countries not all appliances are covered by these policies.

Countries struggles to implement MEPS and labeling policies, and some challenges still hinder the expansion of this sector. Nevertheless, most barriers are linked to monitoring, verification and enforcement (MV&E). Three major measurement must be adopted to develop effective MV&E plans and to ensure the compliance with the regulation. Figure 3 depicts the three key pillars for a compliance framework. Most of the countries have no problem with registration and certification. Real challenges are related to market surveillance and enforcement.

Figure 3: Key pillars for MV&E, Source: CLASP 2015



Implementation agencies lack the required resources to carry out market surveillance and enforcement. These resources can be tangible or intangible, like capacity development of the local experts in charge of the process implementation.

As we can see from the figure above, communications should target all the stakeholders during all the phases of the project. One of the main barriers is still the end users' awareness of labeling and MEPS programs. In fact, so far, the decisions of the end users keep relying on sticker price and not on life cycle costs. Countries need innovative awareness campaigns to deliver the message of MEPS and labeling programs.

High performance air conditioners have a high selling price, which discourages end user to consider buying them, even when the end user is aware about energy saving. Replacement programs are needed in all countries to initiate the adaption of high-performance air conditioning. Scrapping centers should be a mandatory part of the program to avoid releasing high GWP gases.

Since energy-using products are traded globally and potentially among the SEMCs countries, there is an increasing trend to harmonize elements of policy products among the SEMCs. More and more, products are also designed based on the requirements of major markets, tailored on the specific demands of their test procedures, on the minimum energy performance standards and energy label classifications. This limits the scope of smaller economies to effectively set their own standards, as these may not solicit the same response from appliances and equipment manufacturers as a regionally or internationally coordinated effort could achieve – thus rendering uncoordinated less effective national programs. Air conditioning can be taken as the first phase of the harmonization process. SEMCs can benefit from this trend in several ways:

- By harmonizing their test procedures and requirements for EE appliances and equipment with their main trade partners, they can benefit from product improvements already developed for other markets;
- The same mechanism allows product manufacturers established in the country, to take increased advantage from their investments in more energy efficient products, because they can sell these recognized energy-efficient products, more easily in other countries that have adopted the same procedures and requirements;

By adopting test procedures, standards and labels of other countries in the region, countries can benefit from the analysis and implementation already done, hence reducing their need to invest significant resources in the development of national standards and labels.

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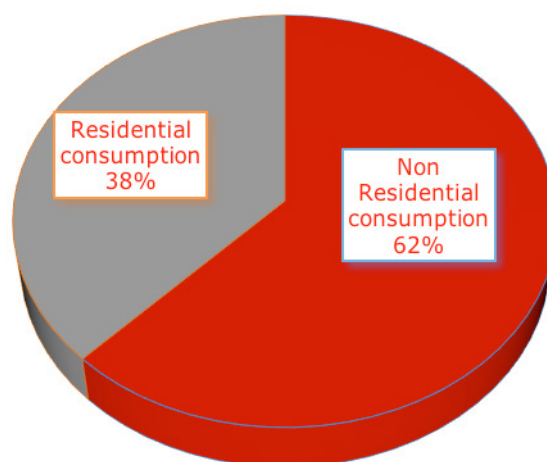
8. Country Papers

Egypt

Overview of Electricity Consumption

The residential sector in Egypt consumes 66,809 GWh/year, which represents around 38% of the total consumption as shown in figure 4. The average electricity consumption for typical household is 234 kWh/month.

Figure 4: Share of residential sector electricity consumption



Air Conditioning appliances in Egypt

A typical household has two air conditioners with an average COP above three. Split type and Window type air conditioning systems are the most common systems with a 5-10-year lifetime. The highest consumption is in June, July, August and September. There are no regulations regarding scrapping of old air conditioners.

MEPS policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, Lighting, Refrigerator/ Freezer, Washing machines
Implementation responsibility	Government
Enforcement actors	Third party
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • High cost of new technology for home appliances regarding to traditional appliances for end users. • There are no Incentives Schemes or financing mechanisms to replace the old appliances with new efficient appliances for end users. • Lack of awareness for End users of the monetary value of the new efficient appliances.
Measures needed to promote the market	<ul style="list-style-type: none"> • Regular updating of the Local standards to fit with the updates and development of the international standards. • The enforcement Decrees for labeling programs to be updated in order to specifically include the implementing agency/ies and include the enforcement tool for implementing the label schemes. • Awareness programs and campaigns targeting the end users to increase the knowledge about the Labeling systems and its benefits. • Clear regulations to enforce all the imported appliances and locally manufactured appliances to make all the needed tests for getting EE labels; and Decree for panning all the equipment with inefficient energy consumption. • Capacity building programs to increase the knowledge of local experts.
Awareness of the program	Very high

Labeling Policy

Labeling Policy level	Mandatory
Applicable appliances	Air conditioning, Lighting, Refrigerator/ Freezer, Washing machines, dryer
Implementation responsibility	Government
Enforcement actors	Third party
Labeling policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • High cost of new technology for home appliances compared to traditional appliances for end users. • There are no Incentives Schemes or financing mechanisms to replace the old appliances with new efficient appliances for end users. • Lack of awareness of end users about the monetary value of the new efficient appliances.
Measures needed to promote the market	<ul style="list-style-type: none"> • Regular updating to make Local standards fit with the updates and development in the international standards. • The enforcement of Decrees for labeling programs should be updated to include specifically the implementing agency/ies and include the enforcement tool for implementing the label schemes. • Awareness programs and campaigns targeting the end users to increase the knowledge about the Labeling systems and its benefits. • Clear regulations to enforce all the imported appliances and to make all locally manufactured appliances undertake the needed tests for getting the EE label, and a Decree for panning all the equipment with inefficient energy consumption. • Capacity building programs to increase the knowledge of local experts.
Awareness of the program	Very high

France

Overview of Electricity Consumption

The residential sector in France consumes 163,170 GWh/year, which represents around 37% of the total consumption as shown in figure 5. The highest consumption is in space heating followed by space cooling and lighting as shown in figure 6. The average electricity consumption for a typical household is 4,770.83kWh/month.

Figure 5: Share of residential sector electricity consumption

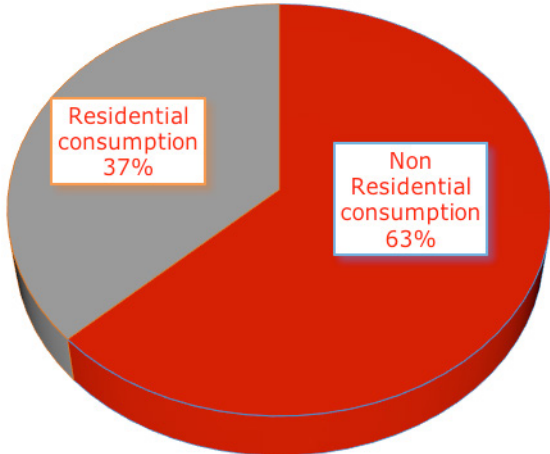
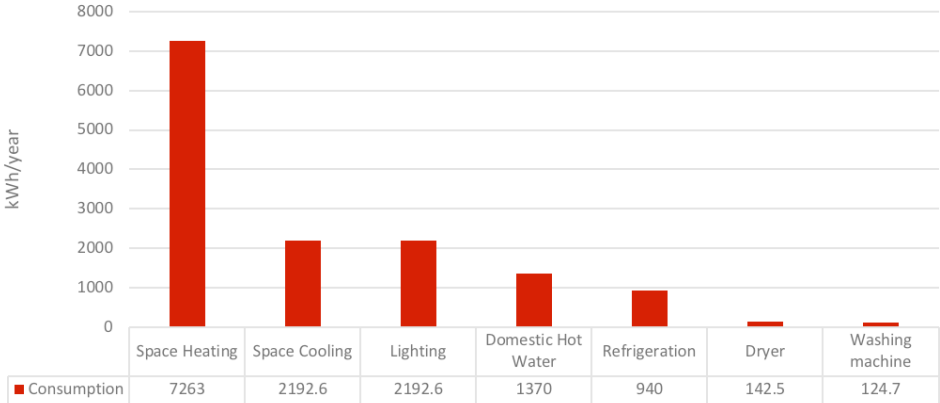


Figure 6: Appliances electricity consumption



Air Conditioning appliances in France

Air conditioning (AC) consumes 8.7% out of the total energy consumption (0.2% in primary housing and 8.5% for non-residential buildings). A typical household has one air conditioner with an average COP above three. Split and other mobile unit systems are the most common systems with a more than 10-year lifetime. The highest consumption is in August. There are regulations regarding scrapping of old air conditioners.

MEPS policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, lighting, refrigerators/freezer, dryer, washing machines, cooker, boilers, coffee machines, computers, industrial fans, standby, TVs and displays, vacuum cleaners
Implementation responsibility	Government
Enforcement actors	Government
MEPS policy aspects	Technical requirements, legal framework Institutional setups, implementation, enforced procedures, monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • Industry lobbying at the regulation stage • Limited resources at the implementation stage
Measures needed to promote the market	
Awareness of the program	Very Low

Labeling Policy

Labeling Policy level	Mandatory
Applicable appliances	Air conditioning, lighting, refrigerators/freezer, dryer, washing machines, cooker, boilers, ovens and hoods, dishwashers, TVs and displays, vacuum cleaners
Implementation responsibility	Government
Enforcement actors	Government
Labeling policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • Industry lobbying at the regulation stage • Limited resources at the implementation stage
Measures needed to promote the market	
Awareness of the program	Medium

Greece

Overview of Electricity Consumption

The residential sector in Greece consumes 19,628 GWh/year, which represents around 36% of the total consumption as shown in figure 7. The highest consumption is in space heating followed by refrigeration and Freezer/Dryer/ Washing machines/ others and Domestic Hot Water as shown in figure 8. The average electricity consumption for a typical household is 250kWh/month.

Figure 7: Share of residential sector electricity consumption

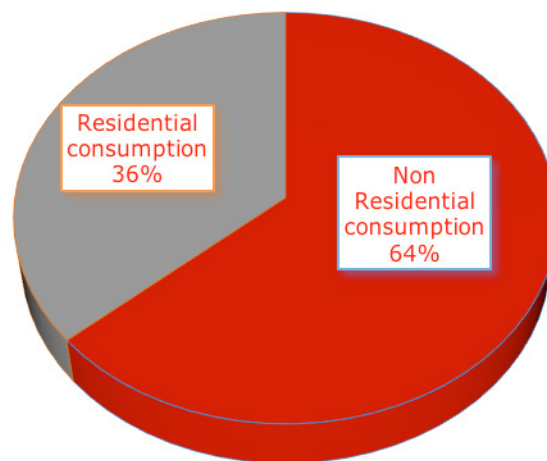
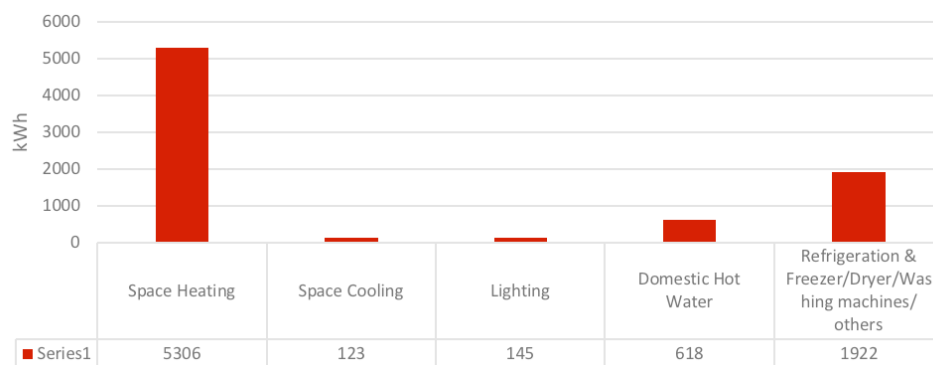


Figure 8: Appliances electricity consumption



Air Conditioning appliances in Greece

Air conditioning (AC) consumes 1% out of the total energy consumption. 60% of households had air conditioning with an average COP under three. Split type air conditioning is the most common system with more than 10-year life-time. The highest consumption is in June, July and August. There are regulations regarding scrapping of old air conditioners.

MEPS policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, cooker, heaters, vacuum cleaners, TV, computers, lamps, fans, ventilation unit, boilers, pumps
Implementation responsibility	Government
Enforcement actors	Government
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • Limited public awareness of labeling and eco-design concepts. This is further amplified taking into consideration that, especially in Greece, during the financial crisis, the main criterion for selecting an appliance was by far the price and not the energy performance or the CO₂ footprint of a product. • The lack of adequate staff and resources of the public authorities for more extensive surveillance of the market and the enforcement of the current legislation. • Limited use of energy performance labels on products displayed in e-shops.
Measures needed to promote the market	<ul style="list-style-type: none"> • Public awareness of ecolabelling and eco-design has to be increased through information campaigns at the national level. • Professionals (retailers, manufacturers, etc.) must be trained on the current legislative framework and legal requirements. • All stakeholders (including for example e-shop retailers) must sit together in order to produce a more efficient action plan.
Awareness of the program	Very Low

Labeling Policy

Labeling Policy level	Mandatory
Applicable appliances	Air conditioning, lighting, refrigerators/freezer, dryer, washing machines, cooker, Boilers, ovens and hoods, dishwashers, TVs and displays, vacuum cleaners
Implementation responsibility	Government
Enforcement actors	Government
Labeling policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • Limited public awareness of the labeling and eco-design concepts. This is further amplified taking into consideration that, especially in Greece, during the financial crisis, the main criterion for selecting an appliance was by far the price and not the energy performance or the CO2 footprint of a product. • The lack of adequate staff and resources of the public authorities for more extensive surveillance of the market and enforcement of the current legislation. • Limited use of energy performance labels on products displayed in e-shops.
Measures needed to promote the market	<ul style="list-style-type: none"> • Public awareness of ecolabelling and eco-design has to be increased through information campaigns at the national level. • Professionals (retailers, manufacturers, etc.) must be trained on the current legislative framework and legal requirements. • All stakeholders (including for example e-shop retailers) must sit together in order to produce a most efficient action plan.
Awareness of the program	Low

Italy

Overview of Electricity Consumption

The residential sector in Italy consumes 65,490.7 GWh/year, which represents around 22% of the total consumption as shown in figure 9. The highest consumption is for refrigeration as shown in figure 10. The average electricity consumption for a typical household is 216.66 kWh/month.

Figure 9: Share of residential sector electricity consumption

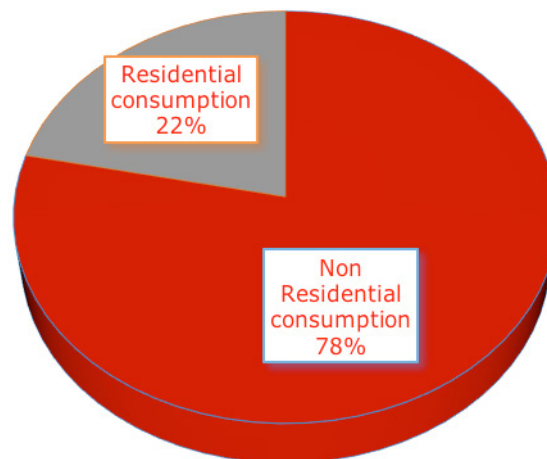
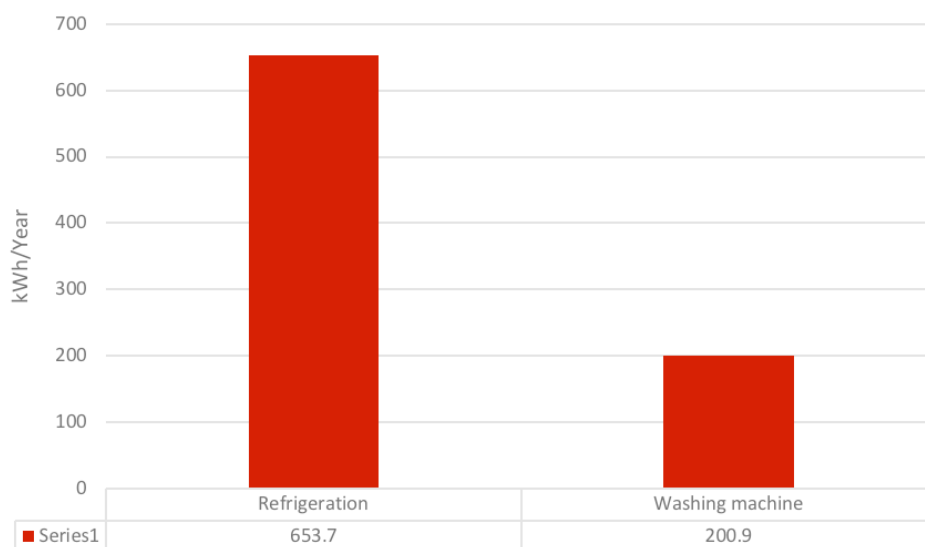


Figure 10: Appliances electricity consumption



Air Conditioning appliances in Italy

Air conditioning (AC) consumes 0.7% out of the total residential energy consumption. The average COP of air-conditioning is above three. Split type air condition, single ducts and double ducts are the most common systems with 5-10-year lifetime. There are regulations regarding scrapping of old air conditions.

MEPS policy

MEPS Policy level	Mixed
Applicable appliances	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, cooker, other
Implementation responsibility	Government
Enforcement actors	Government/ Self-certification
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	Lack of information for market economic operators, insufficient market surveillance
Measures needed to promote the market	
Awareness of the program	Medium

Labeling Policy

Labeling Policy level	Mixed
Applicable appliances	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, cooker, other
Implementation responsibility	Government
Enforcement actors	Government/ Self-certification
Labeling policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	Lack of information for market economic operators, insufficient market surveillance
Measures needed to promote the market	
Awareness of the program	High

Jordan

Overview of Electricity Consumption

The residential sector in Jordan consumes 8,038 GWh/year, which represents around 46% of the total consumption as shown in figure 11. The highest consumption is in space heating followed by space cooling and lighting as shown in figure 12. The average electricity consumption for a typical household is 245kWh/month.

Figure 11: Share of residential sector electricity consumption

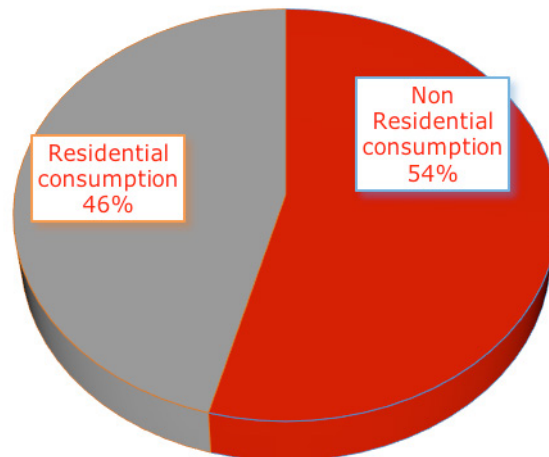
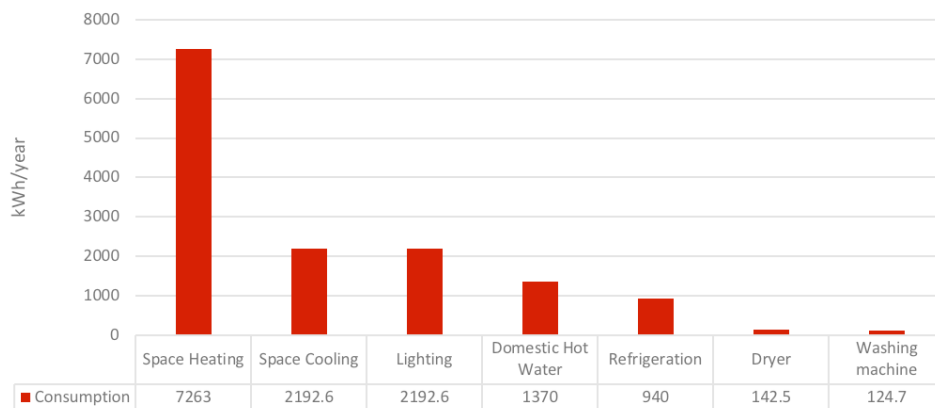


Figure 12: Appliances electricity consumption



Air Conditioning appliances in Jordan

Air conditioning (AC) consumes 4% out of the total energy consumption. The typical household has one air conditioner with an average COP above three. Central and Split systems are the most common systems with more than 10-year lifetime. The highest consumption is in June, July and August. There are no regulations regarding scrapping of old air conditioners.

MEPS policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, TV, dish washer, fans
Implementation responsibility	Government
Enforcement actors	Government
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • Availability of market data to establish the baseline for energy consumption. • Cost benefit analysis for updating MEPS are not conducted. • Local manufacturer are not ready to upgrade their production line to comply with MEPS.
Measures needed to promote the market	<ul style="list-style-type: none"> • Conducting market analysis to establish a baseline for energy consumption. • Conducting cost benefit analysis for updating MEPS. • Support local manufacturer in upgrading teh production line to comply with MEPS.
Awareness of the program	Low

Labeling Policy

Labeling Policy level	Mandatory
Applicable appliances	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, TV, dish washer, fans
Implementation responsibility	Government
Enforcement actors	Government
Labeling policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	Availability of market data to establish base line for energy consumption.
Measures needed to promote the market	Conducting market analysis to establish baseline for energy consumption.
Awareness of the program	Medium

Lebanon

Overview of Electricity Consumption

The residential sector in Lebanon consumes 7,050 GWh/year, which represents around 39% of the total consumption as shown in figure 13. The highest consumption is in space heating followed by space cooling and lighting as shown in figure 14. The average electricity consumption for a typical household is 435.16kWh/month.

Figure 13: Share of residential sector electricity consumption

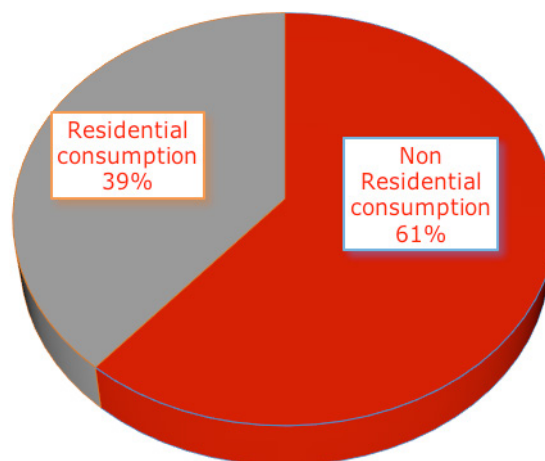
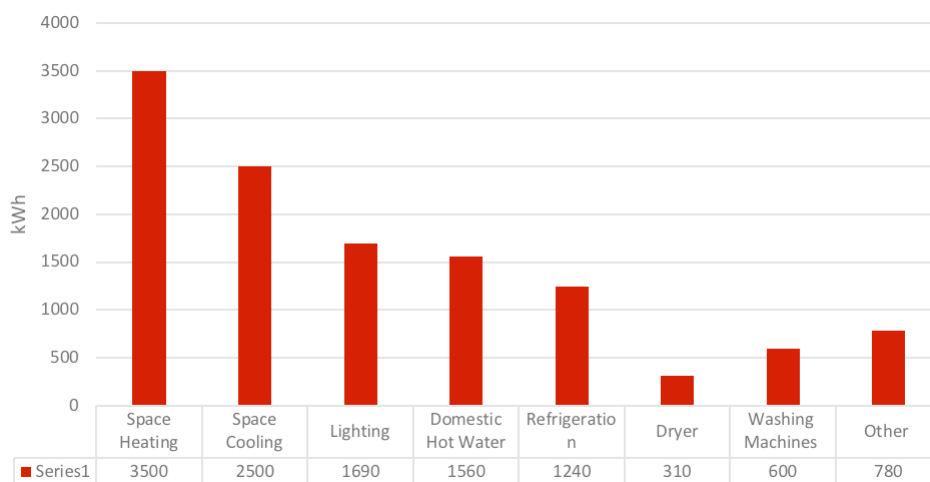


Figure 14: Appliances electricity consumption



Air Conditioning appliances in Lebanon

Air conditioning (AC) consumes 12.4% out of the total energy consumption. A typical household has two air conditioners with an average COP under three. Split type air conditioning is the most common system with an average 5-10-year lifetime. The highest consumption is in July, August and September. There are no regulations regarding scrapping of old air conditions.

MEPS policy

MEPS Policy level	Voluntary
Applicable appliances	Air conditioning, Refrigerators/freezer, lighting, solar water heater, electric water heater
Implementation responsibility	Government
Enforcement actors	Government
MEPS policy aspects	Technical requirements
Missing aspects	Legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • Resistance to change the regulation • No accreditation of testing labs • Fake certification from Asia • Power black outs are a barrier for EE (appliances). • Secondhand market for appliances. • Low payback time of EE appliances (Electricity subsidies)
Measures needed to promote the market	<ul style="list-style-type: none"> • Strong institutional set-up and experience. • Interest to work on labelling, based on the EU Energy Performance Index. • Database and voluntary system for equipment registration. • Awareness of the possibility to increase EE in Appliances
Awareness of the program	Very Low

Labeling Policy

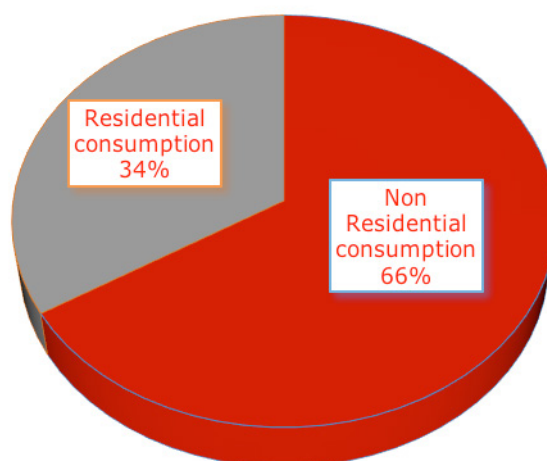
Labeling Policy level	
Applicable appliances	Air conditioning, Refrigerators/freezer, lighting, washing machines, Electric motors, Transformers
Implementation responsibility	Government
Enforcement actors	Government
Labeling policy aspects	None
Missing aspects	Technical requirements (planned), Legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Applicable to imported appliances	Yes
Barriers for implementation	<ul style="list-style-type: none"> • Resistance to change the regulation • No accreditation of testing labs • Fake certification from Asia • Power black outs are a barrier for EE (appliances). • Secondhand market for appliances. • Low payback time of EE appliances (Electricity subsidies)
Measures needed to promote the market	<ul style="list-style-type: none"> • Strong institutional set-up and experience. • Interest to work on labelling, based on the EU Energy Performance Index. • Database and voluntary system for equipment registration. • Awareness of the possibility to increase EE in Appliances
Awareness of the program	Very Low

Morocco

Overview of Electricity Consumption

The residential sector in Morocco consumes 10,965 GWh/year, which represents around 34% of the total consumption as shown in figure 15. The average electricity consumption for a typical household is 116 kWh/month.

Figure 15: Share of residential sector electricity consumption



Air Conditioning appliances in Morocco

A typical household has one air conditioner with an average COP above three. Split type air conditioning is the most common system. The highest consumption is in July and August. There are no regulations regarding scrapping of old air conditioners.

MEPS policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, TV, dish washer, fans, vacuum devices , electric oven, water heaters
Implementation responsibility	Government
Enforcement actors	Government, Third party
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation. Enforced procedures as well as monitoring and evaluation procedures are planned.
Missing aspects	None
Applicable to imported appliances	No
Barriers for implementation	<ul style="list-style-type: none"> • Weak control process • Absence of MV&E system
Measures needed to promote the market	<ul style="list-style-type: none"> • Strengthen and consolidate the control process • Implementation of an MV&E system • Capacity building of actors
Awareness of the program	High

Labeling Policy

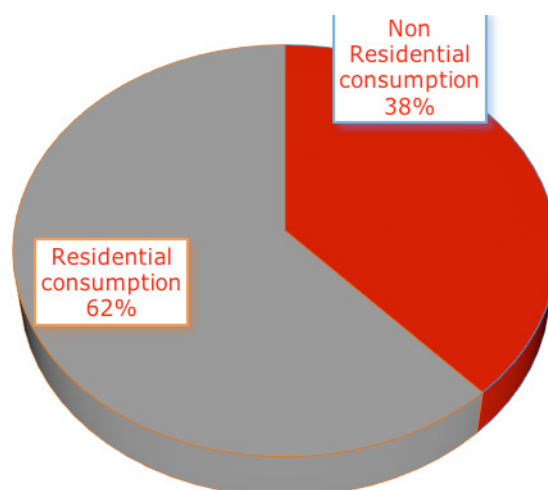
Labeling Policy level	Mandatory
Applicable appliances	Air conditioning, refrigerators/freezer, lighting, dryer, washing machines, TV, dish washer, fans, vacuum devices, electric oven, water heaters
Implementation responsibility	Government
Enforcement actors	Government, Third party
Labeling policy aspects	Technical requirements, legal framework Institutional setups, Implementation. Enforced procedures as well as monitoring and evaluation procedures are planned.
Missing aspects	None
Applicable to imported appliances	No
Barriers for implementation	<ul style="list-style-type: none"> • Weak control process • Absence of MV&E system
Measures needed to promote the market	<ul style="list-style-type: none"> • Strengthen and consolidate the control process • Implementation of an MV&E system • Capacity building of actors
Awareness of the program	High

Palestine

Overview of Electricity Consumption

The residential sector in Palestine consumes 3,325 GWh/year, which represents around 62% of the total consumption as shown in figure 16. The average electricity consumption for a typical household is 306 kWh/month.

Figure 16: Share of residential sector electricity consumption



Air Conditioning appliances in Palestine

A typical household has two air conditioners with an average COP above three. Split systems are the most common systems with 5-10-year lifetime. There are no regulations regarding scrapping of old air conditions.

MEPS policy

MEPS Policy level	Voluntary
Applicable appliances	MEPS are not existing as a mandatory activity in Palestine
Implementation responsibility	Mixed model
Enforcement actors	Government
MEPS policy aspects	Planned (Institutional setups, Implementation, enforced procedures)
Missing aspects	Technical Requirements, Legal Framework, Monitoring & Evaluation procedures
Applicable to imported appliances	No
Barriers for implementation	<ul style="list-style-type: none"> • Occupation • Lack of or limited qualified and internationally accredited testing laboratories • Lack of data and difficulty in exchanging information • The high price of highly efficient products • Lack of government incentives • Lack of financial resources at the national level
Measures needed to promote the market	
Awareness of the program	Low

Labeling Policy

Labeling Policy level	Voluntary
Applicable appliances	Labeling in Palestine is voluntary and is linked to the Eu label through Israeli testing laboratories
Implementation responsibility	Mixed model
Enforcement actors	Government
Labeling policy aspects	Legal framework is planned
Missing aspects	Technical requirements, Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Applicable to imported appliances	No
Barriers for implementation	<ul style="list-style-type: none"> • Occupation • Lack of or limited qualified and internationally accredited testing laboratories • Lack of data and the difficulty of exchanging information • The high price of highly efficient products • Lack of government incentives • Lack of financial resources at the national level
Measures needed to promote the market	
Awareness of the program	Medium

Portugal

Overview of Electricity Consumption

The residential sector in Portugal consumes 11,722 GWh/year, which represents around 26% of the total consumption as shown in figure 17. The highest consumption is in space heating followed by space cooling and lighting as shown in figure 18. The average electricity consumption for a typical household is 245kWh/month.

Figure 17: Share of residential sector electricity consumption

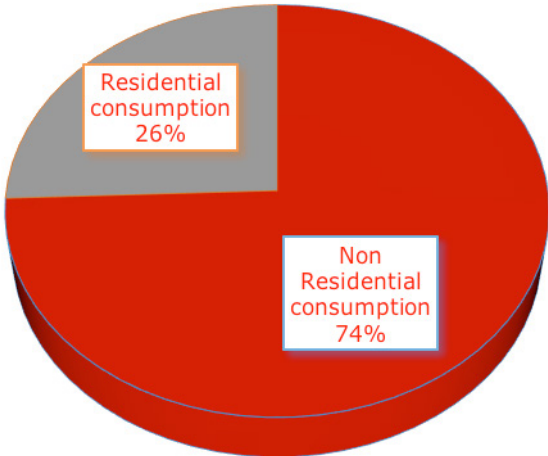
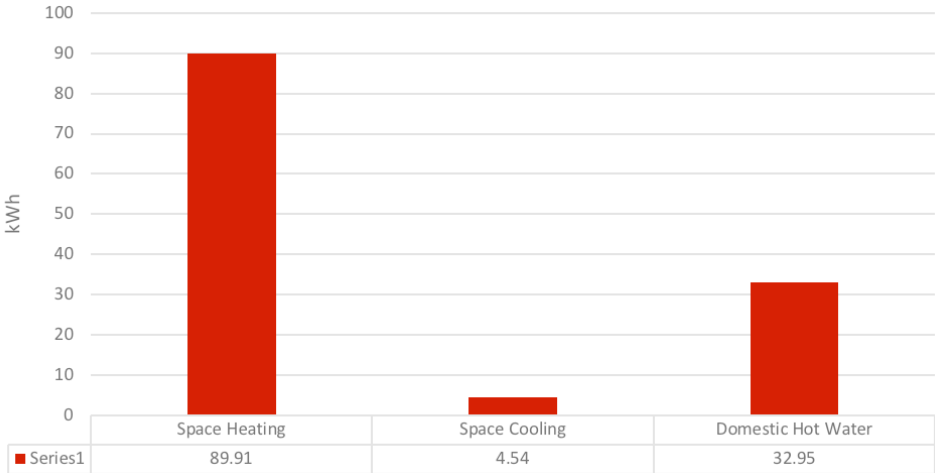


Figure 18: Appliances electricity consumption



Air Conditioning appliances in Portugal

A typical household has an average COP above three. Split type air conditioning systems are the most common systems with more than 10-year lifetime. The highest consumption is in July, August and September. There are regulations regarding scrapping of old air conditions.

MEPS policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, Refrigerators/freezer, lighting, dryer, washing machines, cooker, TV, boilers, vacuum cleaners and ventilation systems
Implementation responsibility	Government
Enforcement actors	Government
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	Lack of knowledge from the consumers.
Measures needed to promote the market	Increase the awareness of the consumers so they make cost effective choices.
Awareness of the program	Low

Labeling Policy

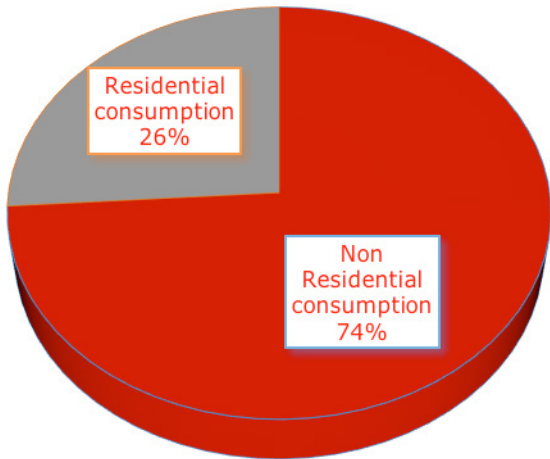
Labeling Policy level	Government
Applicable appliances	Air conditioning, Refrigerators/freezer, lighting, dryer, washing machines, cooker, TV, boilers, vacuum cleaners and ventilation systems
Implementation responsibility	Government
Enforcement actors	Government
Labeling policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures, Monitoring and evaluation procedures
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	Lack of knowledge from the consumers.
Measures needed to promote the market	Increase the awareness of the consumers so they do cost effective choices.
Awareness of the program	High

Spain

Overview of Electricity Consumption

The residential sector in Spain consumes 70,012 GWh/year, which represents around 26% of the total consumption as shown in figure 19. The average electricity consumption for a typical household is 314.75kWh/month.

Figure 19: Share of residential sector electricity consumption



Air Conditioning appliances in Spain

A typical household has an air conditioner with an average COP above three. Split type air conditioning and reversible heat pump systems are the most common systems with more than 10-year lifetime. There are regulations regarding scrapping of old air conditions.

MEPS policy

MEPS Policy level	There is not a Minimum Energy Performance Standard set, except when substitution of inefficient appliances is authorized through public funds.
Applicable appliances	
Implementation responsibility	
Enforcement actors	
MEPS policy aspects	Technical Requirements, legal framework, Implementation, enforced procedures,
Missing aspects	Monitoring and Evaluation procedures, Institutional set-up
Applicable to imported appliances	No
Barriers for implementation	The regional administrative competences in the field of energy.
Measures needed to promote the market	Persuasion of every Regional Government in Spain to commit to energy saving targets.
Awareness of the program	High

Labeling Policy

Labeling Policy level	Mandatory to provide energy label
Applicable appliances	Air conditioning, Lighting, Refrigerator/Freezer, Dryer, Washing machines, dishwashers, electric ovens, range hoods, boilers, heat pumps
Implementation responsibility	
Enforcement actors	
Labeling policy aspects	
Missing aspects	None
Applicable to imported appliances	Yes
Barriers for implementation	The regional administrative competences in the field of energy.
Measures needed to promote the market	Persuasion of every Regional Government in Spain to commit to energy saving targets.
Awareness of the program	None

Tunisia

Overview of Electricity Consumption

The residential sector in Tunisia consumes 5,005 GWh/year, which represents around 30% of the total consumption as shown in figure 20. The highest consumption is in space heating followed by domestic hot water as shown in figure 21. The average electricity consumption for a typical household is 120kWh/month.

Figure 20: Electricity consumption in Tunisia

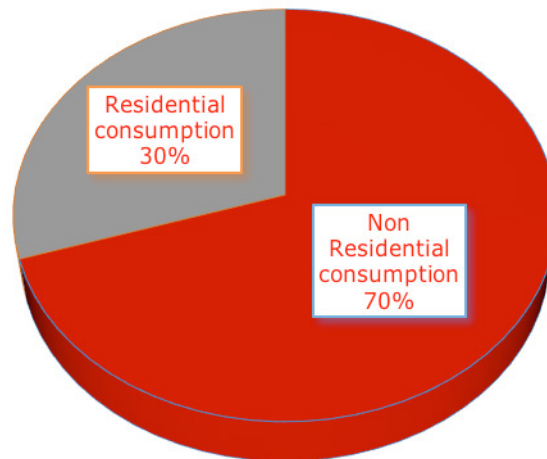
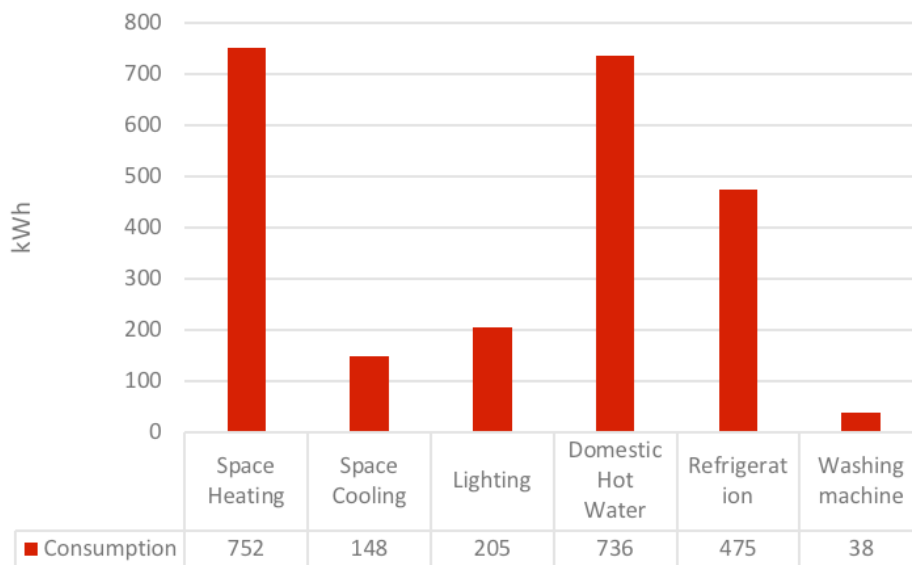


Figure 21: Consumption per category



Air Conditioning appliances in Tunisia

Air conditioning (AC) consumes 7% out of the total energy consumption. A typical household has 1-2 air conditioners with an average COP above three. Split systems are the most common systems with more than 10-year lifetime. The highest consumption is in July and August. There are no regulations regarding scrapping of old air conditions, but there is a specialized center for scrapping AC.

MEPS policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, Refrigerators/freezer
Implementation responsibility	Government
Enforcement actors	Third party
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures
Missing aspects	Monitoring and evaluation procedures
Applicable to imported appliances	Yes
Barriers for implementation	Informal market problem
Measures needed to promote the market	Market control and surveillance, increased awareness
Awareness of the program	Medium

Labeling Policy

MEPS Policy level	Mandatory
Applicable appliances	Air conditioning, Refrigerators/freezer, washing machines
Implementation responsibility	Government
Enforcement actors	Third party
MEPS policy aspects	Technical requirements, legal framework Institutional setups, Implementation, enforced procedures
Missing aspects	Monitoring and evaluation procedures
Applicable to imported appliances	Yes
Barriers for implementation	Informal market problem
Measures needed to promote the market	Market control and surveillance, increased awareness
Awareness of the program	Medium

This publication is a product of the meetMED (Mitigation Enabling Energy Transition in the Mediterranean region) project which is funded by the European Union and jointly implemented by the Mediterranean Association of the National Agencies for Energy Management (MEDENER) and the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE). The conclusions of this report result from the analysis of the Country Policy Papers prepared by the meetMED Regional Expert Network (REN) – a network composed by experts coming from 13 Mediterranean countries – the aim of which is to support national governments in the implementation of EE and RE policies enhancing national programmes and frameworks in the region. Since 2012, the eight target countries (Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestine and Tunisia) have improved their energy efficiency and renewable energy sectors, having put in place long-term national energy strategies that set ambitious targets for energy savings and renewable energy penetration. Nevertheless, several challenges still hinder the development of EE and RE, particularly related to governmental, technical or information aspects. This report identifies a set of recommendations that can be implemented to promote the development of both sectors. Awareness of the population for EE and RE benefits should be one of the main objectives of the countries since the lack of knowledge is a clear barrier to the dissemination of good practices. Regional cooperation should be encouraged to facilitate the energy transition in the Southern and Eastern Mediterranean Countries (SEMCs) – cooperation will accelerate the implementation of common measures and help overcome shared barriers.



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