



Energy Efficiency Building Code

A Roadmap for implementation
in the MENA Region

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Energy Efficiency in the Construction Sector
in the Mediterranean



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A good design is the first step to EEBC implementation



Check implementation on site



Reducing building energy consumption needs a mandatory EEBC



Residential project under construction: PG House Amman, Jordan, by architect Florentine Visser, delivered in 2008, includes the following energy saving measures: passive design, windows shading, double cavity wall with 3cm polystyrene insulation, roof insulation and double glazing.

Result: the home owner does not need air conditioning and starts heating a month later than his neighbours.



An EE Building Code is a must to design and construct buildings that include energy saving measures. It's important that all parties work together in the implementation process



Introduction

Energy Efficient Building Code: a pre-requisite!

Population growth, rising urbanization and economic development increase energy demand in the Middle East and North Africa (MENA) region. With the current enhanced standard of living, more households are using electronic equipment, such as air conditioners, which increase energy consumption in buildings. In many MENA countries, this rise will be even faster since the building sector is growing rapidly. Limiting this increase will not only have economic and environmental benefits, but it will also support energy security and reduce national energy bills. This will, in turn, free up resources for sectors in need, such as health and education. The European Union (EU) has named energy efficiency (EE) as one of the best ways to foster energy security in the long term¹.

New buildings have a vast energy saving potential

The building sector is estimated to be responsible for more than one-third of the global final energy consumption², the biggest single contributor to total energy consumption. This is why EE measures in buildings are crucial to reduce the growth rate of energy demand and to reach national energy saving targets. The saving potential accumulates year by year – based on the rapid urbanization and the long lifetime of buildings.

New buildings offer a good opportunity to start with energy saving in the building sector. This will consequently lead to more job creation and relief of national energy bills for energy subsidies.

Energy saving measures in buildings are simple

Simple elements such as insulation, shading and efficient appliances generate energy savings and at the same time increase indoor comfort. If EE is considered from the preliminary design sketches of a building, it becomes more cost efficient. Therefore, it is crucial to take advantage of energy saving potential in new buildings from the very beginning.

The recent Energy Efficiency Building Code (EEBC) study of MED-ENEC showed that countries in the MENA region are making progress in developing technical standards for energy efficient buildings. Some MED-ENEC partner countries already have mandatory EE technical standards dictated by law.

However, there are still substantial barriers, particularly in the implementation process: in most countries the challenges occur at the institutional coordination level and effective enforcement systems.



Dr. Kurt Wiesegart MED-ENEC Teamleader

Energy efficiency building codes are a must

The only way to recover the huge energy saving potential in buildings is to make the EEBC mandatory. An appropriate institutional enforcement system on a local level has to be designed.

The IEA estimates that four-fifths of the energy saving potential in the buildings sector worldwide will remain untapped because of various barriers, including lack of awareness and perceived high upfront costs. The IEA suggests building upon stronger policies to “realize the full potential of energy efficiency and deliver significant economic, environmental and energy security gains”³.

The EEBC Roadmap

MED-ENEC supports overcoming barriers of EE in MENA countries. Therefore this EEBC Roadmap has been designed to assist in the implementation of successful EE Building Codes. The feedback from partner countries on the EEBC study published in September 2012 and from participants at MED-ENEC regional EEBC workshops in 2011 and 2013 was very much appreciated and helped tailor this EEBC Roadmap to the needs of policy makers in the Arab region. The full EEBC study and roadmap are available on the MED-ENEC website: www.med-enec.eu⁴.

To structure the policy design and implementation process a five-step policy design cycle is introduced. This approach contains the key elements to move forward on specific regional challenges and highlights relevant best-practice examples. To customize the EEBC Roadmap to the specific needs of a country, a set of cards is included at the back of this brochure. These cards present the cycle steps, related activities and relevant institutions and can be used to create an inclusive implementation plan.

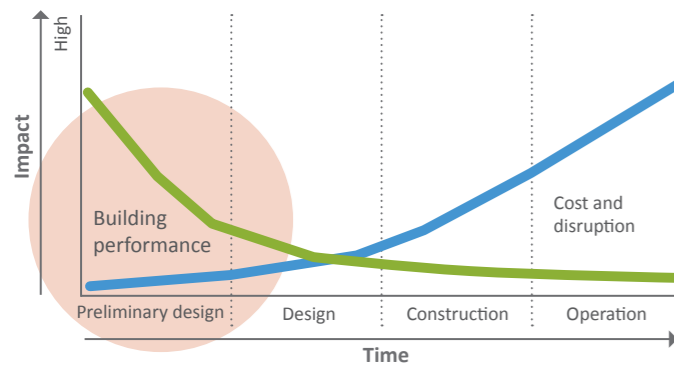
The basis for a country's specific strategy for successful implementation of the EE Building Code

EE BC international development

Do it right from the beginning

Mandatory building codes guarantee the minimum level of safety, construction quality and indoor comfort. Now, with the continuous rise in energy prices, the energy performance of buildings starts to play a role as well.

Figure 1: Cost effective Impact of EEBC (WBCSD)



Energy efficiency measures are most cost-effective when implemented at an early stage in building project development, from the design phase, as indicated in Figure 1.

The impact of EE measures decreases during the building process and life cycle (green line), while the related costs for measures to reduce the energy consumption increase (blue line).^v

Thus, once a building is constructed, it is more expensive and complicated to reduce its energy consumption. That is why it has to be done from the early beginning.

Energy efficiency requirements in building codes ensure that the energy efficiency measures are taken into account

from the very beginning. Therefore, countries across the world started developing and implementing Energy Efficiency Building Codes (EEBCs). Figure 2 shows the countries that already have a mandatory building code in place, and in which other countries EEBC's are becoming a common practice. It also shows that the MENA region lacking behind, especially on the implementation, mandatory level.

The EU solution to energy saving : EPBD

The European Union recognised the cost-effective energy saving potential in the building sector and thus developed the ambitious Energy Performance of Buildings Directive (EPBD).^{vi}

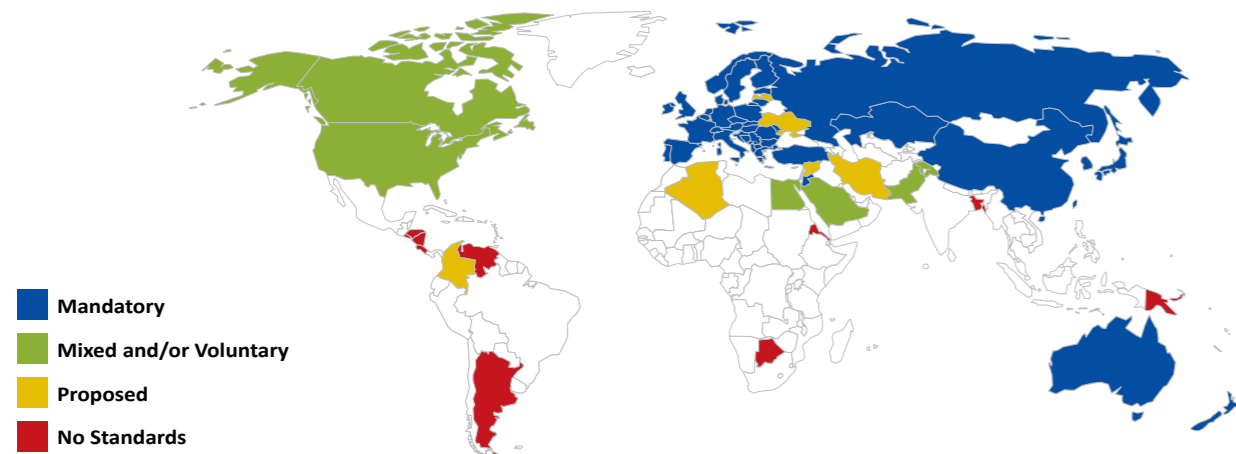
The EPBD regulates both 'passive' measures for the building design and envelope, as well as the 'active systems', such as for heating/cooling and lighting.

The EPBD introduced certificates which indicate the Energy Performance of the building as a numeric value, allowing for benchmarking. The certificates also include a list of cost-effective energy saving measures.

After the first version, the 2010 update, Directive 2010/31/EU, raised the bar to a higher level by introducing the ambitious concept of nearly-zero energy consuming buildings, by including Renewable Energy systems. After 2020, this will be mandatory for all new constructions.

The end responsibility of the implementation of the EPBD is usually with a national Ministry, like Housing, or Urban Development. The actual enforcement of the EPBD is delegated to local level through regulations and directives. Depending on the selected model, the local governments could engage private sector auditors, which are officially accredited, for the final enforcement.

Figure 2: Worldwide implementation of EE Building Codes 2009



The government to set a good example: insulation work at the Turkish Ministry of Energy

League of Arab States; The Arab EEBC

The executive committee of the council of the Arab Ministers of Housing and Construction prepared the Arab Energy Efficiency Building Code. The final version is based on the unified format of the Arab Standards and is being prepared for adoption by the Arab Housing Ministers council.

The Arab EEBC addresses the need to set up a National Institution for Building Codes.

Its technical structure is similar to international EEBC's and contains eleven chapters covering the following issues:

- General and Nomenclatures
- Scope
- Climatic zones for Arab countries

- Compliance
- Description of compliance options
- Mandatory Provisions
- Requirements for :
 - Building Envelope (thermal insulation, windows to wall ratio, solar shading)
 - Heating, Ventilation, and Air-Conditioning
 - Service Water Heating
 - Power
 - Lighting
 - Other Equipment
- Product Information and Installation Requirements
- Information products.

Successful EEBC Implementation needs planning

A complicated process simplified

The design and implementation of an EEBC is a complicated process which can be structured by taking five simple main steps. The structure will help policy makers identify the gaps and essential activities to achieve specific goals. This five-step approach follows the methodology of the Policy Design Cycle, which is a popular tool that has been applied by the EU, for example, to implement, monitor and evaluate EU energy efficiency instruments.^{vii}

The EEBC Roadmap for the MENA countries

Based on the Policy Design Cycle, MED-ENEC created a roadmap specific for EEBC policy making in the Arab region. In this EEBC Roadmap each step of the Policy Design Cycle is further detailed with sub-steps:

1 Target setting

This step defines the impact the EEBC should have. It also identifies the experts and stakeholders involved, like architects, contractors, building owners, etc. Their involvement is important not only for realistic target setting, but also for the further development of the EEBC. Changes in government policies need to be communicated to the general public, and this should already start with EEBC targets.

2 Strategy

This step sets the framework to implement the EEBC successfully. The strategy includes budget assignment, time planning, development of supporting policies, such as economic incentives, and development of the technical code. These elements are necessary to form the comprehensive, strategic policy planning. Since most of the MED-ENEC partner countries already have technical standards in place, this EEBC roadmap is focused on the supporting actions for the effective impact of the building code.

3 Implementation

This step addresses the implementation of the EEBC. The set-up of the institutional and legal framework is to be defined. This is a complicated process which involves many parties, various ministries (e.g. housing, finance, municipalities, energy, etc.) and other entities (e.g. for enforcement and monitoring). Verification of the draft regulations by stakeholders

The five steps of the policy design cycle:

- 1 Targets
- 2 Strategy
- 3 Implementation
- 4 Enforcement
- 5 Evaluation

takes place in this phase as well. This secures its embedding and adoption to be a practical and realistic law that can be implemented with normal efforts.

4 Enforcement

This is considered the most important step for EEBCs. It details the enforcement mechanisms to ensure the EEBC is implemented. This step is often a challenge. The roadmap explains how EEBC-specific enforcement mechanisms such as permitting, compliance, or certification can be done.

5 Evaluation

This step deals with the evaluation of the impact of the EEBC. It involves data gathering about the current building stock, its energy consumption and the evaluation of building code compliance. The lessons learned in this stage should be the basis for further development of the EEBC: the next round of the Policy Design Cycle, or EEBC Roadmap.

The next chapters provide the details of these five steps and related information on good practice as example.^{viii}

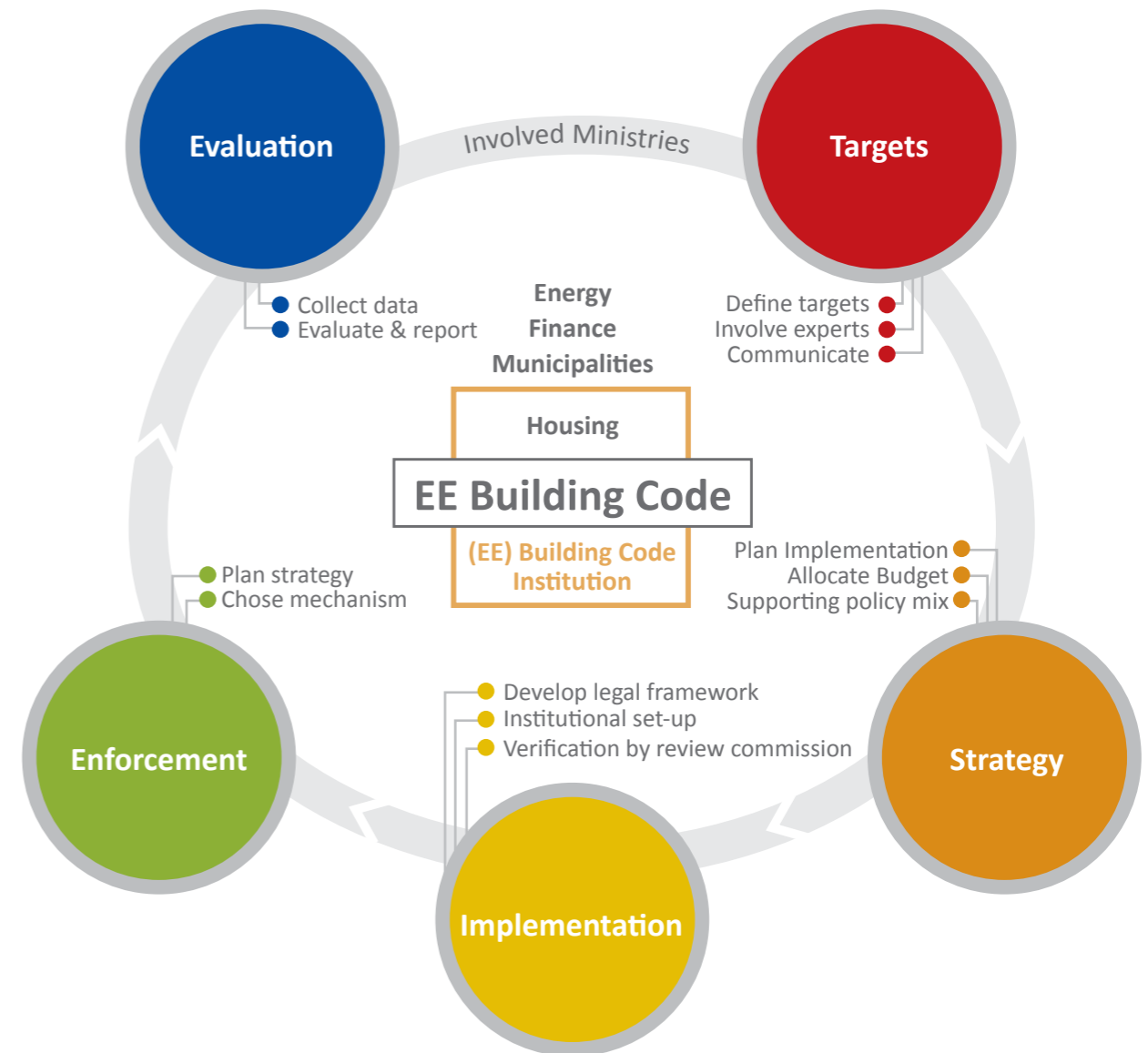
The EEBC Roadmap structures the policy development process and includes all important elements.

The EE policy design is neither a linear process nor a general recipe for success. Therefore, the EEBC Roadmap is set up in a flexible way. The different sub-steps or relevant activities can be taken in any desired order, depending on the circumstances of each country.

However, it is recommended to consider each step individually to achieve a comprehensive and integrated EEBC that has an actual impact on the reduction of building energy consumption.

EEBC Roadmap

Figure 3: The EE Building Code Road map structures a complex policy-making process into 5 simple steps



1. Target Setting



A target is necessary to evaluate the impact of a policy.

Define TARGETS

Setting a specific goal and estimating the expected impact helps to choose the most suitable and effective policy instruments to achieve the goal. Therefore, it is important to outline the long term goal and the EEBC impact through a set of concise and measurable targets.

The targets must be specific, measurable and should have a time limit.

This helps to estimate the impact of the EEBC and allows monitoring and evaluating the actual achievements.

Practical tips for target setting

- Formulate an overall target to which many people will possibly agree (e.g. reduce household electricity consumption by 10% in 2020).
- Based upon this main target, define the secondary sub-targets for specific sectors or technologies (e.g. determine a number of new solar water heaters to be installed per year).
- Robust and credible targets need to refer to the current building stock or energy performance of buildings baseline.



A clear target is a communication tool to explain the need of EEBC

Figure 4: Important stakeholders, and change agents

Policy and Administration	<ul style="list-style-type: none"> • Ministries (e.g. Housing, Energy) • Sub departments • Regulatory and legislative bodies / commissions • Municipal administration
Private Sector	<ul style="list-style-type: none"> • Developers, contractors • Architects, engineers • Energy auditors • Suppliers of material & equipment • Banks, utilities • Building owners, general public
Stakeholder Organizations	<ul style="list-style-type: none"> • NGOs in the field • Chamber of architects • Chamber for building land matters

Definition of EE targets

Palestine set specific energy saving targets in their National Energy Efficiency Action Plan (NEEAP) and included sub-targets for the near future (see p.19 for details).

The German government adopted the integrated energy and climate protection programme (2007). This programme defined ambitious climate change targets for 2020:

- greenhouse gas emissions to be reduced by 40% (compared to 1990);
- the share of renewable energy in electricity generation to be at least 30%;
- the share of renewable energy in heating energy to be 14%.

To specify the targets, the programme includes 29 points. On the building level for instance the primary energy threshold consumption were reduced by 30%.

Involve EXPERTS

Experienced building professionals can give valuable insights; therefore it is important to include them in the EEBC policy development and implementation. Feedback from these stakeholders is valuable in most of the cycle steps.

During the target setting phase experts can help identify the exact benchmarks, while professionals from the private sector can identify current barriers for energy efficient buildings and provide practical solutions. This involvement supports innovative solutions and will make the policies more practical.

Furthermore, technical experts are important ambassadors for change, and to implement the policy. Involved stakeholders will actively increase acceptance of measures within their peer groups, especially if they have an interest in a successful EEBC.

COMMUNICATE the Targets with Stakeholders

In addition to the professionals in the public and private sectors, the general public needs to be informed on the implementation and effects of the EEBC. Therefore, awareness raising and capacity building are essential. Communicating the benefits of energy efficiency in buildings (e.g. cost savings, thermal comfort, etc.) increases acceptance and awareness, and this supports compliance with the EEBC.

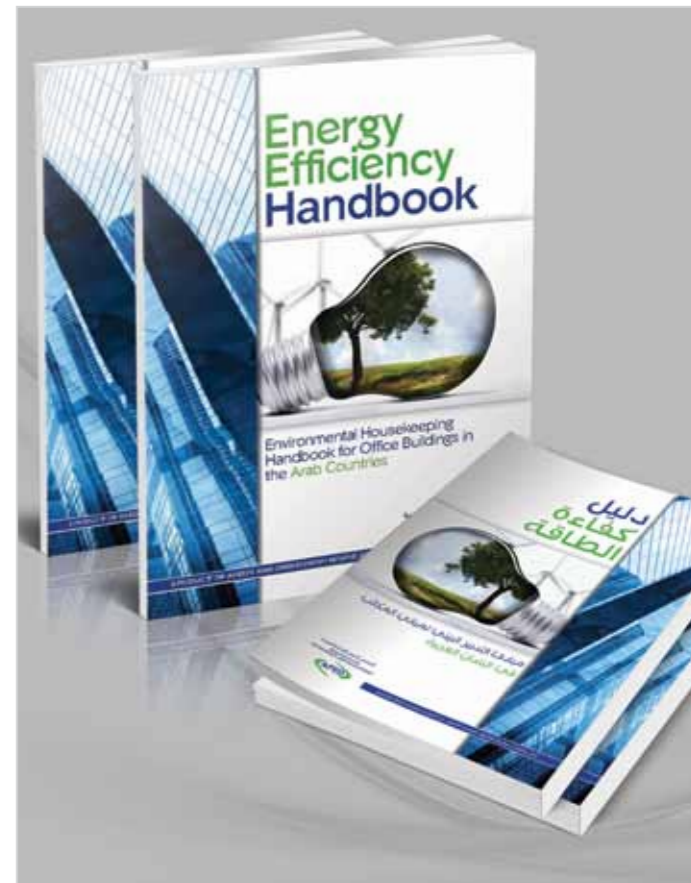
Suggested communication activities are:

- Use the target setting process for awareness raising among the general public, professionals and public sector;
- Support capacity building for architects, civil engineers, urban planners etc.;
- Train building code officials, public institutions etc.;
- Trainings are also an opportunity for interaction and networking among different stakeholders, so they can learn from each other;
- Involve committed actors in the communication and dissemination process, let them be the 'change-agents' for successful EEBC implementation.

Support from the private sector

It is important to find the right allies. Insulation suppliers for instance benefit from an enforced EEBC, since with increased insulation regulations, also the demand for insulation material will increase. Therefore they can be a partner in the communication activities themselves.

Equally, the association of engineers might have an interest in obligatory certification. When they are in charge of testing and certifying their members, they can find a new role and a way of revenue generation.



Good information on energy efficiency is essential to inform architects and engineers

Specific, detailed **targets** are the input for the development of the technical building code ►
 External **experts** need to verify the code ►
 External **experts** to be involved in the enforcement process ►
 The initially estimated impact and **target** are to be evaluated against the actual results ►
Communication should be included throughout the whole cycle. ►►►

2. Strategy



A holistic strategy is essential for EEBC implementation, including all relevant entities stakeholders

PLAN Implementation

Technical and economic studies of local conditions (e.g. geography, climate and current building stock) provide the basis for technical standards. When planning the implementation and enforcement of the EEBC, policy makers need to answer the following questions based on existing structures, experience and local conditions:

1. What type of EEBC should be used?
2. What is the available budget? Are there other resources that could be tapped into?
3. Which supporting measures are most suitable and accessible?
 - Which solutions didn't work well in the past? What should be avoided?
 - Can we learn from positive experiences in neighbouring countries?
 - Are there possible synergies with other policies which could be combined? (e.g. incentives for environmental protection in the building sector)

Code design types

An EEBC provides technical standards that can be formulated in different models. There are three basic models for building codes: prescriptive, performance based and the mixed model. Each is detailed in the table below. The performance based code is more complex and requires

architects and engineers of higher skills for design and compliance verification. This could be the long term target since more actions need to be in place to implement such an EEBC model successfully. The benefit of the performance based building code is that it is more flexible and allows for innovative efficiency solutions to further support the market and product development.

However, in the short term a prescriptive code might be quicker and easier to implement as clear rules are given and complex calculations are not needed. The mixed models are very suitable to bridge from the prescriptive to the performance based model.

In order to reach the final target, a differentiation in short, medium and long term measures, is more effective. This, since setting up institutions or developing market infrastructure needs time, and cannot be all achieved in the same time:

- Short term measures may include prescriptive building codes with set U-values for building envelope, which can take effect quickly for all new buildings.
- Long term measures take time to generate the benefits, for example funding for research and development (R&D).

Allocate BUDGET – the ultimate government commitment

Implementing an EEBC and supporting policies incurs costs. To execute the different steps and activities resources in terms of time and financial funds are needed. Budgeting is often challenging as financial resources are usually limited and different departments need their part of the scarce resources. The following activities help:

- Use existing resources: try to add energy efficiency requirements to existing support schemes.
- Energy price reform: reducing energy subsidies can create budget to implement energy efficiency policies, like sales tax reduction. Additionally, when energy subsidies decrease, the payback time for EE investment will be more interesting, and therefore more profitable.
- Tax incentives: consider reducing taxes for energy efficient products or raising taxes for inefficient ones.
- Communicate financial benefits: Energy saving measures reduce the energy bill for the consumers. With interesting payback times, it makes sense to invest in these measures, as the investment will be paid back from the energy savings. This needs to be communicated clearly, to convince energy consumers to make such investments, and share the financial burden.

Examples of supporting policies

Egypt has adopted minimum energy performance standards with mandatory labelling for some goods such as fridges and washing machines. In Austria, some subsidies are linked to efficiency and renewable energy measures which are stricter than the national building code. This has led to a significant increase of buildings with a better energy performance than required by code.

The best way to show commitment is to allocate a budget for EEBC Implementation!

Supporting POLICY MIX

The energy efficiency building code needs supporting policy measures, “carrots and sticks”, to achieve a holistic EE strategy. This means incentives to promote specific measures and penalties for non-compliance need to be in place. Rejecting a building or occupancy permits for non-compliance can be a “stick”, while tax reductions on efficiency products can be an incentive.

Table 2 lists policies which support the EEBC. Enforced regulation works as “stick” while financial measures are the “carrot”, an incentive for compliance.

This strategic policy mix is the preparation, and closely interlinked with the enforcement which is illustrated in step 4 of this roadmap.

Table 1: Characteristics of different code design types

Name	Description	Advantages	Disadvantages
Prescriptive	Prescriptive EEBCs are based on threshold values for energy efficiency requirements for each building element, and for equipment, or parts of it. Each of the individual components has to comply with the given technical specifications.	Clear guidelines, thus easy to implement for builders and architects; Easy to verify; Effective on when low, and informal, skill level is common practice.	Not flexible; Requires frequent updates from regulator to keep up to date.
Performance based	Performance based EEBCs consider only the desired overall energy performance of the building. How this performance is achieved is up to the architect or engineers. The compliance requirements are based on a building's overall consumption of energy, fossil fuels or the building's greenhouse gas emissions.	Flexible; allows for creative solutions; open for technology change and development.	More complex; requires a higher skill level of architects and engineers, for design and compliance verification.
Mixed models	Mixed models, are a mix of the two types above and a variety of mixed models exists (e.g. model building, energy or thermal frame, trade-off model, to name only a few). The Trade Off, for instance, sets values for each building element summing up to an overall target value. Different elements can balance the total energy consumption, i.e. if one element underachieves it can be offset by another element that saves more energy than required.	Suitable to bridge the transition from a prescriptive to performance based code.	Requirements might be complex or confusing; May leave room for loopholes and non-compliance.

Table 2: EE policy measures in support of energy efficient buildings

Type of policy	Type of measure	Example	Type of policy	Type of measure	Example
Regulation	Mandatory standards, i.e. the building code	EEBC elements: - U-value for building materials - HVAC efficiency standard - Energy Performance Standards	Monetary incentives	Fiscal incentives	- VAT reductions on efficient appliances - tax reduction for EE buildings (label above Code) - eco tax on electricity consumption
	Mandatory information systems	- labelling - meters			
Monetary incentives	Mandatory verification	- energy audits	Voluntary agreements	Voluntary co-operation	- producers (e.g. of household appliances) commit to EE targets
	Financial incentives	- grants for energy efficient building projects - subsidised technologies - special loans (e.g. low interest) - energy price reforms (reducing the payback of efficiency measures)			
Communication / awareness	Information	- EEBC launch events for relevant stakeholders - brochures on the code, technologies and benefits - trainings for architects, the construction sector and public servants			

- ◀ Interview experts concerning observed **barriers and needs**;
- ◀ Involve experts in the **planning process**

- ▶ Make **budget** available for the enforcement
- ▶ include both, carrots and sticks in the enforcement strategy
- ▶ Allocate **budget** for monitoring

- ▶ Allocate **Budget** for the institutional set-up
- ▶ Identify which activities and institutions are already involved in relevant processes
- ▶ Discuss with ministries the synergies with **planned activities**

3. Implementation

Successful implementation of an EEBC requires anchoring it in its specific political context.



Figure 5: Elements of flexible and binding legal framework

Framework		Pro	Con	Actions
Law text		Provides a strong and long term commitment and mandatory legal framework	Formal approval procedures can take time and be complicated, therefore difficult to update	- write draft - parliament approves and adopts it - enforce
Directives	Decrees	Easier to update by government departments or authorised entity.	May not be taken as seriously as a law	- government department can change it if authorised to do so in original
Guidelines	Information campaigns	additional tools	no juridical power	- assign responsibilities
Trainings	Voluntary agreements			

Figure 6: Assign Institutions responsible for different EEBC implementation activities



Develop LEGAL FRAMEWORK – binding and flexible

Figure 5 shows the different elements of a binding and flexible set-up for an EEBC framework.

The law text functions as the overall framework, or umbrella, which sets the general conditions, competences and jurisdiction, and provides the legal security. Frequent changes in the legal framework should thus be avoided since that makes the investment climate unstable and therefore risky.

Directives, or decrees, under the law text, provide the technical standards and specifications. Over time, these need to be changed due to technology and material developments or because the next phase in the implementation strategy has been reached (step 2).

The flexible formats are important to keep the EEBC up to date, without going through the complete legal endorsement procedure again, a process that consumes time.

The set-up of laws, directives and guidelines, have to form an effective and flexible legal framework

INSTITUTIONAL SET-UP - independent and competent

Only when institutions have clearly assigned responsibilities, they will take action and ownership for the development, implementation or enforcement of the EE building code. Therefore institutional competences and responsibilities have to be identified and assigned very clearly.

Generally speaking there are three models of potential institutional set-up:

- Government:** Everything is handled within sub-departments of the government body
- Third party:** External consultants or private sector companies are commissioned to develop and implement a building code, including the enforcement and monitoring
- Mixed model:** E.g. the policy process is developed by government departments, but monitoring is managed by external consultants.

It is recommended to have one central institution in charge of the development and implementation of the EEBC. In Figure 6, such a central institution is represented by the (EE) Building Code Council. Examples of other entities relevant and involved are also shown in the figure. The map of the institutional set-up will look different in each country and policy makers will need to ask themselves:

- Which entities could take on duties of EEBC related implementation?
- Which parties have an interest in the implementation of the EEBC? How can they be involved? (see also step 1 - Targets)

VERIFICATION by a review commission

A public and expert review of the code will raise credibility, awareness and ensure the technical accuracy of the code. The following activities are recommended:

- Have an expert committee review the technical standards and the legal framework. Besides this technical expert review, it is advised to collect also

Involving different institutions

Jordan has a National Building Code Council, responsible for the legal development of the Building Code, while the Royal Scientific Society is responsible for the technical development.

feedback from private sector stakeholders (like architects, developers and contractors) to make use of their practical experience with the building code application.

- The expert review ensures that the code is consistent and in line with the best practices and state-of-the-art technology, relevant for the technical implementation of the EEBC.
- Involving experts from different related fields will help avoid conflict of interests.
- Assign the roles and responsibilities of the regulatory, administrative and executive authorities. In case this is not clear, a collaborative approach is recommended to solve any existing problems and to revise the policies or legislation (including amendments to statutes).



involvement of experts: the MED-ENEC Building Energy Efficiency Indicators workshop in Beirut Lebanon, April 2013

- Refer to Targets when developing the code and its legal framework.
- Build upon the identified groups
- Allow sufficient budget both for new institutions and the development and verification of new legislation
- Build upon the identified expert groups when designing the institutional set-up
- Time planning to include the assignment of institution (work with existing entities for short term actions).

- Define enforcement procedure in the legal framework
- Create synergies between the actors in charge of enforcement and on-site inspections
- Verify the enforcement alongside with the legislation
- Include monitoring in the legal framework and the institutional set-up
- Identify an independent institution for the evaluation (step 5)
- Review whether implementation ensures the execution of all elements planned in other steps.

4. Enforcement

Strict enforcement ensures that the EEBC is executed during construction.



Plan ENFORCEMENT STRATEGY – key for a successful EEBC

Stringent enforcement is essential to ensure that new buildings are fulfilling the EEBC requirements. Strict checks during construction permitting and construction phase are needed to verify the implementation of the EEBC. Penalties for non-compliance secure energy savings during operation of the building (cost-) effectively ^{ix}. In order to ensure successful implementation and generate energy savings it is recommended to:

- Integrate EE into the existing construction process. This can be done by integrating the EE requirements in the existing building code or by adding separate reporting to the existing construction permitting procedure.
- Assess whether the existing construction permitting process is effective and how this process can be improved and simplified.
- The enforcement process can be executed in different ways. Table 3 summarizes the three main code enforcement models and their main characteristics. The final model selection depends on capacities and funds available in the specified country. Existing national structures and entities should be taken into account to avoid double structures and inefficiencies.

Chose ENFORCEMENT MECHANISMS – secure untapped savings

The World Bank distinguishes following groups of tools to support compliance which complement each other. They are closely linked to the supporting policy mix which is discussed in step 2 - Strategy.

The legal regulation ensures that compliance is checked during the building process. Tools include:

- Review of plans at design stage (usually in place);
- Inspection at construction site (costly, but strongly recommended even if only for a small random sample);
- EE building (performance or compliance) checks as part of the occupancy permitting process.
- Certified EEBC architects

Supporting compliance measures include financial support and penalties, such as:

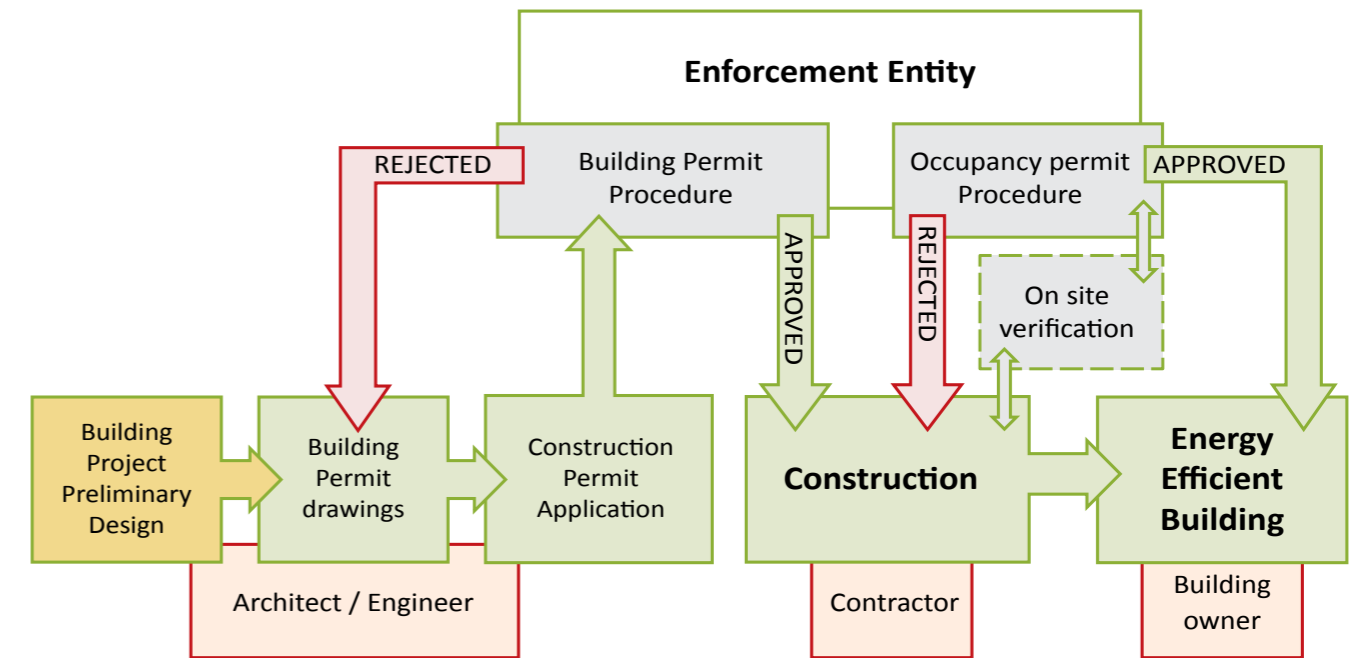
- Rejecting building and/or occupancy permits, are opportunities to integrate EE into existing enforcement structures.
- Non-compliance is to be fined or certification to be withdrawn
- VAT exemptions or tax credits function as temporary, positive incentives.

Table 3: Different actors can be in charge of the EEBC enforcement ^x

	State agency	Third party	Self-certification
Characteristics	- Government agency / local authority responsible for review of plans+ on-site inspections; - Issues building and occupancy permits	- A (Private) third party is responsible for (partial) reviewing and/or inspection (usually some sample checks by govt.)	Builder/architects provide compliance statement to owner/government (some sample checks of statements by govt.)
Input needed	Trained public sector staff	Trained and certified third party staff	Budget for site supervision, knowledgeable builders and owners; energy labels and building certificates
Costs	Medium – covered by the state and project owner	Higher for the project owner	Low – or not visible as it will be included in the engineers fees or construction cost
Risks	Low, provided funding for building permitting and on site verification processes is adequate. Unpredictable timeframe for approval process	Medium Quick, and clear process	High if executing and supervising parties are not regulated, lower if builder/architect is regulated in an association, Quick, and clear process
Examples	Prevailing option in the MENA region	France, Mexico, some in UK, USA	Germany

- ◀ Refer to targets and actors when developing the **enforcement strategy and choosing mechanisms**
- ◀ Include **enforcement** into the design of new policies and measures
- ◀ Combine incentives with **enforcement**
- ◀ Formulate binding legal requirements to strengthen **enforcement** and relate penalties intelligently

Figure 7: the simplified EEBC enforcement process: two checks to verify compliance



Information related to specific actions creates insights and knowledge, and helps to reduce complexity and increase awareness: These activities can be officially promoted, supported or even required but do not necessarily have to be paid by the government.

- Checklists, software tools, trainings etc. support professionals to keep up with new regulations and technology development;
- Certificates and ratings systems inform building owners and professionals and raise awareness for saving potential. Several countries use certificates of compliance of energy efficiency requirements for new buildings, including many European countries, Japan and Australia.

Permitting ensures EEBC compliance. The permitting process needs to be simple and clear, see Figure 7, to avoid confusion and in order to limit costs for both the administration and the building owners. Including the EEBC enforcement in the general building permitting process avoids additional costs for paperwork. It also helps to integrate EE with other building elements such as safety, which creates economic efficiency. In addition, transparent and fair procedures for compliance assessment through

clearly outlined enforcement methods (e.g. frequency and scope of checks) support acceptance of such schemes. Since the certification is based on the monitoring process, data on occasions of non-compliance can already be gathered (see step 5 - Evaluation).

Who is in charge of enforcement actions?

Lebanon plans to grant an increased built up floor area to building projects which comply with the ambitious green building code. (more details on page 21). According to the European Directive on Energy Performance, all new buildings must be certified by an independent expert. In Portugal and Denmark the building's energy efficiency must be declared before the building is constructed. This can be done by the architect or the contractor. After construction, a certificate is to be issued by independent consultants including a review of the self declaration. If the building fails to comply with the regulations, the use of the occupancy permit needed to use the building can be rejected, until an adequate efficiency level is accomplished.

Data gathering for the evaluation can be facilitated by collecting **energy certificates** centrally ▶

5. Evaluation

Regular evaluation of the policies helps to identify success factors and ineffective elements.

The evaluation of the EEBC achievements needs to take place regularly (every 3-4 years). The results of the evaluation need to be compared to the set targets. Based on the evaluation's outcome ineffective parts are to be adjusted, or going through the policy design cycle again.

Collect DATA – to manage is to measure

The following some key steps help to set up the monitoring process:

1. Look for existing studies concerning the building stock, building codes etc., review them and build upon their findings
2. Conduct a compliance survey
 - I. Potential target respondents:
 - Code officials
 - Contractors
 - II. Potential subjects for the interview
 - Enforcement practices (awareness of)
 - Perceived Barriers
 - Potential solutions and current best practice
 - III. Potential means
 - Telephone interview
 - Online questionnaire
 - Targeted mailing
3. Evaluate enforcement results (e.g. building permits and on-site inspection reports if available)
4. Consider the local conditions – what is a typical challenge in local construction and how has it been dealt with in the EEBC case?

Assign an independent institution for the evaluation process

To ensure neutrality, an independent institution, which is not in charge of any other policy cycle steps, should monitor the evaluation process.

Ensure that all necessary data is available; create communication channels between verification and evaluation entities for data sharing.

Evaluate and REPORT – inform to take action

Regular reporting

A summary of the findings should be submitted regularly (e.g. half yearly) to the government institution in charge. Only well-informed governments can adjust policies. This



can be done by going over the entire EEBC Roadmap again.

Change / amend policies according to results

Already at earlier stages it should be ensured that policies can be changed and reviewed according to the evaluation results.

Policy evaluation

Tunisia has commissioned research on energy auditing of the building sector. The results can be used for monitoring the EEBC process (see p.19 for further information).

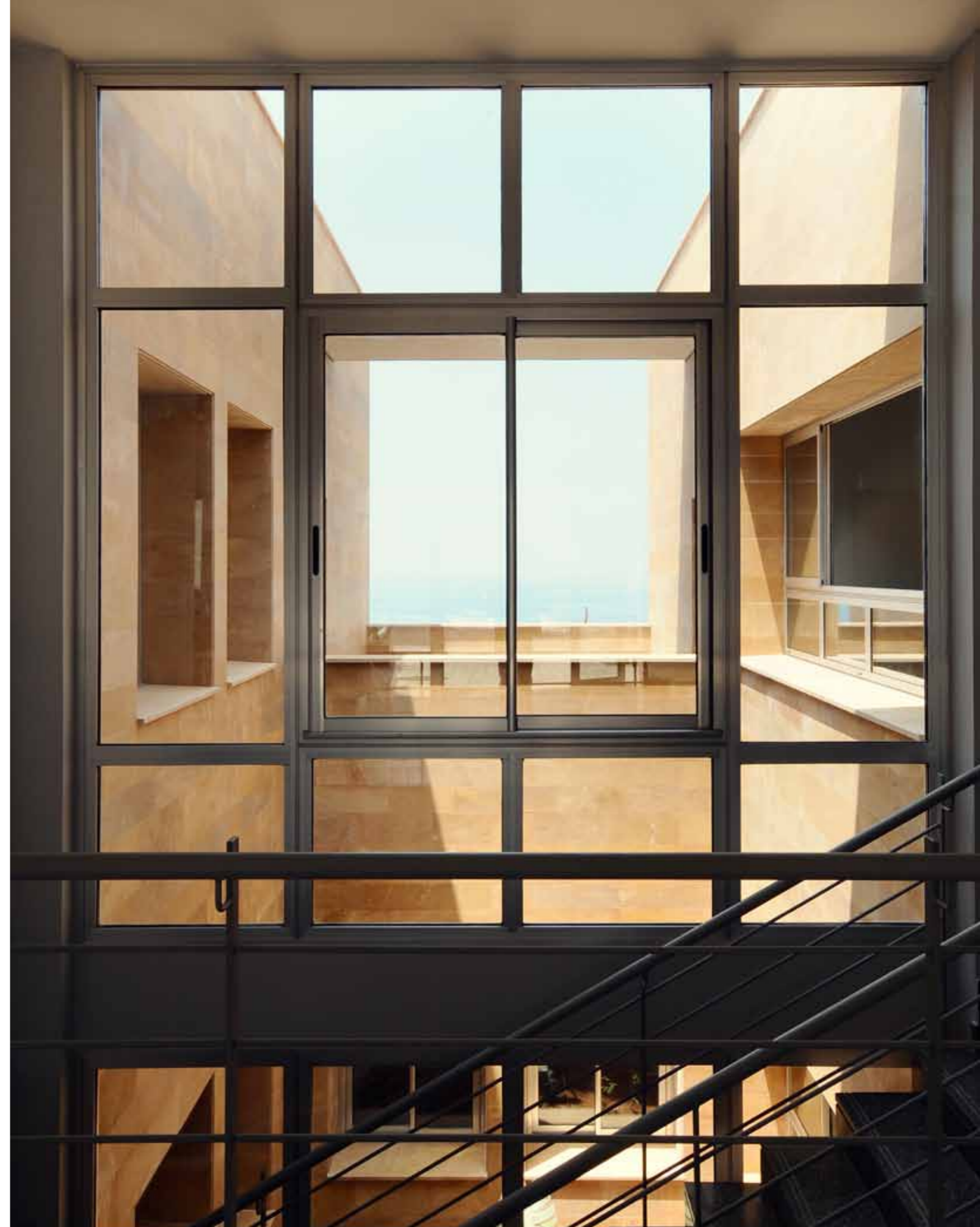


Evaluation of EEBC is needed for future upgrading of energy performance of buildings

This is not the end of the EEBC Roadmap as it is a cycle, thus the process starts over again.

And since it is a flexible process, some action still might need to be done.

- ◀ Build upon expert input for **data** collecting
- ▶ Use existing institutional structures for **data** gathering
- ▶ Create an independent institution in charge of the **evaluation**
- ▶ Make the legal set-up flexible to allow for changes after the **evaluation**
- ▶ Use energy certificates as input for data gathering



Lebanon: Qobbeh Educational Complex, Dar al Aytan al Islamiya, Khaldeh Built 2012

The courtyard in the administration building which includes following energy efficiency measures:

Massing and orientation, Shading strategies, Natural ventilation,
Envelope components, Natural daylight, Climatic buffer zones.

Architects: Maha Nasrallah and Prime Design

Where are we moving on the roadmap?

The first steps are taken: EEBCs are available

Most countries have already established the first steps and an existing EEBC. The roadmap helps to identify the remaining gaps. Learning from the experience of neighbouring countries can help to fill those gaps.

The implementation of the EEBC (step 3) shows gaps in the political and institutional framework. The enforcement seems to be the core challenge in the region. Opportunities to improve the enforcement process include enhancing existing structures (e.g. adding EE requirements to the building permitting process) or developing a specific EEBC enforcement strategy, targeted at the local barriers and needs.

Finally, monitoring and evaluation (step 5) has hardly been addressed so far and collecting reliable data for the evaluation will be one of the next steps.

Best practice examples from the region^{x1}

MED-ENE facilitates the interaction between different partner countries to support the exchange of new ideas and solutions to local challenges.

Step 1 – Palestine has developed specific targets for an EEBC as part of the NEEAP

Palestine has adopted a National Energy Efficiency Action Plan (NEEAP) in March 2012. It specifies the target to achieve cumulative energy savings of 426 GWh or 5% by 2020. The main target is also broken down to sub-targets for the near future (1% or 54 GWh savings 2012-2014).

Step 2 - Egypt has set up mandatory building codes

Egypt aims to reduce the national electricity consumption by 20% by 2020. Two building codes were announced by ministerial decree (residential buildings, 2005 and commercial buildings, 2009). The Ministry of Housing is

in charge of the EEBC. Various stakeholders are involved in the process, including the Housing & Building National Research Center (HBRC), the New Urban Communities Authority (NUCA), the Supreme Energy Council and the Ministry of Energy. They cover governmental institutions and legal and private sector entities.

Step 3 –Jordan has created a national building code council following the LAS recommendations

An independent institution, the Jordanian National Building Council (JNBC), has been created with the aim of modernizing the existing regulation of the construction sector. The council verifies and approves the building codes and issues instructions on EE design and execution, among other tasks.

Step 4 – Lebanon included EE requirements in the building sites criteria

Lebanon included the enforcement of their green building code with the existing land-use building permitting system. Building plans that comply with the ambitious code (which is not yet adopted) will be granted a higher investment factor (25% horizontal increase for buildings with 4 floors or less, and an additional floor for buildings with more than 4 floors).

Step 5 – Tunisia is developing a monitoring process including specific data collection

The Tunisian National Agency for Energy Management (ANME) commissioned an assessment of energy auditing of the building sector ('Audit sur Plan'). This report provides recommendations for the first steps towards monitoring building energy efficiency performance and measures and feeding the findings back into the policy process. ANME is processing these recommendations to improve energy auditing in the building sector.

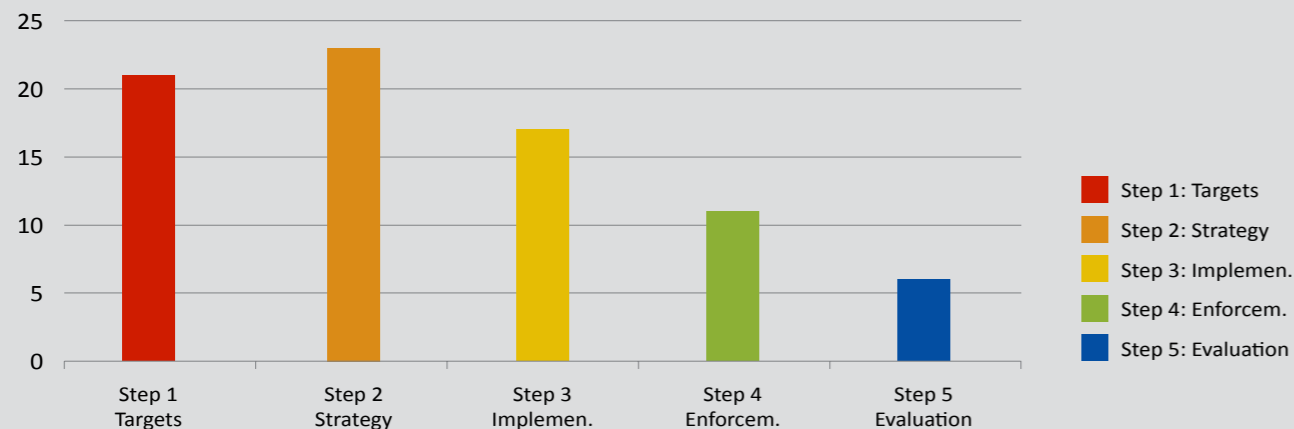
Progress in the region so far

Figure 8 illustrates the progress made so far, based on the input given by the participants of the MED-ENE EEBC workshop held in April 2013, in Tunis.

The step where most progress has been made gets 5 points, the next 4 and so on. The figure shows the cumulated results for all countries that participated.. The figure shows that almost all countries have defined their targets (step 1) and developed a strategy (step 2) but enforcement and evaluation still need to progress.

Figure 8: The first steps are made, still enforcement and evaluation lag behind.

Most progress has been made in the first steps: targets and strategies



Source: MED-ENE EEBC Roadmap workshop, April 2013



The government sets an example by implementing energy efficient in Embassy of the Kingdom of the Netherlands in Amman, Jordan, Architect Rudy Uytenhaak

WHAT'S NEXT on the roadmap?

Each partner country has its own path to energy efficient buildings. Hence, the next steps also differ in each country, from specifying targets to disseminating the positive experiences in urban areas to the rural countryside. Below are examples of selected MED-ENEC partner countries illustrating the next steps to move forward.

Egypt

Egypt's EEBC is approved and will be reviewed every 5 years. With the legal framework in place, Egypt now plans to consolidate the cooperation between institutions and secure enforcement of the EE building code. The current key challenge is the enforcement mechanism, which is not yet operational.

Jordan

The government of Jordan endorsed the Energy Saving Building Code in 2012 and installed a special Building Code Institution, which follows the Arab Building Code Guidelines of the League of the Arab States. Now the focus is on the enforcement of the building code in general and specifically for the on-site verification of the energy saving measures and solar water heater building code.

Furthermore, awareness raising and capacity building are under development to inform the public and professionals.

Lebanon

Lebanon is currently developing the decree that will include the Thermal Technical Standards in addition to other energy efficiency and green building criteria in an official green building code. Once the decree is finalised and approved, training of the administration and professionals will be tackled to improve awareness and ensure the implementation of the code. The development of a strategy to monitor and evaluate the EEBC shall identify how to use existing institutions and procedures in order to structure the process more effectively.

Morocco

Morocco currently considers financial incentives as an important addition to the technical standards set in the EEBC. The incentives shall increase the willingness to comply with the code, which is not yet mandatory. Supporting policies could, for example, build upon international funding. Morocco also plans to set up a reliable enforcement and evaluation system.

Figure 10: The main focus in the MENA-countries: Enforcement and Implementation



Palestine

Following the EEBC measure of their NEEAP, Palestine is currently developing Technical Standards and an EEBC Action Plan. This action plan includes priorities to be tackled first. Also budgets are allocated for specific activities and measures, according to the priorities.

Also in Palestine, the development of an enforcement strategy and selection of enforcement mechanisms for EE buildings is a priority.

Tunisia

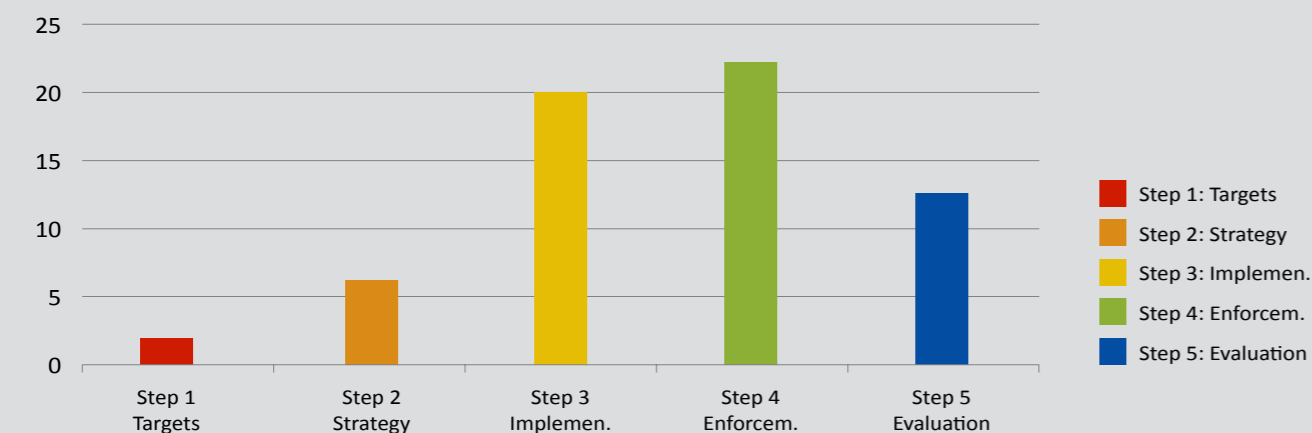
Tunisia has developed an EEBC that includes a performance-based component (heating and cooling load) which is mandatory for building projects larger than 1000 m². The challenge now, is to implement the standards in rural areas. The enforcement of the EEBC is a priority in the implementation process. With most operational elements in place, the next step is to develop specific data gathering methods and thus improve monitoring and evaluation.

Priorities for next steps

In most MED-ENEC countries enforcement is considered as most urgent and challenging, see Figure 9 below. The bars in the chart below represent the cumulated priority assigned to each step during the MED-ENEC EEBC workshop held in April 2013, in Tunis. 5 points go to each countries first priority, the second got 4 points and so on.

Figure 9: EEBC enforcement and implementation: the most urgent issues.

Priorities next steps



Source: MED-ENEC EEBC Roadmap workshop, April 2013



Focus on enforcement is needed to ensure execution of energy efficiency building codes

RECOMMENDATIONS for moving on

The recommendations in this brochure are based on the challenges faced by many countries, as well as on the lessons learned from the region's good practice examples.

- 1. Commit!** Assign a budget for long term EE policy development and implementation (high level/ e.g. parliament if applicable). Engage high ranking officials, to show the public that EEBC is a serious business.
- 2. Enforce!** Ensure that the policies get to the construction site, using carrots and sticks, through financial incentives as well as strict permitting and inspections. Go on site and ensure that the code is complied with.
- 3. Take action!** Ensure that words are followed by action through implementation and enforcement of the relevant laws. This will make stringent enforcement visible to the public and demonstrate that this issue is taken seriously
- 4. Look at the big picture!** Take a holistic approach to energy efficiency building codes. This will help to avoid having a law with no effect. A simple regulation is not sufficient and will hardly produce the desired effects. Tackling all five steps of the EE BC Roadmap helps to

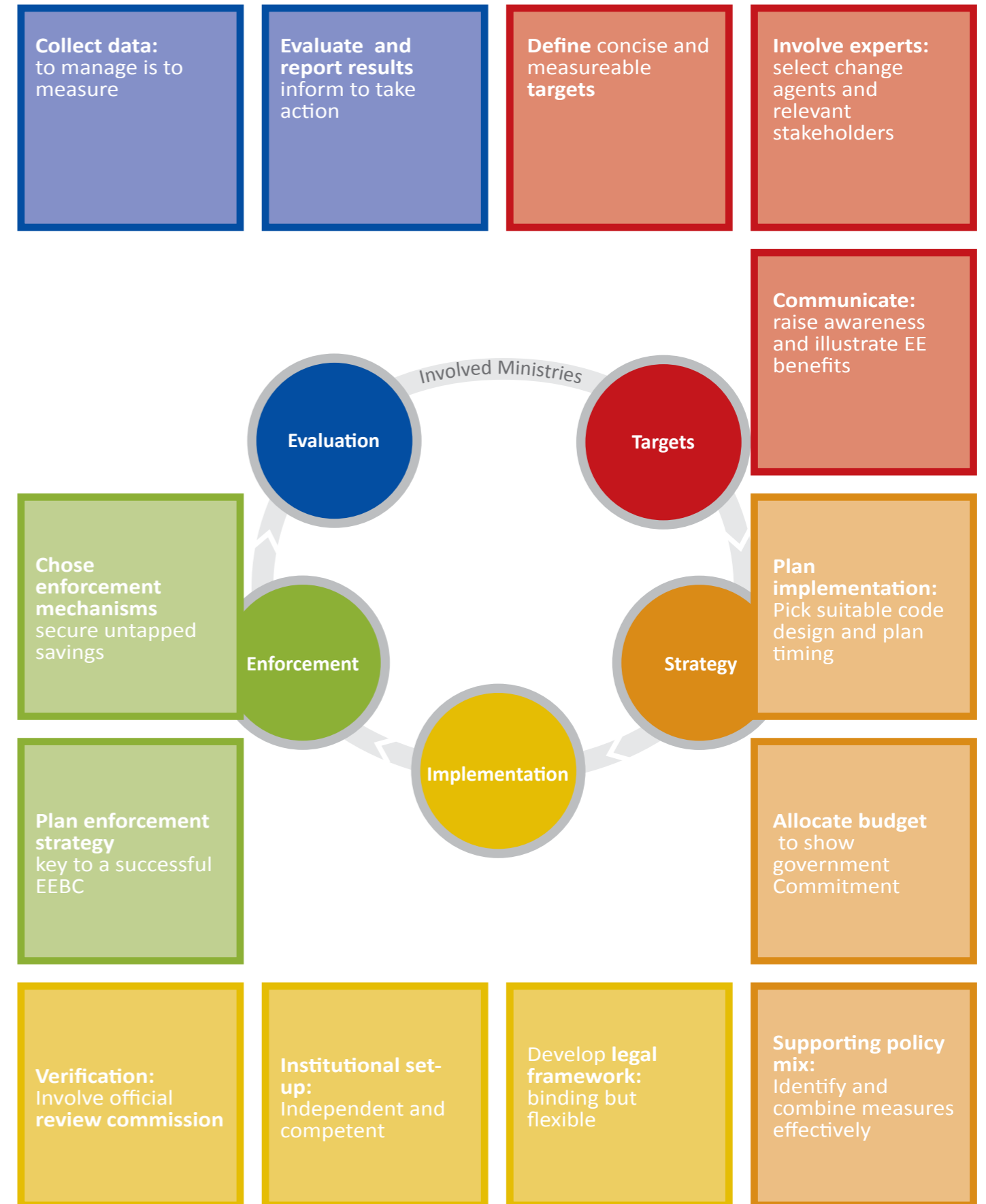
create the necessary framework for effective energy efficient buildings.

- 5. Involve!** Include stakeholders early on and throughout the policy design process to ensure public acceptance. This will keep the policy development rooted on the ground, and ensures that it fits its purpose.
- 6. Communicate!** Share the benefits (economic and other) with everyone, explain the individual advantages and illustrate that energy efficiency generates financial savings and more comfort, not less. Trainings raise awareness and increase implementation, due to knowledgeable officials, architects and builders.
- 7. See what you have!** Often existing structures can be used cost-effectively, instead of creating new institutions. Also, experience from the construction sector is valuable: the EEBC implementation and enforcement is not starting from scratch.
- 8. Make your own country's specific EEBC Roadmap!** This brochure includes a 'card game' to develop an EEBC roadmap that addresses specific country needs. See below for instructions .



Constructive discussions at the Arab Energy Efficiency Day at the League of Arab States, May 21, 2013

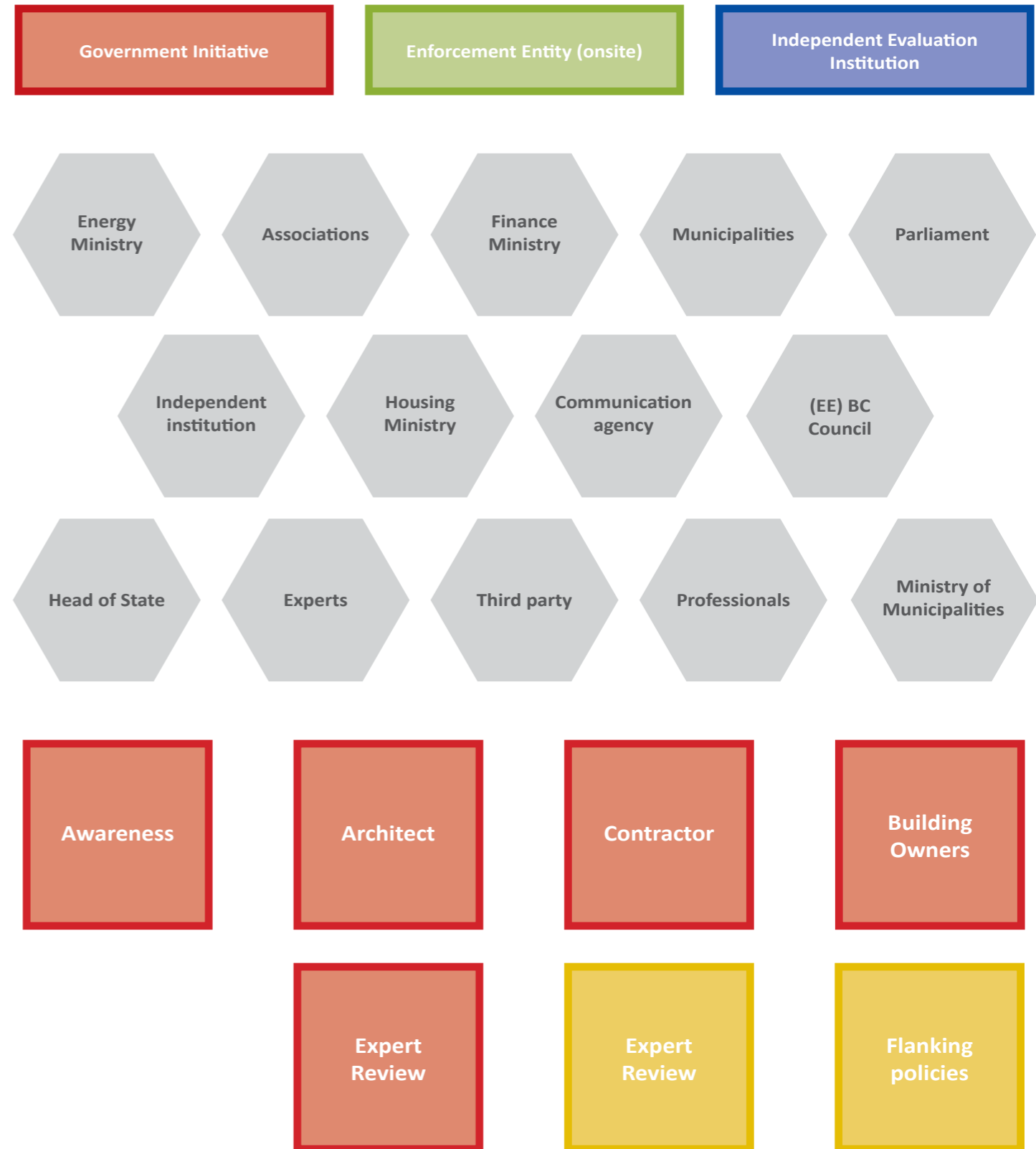
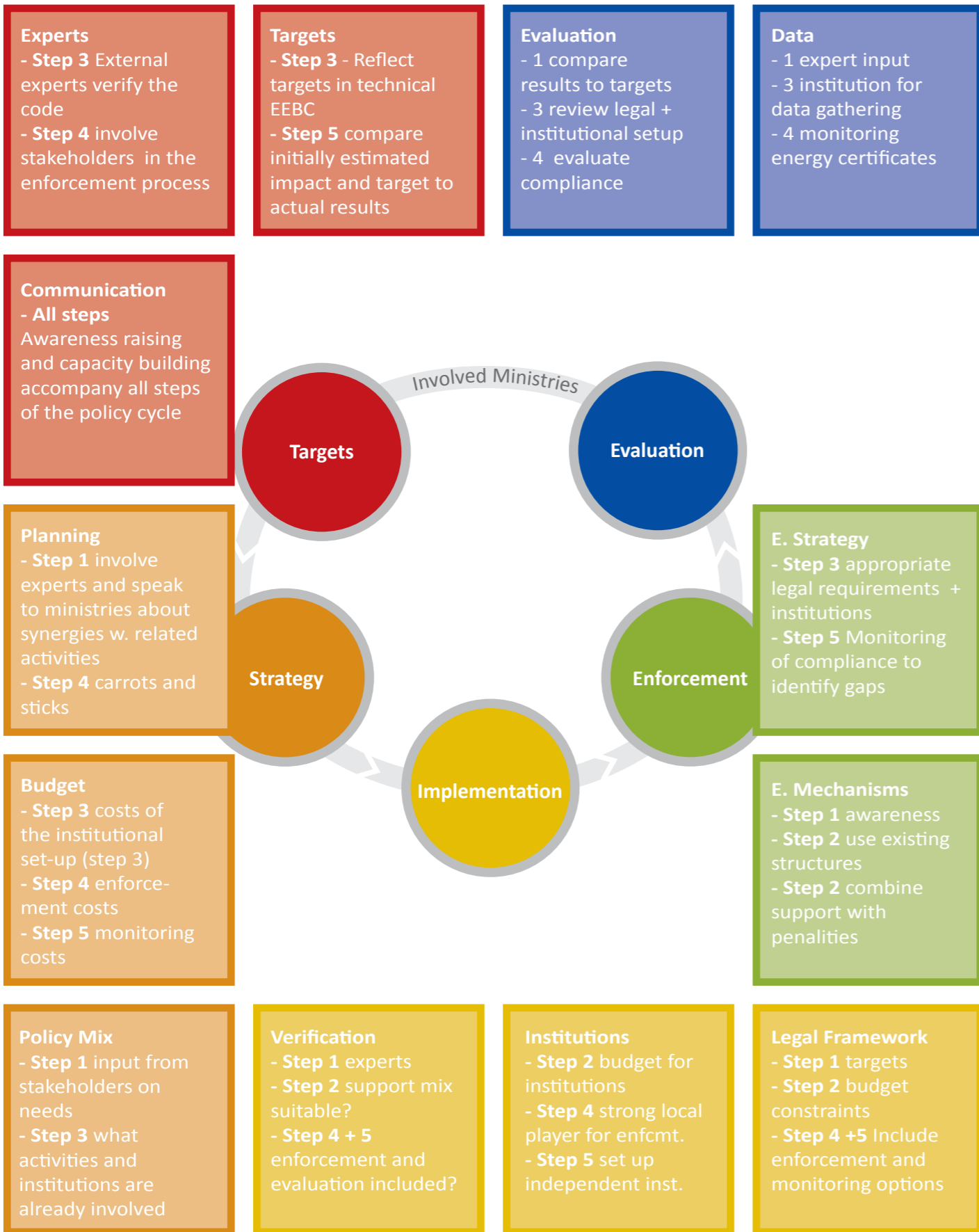
Make your own Roadmap



EEBC Road Mapping

- Take out all policy activities (coloured side up) and sort them into
 - Activities already finished
 - Activities in progress
 - Activities not yet started

- Spread the cards a) and b) on the table and try to bring them into a roughly chronological order
- Once all activities are spread out, have a look at the institutions provided on the next page.
 - > Which institutions do you have, or can be added on the empty cards?

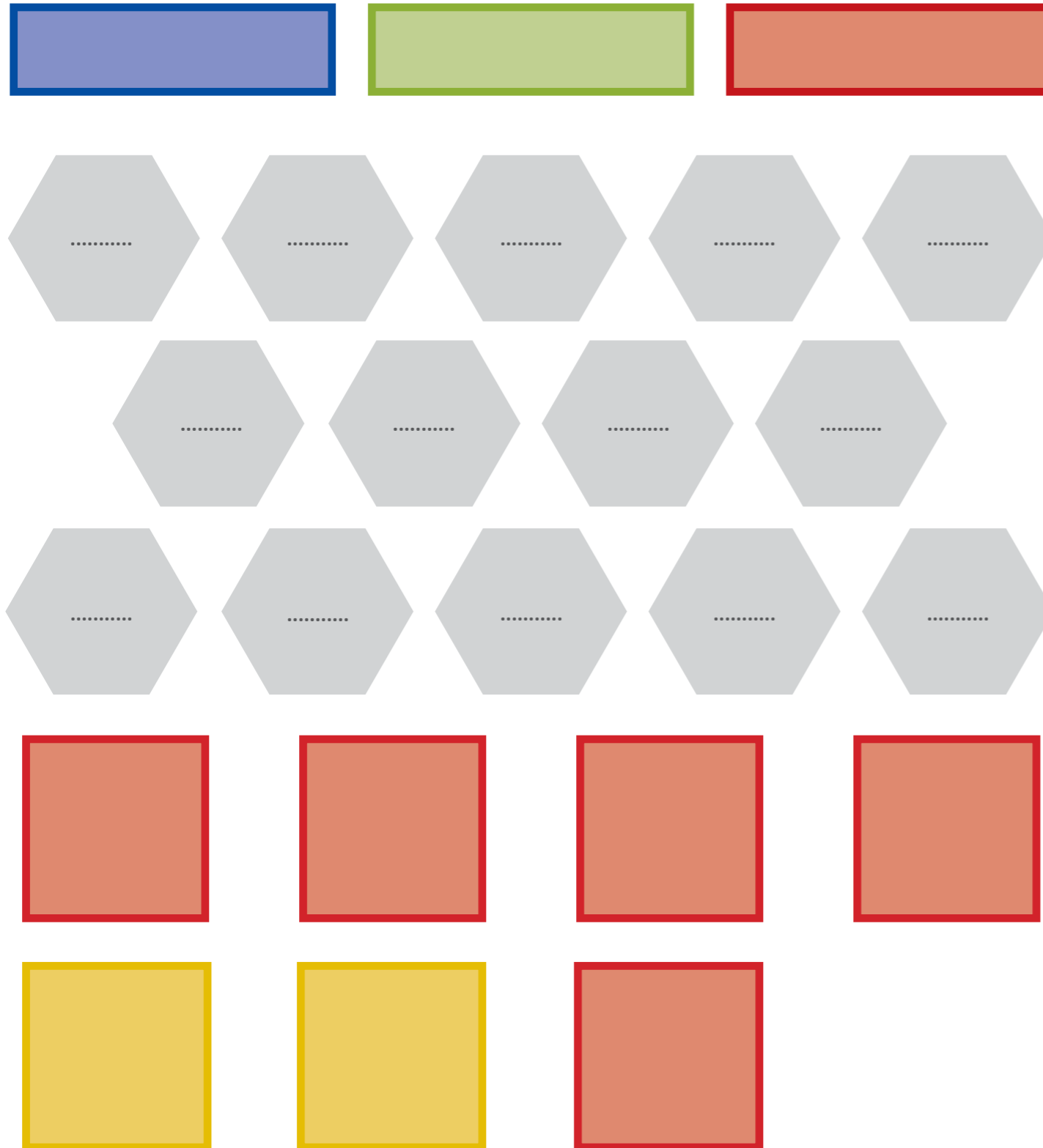


- Match the institutions with the tasks they are responsible for by adding the institution-cards to the action-cards.
- Once all activities and responsible institutions are mapped out, decide which the steps, or activities are not yet tackled.

- Turn the cards around and have a look with which actions this might have synergies. Plan whether you can take action by linking the not-yet-started ones to actions already being tackled and their corresponding institutions.

> We hope you got some new ideas on what to tackle next and how?

Policy Makers Checklist



Section	Action	Details	Achieved?
POLICY MAKERS' CHECKLIST 1: Target Setting Milestones			
1.1	Define targets	Concise and measureable targets based on the local circumstances such as climate and infrastructure.	<input type="checkbox"/>
1.2	Pool of experts / change agents	Government identifies experts and committed stakeholders for reviewing, communicating, validating etc.	<input type="checkbox"/>
1.3	Communicate	Raise awareness for efficiency, indicating win-win potential of energy saving measures.	<input type="checkbox"/>
POLICY MAKERS' CHECKLIST 2: Strategy Milestones			
2.1	Plan implementation	Decide on code type and intelligent timing.	<input type="checkbox"/>
2.2	Budget	- Realistic budget, acceptable for majority of politicians, departments and public; - Specify the budget early on and allocate a specific budget to each planned activity of the EE BC Roadmap.	<input type="checkbox"/>
2.3	Policy Mix	Combined supporting measures, also beyond BC itself, are necessary to set targets.	<input type="checkbox"/>
POLICY MAKERS' CHECKLIST 3: Implementation Milestones			
3.1	Institutions	- Set up an independent (EE) BC entity; - Allocate specific responsibilities to relevant departments & specialists; - Build a network between all actors; - Chose method of awareness building.	<input type="checkbox"/>
3.2	Legal framework	- Chose format which is easily amendable and approvable; - Pick combination of carrot & stick measures;	<input type="checkbox"/>
3.3	Verification	Expert review and communication with all entities, involved in implementation and execution.	<input type="checkbox"/>
POLICY MAKERS' CHECKLIST 4: Enforcement Milestones			
4.1	Enforcement strategy	Plan which entity will enforce what and how – use existing structures.	<input type="checkbox"/>
4.2	Enforcement mechanisms	Use a smart mix of different enforcement actions from permitting to training.	<input type="checkbox"/>
POLICY MAKERS' CHECKLIST 5: Evaluation Milestones			
5	Evaluation	- Assign an independent entity for objective data gathering; - Evaluate compliance, energy consumptions and also spin-off effects like jobs creation etc.; - Take lessons learned from evaluation results and update policies accordingly.	<input type="checkbox"/>

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www.med-enec.eu/sites/default/files/user_files/downloads/MED_ENEC_EEBC%20Road%20Map%20Draft%20October%202012.pdf
- V WBSCD, World Business Council for Sustainable Development (2008)
- VI More information and the full text of the European Energy Performance of Buildings Directive (2010/31/EU) can be found at: http://ec.europa.eu/energy/efficiency/buildings/buildings_en.htm
- VII AID-EE Project commissioned by the European Union. Project website with the agenda and results: <http://www.aid-ee.org/>
- VIII Full MED-ENEC roadmap study available at <http://www.med-enec.com/ar/news/med-enec-develops-roadmap-energy-efficiency-building-code>
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List of Abbreviations

ANME	Tunisian National Agency for Energy Management
BC	Building Code
EC	European Commission
ECCP	European Climate Change Programme
EE	Energy Efficiency (measures)
EEBC	Energy Efficiency Building Code
ENPI	The European Neighbourhood Partnership Instrument
EPBD	Energy Performance of Buildings Directive
EU	European Union
GHG	Greenhouse Gas
KE	MED-ENEC Key Expert
LAS	League of Arab States
MED-ENEC	Energy Efficiency in the Construction Sector in the Mediterranean
MENA	Middle East and North Africa
NEEAP	National Energy Efficiency Action Plan
NGO	Non-governmental organisation
OECD	Organisation for Economic Cooperation and Development
R&D	Research and development
RE	(use of) Renewable Energy
VAT	Value Added Tax

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Authors:

Florentine Visser, Key Expert MED-ENEC
Caterina Salb, Policy Expert, Ecofys
Dr. Kurt Wiesegart, Team Leader MED-ENEC
Riadh Bhar, Building Expert, Ecofys

Layout design:

Rabab Kandil, Marwa Mahmoud, Integrity - Cairo, Egypt

Contact: MED-ENEC II Project Office
7 Tag El-Din El-Soubky Street, 11631
Heliopolis, Cairo, Egypt
Email: info@med-enec.eu
Phone: (+20 2) 24 18 15 78/9 (Ext.108)

Consortium Partners:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, ECOFYS Germany
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