Stakeholder Report: Egypt

IKI Project: Accelerating 0-emission building sector ambitions in the MENA region (BUILD_ME)

Prepared on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety under the International Climate Initiative

By:
Navigant, A Guidehouse Company (formerly Ecofys)
Albrechtsstr. 10c
10117 Berlin

T +49 30 7262 1410
guidehouse.com

in cooperation with IDG and HBRC

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This report summarises the results stakeholder interviews and roundtables conducted during the first phase of this project from 2016 to 2018. Any developments after this date are not reflected in this report. Also, some of the results presented in this report reflect the views of individuals interviewed in the course of the project and may therefore not reflect the position of Navigant, it's partners or the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

[1] On October 11, 2019, Guidehouse LLP completed its previously announced acquisition of Navigant Consulting Inc. In the months ahead, we will be working to integrate the Guidehouse and Navigant businesses. In furtherance of that effort, we recently renamed Navigant Consulting Inc. as Guidehouse Inc.

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OVERVIEW

Context: IDG and Navigant, project partners within the IKI Project Accelerating 0-emission building sector ambitions in the MENA region project known as BUILD_ME have conducted hundreds of interviews whether in person or via phone and organised stakeholder roundtables to assess drivers and barriers for efficient heating and cooling in residential buildings in Egypt. A similar approach was used in Lebanon and Jordan, for which stakeholder reports are also available.

Aim: The aim of the interviews and interaction with stakeholders at roundtables was to

- Assess barriers for the uptake of efficient and/or renewable energy-based cooling and heating technologies in residential buildings;
- Evaluate what role different stakeholder groups play in the decision process;
- Collect recommendations on how the financial and regulatory framework should be changed to incentivise homeowners and developers to choose efficient heating and cooling appliances rather than conventional ones.

Measures to unlock energy efficiency potential in new residential buildings in Egypt

This report presents policy recommendations to unlock rapidly the potential of accelerating energy efficiency in new residential buildings in Egypt. The recommendations are based on interviews with key stakeholders and roundtable workshops carried out in Egypt in 2017 and 2018 allowing all key stakeholder groups to provide inputs.

Project Developers

i. The public sector should lead a national initiative with pilot projects adopting energy efficiency policies, approaches and solutions as to increase national ambition on energy efficiency targets
ii. Create a regulatory framework to offer incentives for project developers applying the building code and implement energy efficiency and renewable energies solutions
iii. Develop a new local building rating system and mandate its use for all new buildings starting from large-scale developers to the smallest scale developments
iv. Simplify the energy efficiency code in check list format and strengthen its enforcement system by linking it to granting permits

Banks

i. Disseminate best practices of international financing organisations active in Egypt
ii. Disseminate best practice of MENA countries, as well as European countries, that have established an energy efficiency fund
iii. Establish an energy efficiency fund to support credit guarantees and pilot project in the field of energy efficiency in residential sector
iv. Create a regulatory framework for commercial banks to offer credit lines with low interest rates to citizens investing in new buildings certified by the new building rating system and manufacturers investing in capacities to increase efficiency of their heating and cooling equipment
v. Capacity training for bankers in understanding the context and business opportunities of energy efficiency lending in order to create innovative banking products and reduce lending risk

Public Authorities

i. Cross cutting national awareness campaigns on all levels from school to universities, engineers, contractors, designers, bankers and investors, municipalities and ministerial representatives regarding the phase out of energy subsidies and the improved benefits of energy efficiency in the building sector
ii. Implement integrated pilot projects in residential buildings and raise awareness on the results of project
iii. Mandatory certification of engineers to the Egyptian energy efficiency building code
iv. Update permitting rules for new buildings with respect to the Egyptian energy efficiency building code
v. Strengthen enforcement in the construction phase of buildings, applying severe penalties to the project developer for non-compliance to the energy efficiency building code

Suppliers

i. Support local industry to increase the efficiency level of ACs
ii. Build capacity at the supplier's floor staff level on the economic and environmental benefits of energy efficient technologies

1. PROJECT BACKGROUND

The MENA region, for most aspects excluding the Gulf countries, is characterised by three important energy challenges, to which energy efficiency in buildings can be an important part of a response:

- Insufficient electricity generation capacities lagging behind demand growth due to a growing population, rising living standards, and a lack of adequate forecasting and planning by governments;
- High dependence on fossil fuels resulting in economies exposed to the price volatility of fossil fuels, be it as an exporter or importer;
- High emission factor of electricity production despite considerable renewable resource potential.

In light of these challenges and the Paris Agreement, the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has decided to finance the two-year project “Accelerating 0-emission building sector ambitions in the MENA region”. The project focuses on improving the energy efficiency of buildings through the uptake of highly energy efficient and/or renewable energy-based heating and cooling systems in new multi-family residential buildings.

In the first phase of the project three target countries out of six were selected for the implementation of project-specific measures, namely Lebanon, Jordan and Egypt. A macroeconomic base analysis served as a foundation for the selection of the target countries. The macroeconomic analysis examined the most relevant parameters pertaining to the economic and legal framework in these countries, as well as other aspects influencing the implementation of energy efficiency measures in the building sector. The target countries were those in which the framework conditions promise the greatest possible success for the implementation of the project objectives.

Phase II of the project focused on the implementation of project activities in the target countries by providing support for the implementation of pilot projects and facilitating a policy dialogue for improving energy efficiency policies and accelerating the uptake of energy efficiency measures in the building sector.

This report summarises project findings for key stakeholder groups and lay down policy recommendations for accelerating energy efficiency in buildings in Egypt. These recommendations have been derived from a round of 144 interviews with key stakeholders including suppliers, 500 representative surveys with local residents and two roundtable workshops conducted in Egypt with relevant stakeholders in 2017 and 2018 from the following groups:

- Project developers, including architects and engineers;
- Banks, including national funds;
- Ministries, including national research centres and municipalities;
- Utilities, including grid operators;
- Technology suppliers.

2. THE ROLE OF ENERGY EFFICIENCY IN BUILDINGS IN EGYPT

2.1 State of the electricity sector – an impediment to a stable and growing economy

The electricity sector in Egypt faces numerous challenges. Being historically heavily subsidised to justify a mean to ensure affordable energy services to lower income households, Egypt has not succeeded to expand generation and transmission capacity to cope with the rising power demand. Facing shortages in domestic gas production, an old power system infrastructure and social unrest, electricity blackouts became frequent in 2011, impeding the government to reform the sector. At last, due to a combination of high oil prices and low currency exchange, energy subsidies peaked at 150 billion LE in 2013, surpassing the combined expenditures of the government on health and education and accounting for more than 70% of all subsidies, 22% of the government budget and 7% of GDP[2].

With growing fiscal pressure, in 2014 the government embarked on a reform plan to gradually eliminate energy subsidies over the course of 5 years, which was extended till the year 2022. In addition, it issued the new Electricity law N.87 in 2015 to boost the liberalisation process of its power sector and strengthen the sector commercial orientation to attract international investors. Both measures did lead to a reduction of energy subsidies in the following years, coupled with record-low international oil prices. In fact, energy subsidies were divided by two compared to 2014. However, the sudden devaluation of the Egyptian pound in 2017 brought back energy subsidies to their all-time high in 2013. Taking an average from 2010 to 2017, the Egyptian government spent LE 25 billion per year to subsidise its electricity sector[3]. If energy subsidies are calculated on the basis of a full economic cost, from supply to distribution, the resulting number will be as high as LE 58 billion per year spent on electricity subsidies2 – equivalent to 3 % of its average GDP from 2010 to 2017[4].

2.2 Energy Efficiency in residential buildings – an untapped potential to reduce subsidies

The residential sector consumes 52% of the electricity generated and with the potential of increasing energy efficiency in buildings to reduce energy consumption by 60% compared to the status quo in a period of ten years, up to LE 14 billion per year could be saved if a nation-wide residential building retrofit strategy is implemented, facilitating energy subsidy cuts. International experience shows that the first step for a successful energy efficiency strategy in buildings is to focus on accelerating energy efficiency in new residential buildings. Given Egypt's high new construction rate (5% per year) and average occupancy ratio of 50% of new buildings[5], tackling energy efficiency in new residential building construction can potentially save LE 0.6 billion per year[6], cutting down energy subsidies by 1.5%.

[2] Energy Subsidy Reform Technical Assistance Facility for Egypt – *World Bank, 2017*

[3] Navigant own calculation based on extrapolation of the ratio of electricity subsidies vs energy subsidies in Reforming Energy Subsidies in Egypt, *African Development Bank, 2012*

[4] Navigant own calculation based on GDP and Currency exchange data obtained from Egypt Arab Republic Data, *World Bank, 2016*

[5] Based on IDG market expertise. The assumptions target new buildings that are not older than five years.

[6] Navigant own calculation based on energy efficiency potential in buildings, current consumption of residential buildings in Egypt, current economic losses of the electricity sector in Egypt. The number reflects savings assuming that all new buildings are built in a BAU approach.

3. STAKEHOLDER: PROJECT DEVELOPERS

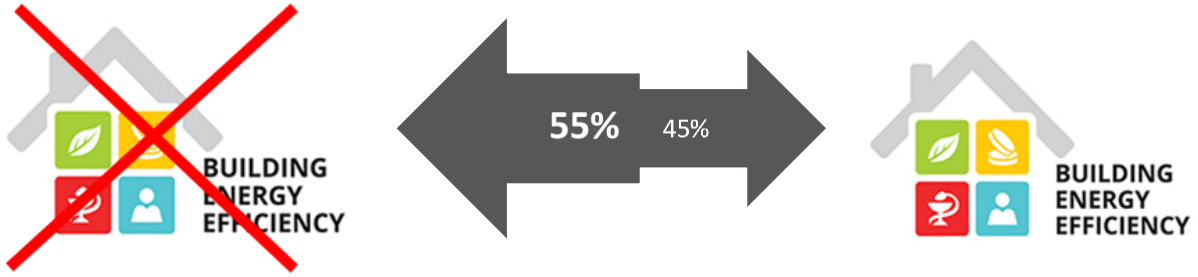
3.1 Context: Whom did we interview?

Seventeen interviewees comprising of project developers, engineers and architects were interviewed in Egypt to gather their views on the drivers and barriers to accelerate energy efficiency in the residential building sector. The interviewees represented different scales of residential buildings developments; the large-scale development projects of areas up to 500 acres, the intermediate scale of up to 50 acres, and the smaller scale developments of multiple individual land lots.

3.2 Status quo: The role of project developers in the decision-making process for energy efficiency

The survey showed that almost half of project developers interviewed (46%) do consider energy efficiency in heating and cooling and energy efficiency plays a role in the design and construction of new residential buildings:

Figure 1: Share of project developers opting for energy efficient designs in their residential projects (n=17)



However, the project developers interviewed served only middle-income (48%) usually in multi-family houses and high-income customers (52%) usually in single family houses. Quarter of the interviewees (25%) actually take the decision regarding heating/cooling systems in the buildings they construct (selling units as fully finished) while the remaining see it as a decision taken by the owner which they can only guide by giving recommendations about the cooling and heating options. Implementing the energy efficiency measures will add to the initial costs of selling the units whether single or multi-family. However, taking the decision for the multi-family houses is more difficult for the fear of losing their attractiveness and competitiveness in the market for the middle-income and upper-middle income groups due to the increased costs. While for the high-income, the additional costs of the systems when added to the unit price will not be a put-off as it is only a small percentage of the total construction costs (usually <10% but depending on the measures undertaken), and it also renders a number of benefits like reduction of the consumption and electricity prices over the life time as well as benefiting from the system‘s longer lifetime and less need of maintenance in comparison with the conventional inefficient systems and measures.

Economic viability assessments

The majority of the companies (around 65%) prepare cost effectiveness calculations for the systems before installing, while the rest considers that the profitability of heating and cooling is irrelevant to them. Payback period calculation (PBP) is the most commonly used method; (>58%) of the interviewees. Despite not being optimal, for them it represents the biggest

attraction for the end users who get motivated if the initial added cost will be paid back after a short period (around 4 to 6 years with a maximum payment of 10-15%) and it is also easy to explain to their clients. Less than 5% of project developer conduct Net Present Valuation (NPV) calculation, the others consider the profitability of the asset over its whole lifetime as not related to them since they do not benefit from the savings once the unit with the system is sold.

3.3 Policy recommendations: How to accelerate energy efficiency in new residential buildings, with a focus on heating and cooling?

I. Public Sector should lead national initiative with Pilot Projects adopting energy efficiency policies, approaches and solutions as to increase national ambition on energy efficiency targets.

Rationale: Currently, there is only a limited number of pilot projects adopting energy efficiency measures and they are all focusing on one of two measures either using efficient lighting units (LEDs) or implementing solar water heaters mainly in the public buildings sector. The New Urban Communities Authority (NUCA) has been leading these pilot projects in the authorities' building as well as a number of the agencies' buildings. Also, a number of buildings of the Ministry of Electricity and Renewable Energy and its affiliated authorities have adopted these measures as a showcase but only for these limited measures.

Implementation: The Ministry of Housing and the NUCA need to take the initiative of implementing pilot projects adopting a wider range of energy efficiency measures and approaches not only in public buildings but also in the residential projects they build in order to lead the market by example. There has to be focus on the measures and approaches that were not tested enough and have not gained popularity in the market. The publicity and dissemination of the outcomes of these projects is crucial for showcasing the potentiality of the measures and for learning from the experiences. Such projects could be supported by local and international organisations in the field whether through technical assistance, co-financing or complete funding.

Impact: Seeing the outcomes of such projects will have the greatest impact on reducing the uncertainty and the status quo bias of the majority of the project developers and houses owners who have an unclear idea about the feasibility of the systems and have no trust in the market, suppliers or technicians. The pilots will break this cycle and will put the measures on display for awareness and for learning by doing.

II. Create a regulatory framework to offer incentives for project developers applying the building code and implementing energy efficiency and renewable energies solutions e.g. reduction in cost of land, increase of built-up area, extra floor allowance, cross-subsidies, tax reductions, credit lines for soft loans at low interest rates.

Rationale: There is a huge gap when it comes to financial incentives and facilitations that support the adoption of energy efficiency measures in Cairo. No financial mechanisms were developed for the support of energy efficiency, they only focused on supporting renewable energies measures, accordingly the implementation rates are very low in comparison to the benefits gained. The only attempt is a regulation, currently under study, to give incentives to developers who implement energy efficiency measures in their projects in the form of a longer allowance period for their instalment payment. However, a lot more is still needed.

Implementation: Financial facilitations are needed from the banks' side to support the adoption decision of both the project developers and individual owners. It could follow a top-

down approach from the central bank and Ministry of Finance as well as the Ministry of Planning where they approve a credit line with lower interest rates and set regulations to all banks to support individuals and developers buying or building Energy efficient buildings or adopting energy efficiency measures. Another option is to follow a more bottom-up approach where the banks themselves initiate credit lines or small soft loans and subsidised financing strategies fitting the residential sector and the individuals. The incentives should differentiate the different levels of ambitions and scales of adoption ranging from the projects with the highest ambitions till the minor interventions adopted by individual owners (reflected by the certification of the rating system; recommendation II).

Impact: Through the interviews with the project developers, the need for incentives to motivate and support their adoption of energy efficiency measures became very clear. Accordingly, this policy is expected to have a huge impact on supporting the adoption of the measures that still have high costs until a competitive market is achieved and the prices start to decrease. Usually energy efficiency measures with highest NPV are the measures that save the highest energy over lifetime, however with longer paybacks they do not get chosen. If incentives exist now to push these, then engineers will choose the technologies with highest impact, eventually spreading the awareness of the potentiality of the measures and increasing adoption rates.

III. Develop a new local Building Rating System and obligate its use for all new buildings starting by large-scale developments until reaching the smallest scale.

Rationale: Currently, there is no adopted rating system suitable for the Egyptian context or contributing to the increased adoption of energy efficiency measures. The Green Building Pyramids rating system is an Egyptian rating system developed in 2011 but has not been strongly put to action and eventually faded away. LEED is the main rating systems adopted in Egypt nowadays, mainly in office and commercial buildings but is faced by severe criticism for its lack of suitability to the context and for being adopted mainly for maintaining status with doubtful impacts on the buildings' actual sustainability. Accordingly, there is no rating system that targets raising the awareness of the consumers (Units' owners) and clarifying the extent of economic benefits they get when adopting any of the energy efficiency and RE measures. Similar to the labels given to household appliances that is translated to monthly savings in energy consumption, a rating system that gives buildings a label (in the form of certification) and assign an economic value for the benefits of the building's measures is highly needed.

Implementation: The development of context-specific building rating systems is the key for a true transformation of the Egyptian building sector towards 0-emission ambitions. It should be a rating system that targets the consumers, putting a monetary value on the benefits of the energy efficiency residential units they will buy at an extra cost. The main aim of the rating system is to translate each certification level into the amount of savings gained from the reduction of energy consumption as a result of the measures implemented in the building. The development of this rating system needs to start as an initiative by the Ministry of Housing in collaboration with the Ministry of Electricity and Renewable energy. A new entity affiliated to the Ministry of Housing can be initiated to be responsible for the development of this rating system and the evaluation and certification of buildings later on. The support of local and international consultants and advisers can be requested on demand from the parties. The enforcement of the rating system could start as optional for new buildings over the course of three years to act as a transitional period preparing the market for its complete obligation afterwards with given financial incentives. The level of certification could be linked to the financial incentive received by the project developers; linking with recommendation II.

Impact: The development and obligation of this new rating system will open the way for a market of greener buildings, where it provides a justification for project developers and investors to go greener without the fear of losing the attractiveness and marketability of their units since their clients now have a transparent system of measuring and evaluating the benefits of these energy efficiency units. Such step pushes the construction market towards the adoption of a wide range of energy efficiency measures ranging from the simplest to the most complex and extravagant, where different development scales can aim at different measures with escalating levels of certifications. It also paves the way for the development of financial supporting mechanisms by having a transparent methodology for evaluating and ranking the sustainability and energy efficiency level of the development projects benefiting from the incentives

IV. Simplify energy efficiency code in check list format and strengthen its enforcement system by linking it to permits acquisition

Rationale: The first energy efficiency code was issued in Egypt twelve years ago starting with residential buildings in 2006, followed by the energy efficiency code for commercial buildings in 2009, and finally for governmental buildings in 2011. However, the adoption of these codes remained voluntary and not obligatory by any law or regulation. Therefore, the awareness of the existence of energy efficiency codes for buildings among architects and engineers working in the field is extremely limited which was proven by the conducted interviews. And for those who know about the code and its contents, they have difficulties in applying it in practice due to its complexity and lack of clear quantifiable aspects that need to be fulfilled in their newly designed buildings.

Implementation: HBRC (Housing and Building Research Center), responsible for the development of the codes, can create a committee from in-house experts and from external local experts in the field for reviewing the existing energy efficiency code and finding ways for its simplification and improvement. It is of high importance to involve practitioners and professionals in the work of the committee to develop an easy to use energy efficiency code that is in compliance with market conditions and existing technologies. Other existing or newly developed codes need to be considered such as the code for district cooling that is currently under development by HBRC as well. The obligation of the energy efficiency code has to be done by a Ministerial decree from the Ministry of Housing and issued in the official gazette. There has to be a link between the code implementation in the new projects and permits acquisition which could be coordinated between HBRC and the municipalities (mainly the districts presidency offices all over the cities districts) responsible for issuing the building permits. The code could define and obligate the minimum requirements while any extra measures taken by the owner or project developer can be rewarded via different incentives. A complementary policy to this one is capacity building and certification of engineers (recommendation IV) without which a proper implementation of the energy efficiency code becomes obsolete.

Impact: Having a code in place guiding the adoption of energy efficiency measures is crucial not only for increasing energy efficiency measures but also for ensuring high-quality practices. It also facilitates the role of the engineers and architects by having a guide to refer to, a need stressed in the interviews with them.

4. STAKEHOLDER: BANKS

4.1 Context: Whom did we interview?

Eight representations from financial institutions were interviewed, including five commercial banks and three international banks. The commercial banks interviewed are the most common banks in the country.

4.2 Status quo: Are you offering low interest loans to energy efficient projects? If yes, what triggered you to do so and how is your experience when it comes to lending money for energy efficiency measures?

The current practices of the commercial banking sector in the field of energy efficiency in Egypt could be described as insignificant. They do not offer any specific loan or grants for applying energy efficiency measures in the residential sector.

Three international banks are engaging in energy efficiency initiatives to support the industrial sector in Egypt in financing energy efficiency measures and raising awareness at university level:

- **European Bank for Reconstruction and Development (EBRD):** in 2016 EBRD initiated a new credit line in Egypt of € 140 million known as Green Economy Financing Facility (GEFF). GEFF works with QNB bank, Al Ahli bank, NBK bank and AlexBank to offer low interest loans of 3% to companies investing in energy efficiency and/or renewable energies projects in Egypt.

- **International Finance Corporation (IFC):** The IFC, which is the private sector lending arm of the World Bank Group, provides the NBK bank a loan of up to $ 50 million to increase the access to finance for SME and promote sustainable energy financing. The loan is a part of the World Bank Group's Country Partnership Framework for Egypt for 2015–2020 to increase climate-related investment.

- **KfW Bank:** The KfW finances university projects to create pilot references at local campuses. It is in process of launching credit lines to banks to target the residential sector.

4.3 Policy recommendations: How to accelerate energy efficiency in new residential buildings, with a focus on heating and cooling?

I. Disseminate best practices of international financing organisations active in Egypt in supporting local SME investing in energy efficiency and renewable energies projects

Rationale: Since their engagement in Egypt, the EBRD and IFC gained valuable experience in understanding the particularities and dynamics of the banking sector in Egypt and gathered lessons that can guide banks how to reduce risk factors of lending to local manufacturers. For example, AlexBank, QNB and NBK bank each managed funds of USD 30 million, USD 40 million, USD 30 million respectively co-financed by the EBRD. The fund is structured in four categories of loan limits depending on the type and size of project. The repayment plan is up to 5 years, depending on the loan type and project conditions. The interest rate is 3% plus Central Bank of Egypt's lending rate for EGP with a minimum of 12%. An investment grant of

10% or 15% of loan amount is available depending on loan type. The participating banks not only offer financing to clients but also technical support as well as investment grant incentives after successful completion, which is one of the most interesting features of this programme.

Implementation: The three international organisations (EBRD, EIB, IFC/World Bank) need to cooperate to organise one national workshop for commercial banks to disseminate results of their financing programme and lessons learned with dealing with local commercial banks. It is necessary to invite the Ministry of Planning, Ministry of Finance and the central bank to participate in the workshop.

Impact: Disseminating best practices of international financing organisations is a necessary pre-cursor for creating a regulatory framework in Egypt to allow commercial banks to offer low interest loans to end users investing in Energy Efficiency projects.

II. Disseminate best practice of MENA countries, as well as European countries, that have established an Energy Efficiency Fund

Rationale: Since 2005, Tunisia provides financing for energy efficiency measures via the National Fund for Energy Savings. Its revenues come from taxes on the first registration of cars as well as on import and manufacturing of air conditioners, from the savings achieved by energy efficiency activities, and from private donations. The fund subsidises measures such as energy audits, power and heat co-generation and substitution of natural gas. It also assists in meeting the minimum energy efficiency specifications for residential and administrative buildings that were set in 2008-09.

In Jordan, the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) signed agreements with local banks to finance renewable energy projects. JREEEF funds individuals and SMEs, mostly in the industrial and tourism sectors. In Lebanon, the National Energy Efficiency and Renewable Energy Action (NEEREA) a national financing mechanism was initiated by the Central Bank of Lebanon (BDL) that finances solar, wind, biomass and hydro projects in addition to energy efficiency measures and green building projects. In Egypt, no explicit energy efficiency funding mechanism exists which slows down the uptake of energy efficient projects and access to low interest funding.

Implementation: Best practices of energy efficiency funds should be disseminated at the workshop of recommendation I. All three international organisations (EBRD, EIB, IFC/World Bank) have experience in setting up and managing energy efficiency funds, e.g. World Bank in Tunisia. Additionally, representatives of JREEEF and NEEREA should present experiences. Representatives of the Central Bank of Egypt, Ministry of Planning, Ministry of Energy and Ministry of Finance as well as representatives of local commercial banks should attend the workshop.

Impact: Disseminating best practices of Energy Efficiency Fund establishment is a necessary pre-cursor for convincing high-level political representative to allocate funds to it.

III. Establish an energy efficiency fund to support credit guarantees and pilot project in the field of energy efficiency in residential sector

Rationale: There exists no fund in Egypt to support commercial banks in lending low interest loans to residents interested in purchasing an energy efficient house or to encourage project

developers, engineering firms, universities and municipalities to collaborate in building a net zero energy building using state of the art technologies and disseminating the results. The key barrier for establishing such fund is the lack of high-level political support and innovation in approaches and policies. Currently, energy efficiency is not prioritised by public authorities as needed. Yet the government misses the opportunity to realise that the cost to benefits ratio of savings 1 kWh of energy outweighs the cost to benefits ratio of subsidising 1 kWh of generated energy.

Implementation: The central bank and Ministry of Planning as well as Ministry of Finance need to cooperate to establish the regulation for creating the fund and assigning an entity to govern the fund, e.g. “Entity to support energy efficiency”. This entity will have the authority to grant commercial banks a certain percentage of money return to the loans they provide to energy efficiency loans. By offering this money back strategy, the energy efficient loan is de-risked and this increases the willingness of banks to lend money for energy efficient projects. In addition, the entity will have an annual budget to fund pilot projects in Egypt to drive innovation and collaboration between all stakeholders.

Impact: Establishing a fund will be a key enabler for implementing the following recommendation and recommendation II of Public Authorities.

IV. Create a regulatory framework for commercial banks to offer credit lines with low interest rates to citizens investing in new buildings that have been certified by the new Building Rating system and manufacturers investing in capacities to increase efficiency of their heating and cooling equipment

Rationale: In a context of low energy prices and high interest rates, the energy efficiency market cannot be triggered without financial incentives. Yet commercial banks in Egypt have never been active in financing energy efficiency projects or services targeting the residential sectors neither did they support local manufacturers in upgrading their assembly lines and technologies to target higher efficiencies (except the recent banks who joined EBRD and IFC programmes). With the gradual phase out of energy subsidies by 2022, the business case of energy efficiency measures will change and a regulatory framework that enables commercial banks to offer low interest loans for energy efficiency applications needs to be initiated by the government.

Implementation: The Central Bank of Egypt in collaboration with the Ministry of Finance and Ministry of Planning issue a circular to commercial banks. Citizens can benefit from low interest loans to purchase energy efficient apartments under the condition that the building has been rated by a developed local rating system. The interest of the loan should be adapted to the ratings. The higher the rating (Silver -> Golden -> Green), the lower the interest on the loan. The circular address also local manufacturers who are aiming to increase the efficiency of their locally manufactured heating and cooling equipment. The efficiency levels can be compared to international benchmarks e.g. Energy Star (US) or the Energy Efficiency Labelling Scheme (EU). The interest of the loan will be tailored to the efficiency level they are targeting to reach.

Impact: Creating such a framework will directly increase market demand for energy efficient houses in the country, indirectly impacting project developers who will adapt their offering to customer demand and purchase efficient products from local manufacturers.

V. Offer training and capacity building to support bank officers in understanding the context and business opportunities of Energy Efficiency lending, with a focus on efficient heating and cooling technologies

Rationale: Because of the non-conventionality of the cash flows of an energy efficient asset, bankers do not understand how to value energy efficient solutions and considers their applications similar to normal goods, instead of depreciable assets.

Implementation: International consultants can train bankers in understanding the impact of bank loans on the value of energy efficiency measures and how to categorise these from least to highest impact with respect to financial indicators. Two initiatives have recently kicked off. One from the Arab African bank and Frankfurt School of Business "Mostadam - sustainable energy for bankers" and one by EBRD and GIZ "Basic sustainable energy knowledge for bankers" which can be taken as a guide for other initiatives.

Impact: Providing such training will improve the ability of bankers to turn energy efficiency lending into innovative banking products, reducing lending risks and opening new market segments, e.g. ESCOs

5. STAKEHOLDER: PUBLIC AUTHORITIES

5.1 Context: Whom did we interview?

This group was comprised of nineteen interviewees, affiliated to a wide range of public authorities categorised as Ministries, municipalities and Utilities. The Ministries included the Ministry of Housing and the affiliated Housing and Research Building Centre, Ministry of Electricity and Renewable Energy and the affiliated New and Renewable Energy Authority, and the Egyptian Environmental Affairs Agency affiliated to the Ministry of Environment and Ministry of Planning. The municipalities were represented through interviewing representatives from the Directorate of Housing and Utilities in two of the main governorates in Egypt: Cairo and Giza. The South Cairo Electricity Company, Industry Modernization Centre and NUCA were interviewed as representatives of the utilities authorities in Egypt.

5.2 Status quo: Does your authority consider setting energy efficiency targets in its future strategy?

For the Ministries of Housing and Energy, all the interviewees agreed on the huge impact of the subsidy removal plan and the increasing electricity prices on increasing the uptake of energy efficiency measures in the building sector. energy efficiency strategies have been in the mandate of the mentioned Ministries and Authorities for almost twenty years with the first strategies adopted in the year 2000. Such strategies included the financial and/or technical assistance for voluntary energy audits, reduction and annulations of custom duty for energy efficiency component as well as issuing national energy efficiency building codes for residential, commercial and administrative buildings. Unfortunately, not all these strategies achieved the expected outcomes. Therefore, nowadays other measures and strategies are being devised to enforce the previous and fill in their gaps as mentioned by the interviewees. These include a regulation that is currently under study to give incentives to developers who implement energy efficiency measures in their projects, which could be in the form of a longer allowance period for their instalments payment or other financial incentives. There is an obligation for buildings with contractual capacity exceeding 500 kW or more to undergo energy audits and energy management in the new Electricity law which is expected to boost the energy efficiency awareness and adoption. Also, a proposal for a code for district cooling in Egypt will be published by the end of the year. Finally, a committee of representatives of multiple Ministries was installed for studying strategies for better enforcement of the energy efficiency code in buildings issued earlier.

Yet there are multiple barriers mentioned by the interviewees that hinder reaching the expected outcomes from these efforts. 67% mentioned the lack of financial support/subsidies for potential investors as a key barrier, 78% saw the upfront investments as too high for potential investors, 78% believed that there is a lack of awareness related to technical energy efficiency options among potential investors. Finally, 67% understood that the main barrier facing the issued standards and code is the lack of real enforcement mechanisms. Accordingly, further efforts that tackle these barriers are strongly needed.

As for the Ministry of Planning, energy efficiency targets are not on top of priorities, where efforts are currently focused on satisfying basic needs for a large number of the Egyptians. However, the Ministry values the importance of energy efficiency and sees it as the solution especially with the increasing energy costs and is aware that to reduce the negative impacts, more incentives should be as well as raising awareness. One possibility mentioned by one

interviewee would be including the energy efficiency financing as part of the real estate financing programme already existing in most of the banks especially the housing and development bank.

5.3 Policy recommendation: How to accelerate energy efficiency in new residential buildings, with a focus on heating and cooling?

I. Cross cutting national awareness campaigns regarding the phase out of energy subsidies and the improved benefits of energy efficiency in the building sector

Rationale: With energy subsidies currently covering 80-90% of utility cost of production in Egypt, electricity prices are the lowest in the MENA region, dis-incentivising investments in energy efficiency. These subsidies have created a lack of awareness on the macroeconomic benefits of every kWh that is not consumed in Egypt and how a reduction in energy subsidies could translate in improved public services. The Egyptian government has taken the decision to enforce cost-reflective tariffs of electricity in 2022 and will phase out gradually energy subsidies in the country. This decision will trigger gradually more attractive business cases for energy efficient measures in the building sector, which will impact all stakeholders.

Implementation: The Ministry of Housing and industrial organisations should collaborate to lead a nation-wide awareness campaign to raise the awareness on energy efficiency on all job levels from students to professors, engineers and industrials, bankers and investors, municipalities and ministers. Bankers will need to attend training to understand how to develop business opportunities of energy efficiency lending (Recommendation IV in banking). Municipalities will need to be trained to inspect the conformity of building design with the energy efficiency code (Recommendation VI). To raise the awareness of citizen and to facilitate the procurement of energy efficient services, a national website grouping all information on the potential of energy efficiency measures in residential households and the contacts of certified ESCOs able to implement these measures should be built[7]. To fortify the linkages between industry and research in energy efficiency, it would be necessary to raise the awareness of industries on the existence of the Technology Transfer Marketing Office existing at HBRC and other universities. In universities, directors should raise the interest of professors in encouraging their students to choose final year projects in the field of energy efficiency and organise national competitions between universities to award best in class projects.

Impact: Increasing the awareness about energy efficiency of each stakeholder group on a national level and their role in accelerating energy efficiency measures will collectively and effectively drive the market demand for energy efficient products in Egypt.

II. Implement integrated pilot projects in residential buildings and raise awareness on the results of the project

Rationale: There exists a lack of integrated pilot projects in the building sector in Egypt which involves the cooperation and collaboration of all local stakeholders. There exists a need to map the role of each stakeholder in the process of implementing energy efficiency measures and the interdependencies between each actor's role and responsibility.

[7] Lessons from the campaign "Deutschland Macht's Effizient" (Germany goes for Efficiency) can be transferred

Implementation: The Ministry of Housing initiates national pilot projects for new residential compounds in different cities of Egypt, inviting the relevant public and private stakeholders concerned in round tables to agree on a roadmap going forward with the execution of the pilot project. The project developer concerned is responsible to raise awareness on the results of the project, highlighting the deliverables of each stakeholder in contributing to the success of the project.

Impact: Increasing awareness and alignment across stakeholders in Egypt on the value of energy efficiency in residential buildings in the country.

III. Mandatory certification of engineers to the Egyptian Energy Efficiency Code

Rationale: Engineering offices are not putting in practice the Energy Efficiency code because they lack knowledge in it. National experts with long due experience in developing the building code stated that the majority of engineers (>75%) are not certified energy efficiency experts. Engineers in Egypt oversize heating and cooling systems, prioritising safety and comfort over efficiency, and do not design control systems to optimise operation and cut energy costs. Heating and cooling load modelling is rarely conducted. Some project developers admitted that they lack knowledge in conducting load analysis to for the heating and cooling demand of the building and thus, just follow business as usual approaches to select or recommend technologies for their clients

Implementation: The Egyptian Engineers Syndicate has the responsibility and authority to design, organise and complete the examination as well as the right to nullify the licenses of engineers who fail the exam. The Syndicate will be responsible to offer trainings to engineers. The training will be voluntary at the engineers own cost. The test shall be designed in different sections targeting different sectors in the design, construction and inspection of new residential buildings, that is civil and mechanical engineers who work in a contracting company will have a test tailored to the design phase of energy efficiency measures whereas engineers who works in a municipality will have a test tailored to the inspection of energy efficiency measures in the construction phase.

Impact: Re-examining the knowledge of engineers will fortify the missing link between the Egyptian energy efficiency building code and the application of the code and provide a boost for energy efficiency to surpass the business as usual approach in the building sector.

IV. Update permitting rules for new buildings with respect to the Egyptian energy efficiency code

Rationale: Currently Chapter 10 of the Egyptian energy efficiency building code requires engineers to compute a detail building performance analysis over a whole year with climatic data. However, there exists currently no specific ceiling on the final energy consumption per square metre. Establishing such a limit would ensure that a benchmark is fixed to qualify a non-energy efficient building from an efficient one.

Implementation: The Egyptian Engineers Syndicate and the Ministry of Housing are responsible to update the permitting rules in Egypt. To be effective, it is important to strengthen enforcement of the code (next recommendation).

Impact: Including an energy efficiency certificate for new buildings in the permitting process will force engineers to adapt their designs to a specific final output, that is simple for municipalities to understand and check the conformity. In addition, it will improve the accuracy of energy consumption forecasts in Egypt for the future.

V. Strengthen enforcement systems in the construction phase, applying severe penalties to the engineering design company for non-compliance to the energy efficiency building code

Rationale: Most of the projects present an initial plan for the authorities and then undergo multiple modifications without notice. In addition, municipalities' inspectors lack the engineering knowledge to inspect the compliance of innovative energy efficient solutions.

Implementation: The Egyptian Engineers Syndicate (EEA), the Ministry of Housing, the Directorate of Housing and Utilities in different governorates and the districts presidency offices in the cities' districts collaborate to form an independent body of certified inspectors. This third-party will have the responsibility to ensure a reliable inspection and a correct enforcement of the building code for new buildings. The Ministry of Housing must grant the authority to this party to set penalties for non-compliance. The EEA is responsible to certify the inspectors. International consultants can support the EEA for the certification process if requested.

Impact: This recommendation is likely to have a high impact as it ensures the implementation of the energy efficiency measures stated at the design level and for which the developers benefited from incentives.

6. STAKEHOLDER: SUPPLIERS

6.1 Context: Whom did we interview?

The consortium hired the market research institute Growth from Knowledge (GfK), as an external partner to conduct a market survey with 500 residents in Egypt and 100 suppliers and retailers of heating and cooling technologies for residential buildings. The goal was to gather the view of each group to understand what drives or hinders them to import/invest in energy efficient and/or renewable energy-based heating and cooling technologies.

6.2 Status quo: What are the current heating and cooling technologies being imported and sold to residential consumers?

Egyptian suppliers and retailers are importing most of their technologies from Japan (45%) and the US (40%). Their orderbooks in selling higher energy efficient technologies did not change in the last five years, but actually some have been observing a slightly decreasing trend. However, more than 90% of suppliers consider importing more energy efficient heating and cooling technologies in the future because of the anticipated effect of the phase out of energy subsidies.

Out of 100 suppliers, the majority import and sell multi-split air source heat pumps (95%), with an average COP of 2.5 varying between 2 and 3. Multi-split air conditioners with an average COP of 2.8 varying between 2.5 and 3 are the second most sold technology in the Egyptian market, followed by electric resistance heaters and electric fans. Single split air conditioners and heat pumps represented a share of 30% in the suppliers and retailers portfolios. Chillers and reversible chillers represented a share of 20%. Boilers were not sold by any supplier.

Regarding water heating technologies, most of the interviewed suppliers sold instantaneous water heaters or did not sell water heating technologies. None were involved in the solar-thermal business. It is important to note that suppliers selling solar PV were not interviewed, which may explain the absent shares of solar-thermal in the supplier portfolio.

A detail breakdown of imported heating and cooling technologies with their respective efficiency levels is illustrated in Figure 2.

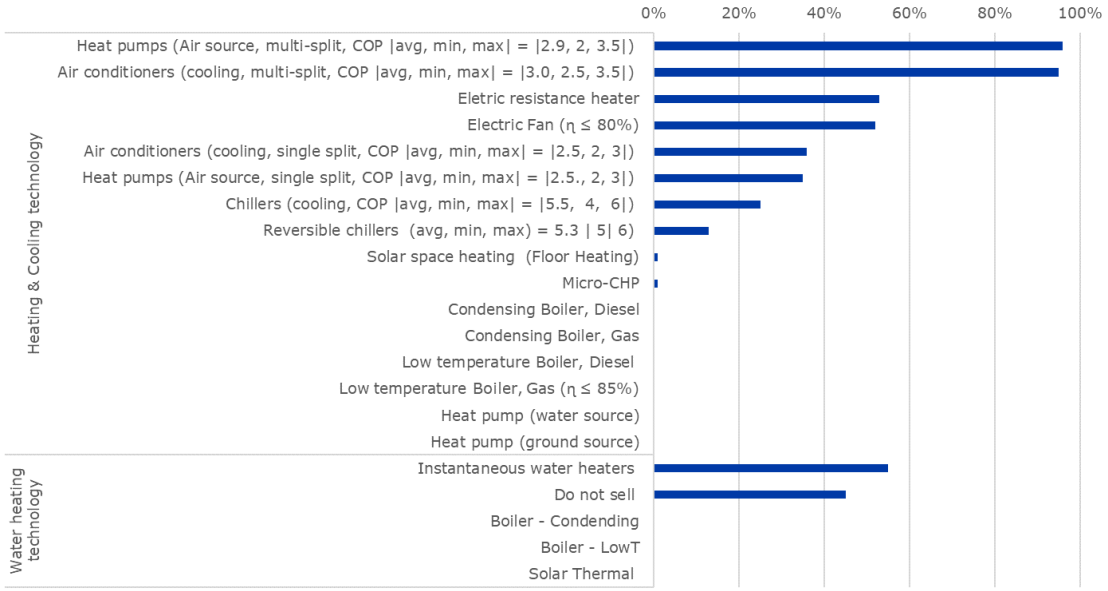


Figure 2: Shares of imported heating and cooling technologies including energy efficiency levels in Egypt

6.3 Policy recommendation: How to accelerate energy efficiency in new residential buildings, with a focus on heating and cooling?

I. Support local industry to increase efficiency level of ACs by making existing energy efficiency standards for appliances mandatory

Rationale: One of the main barriers local industries are facing in assembling energy efficient technologies is the fear to lose competitive edge with other suppliers, who chose low-cost equipment to sell at minimum upfront cost to their customers. The currently existing the Energy Performance Standard for air conditioners is a guideline and not a mandate. By making the standard mandatory and, hence, banning the production, assembling and import of technologies that are not in line with the Energy Performance Standards set, authorities can ensure to suppliers the same level playing field. In addition, the enforcement of the standard would facilitate the sales of highly efficient equipment in retail stores as equipment will be labelled with respect to the standard.

Implementation: The Egyptian parliament needs to pass a legislation to turn the Air Conditioners Energy Efficiency Standard No. 3795 into a mandatory requirement and authorise the existing testing laboratory to pass high fines on non-compliant products. The laboratory will run random compliance tests on the produced, assembled and imported heating and cooling products in Egypt.

Impact: Ensuring minimum performance standards and labelling of products entering the market will impose a certain minimum level of safety and energy performance. Giving incentives to products with an energy efficient label (e.g. in line with EU energy labelling) will ensure that importers target the right quality of technologies.

II. Build capacity at the supplier's floor staff level on the economic and environmental benefits of energy efficient technologies imported in the country

Rationale: Our interviews with 400 consumers in Egypt proved that the biggest driver for them to purchase an energy efficient heating or cooling technology at a retail store is the ability of the vendor to present convincing arguments to defend the case. Vendors should guide customers in their purchase, explaining that the benefits of energy efficiency pays off over the lifecycle of the equipment and how the present value of the technology should be their decision factor for a profitable investment. They should inform them about the possibilities of financing to cover the additional upfront cost.

Implementation: A number of authorities and organisations need to come together to organise different trainings and workshops on the potentials of energy efficiency technologies and the extent of their benefits for stronger marketing of them to customers. These include the Egyptian Environmental Affairs Agency (EEAA), the Egyptian organisation for Standardisation, Egyptian Organisation for Standards and Quality (EOS). Support could be given by RCREEE, being experienced in organising similar workshops that aim at raising the level of awareness of the suppliers' staff. Also, local and international consultancies could provide such type of training or support the involved entities technically.

Impact: Increasing shares of energy efficiency products sold in supplier portfolio.