

# Summary Report: Lessons Learnt of technical assistance offered to Pilot Projects

BUILD ME – boosting ambitions to achieve a climate-neutral  
building standard in the MENA region

**Prepared for:**

Supported by:



based on a decision of the German Bundestag

November 2021



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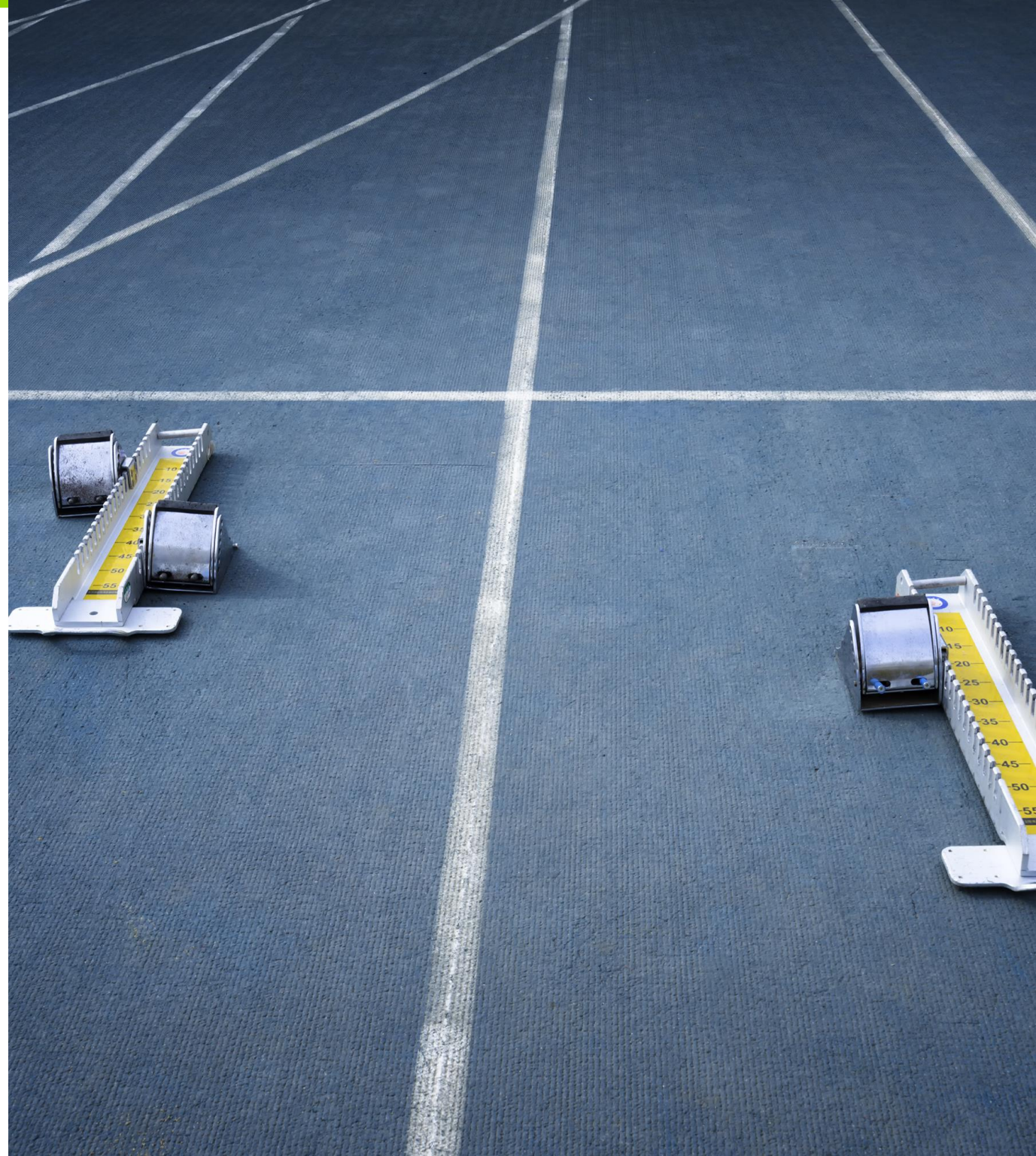
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# 1. Introduction



# Introduction to the BUILD\_ME project



# BUILD\_ME project at a glance



## Phase I 2016 - 2018

Extensive analysis and research  
Identification of barriers  
Recommendations



## Phase II 2019 – 2021

Implementation of recommendations  
Dissemination of results  
Upscaling



# Objectives of Phase II of the BUILD\_ME project

## Objectives and goals

- **Facilitate & increase access to financing** & funding opportunities for EE building projects
- Support the **reform & transitions of political frameworks** towards improving energy efficiency in the building sector
- On the ground learning from energy efficiency measures in **pilot projects**

### WP1 Preparatory steps

- Software tool: energy performance & cost-effectiveness
- Building typology
- Building specifications & reference values

### WP2 Support pilot projects

- Technical support of PPs.
- Testing EE labelling scheme
- Support financing applications
- Collect insights on the ground as input for WP3

### WP3 Framework conditions

- Voluntary EE labelling scheme
- Facilitate & increase access to financing
- Building codes
- National strategies (NEEAPs & NDCs)

### WP4 Capacity building and dissemination

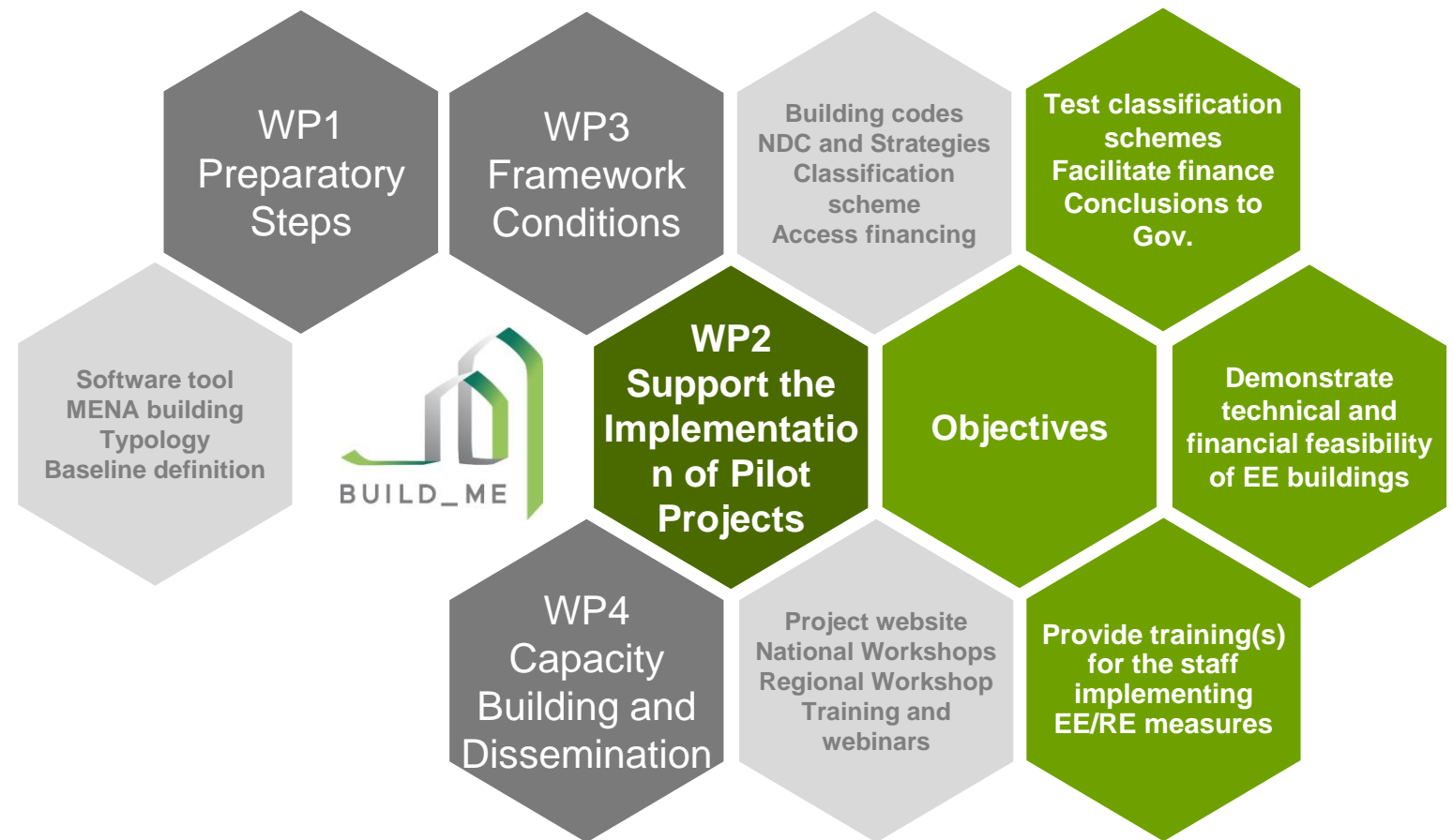
- Website, workshops, trainings, database for best practice buildings, webinars, newsletters, brochures, etc.



# Zoom into WP2: Supporting Pilot Projects

## BUILD\_ME Project and the Objectives of Pilot Projects

- To provide technical support for the selected pilot projects in the three targeted countries.
- To collect insights and profound understanding of the real-life challenges on ground.
- To test BUILD\_ME energy efficiency labelling scheme and improve it while working on real projects.
- Testing and improving the building energy performance BEP tool developed in WP1 of BUILD\_ME.
- Support financing applications of the pilot projects to better understand the and support the available finance mechanisms.



# Objective of the Report

## Summarize the process of supporting the PP



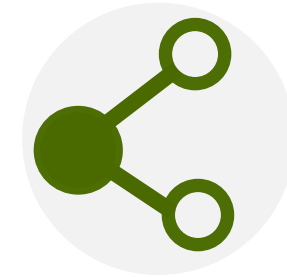
Summary of the process of selection and the provided technical support for the selected pilot projects in the three targeted countries.

## Documentation of the lessons learnt and insights from PP



To document the insights and the understanding of the project developers' real-life challenges. This will include the challenges at the technical aspects, regulatory aspects, capacity building aspects as well as the market of EE materials and systems in the target countries.

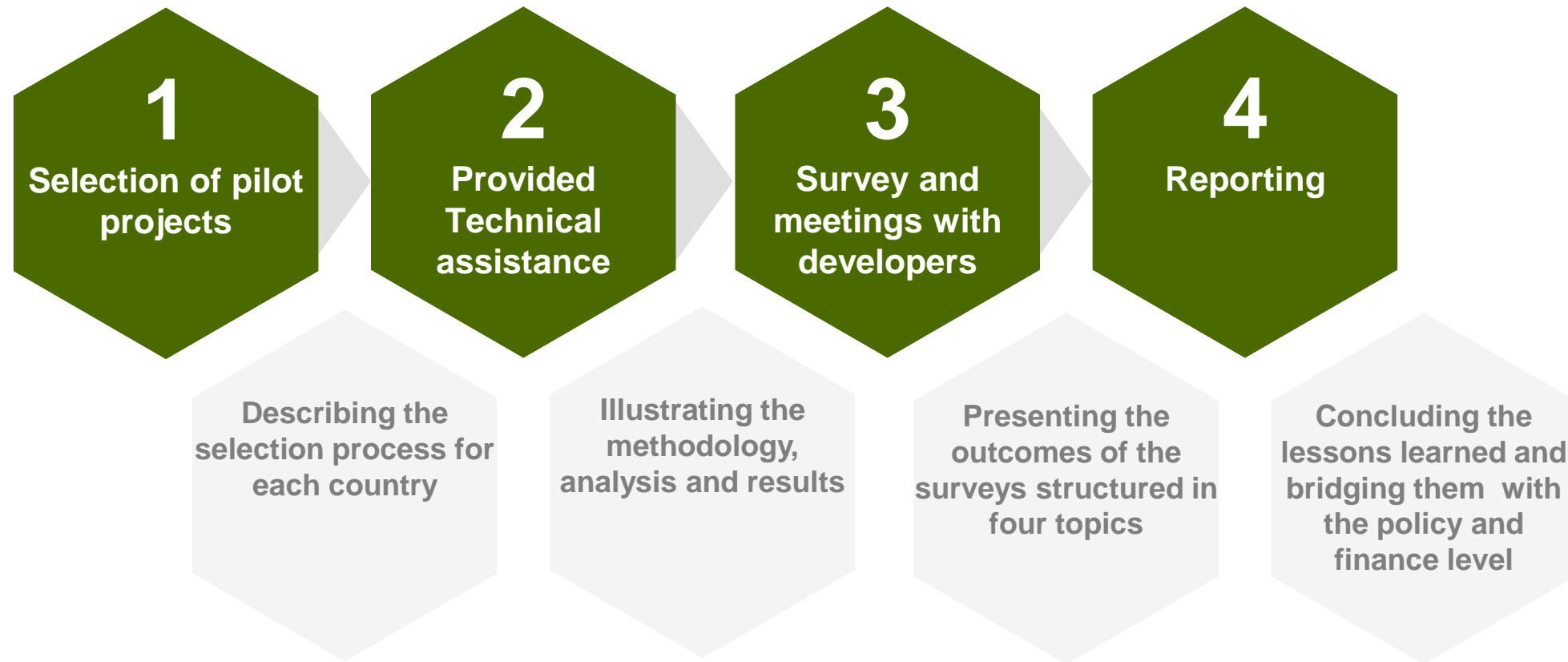
## Dissemination of the results



The lessons learnt will be disseminated and shared with various groups of stakeholders such as governmental entities and private developers.



# Methodology of the report

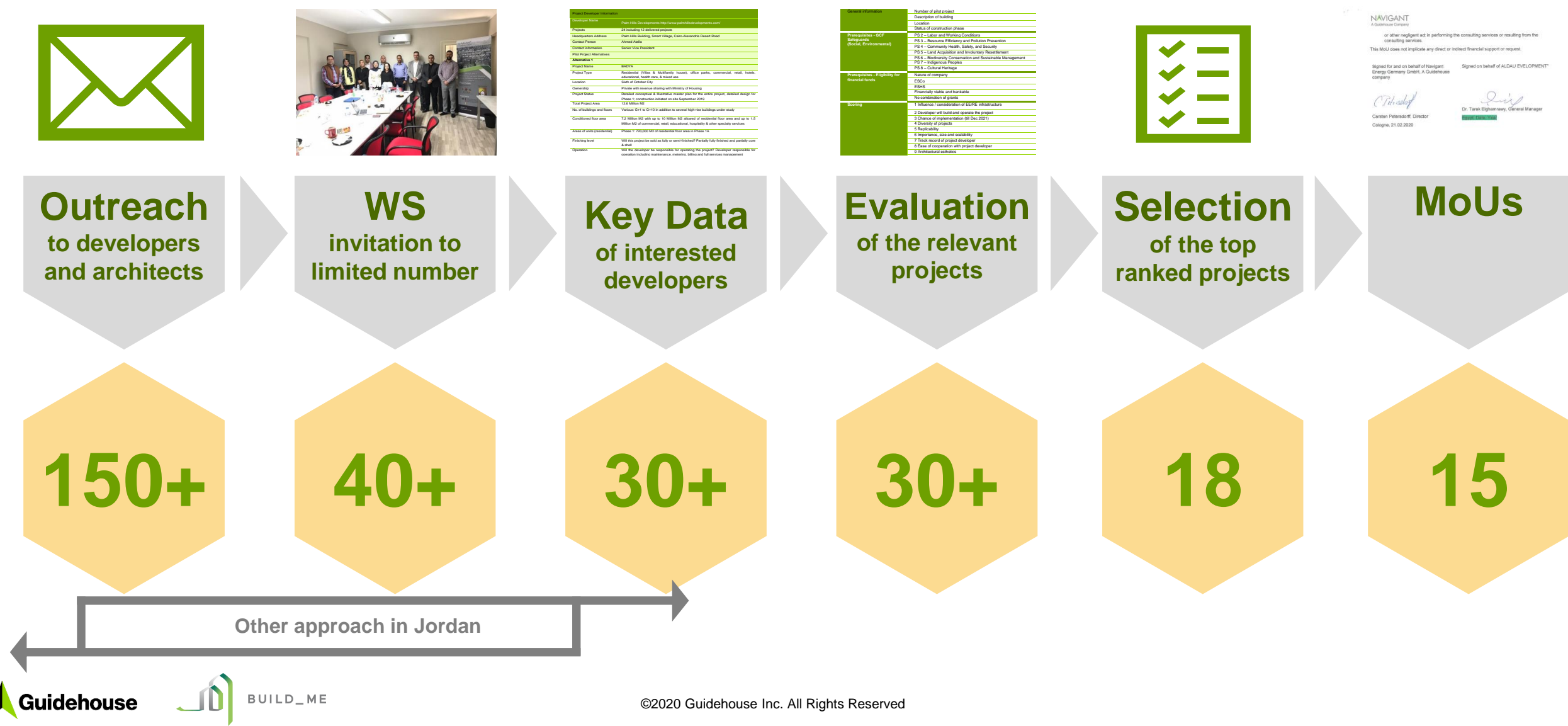


## 2. Selection Process



# Process of selecting the pilot projects

## Total numbers of the three BUILD\_ME countries (EGY, JOR and LEB)





# Developed evaluation matrix to assess pilot projects



## Prerequisites

### GCF Safeguards (Social, Environmental)

- A) PS 2 – Labor and Working Conditions
- B) PS 3 – Resource Efficiency and Pollution Prevention
- C) PS 4 – Community Health, Safety, and Security
- D) PS 5 – Land Acquisition and Involuntary Resettlement
- E) PS 6 – Biodiversity Conservation
- F) PS 7 – Indigenous Peoples
- G) PS 8 – Cultural Heritage

### Prerequisites - Eligibility for financial funds

- A) Nature of company
- B) ESCo
- C) ESHS
- D) Financially viable and bankable
- E) No combination of grants



## Scoring

- 1 Influence / consideration of EE/RE conception (incl. HVAC)
- 2 Developer will build and operate the project
- 3 Chance of implementation (till Dec 2021)
- 4 Diversity of projects
- 5 Replicability
- 6 Importance, size and scalability
- 7 Track record of project developer
- 8 Ease of cooperation with project developer
- 9 Architectural esthetics
- 10 Special consideration

# Evaluation of the projects in the long list incl. score

## Egypt

Project Name	Developer	Score
BADYA	Palm Hills	93%
CIB El Sadat Branch	CIB	89%
Palm Hills Alexandria	Palm Hills	86%
Al Alamein University Administration Building	NUCA	85%
CAIRO WEST RESIDENCE	ALDAU Development	83%
ALDAU Strand Botique Hotel	ALDAU Development	80%
CIB Zohour Club Branch	CIB	76%
Confidential	Samcrete	76%
Heliopolis Residence	Mist Al-Ghad	75%
Hyatt Regency Cairo West	ALDAU Development	73%
STEIGENBERGER ALDAU	ALDAU Development	71%
Zayed - 22	True Real estate Development	71%
Janna Misr	NUCA	61%
Beverly Hills - 229	Emirates Real estate	59%
Wrood - 26	True Real estate Development	55%
PyraMed Medical Park	Samcrete	51%

## Jordan

Project Name	Developer	Score
KONN Project	Uraiqat Architects	90%
Private Villa	Salfiti Architecture + Interior Design	88%
Private Villa	Al-Aqtash Est. for Contracting	87%
Private Villa 01	Eng. Mohammad Issa	87%
Private Villa 02		87%
Shopping Mall	Bawabet AlMansoura Contracting Company	85%
HQ and Show Room	Hani Daoud Construction	85%
Multi-Family House	Mohammad Abu Aisha	82%
Multi-Family House – Detached	Ghaith Abu Eid	78%
Private Villa	Technical Construction Co.	65%
Private Villa	Eng. Samer Rajeha	63%
Multi-Family House – Detached	Eng. Samer Rajeha	53%
Embassy of Kuwait in Jordan		50%
Mixed-use Complex Building	Madanat Contracting Co.	48%
		43%
Multi-Family House – Complex	Arab Technical Construction Co	43%
Office Buildings	Eng. Bader Sheiha	40%

## Lebanon

Project Name	Developer	Score
Kye Beachfront Resort	Rise Properties	88%
KLEOS	Hayek Group	80%
Arcade Suites II	Arcade Group	78%
Frames	Cipher Architect	76%
City Towers	Al Bani Development	72%
Collège Notre Dame De Nazareth Extension	Pierre Dammous & Partners	71%
Mar Mikahel Village	Capstone	70%
Al Moutahed Warehouse and Offices	Al Moutahed	59%
Verro-Motto	Bistany and Bakhous Families	58%
Al-Amir 17	Al-Amir Engineering & Construction	45%

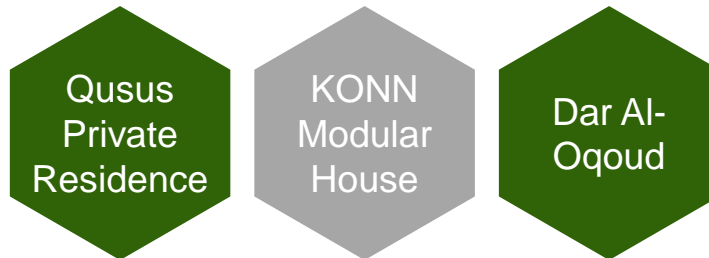
# Overview of selected pilot projects

15 pilot projects

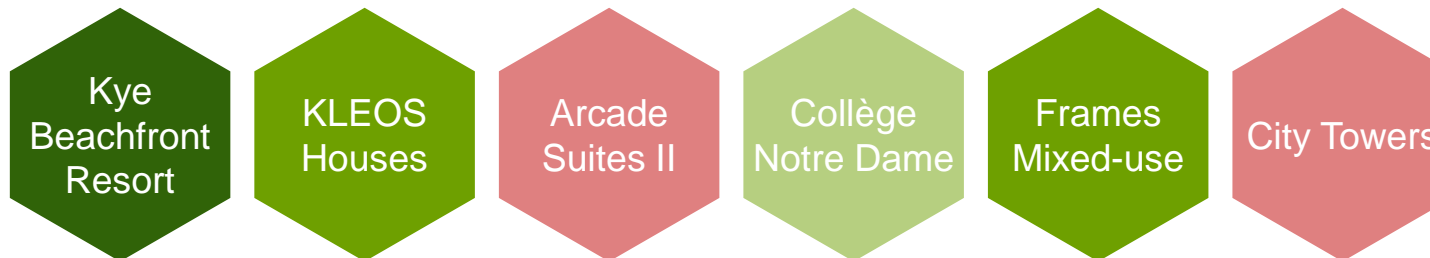
**EGY**



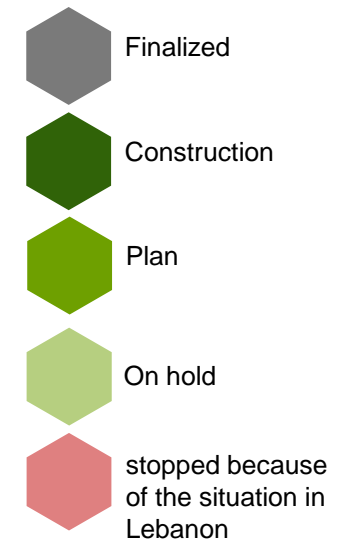
**JOR**



**LEB**



**Status of PP, Oct 2021**





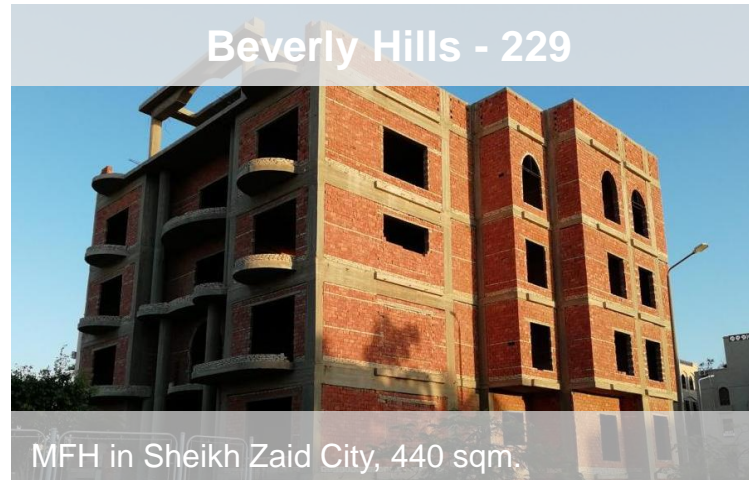
# Overview of selected pilot projects in Egypt

Cairo West Residence



MFH in Giza, 690 sqm.

Beverly Hills - 229



MFH in Sheikh Zaid City, 440 sqm.

New Mansoura university



Library building in New Mansoura City, 1200 sqm.

Palm Hills, Badya



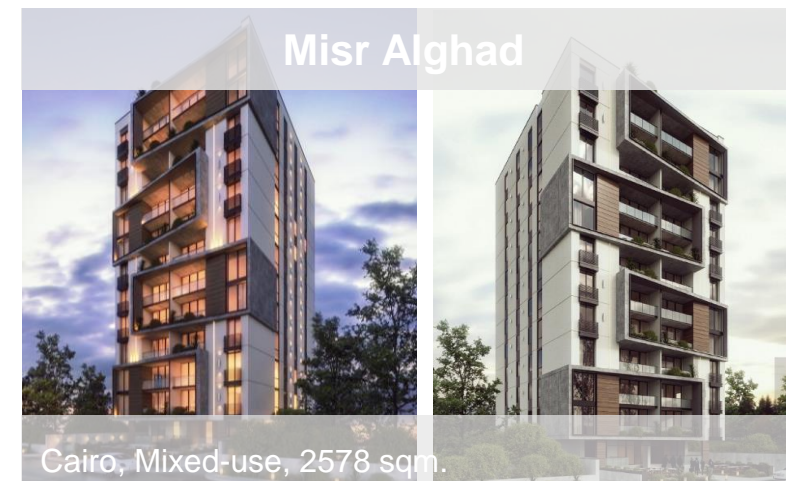
6th of October City, exemplary MFH 2000 sqm

Palm Hills, Alexandria



Alexandria, one building will be selected

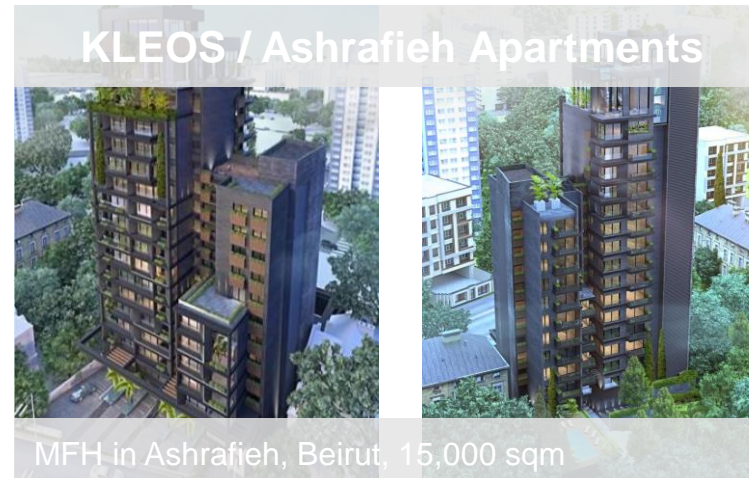
Misr Alghad



Cairo, Mixed-use, 2578 sqm.

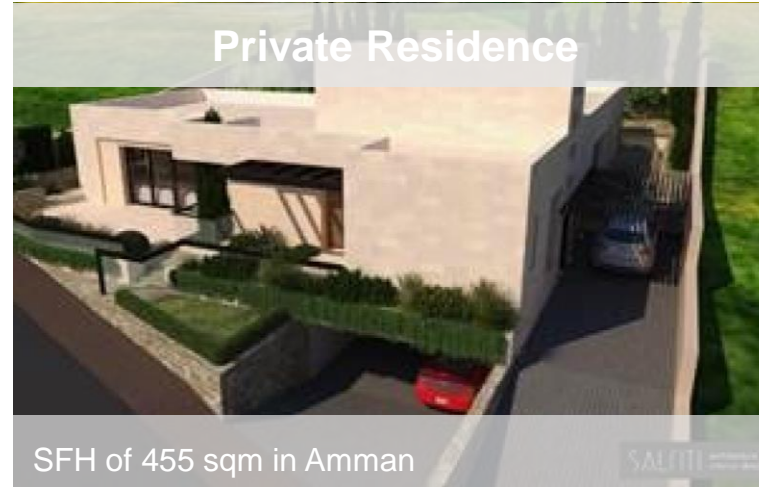


# Overview of selected pilot projects in Lebanon





# Overview of selected pilot projects in Jordan





# Observations and lessons learnt (LL) of selection process



The project partners were selectively invited in each country with around 50 developers to join BUILD\_ME as pilot projects. Responses to the invitations were as follows: In Jordan 20%, In Lebanon 50%, In Egypt 50%.



The interested developers have been asked to join a workshop with BUILD\_ME team. While in Egypt and Lebanon all invited developers have joined the WS, limited number joined the workshops in Jordan.



All developers who attended the workshops have been asked to fill a template of the key information of their projects. the responses were as follow

In Jordan 20% (as no financial support for hardware can be guaranteed, PP lost interest)

In Lebanon 100%

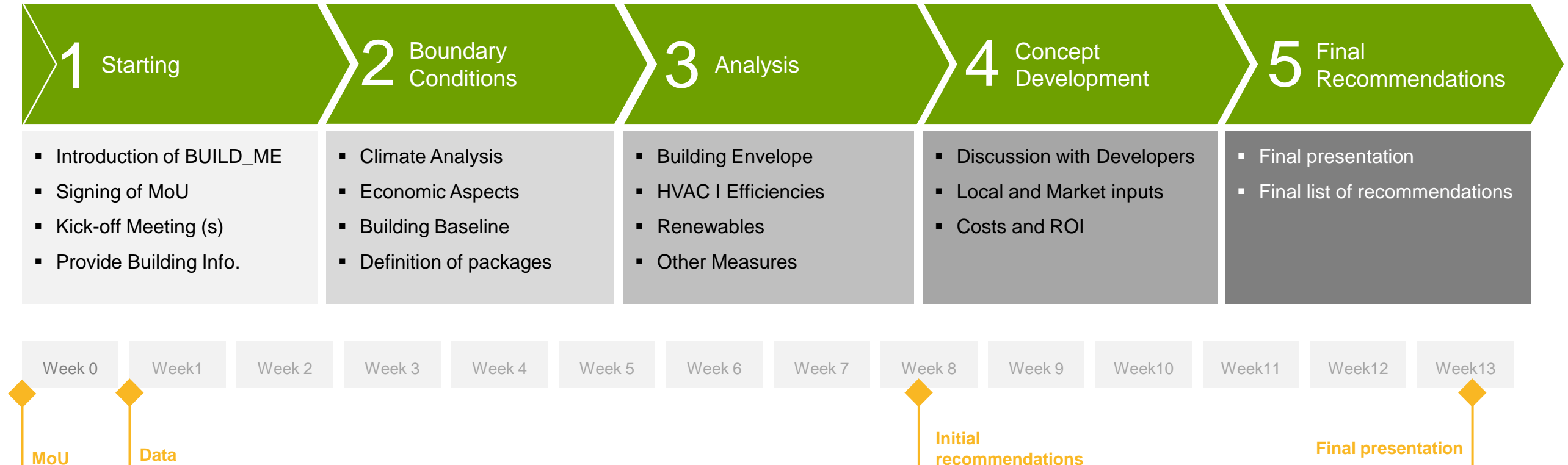
In Egypt 85%

LL: Interest in Energy Efficiency gradually increase, but still remains (partly) dependent on financial stimulus



# Approach and Methodology to support the PPs

## Steps Towards a Low Energy Building



- Initial timeline to be adjusted according to the demands and development of the pilot project.
- Remain in close exchange of data, information and concepts
- Field visits will be coordinated and executed by BUILD\_ME National Partners and/or local experts.



# Overview of Measures utilized in the optimized solutions

## Scope of Measures

### Envelope



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Roof insulation

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External wall insulation

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Low-E glass windows

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Shading

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Air tightness

### Systems



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Heating

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Cooling

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Hot water supply

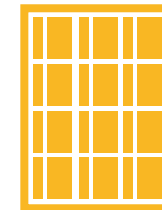
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Ventilation systems

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Lighting systems

### Renewable



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PVs, Solar Thermal

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Solar water heaters

# Definitions (1)

## Baseline

Presenting the Building as Usual (BaU) in the respective country, related to all indicators.

## Optimized package

Representative for the specific EE/RE measure packages for the respective pilot project.

## Global Costs

All cost elements are considered: Operational and investment cost incurred over a relevant time period.

The different types of costs incurred each year, respectively, are summed by using the NPV methodology, in order to express them in terms of value in the first year.

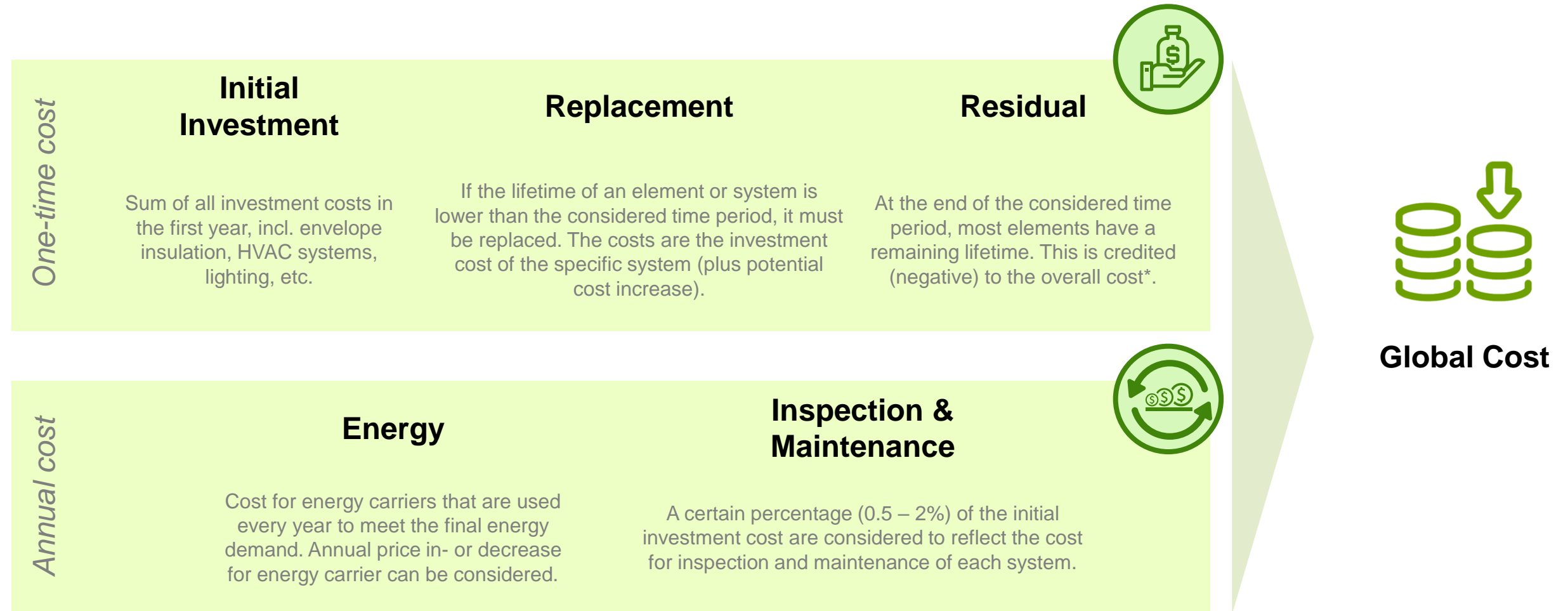
More details on next slide

## Incremental Costs

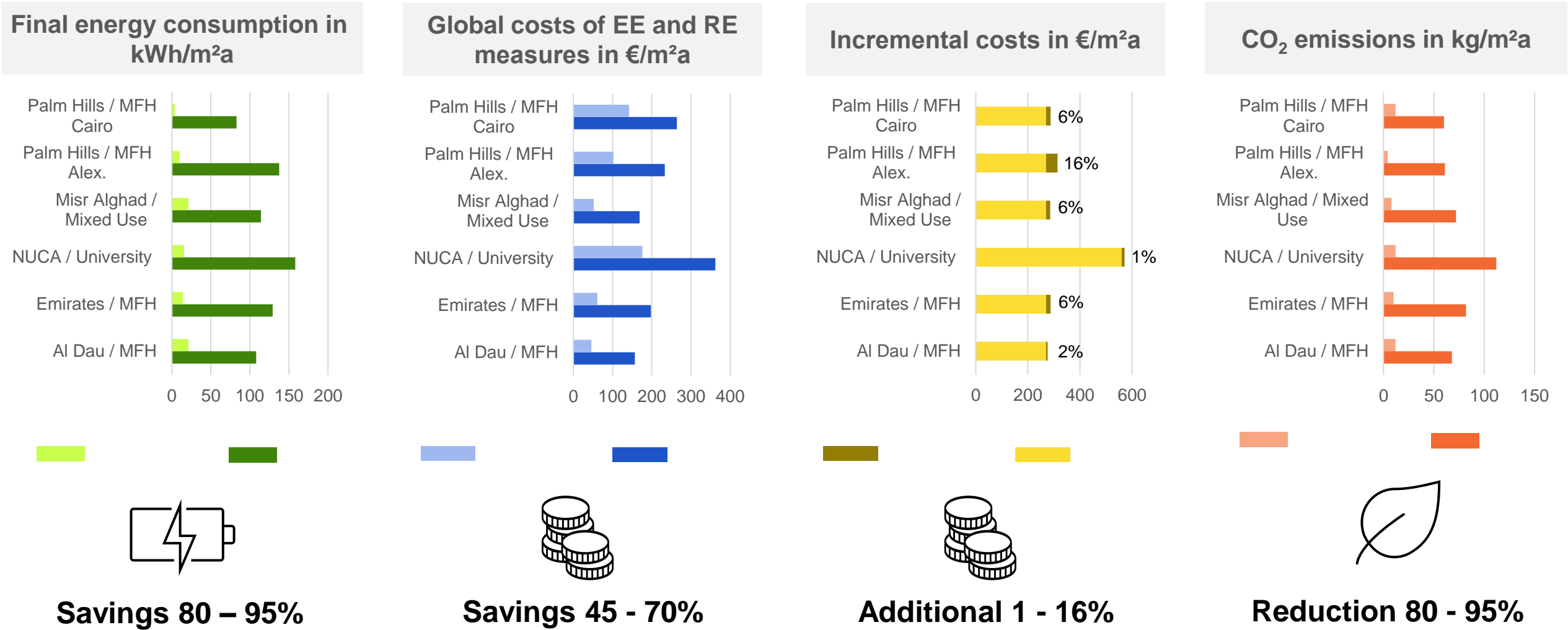
Additional costs for EE / RE measures related to the BaU costs related to Built Up Area in €/m<sup>2</sup>.

# Definitions (2)

## Zoom into Global Costs

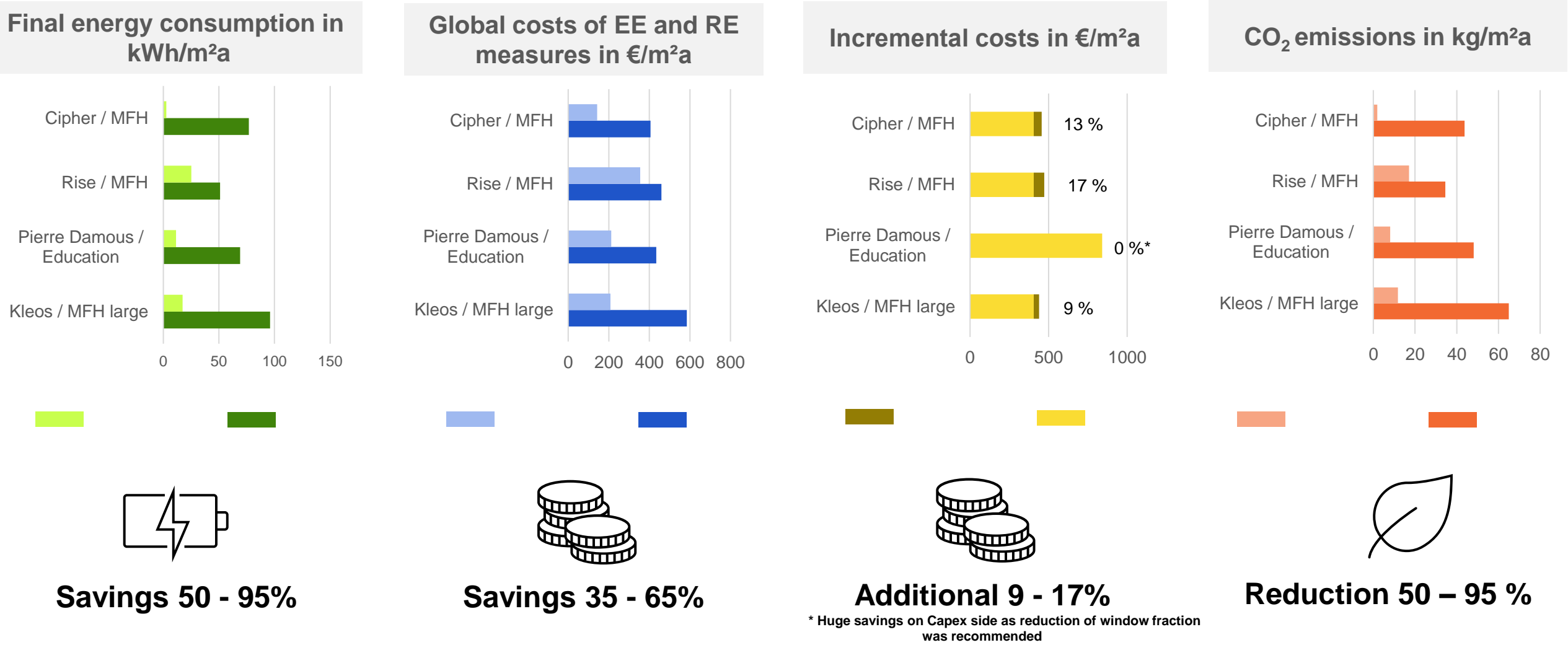


# Savings of the Optimized vs Baseline in Egypt

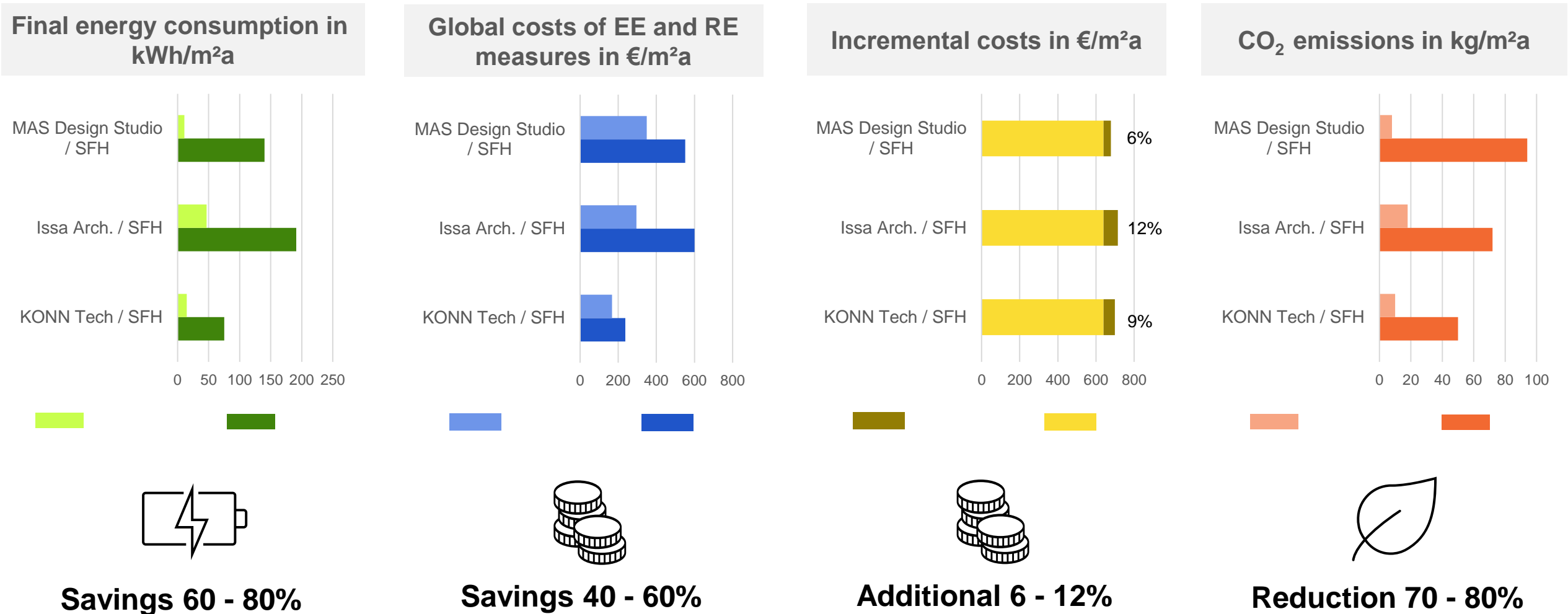




# Savings of the Optimized vs Baseline in Lebanon



# Savings of the Optimized vs Baseline in Jordan



# Exemplary technical recommendation for MFH, Egypt

## Cost optimal ranges of ecological and economic attractive measures

Measure	Target Specs.	Energy Savings	Global cost savings
Reduction window fraction	From 40% to 20%	10-15%	15-20%
External wall insulation	0.38 W/m <sup>2</sup> K = 5 cm cavity insulation	20-25%	20%
Roof insulation	0.30 W/m <sup>2</sup> K = 12 cm insulation	15-20%	10-15%
EE Windows	1.2 W/m <sup>2</sup> K -> Low E Window	15-20%	5-10%
EE Cooling	SEER=5 -> Top performer	40%	30%
Solar thermal	Meet 100% hot water demand	5-10%	0-5%
Photovoltaics	Exploit max. available roof surface	15-20%	0-5%



# Exemplary technical recommendation for SFH, Jordan

## Cost optimal ranges of ecological and economic attractive measures

Measure	Target Specs.	Energy Savings	Global cost savings
Reduction window fraction	From 40% to 20%	15-20%	15-20%
External wall insulation	0.4 W/m <sup>2</sup> K = 8 cm with cladding	5-10%	5-10%
Roof insulation	0.34 W/m <sup>2</sup> K = 10 cm insulation	0-5%	0-5%
EE Windows	1.2 W/m <sup>2</sup> K -> Low E Window	15-20%	0-5%
EE Cooling	SEER=5 -> Top performer	25-30%	15-20%
Solar thermal	Meet 100% hot water demand	10-15%	0-5%
Photovoltaics	Exploit max. available roof surface	15-20%	10-15%

# Exemplary technical recommendation for MFH, Lebanon

## Cost optimal ranges of ecological and economic attractive measures

Measure	Target Specs.	Energy Savings	Global cost savings
Reduction window fraction	From 40% to 20%	20-25%	25-30%
External wall insulation	0.4 W/m <sup>2</sup> K = 6 cm insulation + cladding	5-10%	0-5%
Roof insulation	0.30 W/m <sup>2</sup> K = 12 cm insulation	0-5%	0-5%
EE Windows	0.9 W/m <sup>2</sup> K -> Triple Glazing	5-10%	5-10%
EE Cooling	SEER=5 -> Top performer	25-30%	25-30%
Photovoltaics	Exploit max. available roof surface	20-25%	10-15%

# KPI's resulting from technical assistance to pilot projects

Target ranges of a optimized EE/RE packages (and savings compared with baseline)

KPI's criteria	Units	EGY <i>example MFH</i>	JOR <i>example SFH</i>	LEB <i>example MFH</i>
Final energy consumption	kWh/m <sup>2</sup> a	5-15 (80-95%)	10-50 (80-90%)	5-25 (50-95%)
Global costs (20 years)	€/m <sup>2</sup>	50-150 (45-70%)	170-350 (30-50%)	150 – 350 (20-65%)
Capex	€/m <sup>2</sup>	15 – 20 (5-10%)	40 – 80 (5-15%)	35 – 70 (10-20%)
PBP	years	3 – 4	5	5 – 10
CO <sub>2</sub> emissions	kg/m <sup>2</sup> a	4-12 (80-95%)	8-18 (80-90%)	5-20 (50-95%)



# Key conclusion of technical assistance to pilot projects

## General conclusion relevant for three countries

- The optimized variants can save up to 95% of final energy (and CO<sub>2</sub> emissions)
- It's possible to max. reduce the specific CO<sub>2</sub> emissions up to a range of 4 – 8 kg/m<sup>2</sup>a
- The payback periods vary from 3 years to 10 years
- The incremental costs vary from 5 % to 15 % compared to the baseline

## Country specific conclusions

### EGYPT

- Savings are less cost intensive – as the baseline is weaker compared with Jor and Leb
- PPs are still reluctant to implement the full set of recommendations and prefer to follow mainly “low hanging fruits” e.g. a minor increase of insulation thickness

### JORDAN

- As the baseline is respecting EEBC with “tight” thresholds, savings are in absolute terms not as high as in e.g. Egypt
- The supported PP's implemented the parts or the full set of recommendations

### LEBANON

- Even with a lacking regulative framework, PPs are seriously considering EE/RE measures
- There is currently a strong appetite for PV

# 4. Survey of project developers



# Egypt





# Egypt : CAIRO WEST RESIDENCE



Name of project developer	ALDAU Development
Description of the building type(s)	Residential gated compound; 14 MFH + 1 Boutique Hotel
Size of conditioned floor area in sqm	Total compound 45,000 sqm (MFH selected as PP 692 sqm)
Location	Cairo (Cairo Alex desert Road)
Status of construction phase	Design phase
Investment costs	Overall 125 Mil €

## Financial Aspects

- “Long and complicated procedures to receive financial support for EE. For example, the developer endeavoured to gain funding from an international development bank, but the process was long and complicated.”
- “The developers can accept a maximum of 10-year payback period for investment on EE measures.”

## Regulatory and Policy

- “The building is not in compliance with the EEBCs.
- Most of the developers and architects are not well-informed about EEBCs.
- Even if a developer decided to comply with the code, there are no procedure to follow.
- The EEBCs are not user friendly. EEBCs are more of academic documents rather than a practical code.”

## Technical

- “There is more support for companies that implement renewable energy measures compared to energy efficiency.
- The green buildings market in the residential sector is limited. But there is a growing interest in EE/RE measures for the hospitality sector. (see as well <https://www.greenstarhotel.org/>)”

## Capacity Building Aspects

- “There has been an improvement in the skills of the craftsmen but there is room for further improvement.
- Training/Vocational programs are important to qualify more workers to implement EE measures.”

# Egypt : Beverly Hills - 229



Name of project developer	True Real estate Development
Description of the building type(s)	Mixed use building
Size of conditioned floor area in sqm	440 sqm
Location	Beverly Hills - Sheikh Zayed
Status of construction phase	Under construction (skeleton + bricks)
Investment costs	1.4 Mil € (including land price)

## Financial Aspects

- *“The EE materials and systems are expensive compared to the conventional materials and systems.*
- *Lack of awareness of available finance/fund incentives.”*

## Regulatory and Policy

- *“There is a lack of awareness about the EEBCs.*
- *The building will not comply with EEBCs.”*

## Technical

- *“Low E-coating windows are not available in the market.”*

## Capacity Building Aspects

- *“Lack of qualified construction workers to implement EE recommendations e.g. double walls and thermal insulation.”*

# Egypt : Misr Al-Ghad



Name of project developer	Misr Alghad
Description of the building type(s)	Mixed Use: residential + office+ spa
Size of conditioned floor area in sqm	2578 sqm
Location	Heliopolis, Cairo
Status of construction phase	Under construction (skeleton)
Investment costs	972,540 € (excluding land price)

## Financial Aspects

- “Lack of awareness of available finance, fund, incentives and opportunities.
- Long and complicate procedures of the available finance/fund opportunities.
- Most end-users of the units are unaware of the benefits of EE and would probably refuse any additional costs for the units.
- A lot of owners will rent out the units and are not concerned about reducing the operational costs of energy”

## Regulatory and Policy

- “The building will not comply with EEBCs as the developer is not informed about them.
- No mandatory regulations regarding EE measures are in place, even in new urban communities.”

## Technical

- “Installing PVs on the roof is challenging as the roof is used for other purposes like roof terrace and pool
- The EE materials and systems are available but are more expensive comparing to the conventional materials and systems.”

## Capacity Building Aspects

- “Lack of qualified construction workers to implement EE recommendations.
- Architects don’t suggest the implementation of EE passive measures in the design process.”

# Egypt : Palm Hills, BADYA



Name of project developer	Palm Hills
Description of the building type(s)	MFH
Size of conditioned floor area in sqm	2000 sqm
Location	Sixth of October City
Status of construction phase	Conceptual Masterplan for the entire project, detailed design for Phase 1; construction initiated on Sep. 2019
Investment costs	15 Bil € (overall project)

## Financial Aspects

- *“A national bank offered a green loan, but the offer wasn’t mature enough as benefits and details of the loan were unclear.*
- *One of the target groups of the project are people living abroad who are planning to return and seeking better living conditions in Egypt. It can be assumed that they are aware regarding the benefits of sustainable measures*
- *A high-level involvement of an international environmental consultant is used for branding purposes*
- *Buyers are not necessarily the end users as many buy the units for investment.”*

## Regulatory and Policy

- *“The project consultant tried to use sustainable measures but not necessarily the EEBC.*
- *EEBCs should be mandatory, and stakeholders should be well informed about such codes.”*

## Technical

- *“Thermal insulation in walls could be used in commercial buildings, as these buildings are operated by the project developer and the savings are immediately harvested*
- *Double and triple glazing are not implemented due to their high cost.*
- *Some of the EE materials and system are imported and require time and additional costs to receive them.”*

## Capacity Building Aspects

- *“Increasing the understanding/awareness of the benefits of EE/RE measures in Egypt could be a strong driver, but it’s not the current case.”*



# Egypt : New Mansoura University – Library Building



Name of project developer	NUCA
Description of the building type(s)	Library Building
Size of conditioned floor area in sqm	12,000 sqm
Location	New Mansoura City
Status of construction phase	Design phase
Investment costs	overall university 436 Mil € (Library 15 Mil €)

## Financial Aspects

- “Budget is limited for a governmental developer with limited chances to invest more in EE measures.
- In 2017, a national bank had a program to support EE in the building sector, but procedures were not clear or not appropriately announced.”

## Regulatory and Policy

- “The building design does not comply with the EEBCs.
- The governments EE policies do not put the building sector in focus. For example, enforcement of the EEBCs is not priority of the government. The priorities are still to provide/meet the basic demands.”

## Technical

- “All EE products are available in the market. The high construction rates sometimes result in shortages in some materials.”

## Capacity Building Aspects

- “The knowledge of EE provided in university is sufficient, with limited chances to practice EE in real projects.
- The knowledge of craftsman and construction workers about EE measures are limited. “

# Summary of Surveys with PPs Developers in Egypt

## Financial Aspects



Limited EE finance opportunities with partly unclear procedures and insufficient dissemination

- The cost effectiveness is the key driver for developers and end-users to invest in EE
- Limited number of financial incentives and funding schemes in the EE in the building sector.
- Lack of awareness about the available funding and financing schemes.
- Most of those programs treat the requests on a case-by-case basis with no clear procedures to follow, therefore financing is not guaranteed

## Regulatory and Policy



Lack of awareness about EEBCs and code is not embedded in permission process

- Most of building projects developers are not aware of the EEBCs in Egypt.
- There is no clear procedures to comply with EEBCs. Compliance with EEBCs is not part of the building permit procedures.
- There is no clear classification for EE of the buildings the processes of construction.
- The vast majority of buildings do not comply with EEBCs.

## Technical Aspects



EE and RE systems are available but with higher costs. The price gap is perceived as high, but no life cycle costs are taken into consideration.

- EE and RE systems and technologies are available in the market.
- The installation of HVACs systems are the responsibility of end-users.
- Higher costs of EE systems e.g., VRF air conditioning.

## Capacity Building Aspects



Increasing awareness among design teams and construction workers is needed.

- Lack of technical capacities of construction workers about EE measure and sustainability in general.
- For example, proper implementation of thermal insulation is a challenge in several cases.

# Jordan





# Example from Jordan : KONN Modular Houses



Name of project developer	KONN
Project name	KONN
Description of the building type(s)	Modular SFH
Size of conditioned floor area in sqm	70
Location	A Suburb of Amman
Status of construction phase	Constructed
Investment costs	TBD

## Financial Aspects

- *“The cost effectiveness is the key driver for clients to invest in EE.*
- *There is a lack of awareness about the available financial incentives in Jordan.*
- *Most of those fund/finance programs deal with case by case and with no clear unified procedures to follow and therefore granting the finance is not certain.”*

## Regulatory and Policy

- *“There is a lack of awareness about the EEBCs in general.*
- *The EEBCs does not cover the process of construction but rather focusing only on the building components as end product.”*

## Technical

- *“Some EE solutions are not culturally preferred and not sufficiently available in the market (e.g. External Thermal Insulation Composite System - ETICS) as “Jordan house owners prefer a massive façade”*

## Capacity Building Aspects

- *“A limited number of architects and engineers are interested in sustainability*
- *There is a lack of awareness among construction workers about EE measures.”*

# Jordan : A Private Villa



Name of project developer	Qusus Family House
Description of the building type(s)	SFH
Size of conditioned floor area in sqm	455 sqm
Location	Amman
Status of construction phase	Design phase
Investment costs	

## Financial Aspects

- *“The design team is not aware of any available funds for EE in Jordan.*
- *End-users are not willing to invest more than 5% of additional costs for EE measures with not more than 5 years of payback period.*
- *There are no coherent and integrated EE solution that can be applied in the markets with definitive sourcing and pricing.”*

## Regulatory and Policy

- *“There is a lack of awareness about the EEBCs.*
- *The building will only comply with the thermal insulation code (among the seven relevant EE codes in Jordan).”*

## Technical

- *“Reversible split unit and LPG boilers are the preferred space heating system. This is mainly due the price, availability and technically ease in the operation phase.”*

## Capacity Building Aspects

- *“It is important to offer training and capacity building for construction workers by providing the proper and easy-to-use tools/platforms, while conducting intensive practical courses and workshops.”*



# Summary of Surveys with PPs Developers in Jordan

## Financial Aspects



Limited schemes for EE finance opportunities and offerings targeting the wide spectrum of real estate projects

- The cost effectiveness is the key driver for buildings end-users to invest in EE measures.
- There is a lack of awareness about the available financial incentives for EE in Jordan.
- Most of those fund/finance incentives programs do not offer a clear procedures to obtain the fund.
- The design team and the owner were not aware of any financial incentives.

## Regulatory and Policy



High compliance with thermal insulation code, but other EE/RE related codes are not known

- Well-elaborated and developed EEBCs codes.
- The EEBCs does not cover the process of construction and the operation of the building but rather the codes focus on the building components.
- There is no clear classification for EE of the buildings the processes of construction.
- Most of the buildings comply with the thermal insulation code but not all EEBCs

## Technical Aspects



Most EE systems are available in the market, it needs to be ensured that they are installed in appropriate manner

- Most of the EE solutions and technologies are available in the market.
- The installation of EE/RE measures are sometimes problematic.
- Some thermal insulation are not culturally accepted “Jordanian prefer to have a massive face”.

## Capacity Building Aspects



Increasing awareness among construction workers is needed.

- A limited number of architects and engineers are interested in sustainability.
- There is a strong need to provide certifications and trainings for construction workers to ensure a higher quality

# Lebanon



# Lebanon : Collège Notre Dame de Nazareth Extension



Name of project developer	Collège Notre Dame De Nazareth
Description of the building type(s)	Amphitheatre and multipurpose hall
Size of conditioned floor area in sqm	2753 sqm
Location	Beirut
Status of construction phase	Design phase

## Financial Aspects

- *“Buyers are sometimes are not that interested in EE, because of the high subsidies on electricity (EDL), particularly in Beirut because of electricity blackouts are not frequent as outside Beirut. For example, The payback of EE measures of project in Dubai is estimated to be 1.5 years but it will be in Beirut 8-10 years for the same project mainly because of energy subsidies.*
- *Several projects have received loans with a low interest rate from NEEREA. The process was not complex, but it has stopped because of the financial crisis.*
- *For the developers selling the units, they would not accept any additional costs as their end-users/clients are not well aware of EE and RE. The issue is different with developers who will operate the buildings and may accept up to 8% additional costs for EE measures.”*

## Regulatory and Policy

- *“International certification schemes will not help a lot to get NEEREA or financial support as they are not directly recognized by banks and separate verification of EE must be completed.*
- *Mandatory Classification scheme of EE of buildings is very important.*
- *Lebanon has already tax-reduction for EE products and systems, this measure is in current times not sufficient as the importing is in general problematic.”*

## Technical

- *“All relevant systems and materials of EE are available in the market. Recently, the heat recovery units and heat pumps for hot water generation became kind of new trends and spreading in the market.”*

## Capacity Building Aspects

- *“There are no proper programs to educate and certify technicians to implement EE measures. Additionally, there is no obligation for them to be certified. Certifying technician and installers would be of a great importance.*
- *More publication to raise awareness about EE among the end-users to tempt them to buy/invest more EE and EE buildings in general.*
- *At the municipality level, the awareness about EE and RE is not raised.”*



# Lebanon : Kye Beachfront Resort



Name of project developer	Rise Properties, Saab Marina
Description of the building type(s)	Residential
Size of conditioned floor area in sqm	11,200
Location	Tabarja
Status of construction phase	Under construction

## Financial Aspects

- *“The developer will be the operator of large parts of the project, therefore there is a high interest in EE measures to reduce the operational costs.*
- *Energy subsidies remain one of the obstacle for EE.*
- *The process of applying for funds or incentives is complex and time consuming. The process should be simplified.”*

## Regulatory and Policy

- *“It is recommended to propose a different regulatory/administrative paths for Green projects / EE building projects. those projects should not follow the same lengthy procedures of other BAU buildings. Speeding up the building permits process may be a strong incentive/driver to construct more EE building projects.”*

## Technical

- *“In general, /average, all products are available, but they are all (mostly) imported with higher prices. The locally manufactured products/systems may not meet the project specifications.”*

## Capacity Building Aspects

- *“There is a need for training, webinars, certificates regulated by government or profession entities.”*

# Lebanon : KLEOS



Name of project developer	Hayek Group
Description of the building type(s)	Residential (+penthouse)
Size of conditioned floor area in sqm	15,000
Location	Beirut
Status of construction phase	Design phase

## Financial Aspects

- *“NEEREA is a lengthy and complex procedures.*
- *It is important to simplify the procedures of EE financial incentives/loans.*
- *Not all banks are embedded in those financing mechanisms/facilities/programs.”*

## Regulatory and Policy

- *“To save efforts and time, it is recommended to adopt EU standards. Most of the standards can be localized and adopted in the Lebanese context.*
- *Classification scheme of EE of buildings will ease access to financing.”*

## Technical

- *“Most / all of the EE products/materials are available in the market. No restriction to import new technologies but importing is not easy because of the financial crisis.”*

## Capacity Building Aspects

- *“Generally, not all architects and teams have experiences with EE but for the large and important projects, the teams are well informed about EE with sufficient experiences. EE is also seen as a new trend in the market.*
- *It is important to prepare more of seminars and workshops to communicate more with professionals in the field. For example, it is possible to prepare a workshop with Order of Engineers and Architects in Beirut (OEA) in Lebanon.”*



# Lebanon : Frames / Baasir



Name of project developer	Cipher Architects
---------------------------	-------------------

Size of conditioned floor area in sqm	4100
---------------------------------------	------

Location	Baasir, Chouf
----------	---------------

Status of construction phase	Under construction
------------------------------	--------------------

## Financial Aspects

- *“Banks in Lebanon used to offer funding schemes, but this is not the case anymore because of the current financial crisis.”*
- *Prices of appliances and EE systems have almost tripled because of the current crisis.”*

## Regulatory and Policy

- *“There is a lot of bureaucratic burdens to comply with the building regulations.”*
- *Market is not well regulated in terms of the supply e.g. inverter for PV systems.*
- *Some policy instruments such as tax incentives of RE are not well implemented because of the disparities of exchange rates. PV should be exempted from taxes, but this exemption is calculated based on the official rate of 1\$=1500 LBP where the real exchange rate is around 1\$= 16000 LEP.”*

## Technical

- *“Because of the frequent electricity blackouts, there is a boom in installing PVs in Lebanon.”*
- *The main challenges of installing PVs are the costs and maintenance of batteries.”*

## Capacity Building Aspects

- *“The technical capacity of workers to implement EE is limited.”*
- *Awareness among end-users is needed*
- *Awareness is also needed about the financial models and benefits of EE measurers in general.”*

# Summary of Surveys with PPs Developers in Lebanon

## Financial Aspects



Financial crisis stopped all EE financing schemes.

- NEEREA was successful in supporting many EE building projects. However, it stopped because of the ongoing financial crisis in Lebanon.
- The process of applying for funds or incentives is (was) complex and time consuming.
- Lebanon implements a tax-reduction for EE products and systems, but the current financial crisis hinders benefiting from such incentive.

## Regulatory and Policy



Weak or no regulative framework for EE/RE

- There is a lack of awareness about the EE standards.
- The EE standards are not included in the building permits process.
- Lack of standards related to material thermal performance
- Energy conservation law presented several times, however amendments requested which delayed its ratification.

## Technical Aspects



Energy Efficient systems are available in the market as they are mainly imported the price tripled because of the current crisis

- EE solutions and technologies are available in the market. However, they are mostly imported and due to the financial crisis, it becomes more challenging to import all necessary systems in a propriate timing and coping with the increased currency exchange rates .

## Capacity Building Aspects



Skilled architects and engineers exist, they focus rather on large projects. While for “standard projects” an increasing of awareness is needed.

- The technical capacity of workers to implement EE is limited.
- Generally, not all architects and teams have experiences with EE but for the large and important projects, the teams are well informed about EE with sufficient experiences.
- At the municipality level, the awareness about EE and RE is not sufficiently raised.

# 5. Conclusion



# General Situation and Impact on the Building Sector



**EGY**

## Thriving for Investment

The construction sector growth in Egypt is estimated to be between 5% to 9% in the last few years. Those levels are expected to grow with the new constructions in the new cities developed by NUCA in the suburbs around the existing cities.

Interest on EE is gradually increasing due to the governmental plans to phase out energy subsidies by 2023.



**JOR**

## Stagnation of new building construction

The rate of the new constructed residential buildings in Jordan has decreased by 33% in 2019 (comparing to 2018). The main reason for this drop is the macroeconomic situation in Jordan that was strongly affected by the regional conflicts especially the Syrian crisis.

The higher inflation rates and higher prices of energies increases the interest on EE in the building sector.



**LEB**

## Political & Economic Bottleneck

While official statistics are scarce, it could be observed that the political and economic crisis, COVID-19 and Beirut Explosion have significantly slowed the growth of construction sector..

Shortage in fuel supply , constraints on imports, and electricity blackouts increase the interest on RE measures. Solar PV systems are being installed at unprecedented rates in Lebanon.

# Lessons learnt – General motivation of project developers

## Interest in Energy Efficiency is gradually increasing

### Reasons listed by developers to invest in energy efficiency

- Higher prices of energy (oil, electricity, gas and diesel) mainly due to high inflation rates and international rising energy prices
- To reduce the operational costs (where the developer will be the operator)
- Marketing their projects as “green development” (mentioned by limited number of developers)
- Egypt: Governmental plans to phase out energy subsidies
- Lebanon: widespread electricity outages and lack of fuel (e.g. diesel)

### Reasons listed by developers to not invest in energy efficiency

- The additional costs of energy efficient design, systems and materials
- Lack of technical capacities of staff, designers, construction workers to implement EE solutions
- Unclear procedures / inexistence of EE funding and financing schemes
- Lack of awareness of end-users and not willing to pay more



# Lessons Learnt - Financial Aspects

## Comparison with the three countries

### EGY

- Limited number of financial incentives and funding schemes exist for EE in the building sector. There is more focus on RE.
- Missing energetic baselines for buildings are still the major gap to accelerate finance

### JOR

- Financing schemes (e.g. JREEEF) focus mainly on RE installations, but do not offer holistic EE/RE packages for buildings.
- JREEEF targets only specific building types and customer groups.

### LEB

- NEEREA was successful in supporting many EE building projects. However, the program stopped, because the ongoing financial crisis in Lebanon.
- The process of applying for funds or incentives is complex and time consuming.

Confirm initial hypothesis that the development of a baseline can unlock the uptake of investments by attracting new financial players targeting the building sector (incl. residential sector). This is relevant for all three countries.

# Lessons Learnt - Regulatory and Policy

## Comparison with the three countries

### EGY

- Most building project developers are not aware of the EEBCs in Egypt.
- There is no clear procedures to comply with EEBCs. Compliance with EEBCs is not part of the building permit procedures.

### JOR

- Well-elaborated and developed EEBCs.
- In general, compliance with thermal insulation code is given, but not with other EEBCs.
- There is no benchmark for the energy performance of buildings.

### LEB

- The thermal insulation code has not been made mandatory.
- There is a lack of awareness about EE standards.
- In general, there are a lot of bureaucratic burdens to comply with the building regulations.

The EEBCs need to be simplified and updated; a focus should be put on awareness rising and enforcement (e.g. embedding the application procedure in the standard construction permission process). Construction site visits should ensure a proper implementation. The whole process needs to be monitored and evaluated. Jordan is slightly more advanced in the process. In all three countries building relevant measures are captured in their NEEAPs.

# Lessons Learnt - Technical

## Comparison with the three countries

### EGY

- EE and RE systems and technologies are available in the market but with higher costs.
- In the residential sector, the end-user (apartment owner) is responsible for the installation of HVACs systems, which hinders the influence of the project developer on the implementation of EE cooling supply.

### JOR

- Most of the EE solutions and technologies are available in the market. The proper installation of the building systems and envelope are sometimes problematic.
- Reversible split unit and LPG boilers are the preferred space heating systems.

### LEB

- The financial crisis complicates the import of several technologies and materials.
- There is an increased demand for roof-based PV systems. Therefore, the ministry of energy and water (MEW) developed a new facilitating mechanism.

In general, all relevant EE/RE technologies are available in all three countries. The lack of life cycle cost considerations and project developers only focusing on the initial costs lead to a perception of high costs. The comparable high energy costs in Jordan and Lebanon (mainly driven by diesel generators) improves the cost efficiency of EE/RE measures. Egypt is catching up with the constant removal of subsidies on energy.

# Lessons Learnt - Capacity Building Aspects

## Comparison with the three countries

### EGY

- Lack of technical capacities of construction workers about EE measures and sustainability in general.
- For example, proper implementation of thermal insulation is a challenge in several cases.

### JOR

- Young architects and engineers are not fully aware of the benefits of sustainability.
- There is a strong need to provide certifications and training for construction workers to better qualify them to construct EE measures.

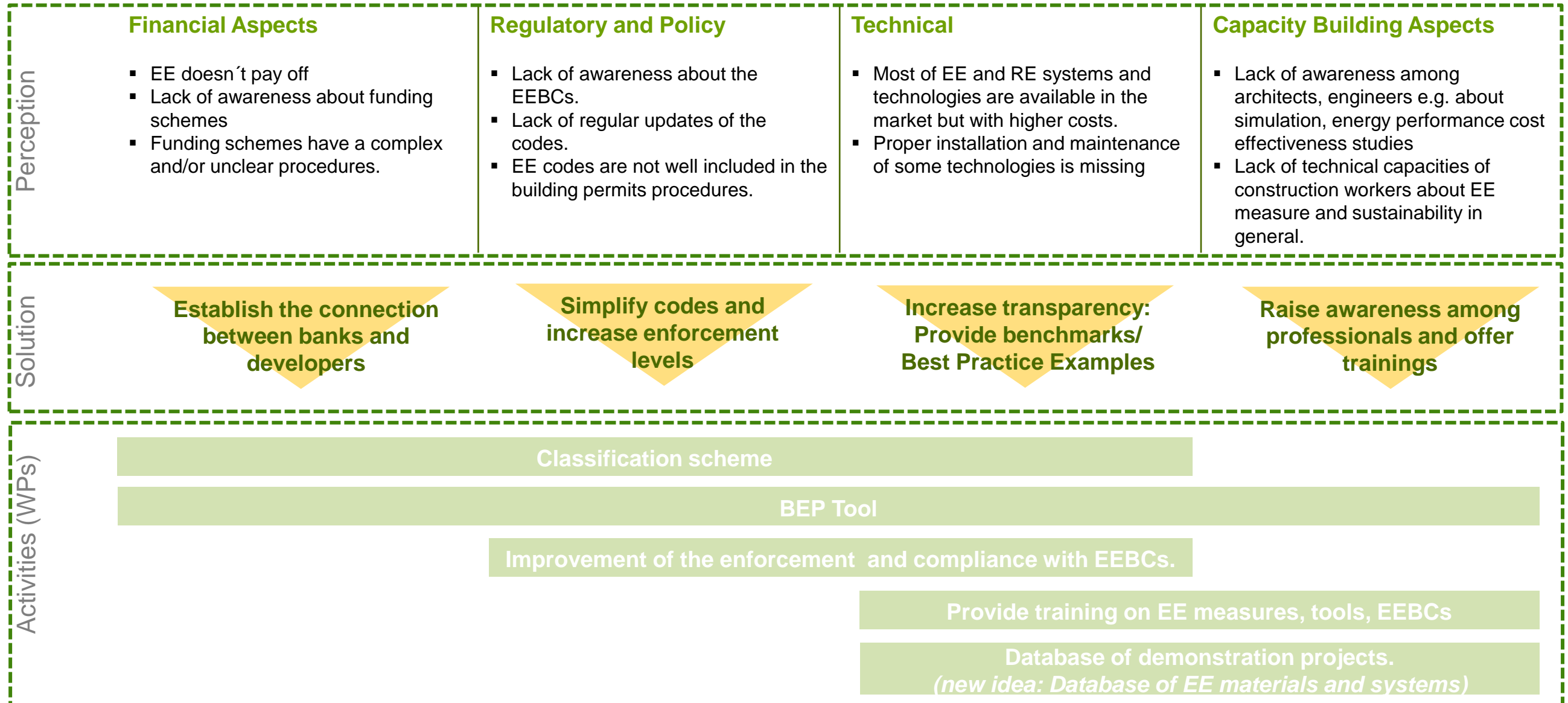
### LEB

- The technical capacity of workers to implement EE is limited.
- At the municipality level, the awareness about EE and RE is not sufficiently raised.

All countries see a need in broader awareness raising and training, the biggest gaps are stated for craftsmen. Only a limited number of architects and engineers are aware of the benefits of sustainability, but the interest is growing. We have observed during our cooperation with the PPs, that the Lebanese counterparts were the most interested, probably this is related with the increased need to overcome unsecure energy supply and high operational costs. The project developers in Egypt were the least interested, possible reasons are the lack of enforced EE regulations and the low energy costs, but also here a change can be observed, driven by the steady increase of operational costs.



# Initial perception, solution and link to BUILD\_ME activities



# Overall conclusion of the technical assistance

The technical assistance offered to the project developers of the pilot projects was enriching for all involved parties

## Benefits for the project developer

- Received a thorough consultancy on the energy saving potential tailored to his ongoing project
- Highly visible technical report analysing the cost efficiency of the most relevant EE/RE measures
- A clearer picture on the available products (EE/RE measures) in the respective country
- Training on the BEP Tool
- All project developer stated that they would work again with the BM team and the majority confirmed that they will use the BEP Tool in their future projects

## Benefits for the BUILD\_ME Team

- Confirmation of boundary condition assumptions used in the BEP Tool (Opex, Capex etc.)
- Further user-friendly design of the BEP Tool by adding more common financial indicators like pay back period and more transparent table illustrating investment costs
- Insights on real-life experiences:
  - Regulative processes
  - Availability of technologies in the market and importing new ones to the market
  - Technical implementation
- Received the confirmation from the project developer that the BEP Tool is an easy to use tool to assess the energy and economic performance of their projects.

## 6. Country stories





# Egypt





# Investments hinder EE

How real-estate investment may obstruct EE?



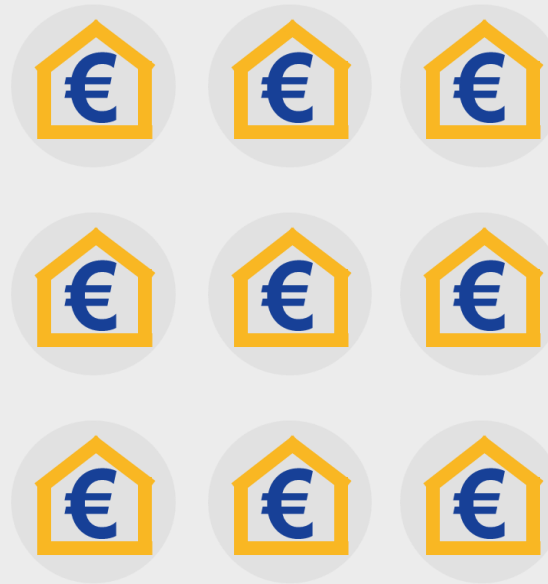
## The developer

### The price tag with secured investment

Additional costs of EE measures may hinder the units' competitiveness in the market.

PVs, STs were not possible as the roofs are used for other purposes

Limited number of buyers/clients who will use the units are concerned about EE.



## The buyer

### Operational costs and EE are not the priority

The main driver is to invest the money in a property to be sold later or used it for their second generation and/or rent it out.

Limited number of buyers will be the end-users of the unit



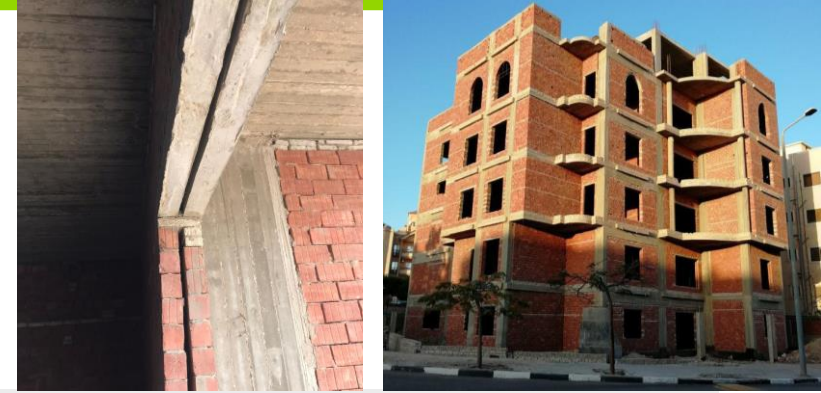
**12.5** million vacant housing units

**30%** of total housing units

**65%** vacancy rate in the new cities

# EE Challenges across the project phases

## Hotel apartments building in Cairo



### The developer is the building operator

- High interest to reduce the operational costs.
- Faced several challenges to construct an energy efficient building.
- Limited financial incentives from a few development banks. Long and unclear procedures make them not guaranteed and unreliable.



### 1 Design

- Limited number of qualified architects and engineers to design and plan EE building.
- Calculate the cost effectiveness of the EE measures was not possible.
- No Energy Service Companies (ESCOs)

### 2 Building Permits

- Procedures does not include EE requirements.
- EEBCs does not provide clear technical guidance and procedures. Its latest issue was in 2005

### 3 Tendering

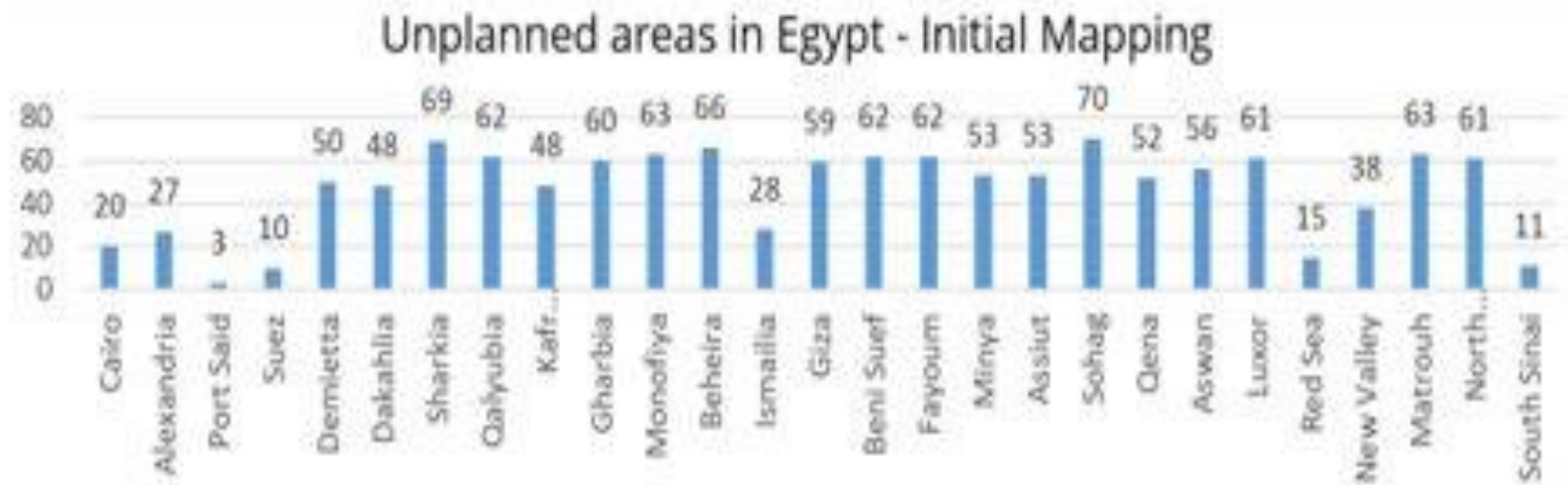
- It was not easy to find EE materials and systems in the market e.g. low E coating windows.
- Efficiencies of materials and systems are not well provided

### 4 Construction

- Lack of construction workers capacities to implement EE measures e.g. insulated double wall with no thermal bridges.

# Buildings Violations

A huge share of the existing building stock is in not planned and built in accordance to the building code, introducing (additionally) Energy Efficiency Building Code will be challenging.



S: <https://egyptindependent.com/unplanned-buildings-make-up-50-of-egypts-housing-blocks-madbouly/> seen 29th Oct 2021

## Unsafe Areas is around 1% of Urban Areas

- Unsafe areas include areas classified as Life threatening conditions, Unsuitable shelter, Health risks and/or Tenure risk.

## Unplanned Areas is around 40% of Urban Areas

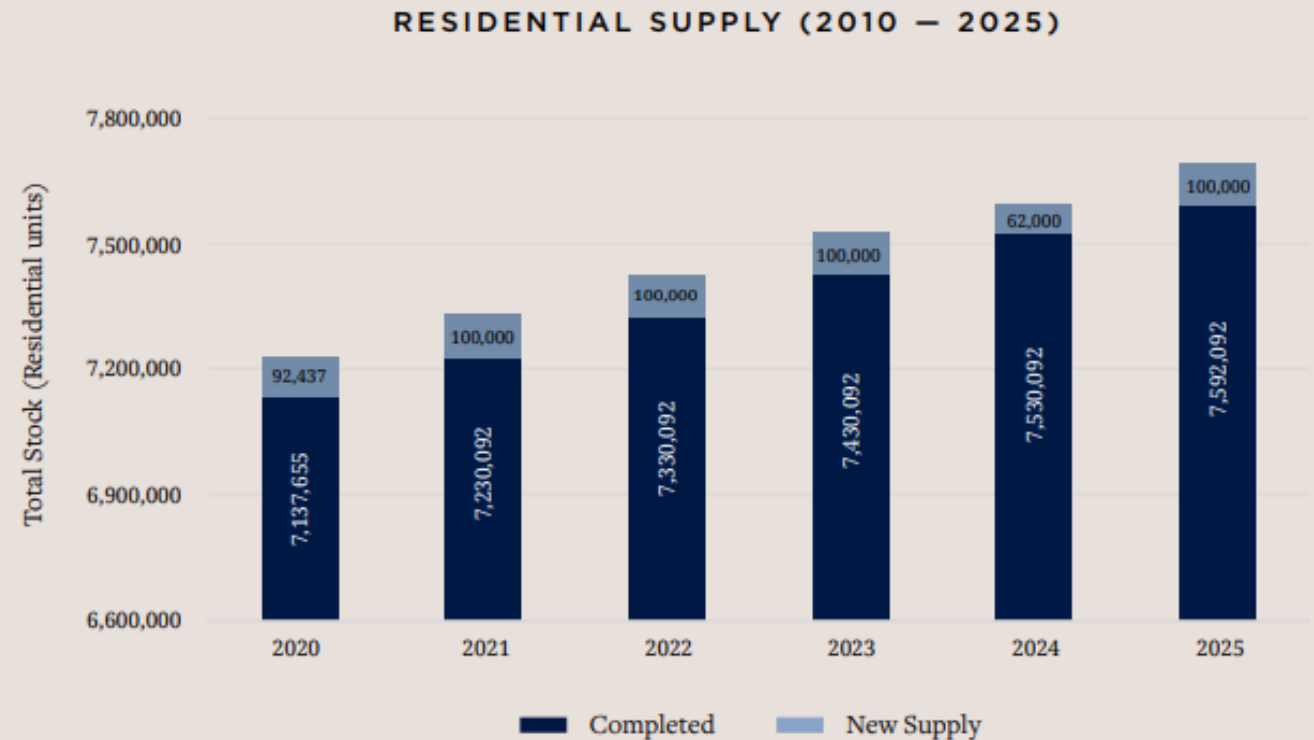
- Unplanned areas include buildings that have arisen in violation of laws and planning regulations.

# Rapid construction of new cities

## Possibility of including EE measures in newly constructed residential units

- The rapid construction of residential units allows for the integration of EE/RE measures.
- The governmental initiatives for creating affordable housing, allows for room to enforce several possible EE measures, such as improving the building envelope and solar water heaters.
- The attractive cost efficiency of PV, could create opportunities to utilize the roofs of the large-scale residential projects provided by the government or the private sector.

Source: [https://www.savills.com.eg/pdf/savills-egypt-property-report-2021---en-\(1\).pdf](https://www.savills.com.eg/pdf/savills-egypt-property-report-2021---en-(1).pdf)



SOURCE CAPMAS & SAVILLS RESEARCH



# Jordan



# Ownership structure impedes EE

## Multi Family Houses: Challenges across the project phases



### The developer is not the building operator

- No interest to reduce the operational costs
- The owner decides how efficient the building should be developed
- Financial incentives for this type of buildings are hard to obtained due to the share of roof and space with other owners.



### 1 Design

- The dwellings in the MFH shall be identical which creates a limitation to provide customized designs.
- Calculate the cost effectiveness of the EE measures was not easy.
- Limited Energy Service Companies (ESCOs)

### 2 Construction

- No follow up on the implementation of codes.
- Application of the thermal insulation could be performed wrongly

### 3 Appliance Selection

- The owner of the apartment decides on the appliance for heating and cooling completely
- Not enough space to install PV or solar thermal systems

### 4 Operation

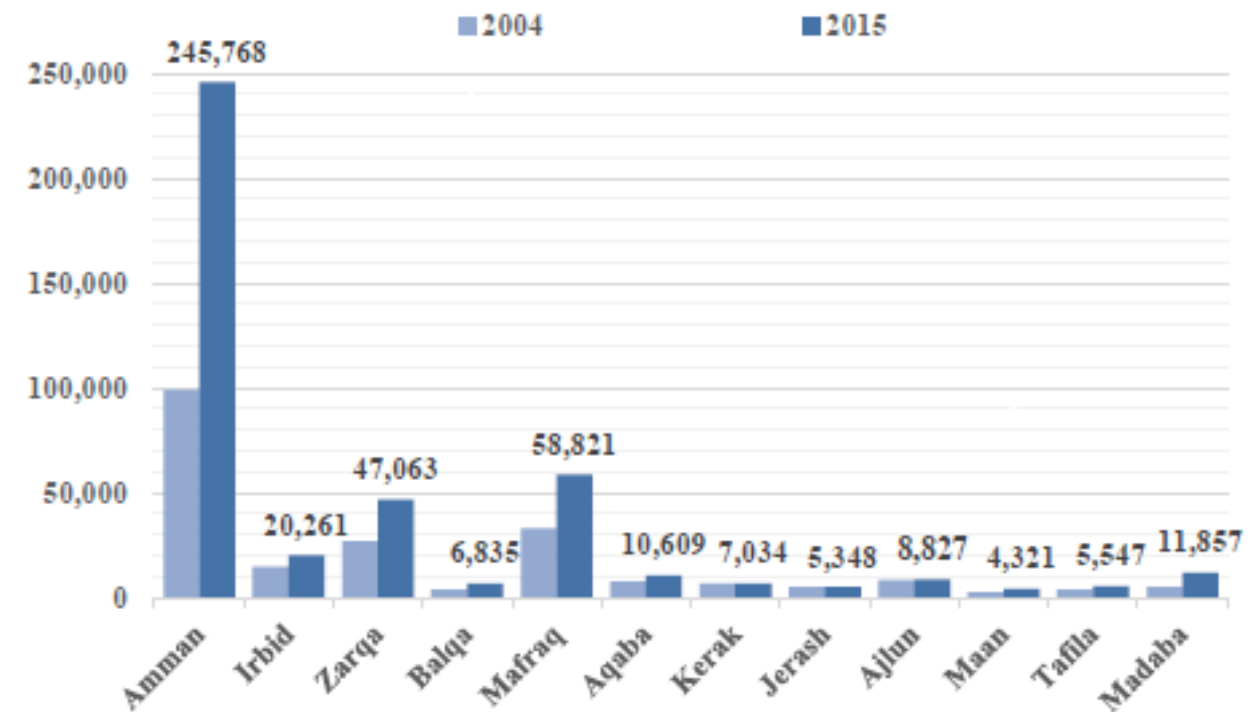
- The developer is not responsible for the building operations
- Each dwelling will be operated separately

# Missmatch of supply and demand in the residential sector

No sufficient supply of affordable housing and vacant costly homes (S: 2018, World Bank, JORDAN HOUSING SECTOR REVIEW)

- “Jordan’s housing needs are driven in the last decade by exceptionally rapid population growth”
- “Jordan has produced sufficient housing units to host its total population, but the vacancy rate has remained, reaching 18.4 % (2015)”
- “The quantitative housing deficit in Jordan is close to 10 percent at a national level (2015)”
- “Only 30 % of households can afford to buy houses above 100m<sup>2</sup> without spending more that 30 percent of their monthly income; in Amman, this is limited to only 10 % of households”

Figure 10: Vacant Units per Governorate 2004-2015



Source: Prepared by authors using Jordan Census 2015, Table 2.1



# Holistic approach developing affordable housing

Modular, Sustainable and Affordable Houses



**8** Weeks Delivery Time

**30k** Euro Construction Costs

**22** kWh/m<sup>2</sup>a final energy demand

## A comprehensive successful solution

- Considering the lack of ESCOs and sustainably architects, KONN offerings of a modular turn-key solution proofed to be A comprehensive approach offering an affordable packaged solutions.
- Energy efficient, renewable energy powered, manufactured single family houses. Optimized to reduce both investment and operational cost.
- KONN started in 2019, in 2020 they were able to construct 3 EE houses with several other projects under construction.



# Lebanon



# Barriers in current times and the effects of the crisis

## At least two main facts freezing any EE project at the moment

- Economic crisis including weakening of the banking sector and risk of deposits; Lebanese Lira devaluation resulted in a hyperinflation rates and severe economic shrinkage, and in addition to decreased purchasing power of Lebanese households.
- Housing loans crisis since 2017 in addition to the decline in foreign investments in real estate resulted in a stagnation and low rates of new construction.

### Devaluation of Lebanese pound

- *“Lebanon is in the throes of a deep economic meltdown that is threatening its stability. The World Bank has called it one of the deepest depressions of modern history.*
- *the Lebanese pound was trading at around 15,150 to the dollar, losing around 90% of what it was worth in late 2019, when Lebanon's economic and financial crisis erupted.”*

S: <https://www.reuters.com/world/middle-east/lebanon-currency-drops-new-low-financial-meltdown-deepens-2021-06-13/>

### High dependency on import of construction materials

- Production of cement decreased by 60% to 70% between September 2019 and February 2020.
- Flat Glass imports dropped from 11,597 tonnes in 2017 to 1,345 tonnes in 2020.
- MDF (used for doors) imports dropped from 18,325 tonnes in 2017 to 580 tonnes in 2020
- Windows/doors frames aluminum imports dropped from 359 tonnes in 2017 to 62 tonnes in 2020

# High vacancy rates don't allow efficient central solutions

## Residential Multi Family Houses



### The developer is the building owner and operator.

- The EE measures are constrained by the preferences of the clients.
- The large scale of the project facilitated importing the best available technologies.
- The low occupation rate of the apartments forced the developer to switch from centralized cooling system to multi split/VRF systems.

## 1 Design

- The developer had to change the design several times to ensure that the project includes what the clients want.
- The clients tend to prefer green roofs and areas which limited the available space for solar PV and SWH.

## 2 Tendering

- The systems and energy efficient materials are imported. The large scale of the project facilitated the importing process.
- During the construction phase that coincided with the banking crisis in Lebanon, no financial incentives were found for implementing energy efficiency measures.
- No tax reduction for importing energy efficiency measures.



# EE still not perceived as business case

## Residential, Retail, and Offices



### The developer

#### The price tag with secured investment

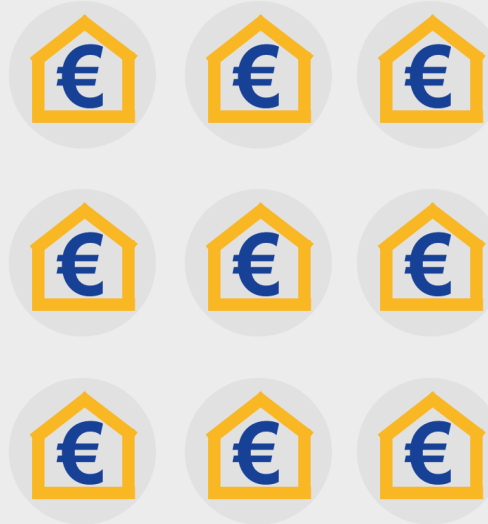
The cost of the energy efficiency measures are very high in Lebanon.

The cost of the apartments are not competitive in the market.

The clients are not willing to pay more even for energy efficient facilities.

The implementation of energy efficiency measures has been reduced several times because of the economic crisis.

MEP team is not aware of the latest energy efficiency measures.



### The buyer

#### Operational costs and EE are not the priority

The buyers prefer to buy the apartments before finishing phase so they would be able to modify freely. This constraints the developers in terms of applying EE measures.

The main driver is to invest the money in a property to be sold later and/or rent it out





# Opportunity

## Weak energy supply as possible driver for EE and decentralized PV

Unstable electricity supply with 9-12 h of outages increases the demand on decentralized diesel generators

Electricity produced by diesel-based generators

- Is expensive due to the gradual removal of energy subsidy.
- Shortages in diesel increasing the outages hours.
- Increases air and noise pollution.
- Generators are space consuming.

Increases the demand on RE technologies and makes the investment in EE and RE more financially feasible

- Reduction of load curves
- Reduction of consumption
- Reduction of emissions
- No additional space EE and for PV only specific room on the roof

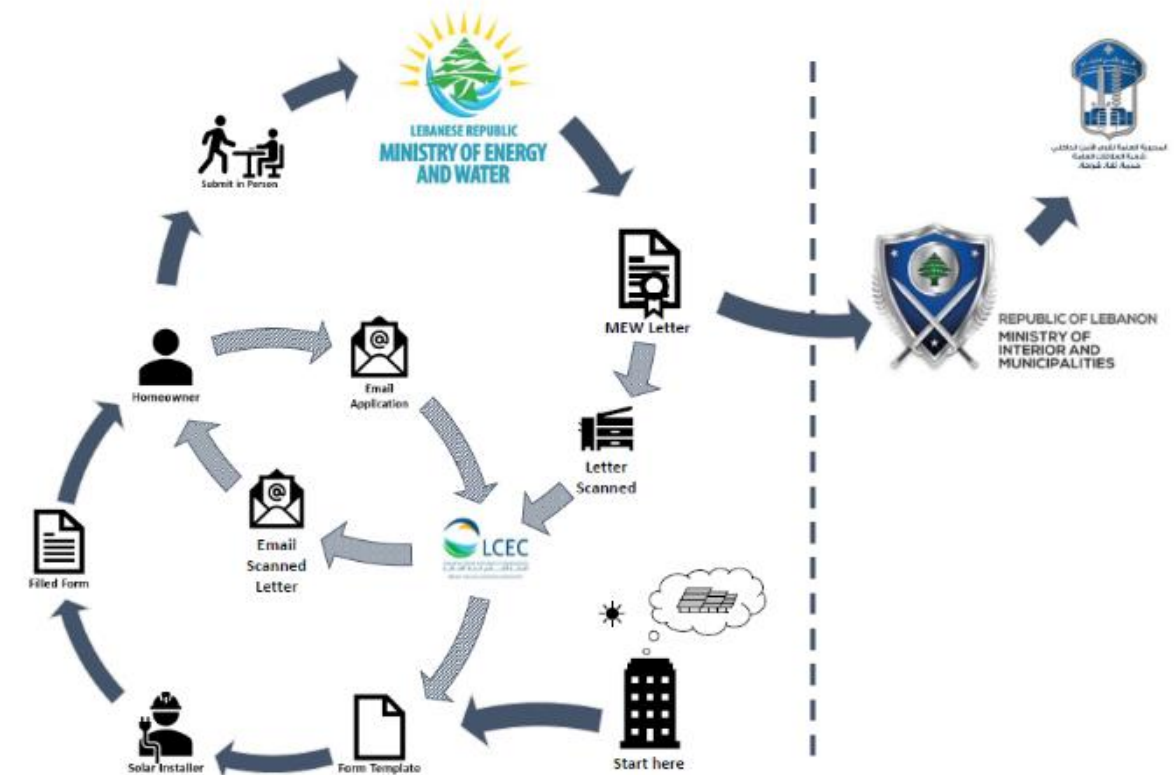
# Opportunities for EE in the Lebanese building sector

## A list of actions and recommendations to overcome the barriers

- How to overcome the fact that end-user doesn't have access to hard currency
  - Project developer replaces the bank (that is not able/willing to give a credit) and sells the units using a "lease format" similar to a loan mechanism but through the developer himself
- Opportunity for enforcing energy performance contracts (EPCs) through the ESCOs
- An amended version of the energy conservation law will be submitted soon to the GoL before sending it to the parliament to enforce the use of EE measures in all sectors not only the building sector
- Restructuring electricity tariffs as per the policy paper and the shortages in fuel imports leading to high energy bills would motivate the end-users to implement EE measures despite the economic crisis
- Local authorities have more chances to access international funds which could be used for EE and RE on a local level (municipalities, villages)

# A Procedure to enhance and regulate Rooftop Solar PV

- As a fruit of collaboration between the ministry of energy and water and the ministry of interior and municipalities, MEW developed a new facilitating mechanism for rooftop solar PV permissions.
- The aim of the procedure is to ensure the safety and quality of the solar PV systems installed for private purposes.
- LCEC plays central role in this mechanism as shown in the next diagram.



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**LCEC - LEBANON**

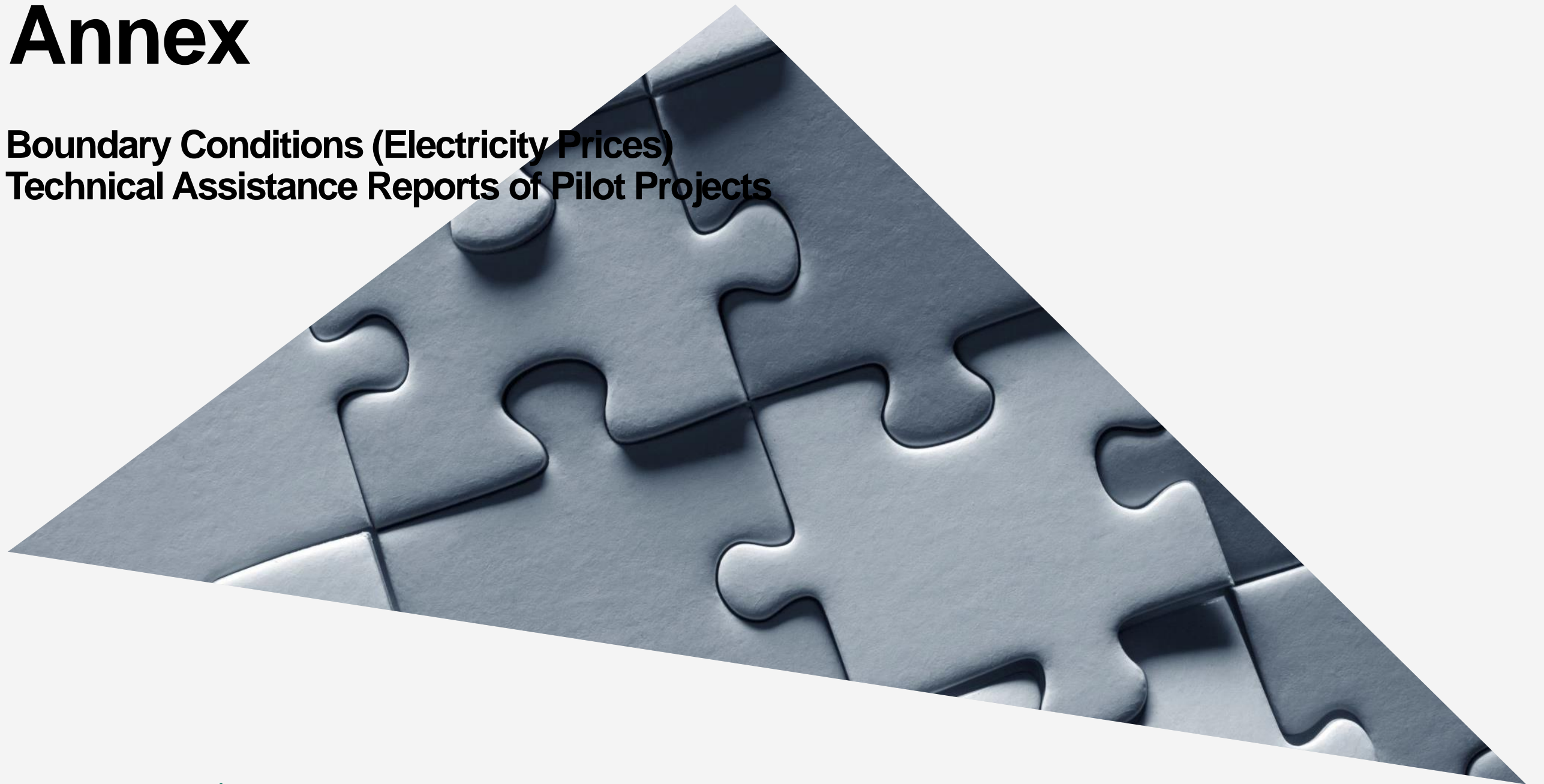
[Sorina.mortada@lcec.org.lb](mailto:Sorina.mortada@lcec.org.lb)

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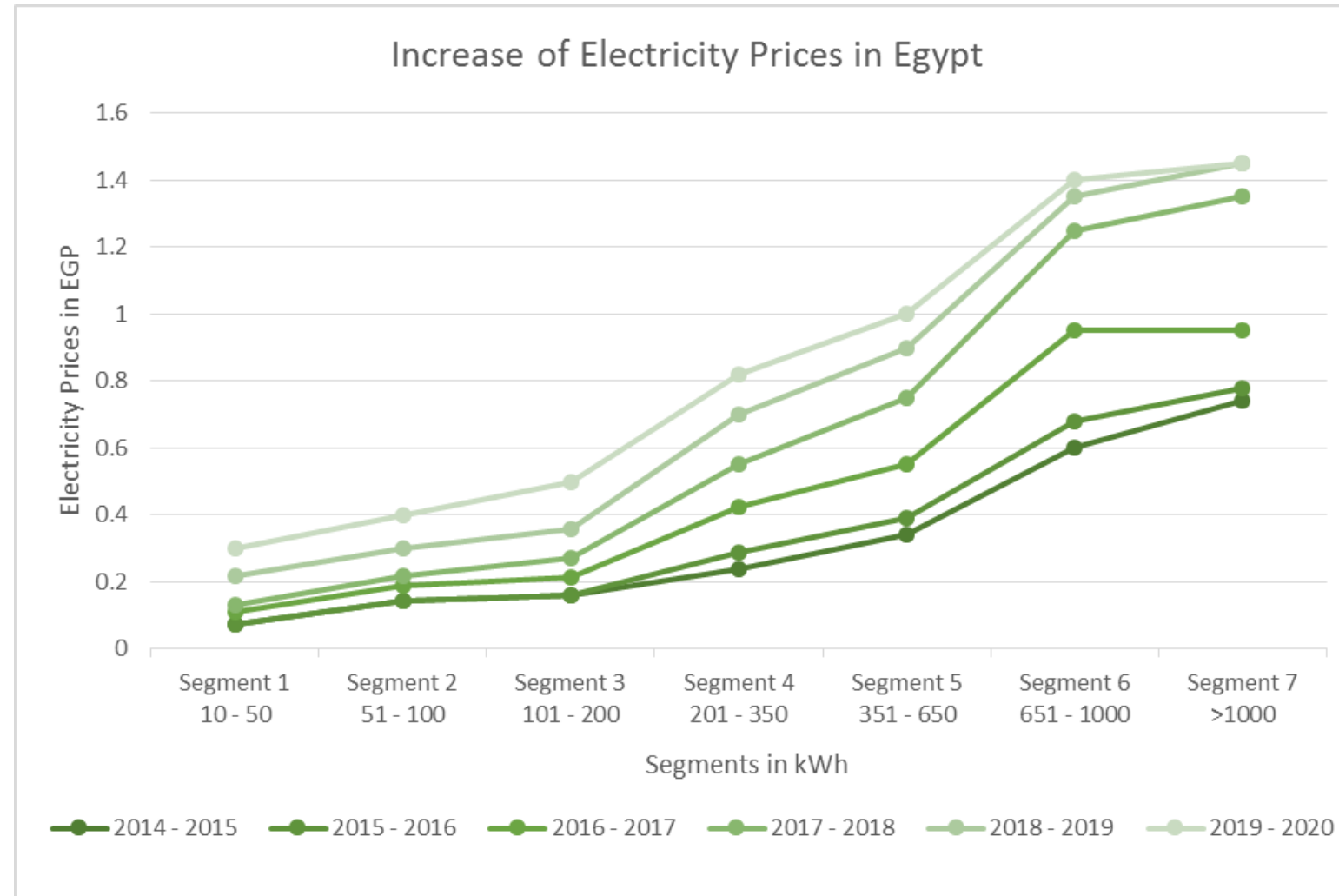
# Annex

## Boundary Conditions (Electricity Prices) Technical Assistance Reports of Pilot Projects



# Electricity price development in Egypt

Steady increase from 2014 – 2020 because subsidy removal

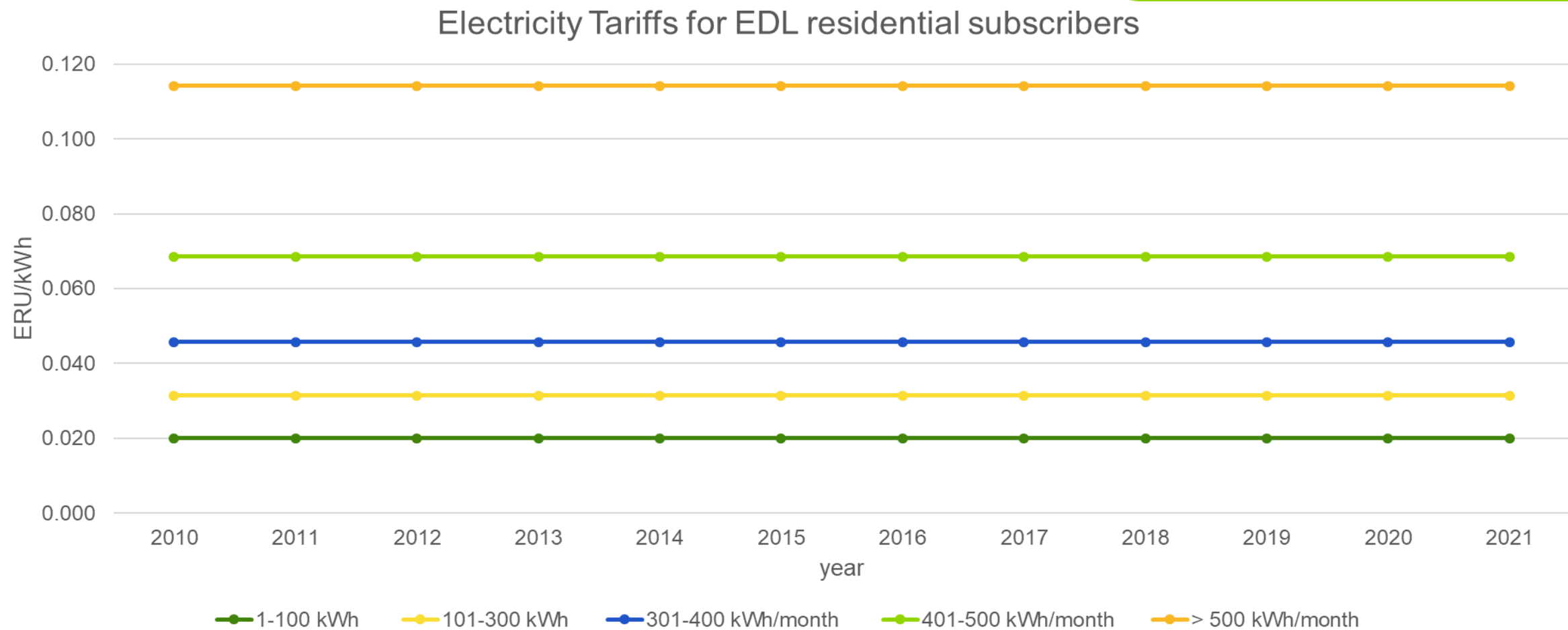


# Electricity Price in Lebanon

## Steady tariffs for electricity supplied by EDL

In addition to the consumed energy, the subscriber has to pay a monthly fees distributed as follows:

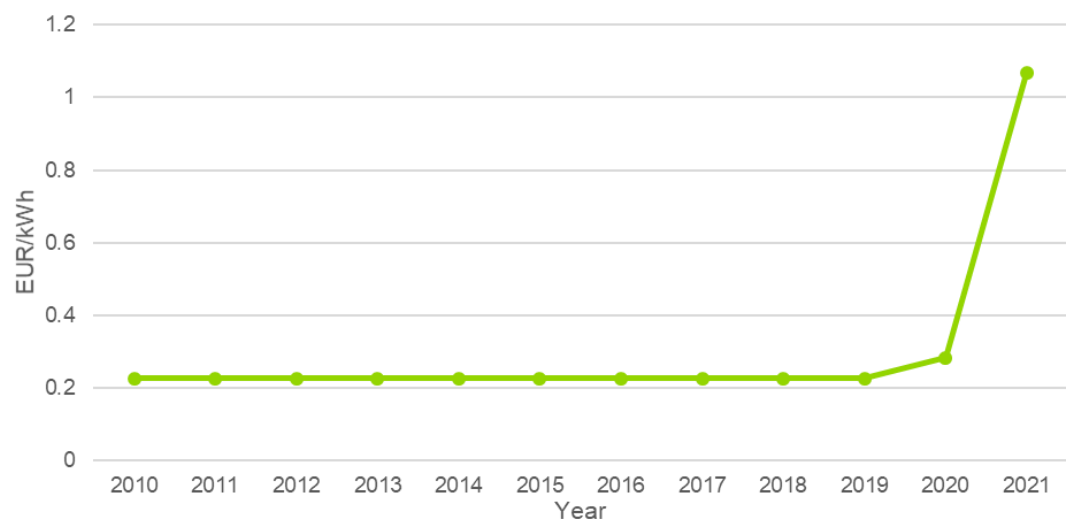
- Monthly constant Fee (0.14 EUR/A).
- Stamp Tax 0.57 EUR
- Rehabilitation Tax (it is a fixed monthly tax equal to 2.85 EUR for those for subscriptions less than 5k.v.a , and it is equal to 5.7 EUR for the subscriptions > than 10k.v.a .
- TVA 10% on the elements mentioned above combined with the price of the consumed energy



# Electricity Price in Lebanon

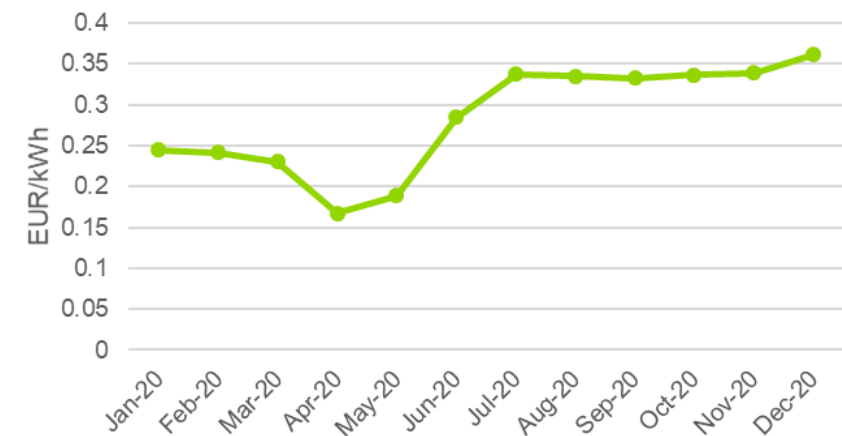
The generator's tariffs increased sharply in the recent years.

Tariff for Generators Subscribers (2010-2021)

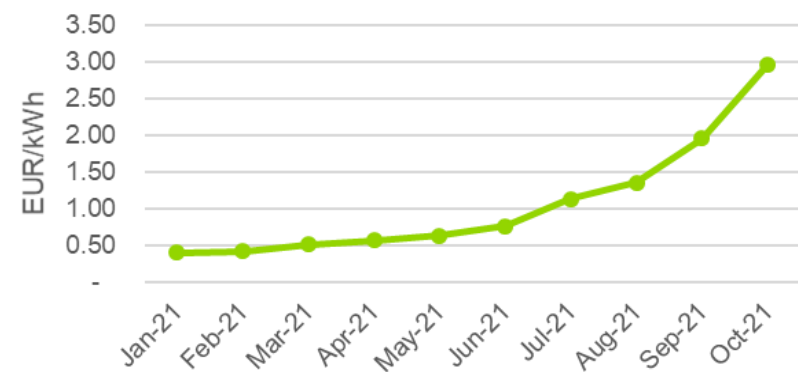


Each subscriber must pay monthly constant fees:  
5A max breaker capacity: 17.1 EUR  
10A max breaker capacity: 34.3 EUR  
October 2021

Generator's tariff development in 2020



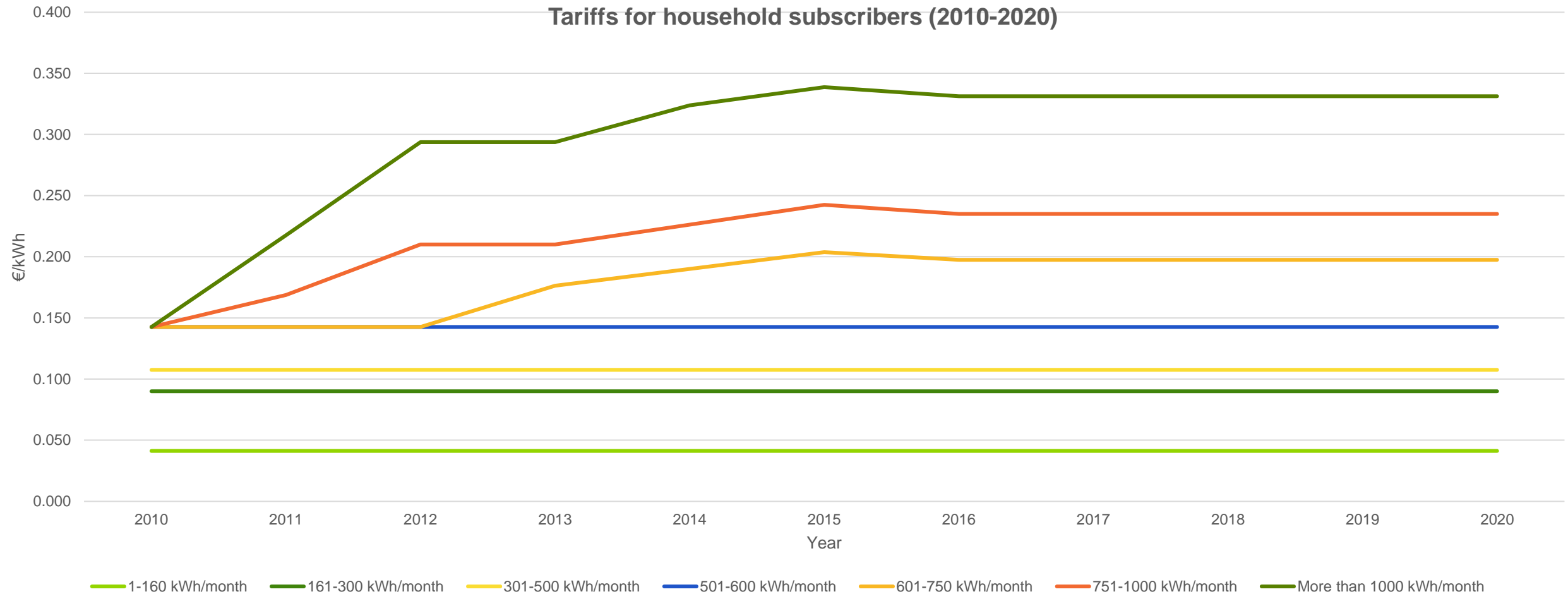
Generator's tariff development in 2021





# Electricity price development in Jordan

Higher tariff classes have increased since 2010 and saturated in 2015



# Technical Assistance Reports of the Pilot Projects

see: <https://www.buildings-mena.com/info/pilot-projects-phase-ii-2019-2021>

