Advancing Deep Retrofits in the UAE

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Suporting Sponsors

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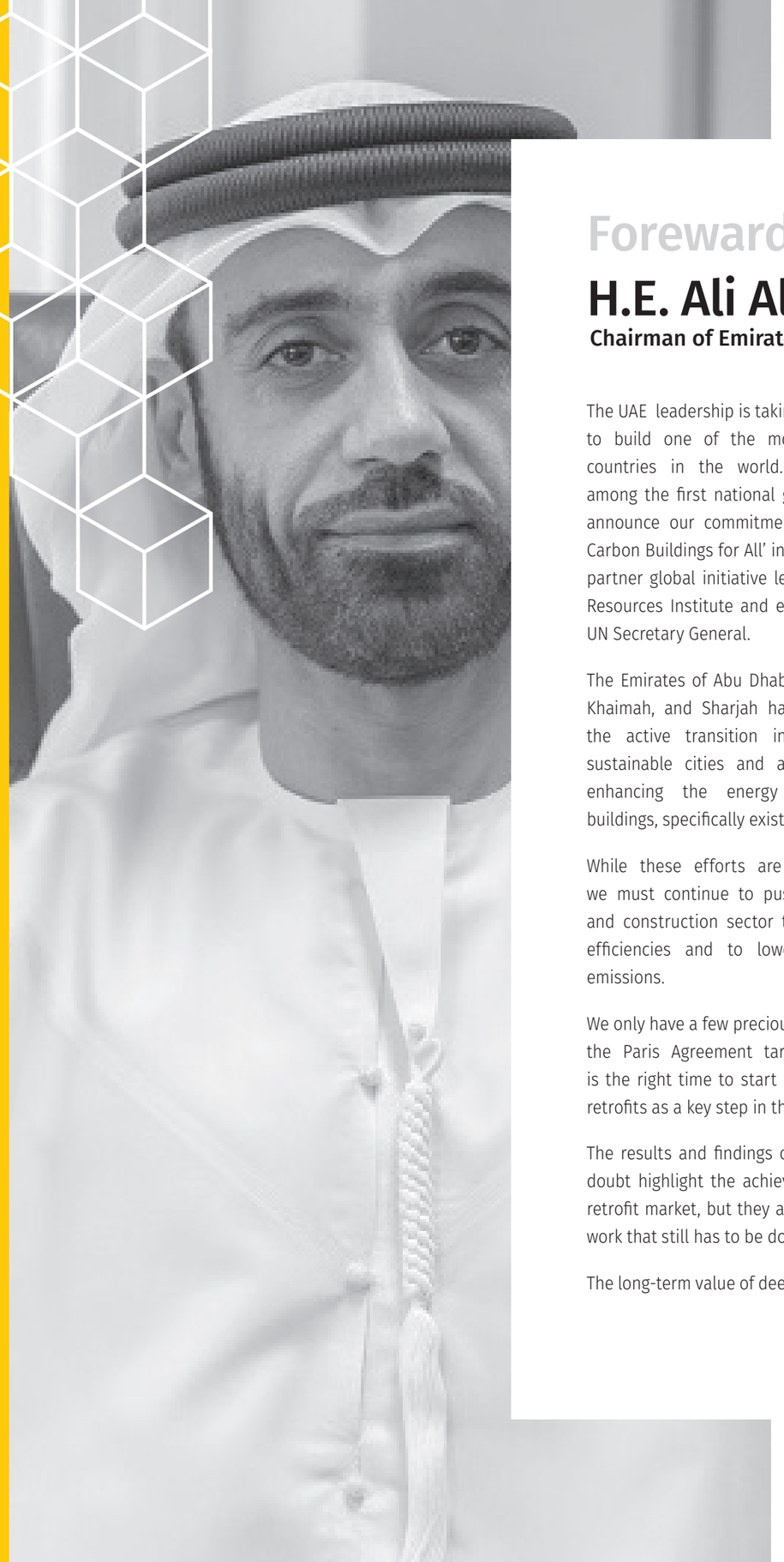
About Emirates Green Building Council
Emirates Green Building Council (EmiratesGBC) is a business forum based in the United Arab Emirates formed in 2006 with the goal of advancing green building principles. The Council gathers member companies and partners representing a diverse range of stakeholders from within the building industry, government, and academia. EmiratesGBC functions as a common platform for all stakeholders to meet, discuss, interact, and exchange ground-breaking ideas which helps to promote a sustainable built environment in the UAE and the surrounding region.

Since its formation, EmiratesGBC has initiated several programs and events related to improving the operational efficiency of existing buildings. Membership is open to all stakeholders willing to influence a positive change in the country's-built environment.

Content



Foreward

H.E. Ali Al Jassim

Chairman of Emirates Green Building Council

The UAE leadership is taking great strides to build one of the most sustainable countries in the world. We are also among the first national governments to announce our commitment to the 'Zero Carbon Buildings for All' initiative, a multi-partner global initiative led by the World Resources Institute and endorsed by the UN Secretary General.

The Emirates of Abu Dhabi, Dubai, Ras Al Khaimah, and Sharjah have commenced the active transition into smart and sustainable cities and are focused on enhancing the energy efficiency of buildings, specifically existing ones.

While these efforts are commendable, we must continue to push the building and construction sector towards greater efficiencies and to lower the carbon emissions.

We only have a few precious years to meet the Paris Agreement targets, and now is the right time to start looking at deep retrofits as a key step in this journey.

The results and findings of this study no doubt highlight the achievements by the retrofit market, but they also point to the work that still has to be done.

The long-term value of deep retrofit, which aims for 50% on-site energy use reduction, outpaces the initial costs where done effectively. The challenge today is not as much in project financing but on the need for industry stakeholders to go further into retrofitting and not look at just the easier tasks – such as lighting. That is why it is important to look at deep retrofitting to achieve the net zero goals.

I am confident this study will provide new and important insights on the retrofit industry in the UAE and highlight the expectations of the diverse stakeholders.

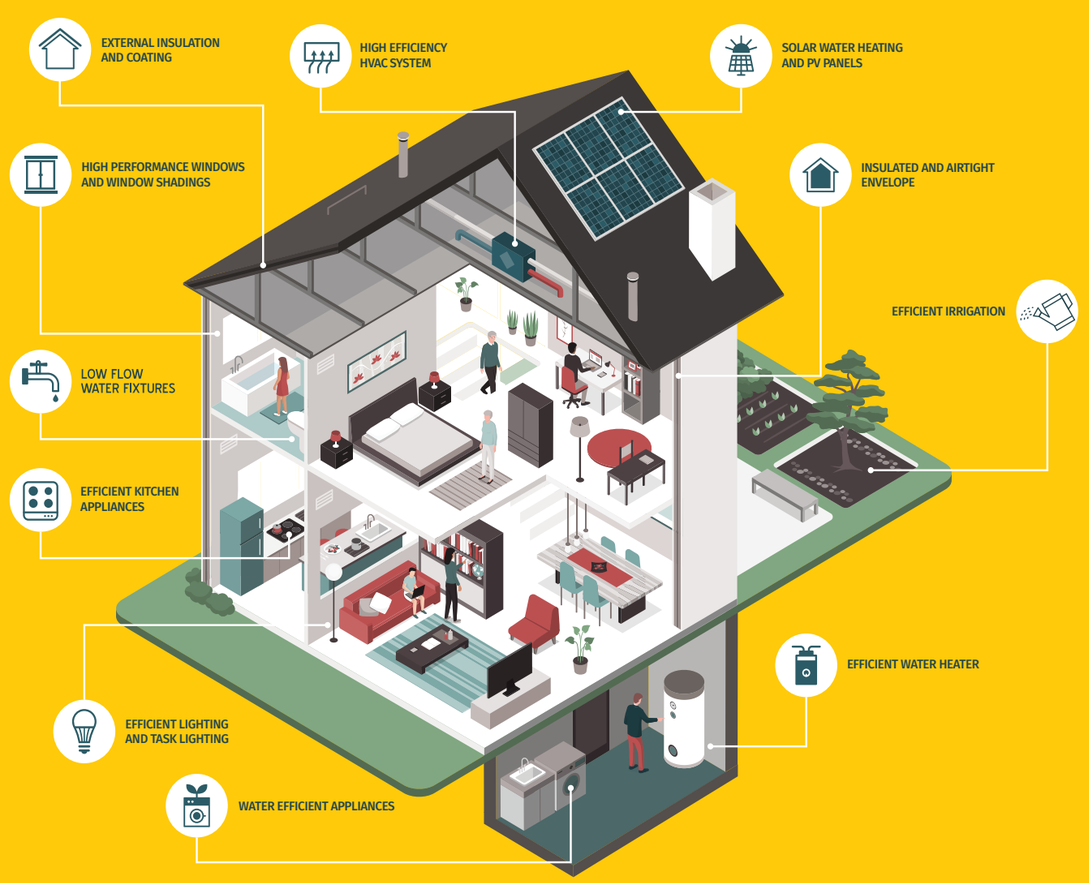
By examining their responses, we can confidently state that achieving deep retrofits is no longer a pipedream but a pipeline to support the green vision of our nation – and in turn, contribute to the global efforts to combat global warming and boost energy and water efficient practices.

I thank all the participants of this study for sharing their knowledge, suggestions and honest opinions for the study.

Study Objective

EmiratesGBC conducted a Deep Retrofit Study to understand the current UAE retrofit market awareness and capabilities, as well as the challenges and opportunities related to deep building retrofit projects. The Study aims to support the industry and government to explore solutions, approaches and incentives to retrofitting buildings that go beyond current renovation programs to achieve greater energy and financial savings. Ultimately, it showcases the viewpoints of the key stakeholders in the UAE retrofit market to support in the development of national and emirate level roadmaps to deep retrofits and decarbonization of the existing building stock.

For further background information, please refer to Appendix: Section A.2.



Definition of Deep Retrofits

A deep building retrofit is defined[1,2] as a whole building analysis and construction process, where the project is considered as a single integrated system rather than several stand-alone systems, in which the site energy use intensity (including plug loads) has been reduced by at least 50% as compared to the baseline site energy use intensity. The reduction target should be achieved by prioritising energy efficiency measures over renewable energy generation, where cost effective.

More details about the definition and difference between shallow and deep retrofits can be found in Appendix: Section A.3 and A.4.

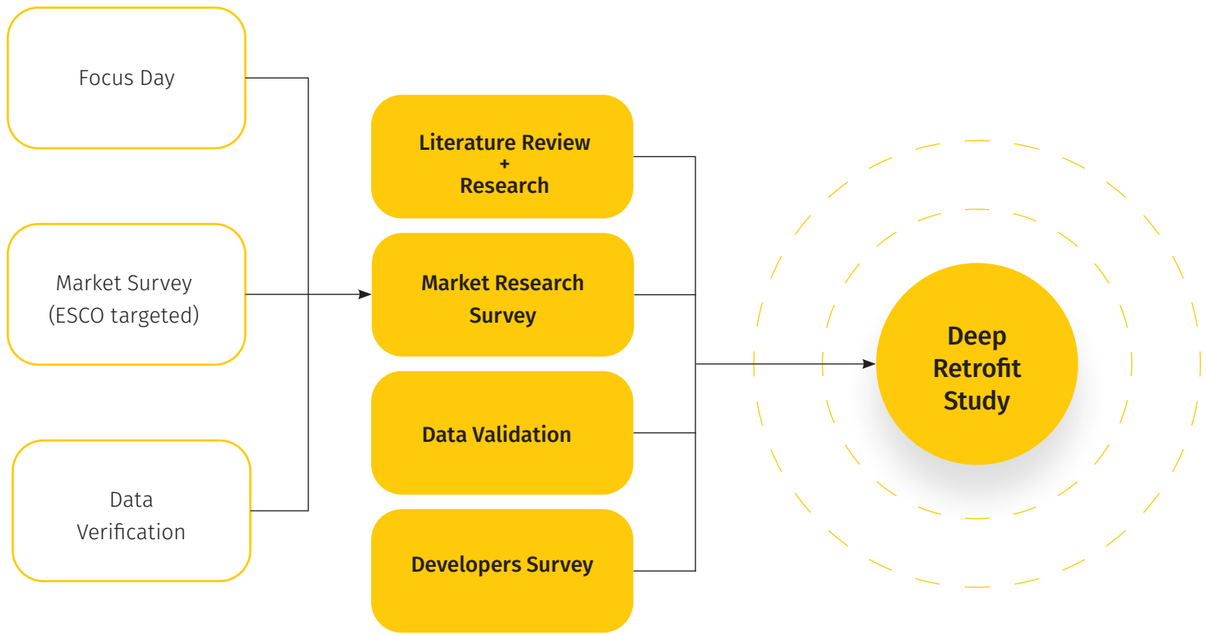
DEEP RETROFITS

50% REDUCTION AS COMPARED TO THE BASELINE SITE EUI

Study Methodology

The Deep Retrofit Study was carried out in several stages, which consisted of a research, literature review, Market Survey and a Developers Survey. While the Market Survey invited responses from all sectors of the UAE retrofit market, the Developers Survey was open to UAE developers only to specifically capture their views and opinions. Both surveys involved phone and email interviews. After data collection, the answers were clarified/ verified and analysed with the key findings, conclusion and recommendations reported here.

More information on the methodology can be found in Appendix: Section A.5



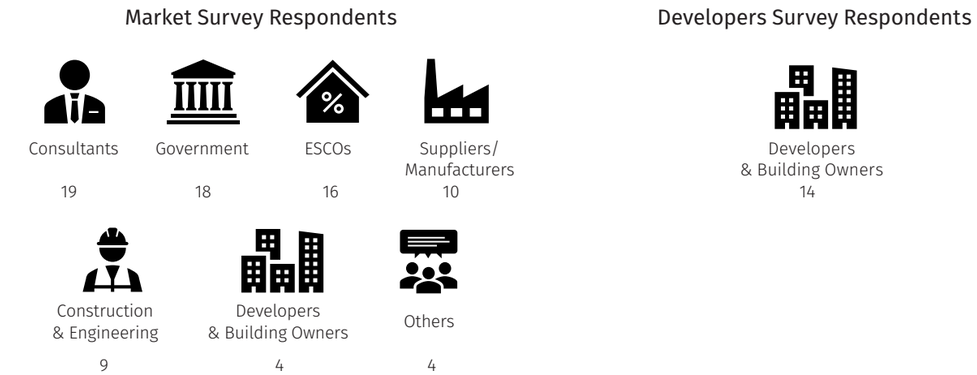
Study Overview

The Market Survey consisted of nine closed-ended questions, which asked stakeholders from the retrofit market about their knowledge of the current market with regards to the highest energy savings projects. They were also invited to share their views on the feasibility of deep retrofits in terms of achievable pay-back period, expertise, technology as well as the associated challenges to deep retrofits. The stakeholders included representatives from ESCOs, government, developers, building owners, suppliers/manufacturers, among others involved in the retrofit supply chain.

The Developers Survey consisted of five closed-ended questions, which exclusively asked developers about their views of the retrofit market and investigated how the energy-saving market can be accelerated to support them. Both surveys included one open-ended question, which invited respondents to share examples of incentives to accelerate the breadth and depth of the UAE retrofit market.

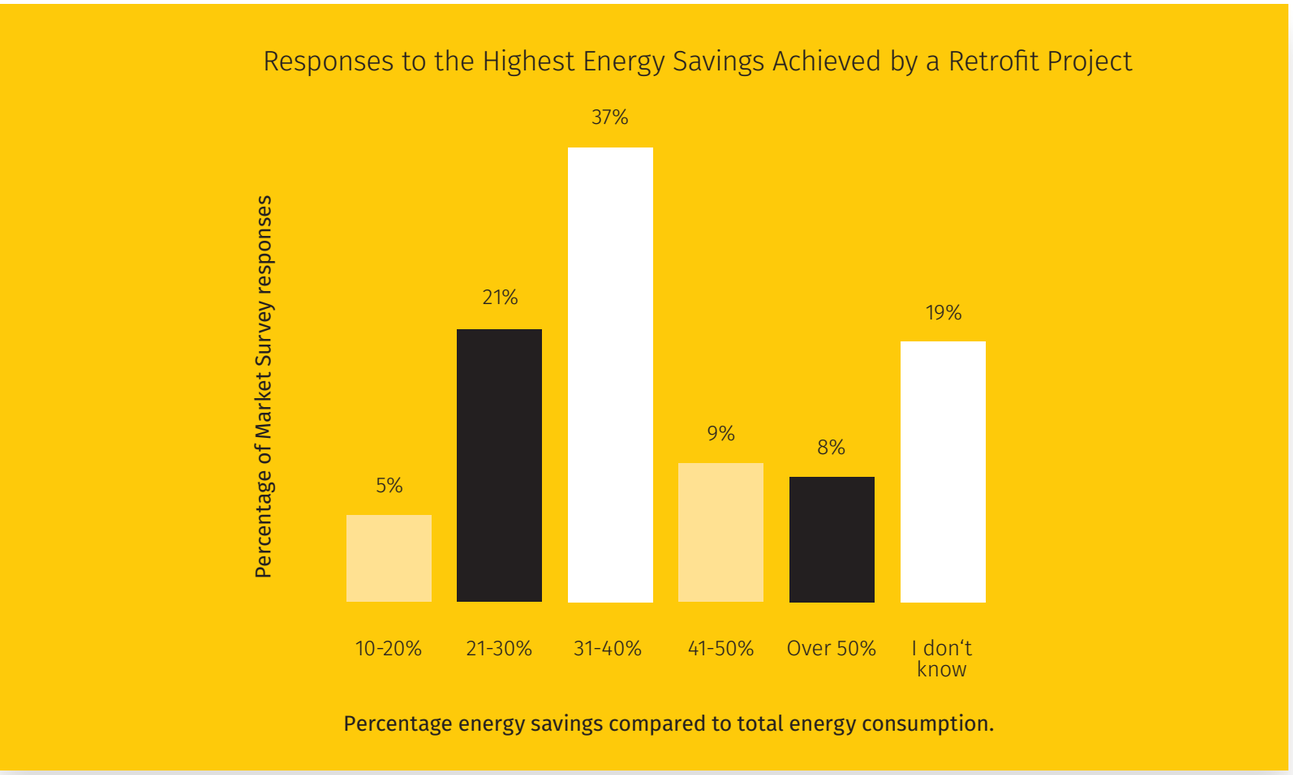
It should be noted that only key results and recommendations from both surveys are reported below. To read all the questions and their respective findings, please refer to Appendix: Section B for the Market Survey, and to Appendix: Section C for the Developers Survey.

80 respondents answered the Market Survey questions, with responses from several sectors. 14 respondents answered the Developers Survey, which were directed to developers only. The Market Survey sector overview is shown below.



Energy Savings in UAE Building Retrofit Projects

As part of the study, the Market Survey asked respondents on what the highest actual energy savings that a UAE building retrofit project has achieved as compared to its total amount of annual energy consumption.



Percentage energy savings compared to total energy consumption.

Around 60% of the Market Survey respondents believe that the highest energy savings in UAE building projects is between 21 and 40%, with over one-third agreeing that savings can reach between 31 - 40%. However, based on correspondence with leading Energy Savings Companies (ESCOs) in the UAE, the highest achieved energy savings in their projects are between 45 and 50%, but does not exceed 50%, if only Energy Efficiency Measures (EEMs) and Energy Conservation Measures (ECMs) are considered. It was verified

IT IS POSSIBLE TO REACH UP TO 50% ENERGY SAVINGS IN BUILDING RETROFIT PROJECTS WITHOUT THE USE OF RENEWABLE ENERGY

that these projects did not account for on-site renewable energy generation in their energy savings calculation, indicating that it is possible to reach up to 50% energy savings in building retrofit projects without the use of renewable energy.

It was observed that there is no common standard used for reporting energy savings in the market, with some retrofit projects including renewable energy generation as part of the reported energy savings, and some not. Additionally, some projects report energy savings along with the list implemented EEM/ECM (such as lighting, or HVAC) whereas others only report total energy savings in kWh or AED, without specifying the implemented measures.

Further confusion arises when a project team reports high percentage savings from just one implemented EEM/ECM, as this leads to the misconception that the project has achieved the reported savings as compared to the overall building consumption. A potential explanation for this is that clients are more concerned with the overall reduction of their utility bills, rather than the specific savings calculations. However, it should be noted that this can be misleading to the general public as it was identified that some projects the respondents had mentioned as the highest energy savings projects, did not match the actual energy savings of the project.

Based on these findings, it is recommended to follow the International Performance Measurement and Verification Protocol (IPMVP) Framework and Guidance to report energy savings and use the formula:

Savings = (Baseline Period Energy – Reporting Period Energy) ± Adjustments

Based on international reports[3], guidance[4,5], and EmiratesGBC publications[6], EmiratesGBC recommends achieving deep retrofits, targeting 50% on-site energy use reduction, by reducing energy demand and implementing energy efficiency measures before addition of on-site renewable energy generation, where cost-effective. It should be noted that the 50% energy savings is a realistic target for poor performing projects as indicated by EmiratesGBC Benchmarking Report[6], where there is considerable difference between the best performers and worst performers. Where possible, renewable energy generation should be reported separately from the deep retrofit target as this can distort the energy savings due to EEMs and ECMs. This recommendation also supports global best practices[7] to focus first on reducing energy demand, then increasing energy efficiency and lastly considering renewable energy. By following this hierarchy, a clear pathway to decarbonisation can be realized.

It is also recommended to increase awareness by showcasing more publicly available information about retrofit projects such as the energy savings percentage in kWh and/or AED as well as the energy efficiency measures considered for the project.

EMIRATESGBC RECOMMENDS ACHIEVING DEEP RETROFITS, TARGETING 50% ON-SITE ENERGY USE REDUCTION, BY REDUCING ENERGY DEMAND AND IMPLEMENTING ENERGY EFFICIENCY MEASURES BEFORE ADDITION OF ON-SITE RENEWABLE ENERGY GENERATION, WHERE COST-EFFECTIVE.

IT SHOULD BE NOTED THAT THE 50% ENERGY SAVINGS IS A REALISTIC TARGET FOR POOR PERFORMING PROJECTS

Feasibility of Deep Retrofits

The Market Survey found that 84% of the respondents agree that deep retrofits with over 50% savings are achievable in the UAE. This is supported by the majority of the responses (64%) from the Developers Survey, who also agreed that deep retrofits are possible.

70% of the Market Survey responses agree that there is sufficient technology currently available in the market to support this.

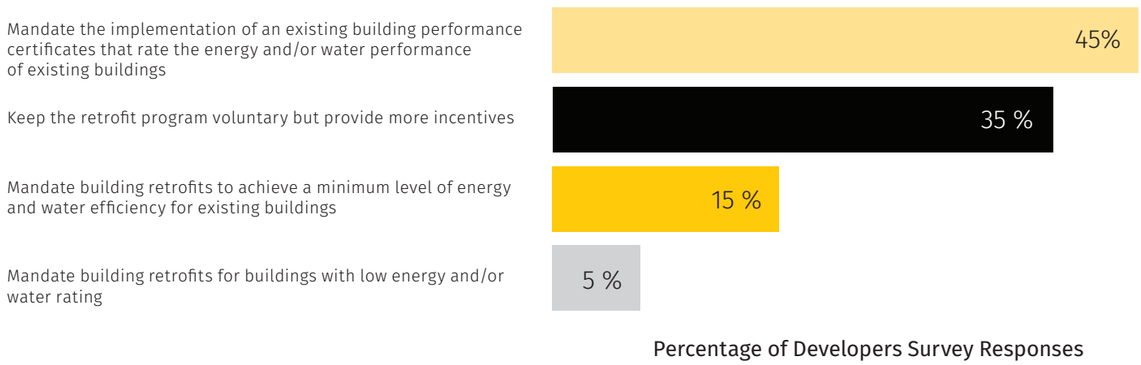
However, 60% of the Market Survey respondents expressed that there is a greater need for technical knowledge and experience for deep retrofits to be delivered successfully in the UAE.

According to the Market Survey responses, 53% of the respondents agree that deep retrofits are expected to have a payback period of 6-10 years with the current tariff rates.

Mandates for Retrofits

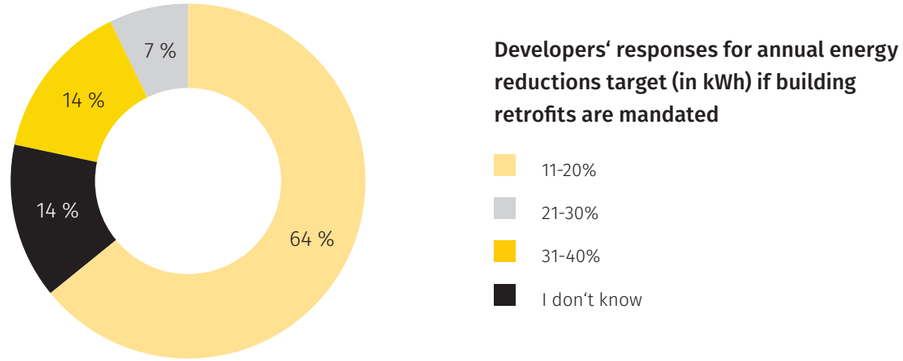
The Market Survey responses showed that 90% of ESCOs, consultants, suppliers and manufacturers call for building retrofits to be mandated. Results from the Developers Survey, however, show that only 15% of the developer respondents agree to mandating building retrofits to achieve a minimum level of energy and water efficiency for existing buildings. On the other hand, nearly half (45%) of the developers believe that the retrofit market can be accelerated by mandating energy and/or water performance certificates for existing buildings. Additionally, over one-third (35%) of developers prefer that retrofits be kept voluntary, with more incentives instead.

Developers' responses on how the government can accelerate the retrofit market in the UAE



86% of the Developers Survey respondents agreed that they are more likely to perform retrofits if energy and/or water use ratings for buildings are publicly available as they would like their buildings to be seen performing at the highest efficiencies.

It was noted that, if retrofits are mandated, two-thirds of developers (64%) would prefer an annual reduction target (in kilowatt-hour) of 11-20%.



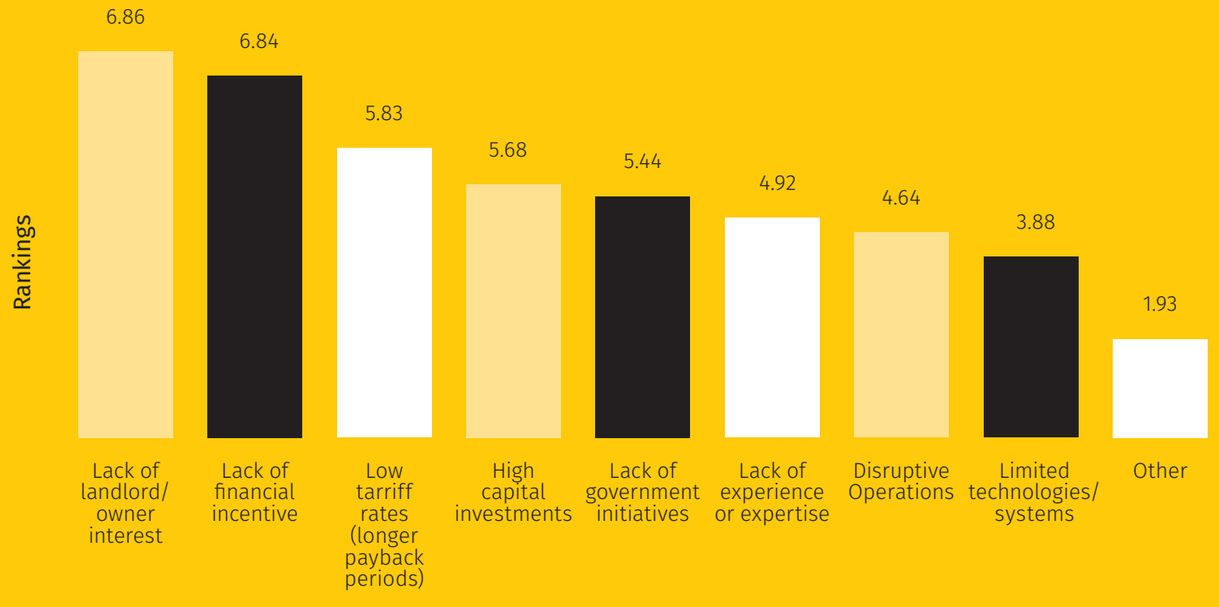
Challenges to Deep Retrofits

The biggest challenges listed by the Market Survey respondents, in order, are lack of landlord interest, lack of financial incentives, low tariff rates, high capital investments, and lack of government initiatives.

The ESCO market respondents, specifically, answered that lack of landlord interest is their biggest challenge and that increased government initiative is required to drive retrofits. On the other hand, the government responses highlighted the lack of experience and technical knowledge is one of the top five challenges to deep retrofits in the UAE.

For developers, however, disruptive operations is ranked as the biggest challenge.

Ranking the Biggest Challenges to Deep Retrofits Based on the Market Survey



Incentives for Deep Retrofits

The following incentives were highlighted by respondents from both the Market Survey and the Developers Survey to accelerate the breadth and depth of the retrofit market:

Building performance

- » Introducing an existing building rating scheme to understand and report building performance
- » Linking building performance to rental costs
- » Introducing time of use or dynamic tariffs rates to promote higher building efficiency

Financial incentives

- » Providing Green loans (lower interest rates), tax-rebates, grants/funds on energy efficiency-related projects and/ or purchases
- » Offering On-bill financing (i.e. repayment of retrofit through utility bills) to streamline financing methods
- » Offering incentives to public and private sectors for investing into EE-related projects (such as hedge/ investment/mutual funds) to drive funding for retrofits.

EmiratesGBC Conclusions

The Study showed a positive position amongst all respondents where majority of the respondents agree that deep retrofits are achievable in the UAE with an acceptable payback period using the current technologies available in the market. While most of the private sector agree that retrofits should be mandated, the developers prefer that building rating schemes should be mandated instead or keeping retrofits voluntary with more financial incentives developed. Developers also agreed that an annual reduction target of 11-20% (in kWh) is adequate, should retrofits be mandated.

The top 3 challenges to deep retrofits identified by the respondents were: Lack of landlord interest, lack of financial incentives, and low tariff rates. The results also showed that there is greater need of market awareness of both retrofit projects and the expertise of the retrofit market. EmiratesGBC recommends that ESCOs should report their project savings transparently and consistently to build confidence and repertoire within the industry to encourage the public to pursue more retrofits.

Our work in the Building Efficiency Accelerator Benchmarking Project Report showed that there is a large difference between worst performing properties and the best performing properties, which presents a perfect opportunity for deep retrofits to become commonplace in the UAE. EmiratesGBC believes that the 50% on-site energy use reduction target is achievable and, with support of regulations and incentives, a decarbonization roadmap can be realized.

References

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Final Remarks

Considerable effort is needed from the buildings and construction sector to help support the UAE in decarbonising its existing building stock. EmiratesGBC invites all stakeholders in the energy efficiency market to progress towards greater efficiencies by raising the awareness and benefits of deep retrofits.

The findings and recommendations in this Study are intended to help build a roadmap towards decarbonisation of existing buildings, but it is only through coordinated actions from both the public and private sector can that roadmap be put into action.

H.E Ali Al Jassim
Chairman

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