



Navigating the Untapped Potential of *Insulated Concrete Forms* as Long-Term Urban Refugee Housing in the Middle East

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ABSTRACT

With over half of the Middle East and North Africa's refugee population living in urban environments, it is essential to explore options for developing safe, durable, and affordable urban refugee housing in order to effectively insure the safety and wellbeing of these vulnerable populations. Insulated Concrete Forms (ICF) is an innovative construction method that has untapped potential for use as long-term urban refugee (LTUR) housing within the Middle East. This research seeks to explore three focus areas: First, a number of current construction methods utilized in humanitarian initiatives providing refugee and crisis relief housing throughout Middle East-based conflict zones are analyzed. For each method, attributes, gaps, and challenges related to safety, durability, ease of construction, and cost effectiveness are examined. Secondly, ICF as a viable option for LTUR housing is discussed, while identifying ICF's attributes and challenges, covering the same aforementioned areas of analysis. Thirdly, a stakeholder analysis exploring the benefits and challenges of utilizing ICF as LTUR housing within conflict zones from the perspectives of key stakeholders impacted from the method is conducted. Throughout this content analysis-based research, information is utilized from first-hand interviews with construction industry leaders, and secondary information collected from construction companies, ICF distributors, governments, and NGOs. By exploring ICF within the context of the current refugee crisis throughout the Middle East, this research seeks to highlight and explore the ways in which the field of construction can innovatively impact social wellbeing by providing higher quality, longer-term urban housing options to refugee populations displaced by conflict.

Key Words: *Construction; Insulated Concrete Forms; Icf; Refugee; Relief Housing; Urban Development; Displacement; Middle East*

1. OBJECTIVE AND METHODOLOGY

This *content analysis* research was designed to achieve three objectives: The first objective is to evaluate a number of innovative construction methods utilized to address the housing needs of long-term urban refugees (LTUR), as well as to identify the gaps and challenges related to these materials and methods in relation to LTUR needs. Secondly, the study will introduce *Insulated Concrete Forms* (ICF) as a viable concrete construction method that has the potential to be highly beneficial for conflict zone-based construction projects designed to meet the housing needs of LTUR. Additionally, ICF's pros and cons, in relation to these unique construction purposes, will be outlined and examined. Thirdly, a stakeholder analysis will be conducted to outline the benefits and challenges of utilizing ICF within these unique refugee-centered circumstances from the perspectives of LTUR, the local host-community, construction companies working in the local-host community, the local government entities addressing the needs of LTUR, and non-governmental organizations addressing the needs of LTUR. Lastly, research gaps, challenges, and steps forward will be outlined to help improve future research and in-depth studies on similar topics.

It is important to point out that this research touches on some of the social complexities impacting LTUR in regard to conflict's deeply impactful impact on the lives of the most vulnerable, as well as LTUR's impact on urban communities hosting refugees on a long-term basis, but none of these critically important areas are explored in-depth within this paper. Instead, this research focuses specifically on ICF's potential to be used for the development of long-term refugee housing within urban environments by highlighting ICF's technical attributes and, in specific, examining ICF in relation to several key social, environmental, and conflict-related challenges faced by LTUR.

2. TOOLS OF ANALYSIS

Informing this research's analytical and descriptive methodology, secondary data collected from construction companies, industry leaders, publications from various international organizations, and websites. Throughout this research, several construction methods used to address the needs of LTUR will be compared to the ICF method by analyzing their similarities and differences using 4 points of comparison: safety, durability, ease of construction, and cost effectiveness.

Referencing information from Middle East-based construction companies utilizing ICF techniques, a localized perspective on the feasibility of effective ICF usage as LTUR housing throughout the region is considered. Additionally, this research utilizes a project management analysis method known as *stakeholder analysis*, wherein the key needs and perspectives of all relevant stakeholders are taken into account to assess the impact that ICF will have on them as well as the impact they will have on ICF. Looking at ICF from a variety of unique perspectives within this specific context is important to help assess the feasibility and effectiveness of ICF as an impactful method of housing for LTUR in the Middle East. Lastly, the final section of this research provides insight into the research gaps and challenges examining ICF within this specific frame of reference. Recommendations for further research and analysis are provided to help inform future studies.

3. INTRODUCTION

The current Middle Eastern refugee crisis has transformed the world's modern understanding of displacement, mass migration, and the ways in which the needs of large groups of highly vulnerable populations are most effectively addressed – immediately and in the long-term. While differencing methodologies exist, most agree that the ability to access and utilize safe, secure, durable, and affordable short and long-term housing is one of the most fundamental necessities within any conflict, crisis, or mass migratory event. Meeting the short-term housing needs of the most vulnerable, international and national humanitarian organizations work to provide necessities on an immediate basis but have typically not focused immediate resources on long-term, sustainable housing options when the immediate needs of vulnerable populations are so dire. As conflict rages on over the course many years, hundreds of thousands of refugees and displaced people are unable to return to their homes, communities, and countries. “Over 2.6 million refugees currently live in camps worldwide and have been displaced for over five years, some for over a generation. While camps can be practical, particularly during emergencies, encampment results in a range of problems, including aid dependency and isolation.”ⁱ Vulnerable refugee populations must often choose between living long-term within a formal refugee camp or taking the risk of resettling (either legally or illegally, depending on a wide range of political and economic factors) into urban communities in new countries or new cities. The later choice can be a greater risk in some ways, but many urban refugees agree that the greater availability of employment, educational, and social stability opportunities make resettlement into urban communities a beneficial decision, yet their challenges do not end here. Securing safe, quality, and affordable housing is only one of the many additional challenges urban refugees must face on a daily basis.

Harsh desert climates, sandstorms, and environmental hazards - in combination with the growing presence of conflict-related dangers - take a devastating toll on communities caught in the conflict-spurred economic, social, political upheaval that impact

the physical integrity of the residential homes, commercial buildings, and governmental/military structures within conflict zones in the Middle East. Historically, the Middle East is a region with a strong history of utilizing concrete and concrete-like materials in both residential and commercial construction projects, partly due to the material's ability to provide protection from the blazing daytime heat and frigid desert nights. However, humanitarian agencies often opt for cloth, plastic, or wooden structures since they can be constructed more quickly than concrete structures and can immediately meet the basic housing needs of the vulnerable population.ⁱⁱ

When examining construction material options for long-term urban refugee housing, as well as the construction of residential and commercial structures based in conflict zones, the current research is largely incomplete and little research is available on the use of innovative construction techniques for LTUR homes. This study suggests that ICF should be considered an innovative construction method that can be effectively used to meet the needs of LTUR. Utilizing concrete and Styrofoam forms to easily and quickly mold concrete into a vast variety of functional designs without the need for highly specialized training or expensive equipment helps to make this method stand out for its high-quality, rapid, cost-effective, and highly durable construction qualities.

First, ICF has been shown to withstand severe natural disasters, conflict-related explosions and weaponry detonation, and long-term environmental stress, making it an ideal construction method for residential, commercial, and governmental/military construction in conflict-zones. Second, ICF is a building method that can be completed with far fewer laborers than traditional construction methods and reduces the construction timeframe significantly due to the simple use of Styrofoam forms, organized like Lego™ bricks to design a structure that could potentially fit into unused urban spaces and then filled with concrete, eliminating the need for wooden wall frames and traditional insulation. The much-reduced timeframe of this method makes it a viable option for the rapid demand for housing in conflict-related displacement situations. Third, the simplicity of this building method requires a relatively short learning curve and is simple enough for laborers with little or no construction experience to complete effectively, meaning that this method could provide skill-building opportunities to a wide range of individuals suffering from lack of employment options in areas ravaged by conflict. Fourth, unlike importing pre-made refugee shelters and the majority of building materials for conflict-based construction rejects, utilizing locally-developed concrete to fill the hollow Styrofoam bricks can help stimulate local economies and provide much-needed jobs to local populations. All of these attributes help ICF stand out as a highly viable method of long-term housing in unstable regions, and when looked at through an innovative lens, it is clear that urban refugees could benefit greatly from ICF-built homes.

4. REFUGEE CRISIS

As the Middle Eastern refugee crisis continues to worsen, millions of individuals from across the Middle East, including Syria, Lebanon, and Jordan have left their homes in attempts to escape conflict, war, armed groups, rights abuses, and the weakening societal structure within their home countries. “Since the start of the Syrian conflict in the early spring of 2011, [more than] 608,000 Syrians have crossed the border, seeking asylum and refuge in Jordan. A recent economic study by the World Food Program stated that the sheer number of Syrians coming in had “triggered major demographic shifts; tested infrastructure, and pressured social services”. This massive demographic shift has changed the face of migration patterns, placed incredible pressure on host countries as well as causing millions of refugees incredible hardship insecurity, and instability. On the other hand, host countries and communities within the Middle East have also felt tremendous strain on their resources, housing availability, and economic opportunities as thousands of refugees and displaced people seek safety, jobs, and housing within urban environments. This strain on already-fragile communities has made it difficult for many refugees to find the opportunities and stable living conditions they imagined, and are often forced to settle in sub-par homes due to their uncertain legal standings within their new communities and/or fragile economic situations. Additionally, housing markets, even in low-income neighborhoods, can fluctuate due to the increased rental subsidies for LTUR provided by organizations such as the United Nations and the Norwegian Refugee Council. With steady new streams of rent money coming in to these neighborhoods, landlords may fall behind on repairs or upgrades to housing as they know that the rental market will remain lucrative regardless due to funding from international or governmental refugee-focused organizations. International organizations have tried to combat this issue by hosting training sessions for landlords and refugee tenants in order to explain legal obligations and rights to both parties. Additionally, organizations have worked to provide “winterization” kits to help LTUR make key repairs and updates to their apartments or homes in preparation for winter weather. While these programs have been successful in some countries, such as Jordan, effective implementation is closely tied to the political climate and an economic funding that may not be sustainable in the long run.ⁱⁱⁱ

The most pressing and immediate needs of refugees and displaced people are survival necessities – shelter, food and water, clothing, and medical attention. Humanitarian agencies have worked tirelessly to provide for refugee and displaced people, although they are often stretched thin due to huge and urgent demand. However, when looking at the needs of refugee populations in the long term, the need to make money, provide a more stable environment for family members, access better schools and medical facilities, and the desire to become more integrated into the local host culture, often become influences that cause many displaced people to leave refugee camps and seek housing within urban environments. According to the UN High Commissioner on Refugees, “Over 60 per cent of the world's 19.5 million refugees and 80 per cent of 34 million IDPs [internally displaced people] live in urban environments.”^{iv} Due to numerous overlapping social, economic, and political reasons, urban-based refugees and displaced people, many with little

economic stability, are often forced to live in unsafe, unregulated, and even illegal apartments, shacks, and other forms of precarious housing within their host urban communities, a situation that can significantly increase their vulnerability as LTURs. “In urban areas, many refugees share accommodation or live in non-functional public buildings, collective centers, slums and informal types of settlements. Conditions are often substandard and providing shelter poses major challenges. In rural settings, delivering protection and humanitarian assistance through refugee camps is common.”^v

Life as a refugee in an urban environment is very difficult and can come with its own set of challenges. “Urban refugees are usually confronted with the same poverty problems as the local urban poor. Yet they also face additional challenges due to their refugee status: in most cases, they live with the constant fear of being arrested, detained and returned forcibly to their home country. They are denied access to basic services such as education or health and are exposed to harassment, intimidation and discrimination.”^{vi} Due to these challenges, and many others, urban refugees tend to keep a low profile in order to fly under the radar and disperse themselves throughout the city. Unfortunately, they also makes it more challenging for humanitarian organizations to effectively seek out, engage with, and provide services to urban refugees. This issue makes it hard to help connect LTUR with safe, durable, and affordable housing.^{vii} “A joint UNHCR and International Relief and Development survey has found increasingly difficult conditions among the hundreds of thousands of Syrian refugees in Jordan living outside camps. Fifty per cent of refugee dwellings are inadequate and hundreds of thousands struggle to pay their rent, according to the findings.”^{viii} It is clear that innovative housing alternatives must be considered to provide for the needs of LTURs.

5. LITERATURE REVIEW

It is important to gain an understanding of the existing, albeit limited, research on concrete construction methods utilized within Middle Eastern conflict zones and for the propose of meeting housing needs of refugees and/or LTUR. Overall, there is a general lack of published data and research on long-term urban housing solutions for LTUR, with the majority of research focused on the development of innovative and more effective shorter-term housing solutions for refugee camps within the Middle East. Additionally, there a significant lack of published information on Insolated Concrete Forms within the Middle East, and nothing has yet been published on the potential pros and cons of utilizing ICF as a long-term urban housing solution for LTURs.

Throughout the Middle East, several longer-term crisis relief-housing methods have been used by refugee-serving international/national organizations and governmental programs to meet the growing housing needs of displaced people and refugees impacted by war and conflict throughout the region. Designated refugee camps have been established with the

support of the United Nations and other international organizations and governments to provide shelter for millions of people impacted by war and conflict within the Middle East. Typically, these solutions are considered short-term housing solutions, not physically equipped so effectively serve the housing needs of the individuals for more than several months before the material utilized becomes ineffective due to harsh climate impact, explosions and other weapon-related impact, and simply the wear-and-tear that naturally occurs when a material is overused for a longer period of time than it is designed for. Faced with perpetual displacement, many refugees and displaced people have also started to seek long-term housing in urban areas where they may be able to find forms of employment, more abundant resources, better quality social services for themselves and their families. For many these LTUR, the traditional tent-style, short-term shelters no longer meets their long-term housing needs, and they are forced to seek long-term housing within a nearby urban community. As LTUR are often economically unstable and may be unable to immediately attain legal and immigrant and work permits within the foreign host country, finding adequate housing that will accommodate their status can be very costly, with their choices often limited to poor-quality housing that may not be safe or sustainable for long-term living.^{ixx}

Published articles on the construction methods utilized to create housing for refugee and displaced populations outline several innovative methods that stand out as viable housing options, each with individual pros and cons associated with safety, durability, ease of construction, and cost effectiveness.

One such example is the *Concrete Cloth Method*, which has numerous benefits in regards to providing immediate and longer-term housing for refugees and displaced populations. “Concrete Cloth is a pioneering “building-in-a-bag” that requires only water and air for construction...It follows a simple, ancient recipe: build a mold to form a desired shape; drop in some reinforcing (steel bars as example); mix cement, water, and rock aggregates; pour the mix in the mold and let it set up. This new cement-impregnated flexible fabric technology let’s you skip expensive forms, structural reinforcement and time-sensitive mixing routines...Finished shelters are waterproof and fire proof...and are ready for occupancy in 24 hours. The units have excellent thermal properties, and are structurally capable of being covered with sand or earth for added insulation. They can be fitted with a combined forced air / inflation units, and their hard shell and lockable doors provide a level of security not possible with soft skinned structures, protecting people and possessions within.”^{ixi} This quick construction method can be used effectively to meet the immediate housing needs of the most vulnerable, but should not be considered a long-term solution since the materials and construction methods used can not be counted on to withstand continuous usage over a long period of time within harsh social and climate-related conditions. In terms of safety and durability, this method provides only minimum safety assurance since the concrete cloth could not withstand serious impact within conflict settings, nor could it long withstand sand, heat, and other natural disaster-related environmental issues that contribute to the harsh

climate of many Middle Eastern countries. In regards to ease of construction, this method earns top points, since the “concrete-in-a-bag” concept makes it very easy for a small group of individuals to complete the structure on their own, without necessarily having construction experience. In terms of cost effectiveness, this method is still relatively expensive, although costs go down when purchasing in large quantities. “A Concrete Canvas shelter would cost 15,000 to 20,000 pounds, in the U.K., for a one-off (\$23,000 to \$30,000), but the price steps down if you are buying volumes.”^{xii} These costs are quite high for a structure that may not be remain usable in the long-term, yet one must also consider that costs will be decreased due to the ease of construction and ability to construct the shelter without the need to hire a professional construction company. Additionally, these structures have a ‘bomb-shelter’ style design and would not work well within urban-based environments. All in all, this method seems to be best utilized in emergency situations where durable structures are needed to meet the housing needs of vulnerable populations in camp-based, yet are not necessarily expected to be used for long-term usage

A second example of a long-term housing method for refugees and displaced people is the Norwegian Refugee Council’s *Lebanon Shelter Program*, which works innovatively to provide long-term housing by renting and upgrading homes/unfinished structures in host-communities for urban-based refugees. “Lebanon currently hosts more than 1.4 million refugees. But because of its refusal to create formal camps, refugees had to rent houses in host communities, which can be costly. Some live in unfinished structures, often lacking windows, proper doors, electricity and water. Here’s what the Norwegian Refugee Council has come up with to alleviate the refugee housing crisis in Lebanon: It offers to upgrade units in unfinished buildings to minimum standards, spending an average of \$1,500 in materials, in exchange for one-year rent free hosting of refugees. ‘The assumption behind this intervention is that at the end of this period the displaced family may have been able to establish themselves economically and enter the rent-paying sector,’ and if so, NRC will facilitate discussions between the building owner and the refugee family to develop a new rental agreement, according to the note provided by NRC to Devex.”^{xiii} This is a unique concept, and certainly more of a methodology than a construction method, yet it is important to recognize that humanitarian organizations fully acknowledge that many refugees, migrants, and internally displaced people are located within urban areas, not only within designated ‘refugee camps’, and therefore their need for long-term housing that melds well within the local host-community is imperative to supporting vulnerable populations establish themselves economically so that they can soon provide for themselves and hopefully integrate more fully into the new community during their longer or permanent stay within the urban environment.

A third example of a high-profile refugee housing method called *Better Shelter*, an award-winning flat-pack refugee dwelling developed by the United Nations High Commissioner for Refugees and the Ikea Foundation. “The six-foot-tall structures, which come in 57-square-foot model and 188-square-foot models, take four people four to eight hours to assemble. Built to

be safer and more durable than traditional canvas or plastic tents, these steel-framed dwellings feature lightweight polymer panels, lockable doors and windows, and rooftop solar panels that can power interior lamps or phone chargers. They currently [in 2015] cost \$1,150 each, but the number is expected to go below \$1,000 as production volume increases.”^{xiv} This refugee housing method targets the needs of refugee camp-based refugees and displaced populations, improving upon traditional tent methods by utilizing more durable, higher quality materials and design, increasing safety-related features, and decreasing associated costs as much as possible. This method is certainly an upgrade to the traditional tent shelters that have been used for years, and provide families with much needed upgrades such as electricity and door locks. However, this method would still lack functionality for long-term use, particularly within urban environments, due to the relative lack of long-term durability to withstand urban and conflict-related impacts because the structures’ lightweight polymer panels may not be designed to fit into urban environments for long-term use.

Looking back at an older example, the *Sandbag Shelter* method is a very straightforward refugee shelter method that can be used to meet immediate housing needs, and can also be upgraded for longer-term use. While this prototype shows a design style akin to ancient Iranian domed ‘beehive’ style homes, the ease of construction and freedom of design would allow the builder to create the size and shape desired depending on the location and number of occupants.^{xv} The simple sandbag-and-barbed-wire technology Use the materials of war (sandbags and barbed wire) to create a safe shelter in most regions of the globe as well as in your backyard utilizes minimum amounts of purchased product and maximum amounts of the free dirt and sand, found in abundance throughout the Middle East. This method creates a shelter with maximum protection against natural and man-made disasters, and also helps to bring the community together, utilizing the strength and skill of the community to design and build these shelters without the need to hire expert craftspeople.^{xvi} This method is unique, in that it can be designed and built inexpensively and without the need of construction experts. The design can also be constructed in a wide range of different shapes and sizes depending on logical need and environmental location. Additionally, the simple sandbag structure can be upgraded into a long-term housing option by utilizing additional materials to seal the sandbag walls, create a more durable roof, etc. In terms of long-term durability (especially within conflict zones), however, the lack of a solid foundation, and structural reinforcement may cause decay or destruction overtime depending on the location and daily usage of the structure. In order to make sure that this housing method does, in fact, meet the requirements of a long-term option, the aforementioned upgrades would be advisable, although the cost of materials and labor would increase.

6. INSULATED CONCRETE FORMS (ICF)

Insulated Concrete Forms is one of the most innovative additions to the Middle Eastern construction industry is the growing

popularity of ICF, which is quickly becoming a preferred building method in many Middle Eastern countries. “ICF is an energy efficient wall construction material that has garnered quite a bit of interest in the building community over the last decade or so. It provides higher insulation values and enhanced structural strength compared to traditional construction materials, such as wood framing or concrete block construction.”^{xvii}

ICF is a construction method that is transforming the way that the construction industry operates. Within the Middle East, there is great potential for this technique to tremendously improve construction speed, long-term durability and the method’s ability to withstand harsh climates, reduce constructing waste, improve structure strength and greatly improve sound absorption. The ICF method constitutes the use of hollow Styrofoam brick-like forms that can be ordered to match any number of different measurements and specifications based on the structure design. The blocks are then attached to one another using nail strips as the structure of the building takes shape, much like building the walls of a home using plastic, attachable Lego bricks. Upon completing this first stage of construction, window and door holes are then cut into the Styrofoam, steel rebar are inserted vertically and horizontally into the ICF walls, and concrete is then poured into the hollow bricks to fill the forms completely.

Once the entire wall is filled with concrete, the concrete filled forms are then vibrated mechanically to ensure that no air pockets remain in the wall as the concrete dries within the ICF bricks.^{xviii} These forms are considered very easy to use and due to the ease of construction, several steps in the building process are eliminated that would otherwise constitute traditional wood-frame construction - such as sheathing and insulating of all exterior walls before the process is complete. “Made of expanded polystyrene (EPS), ICFs stack and lock into place much like LEGOs. Extreme heat, frigid cold, rain or sun — it doesn’t matter — EPS insulates concrete, allowing it to wet-cure as it strengthens. After the concrete cures, the plumbing and electrical installation can begin. The foam is easy to cut and remove so electrical lines can be installed. Plus, any exterior or interior finish can be applied — from panel and lap siding to brick, stone or stucco. The forms feature a bracing system with unique alignment features to ensure a smooth wall finish. Only basic hand tools are needed to position and secure our lightweight blocks. High-density webs provide furring strips for any standard wall-finishing product. High-density plastic webs are recessed by 1/4”, providing a uniform exterior to which any stucco or EIFS material can be applied. Having such a uniform surface provides superior adhesion and crack resistance. Radius walls and angled walls can also be constructed with ease through simple mitering techniques”.^{xix} Easier to use than traditional building techniques, with a multitude of added benefits that meet the regional demands of the Middle Eastern construction industry, ICFs stand out as a valuable technique to consider.

7. ICF AND THE MIDDLE EASTERN CONSTRUCTION INDUSTRY

Understanding the unique construction attributes associated with ICF, it is clear that this construction technique can be highly beneficial for a multitude of different projects and can meet the needs of builders and consumers all around the world. From a regional perspective, the usage of ICF throughout the Middle East offers a unique chance to critique the effectiveness, challenges and opportunities related to ICF use within the region. David Hall a marketing manager for the company, *Liteform Technologies* has been supplying ICFs to the Middle East for more than a decade, and now has manufacturing facilities in the region. Mr. Hall asserts, "This is a region that is very familiar with concrete construction." Jim Buttrey, the vice president of sales and marketing at *IntegreSpec*, another company working with ICF in the Middle East, agrees with Hall's assessment on efficiency, stating, "The Middle East has become much more energy efficient in the last decade," he says. "It's true they have plenty of oil, but oil exporting corporations recognize it's far more profitable to export it than use it internally. My experience is that Middle Eastern nations are very conscious of energy efficiency, and that ICFs have considerable potential there." He adds that nearly all the buildings—residential and commercial—are finished with beautiful stucco exteriors, and ICFs provide the perfect substrate. There is also a need for durability. Most populated areas of the Arabian Peninsula are near the coast, located within the risk zone for typhoons blowing off the Indian Ocean. They're also occasionally hit with the legendary desert windstorms that arise further inland."^{xx} Considering the region's harsh and dramatic environmental conditions, it seems like ICF is uniquely equipped with the qualities necessary to withstand most any environmental condition that the Middle East has to offer.

Currently, there is already founding of ICF focused companies operation within the Middle East, and based on the growing success and utilization of the technique throughout the region, this foundation will only become stronger as time goes on. "ICF technology is ideal for the region. An ICF structure can be completed in much less time than the post-and-beam method [common in the region], which is a tremendous advantage in terms of saving money and in meeting the construction needs of the area. *BuildBlock MidEast* has successfully completed several ICF projects across the Middle East and now homeowners, builders, and government agencies are recognizing the superior features of ICF structures. The concept has been well received by the various ministries of Bahrain and in the UAE who have asked us to explain the benefits of the system better." Based on the enthusiastic response, *BuildBlock MidEast* began setting up a manufacturing facility in Bahrain with dedicated tooling, molding equipment, and 10,000 sq. ft. of storage area. The projected capacity is nearly 500,000 forms annually."^{xxi} Obviously there is significant growth potential as long as barriers that come along with internationally based construction projects are dealt with effectively, and local partnerships are strengthened.

Particularly for Middle Eastern projects that require specialized qualities such as durability against wind, sand storms, extreme temperature variations, sound transmission, earthquakes, and explosions - ICF has already begun showcasing its technical value within the region, can continue to be proven vital as LTUR housing.

8. BENEFITS OF ICF

There are a wide range of different reasons why the ICF method has gained popular momentum within the Middle East in the last decade – with many benefits relating back to the ease of ICF construction, the energy efficiency of this method, and regional climate specific durability. "The benefits of advancing this construction technique are significant and immediate. The forms used with ICF create incredible energy efficiency since they remain part of the structure and provide immediate high-level insulation as part of the process. ICF structures are both hurricane and tornado resistant because of the construction density and the durability inherent in the construction process".^{xxii}

The ICF construction method boasts numerous benefits that increase the technique's value to both the construction company and the consumer. For companies and consumers within the Middle East specifically, several benefits practically stand out due to the social, environmental and industry specific components that impact the value of ICF. Sound absorption is a benefit that has become increasingly desirable throughout the region – specially within Gulf countries that are rapidly developing and experiencing urbanization that increases the impact of noise pollution. "Sound travels through materials in much the same way that heat does. Good insulating materials tend to absorb sound, and materials that are good at conducting heat also tend to transfer sound more readily. A typical ICF wall has 5 inches of EPS insulation and 6" of solid concrete. A standard Concrete Masonry Units (CMU) wall has 1/2 an inch of EPS insulation, 2 1/2 inches of concrete, and a 5-inch air space. This should illustrate the drastic difference in sound transmission between ICF and CMU construction. While results are not entirely conclusive, some tests show that ICF can reduce sound transmission 200% better than CMU."^{xxiii} For many construction companies building within urban environments, the ability to create homes and buildings that will block out city noise and even isolate noise within the structure is a huge advantage that increases the value of the building and creates higher demand for ICF.

9. ICF COSTS

The cost of using ICF is usually the element that is most likely to make companies and consumers hesitate from using this technique. "Most people agree that the cost of constructing a building with ICF exterior walls is a little higher than the cost of constructing it with standard frame walls. But not everyone agrees. Lon, a longtime builder in Oregon, says: "I've come up with an efficient operation over the years. Right now I can build an ICF house for about the same house for about the same price

as frame, maybe a little less. It's because the ICFs give me some savings on other parts of the house. The ICF walls themselves are definitely some more [money], but they save me money in other places." As soon as the job starts requiring some higher structural strengths, energy efficiency, sound deadening, and the like, ICFs can be very cost effective".^{xxiv} When long-term expenses are taken into account, lower electricity bills and the long-term durability that allows buildings to last a significantly longer time without the kinds of maintenance that more traditional buildings will eventually need, are all ways in which the slightly higher cost of using ICFs are often justified. That being said, ICF is certainly a specialized construction technique and the finished product may end up being too advanced for particular types of construction that do not require additional sound reduction or environmental effectiveness. Therefore, a critical cost analysis should be conducted to assess whether the higher price is really worth the cost in the long term.

10. ICF DESIGN FLEXIBILITY

As the Middle East continues to develop rapidly with new design and construction influences being introduced to the region on a regular basis, the fact that ICFs are highly flexible in terms of design is a perk that attracts users to this technique. "With ICFs you can construct practically any design that you could with frame or other materials. Some things are easier than others to do. Because the frame is light, easy to cut, and bendable, you can often create curved walls and irregular openings like arched windows and doors faster and easier. The strength of reinforced concrete makes it possible to form long-span headers for openings and ICF floor systems can make long clear spans".^{xxv} The ways in which ICF allow for uniqueness in design make ICF the perfect material for residential or commercial buildings wishing to take on a modern aesthetic or those designed as artistic landmarks.

11. ICF SOUND REDUCTION

In urban environments, noise is a significant issue to consider when building residential homes. Particularly when houses are built near industrial areas or transportation hubs, the amount of noise pollution can be a significant issue impacting the wellbeing of urban residents. "ICF walls have excellent sound attenuation. Today, scientists measure the amount of sound that gets through a wall with the sound transmission coefficient (STC). The idea is pretty simple. The testers make sound on one side of a test wall and measure how loud it is on the other side. The greater reduction in the sound energy, the higher the STC and the better the wall is at stopping around. In the 1960s the National Association of Homebuilders Research Foundation tested the STCs of some typical frame wall. The results are still valid because the materials they used – 2 X 4s with fiberglass insulation and gypsum wallboard on each side – are virtually the same as today. They found that these walls had an STC of about 36. Some of the ICF suppliers have paid to have their walls tested, too. Depending on the brand of ICF tested, the thickness

of the concrete, and so on, these have shown an SC of 46-59. When you add finishes that increases".^{xxvi}

12. ICF CONSTRUCTION SAFETY, LEARNING CURVE, AND PROJECT COORDINATION

Looking at most forms of construction; expertise or at least extensive experience is necessary in order for any individual or team to be able to effectively construct a high quality and safe building. While workers that have expertise and extensive experience in the construction industry can only add to the implementation quality of ICF, this technique is unique in that workers utilizing ICF do not need extensive previous experience or expertise in this technique in order to be able to produce a high quality and safe final product. "While it may take two years to become a good mason, it only takes three to five jobs for an ICF crew to become proficient".^{xxvii} Of course practice makes perfect, and over time workers will develop a greater expertise in ICF construction, but it is certainly a benefit to know that remote Middle Eastern construction projects could utilize local workers with more rudimentary construction skills and still be able to produce a high quality building. In terms of having a large-scale construction team, the unique materials and ease of construction also allow a general contractor to downsize his or her construction team and still be able to coordinate effectively with everyone to get the job done well. "You can simply hire one framing crew to do the entire shell from the bottom of the foundation to the top of the roof. In that way you eliminate the masonry or forms crew that would have otherwise have done the foundation. In a lot of areas today this is very attractive because masonry crews are becoming hard to get, hard to coordinate, and expensive".^{xxviii} In terms of safety, there is always a potential for risks on any construction site, but because ICF is made up of materials that are much less heavy and cumbersome, there are fewer material-related injuries documented across worksites using ICF. "Most of the work at the jobsite is with foam, which is light, soft material. There will be fewer injuries from muscle strain or from building materials accidentally striking a worker".^{xxix}

13. ICF STRENGTH AND DURABILITY

In terms of strength, it is clear that the innovative method of construction varies from CMU style of concrete construction – which particularly impacts the overall strength of the structure. Throughout the region, Middle Eastern countries are particularly vulnerable to harsh heat, strong wind and sand storms, and even earthquakes – meaning that strength and durability are highly valued features in construction projects. "The strength of ICF versus CMU should be fairly clear when you consider the way each system is constructed. CMU construction features hollow-core concrete blocks that are laid on top of each other. These blocks are fused to one another with mortar and then have steel rebar and additional concrete reinforcement inserted at key points, such as corners, door frames, and around windows. ICF construction features a solid 6" thick concrete wall around the

entire perimeter of the building. Furthermore, ICF is reinforced with steel rebar both vertically and horizontally. When any structure faces stress, such as that from a hurricane, earthquake, or tornado, the weakest point is always at the joints in the structure. These joints are always where cracking and failure will occur first. In CMU construction there are joints between each individual 16" x 8" block. In ICF construction, because the wall cavity is filled with a solid pour of concrete, there are no joints. Period. Conservative estimates show that a 6" ICF wall is about 50% stronger than a CMU wall".^{xxx}

Throughout out the Gulf Cooperation Council countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and The United Arab Emirates), construction laborers are overwhelmingly blue-collar workers from lower income countries – including Indonesia and Pakistan - who are hired to work low-skill construction jobs for local and international construction companies.^{xxxii} Traditional construction methods tend to be highly labor intensive, requiring large numbers of laborers to be hired for a single job. A major benefit of ICF is the ease in which a small number of people can quickly construct residential and commercial structures without the need for large construction teams of massive equipment to complete the job effectively. "ICF provides, in one step, the structure's framing, insulation, vapor barrier, finish attachment and shear resistance which also eliminates the need to coordinate and manage multiple crews and tradesmen."^{xxxiii} The ability to construction high quality homes and buildings with smaller numbers of people will also help promote the work of smaller construction firms who may not have the capacity to hire numerous foreign workers for every project.

14. ICF ENVIRONMENTAL CONSCIOUSNESS AND SUSTAINABILITY

Although environmental consciousness hasn't always been a significant concern for construction industries within the Middle East, the green building movement has just begun to take hold within the region as concern for the industries' environmental impact as gained a growing foothold within the industry and society at large. "Insulated concrete forms (ICF) offer a high level of energy efficiency compared to traditional 'stick built' wood framed walls. ICF construction is essentially a concrete and foam sandwich, which is put together like a set of Legos on site. Once the foam blocks are in place, concrete is poured in the center cavity and allowed to set. This forms a sound structure with excellent thermal properties".^{xxxiii} Compared to more traditional forms of concrete-based construction, ICFs generate a much lower amount of debris and waste on the worksite that goes straight into the landfill. "According to Jeff, an ICF contractor in Maine: On a big basement, we get our ICF scraps in one large trash bag one buy walks off the site and we're good to go. Everything else we have to remove is equipment".^{xxxiv}

Looking at an ICF building's ability to conserve energy throughout the structure's life cycle, the benefits of ICF

compared to structures built with more traditional methods are more noticeable. "In a building's life cycle (from construction to demolition), the greatest ecological impact is the amount of fuel needed to heat and cool the home. Insulating Concrete Homes are a preferred environmental choice because of significant savings in natural resources needed to maintain a comfortable temperature. ICFs can significantly contribute to a mold-free environment due to the inorganic nature of the material. They also create a very tight building envelope, reducing unintentional air infiltration. In high-humidity environments, interior moisture should then be controlled through the use of spot removal (e.g., bathroom fans) and properly sized air conditioning units that will cycle on long enough to dehumidify the air".^{xxxv} As environmentally conscious practices continue to become more commonplace throughout the Middle East, ICF's low-waste generation will only increase its value within the construction industry.

15. ICF RESISTANCE TO ENVIRONMENTAL ELEMENTS AND NATURAL DISASTERS

The natural environment in the Middle East is prone to different harsh elements that typically have a significant effect on buildings overtime. This is one of the reasons why Middle Eastern construction often enters around the use of concrete, marble, and other durable substances that can ensure things like sandstorms, typhoons, flooding, heavy winds, and earthquakes, to a greater degree than wood-based construction techniques. "Homes built with ICFs offer resistance to natural disasters such as tornadoes, hurricanes, earthquakes, fires and floods".^{xxxvi} Of course every specific country throughout the Middle East has its own specific natural challenges that the local construction industry must face, but typically ICF is designed to meet most challenges related to natural disasters or harsh natural elements.

16. ICF R-VALUE

On the major ways of evaluating the heat conductivity of a material is by calculating its R-value. This is an important test for construction building materials because the score earned will be able to showcase how effective the material is keeping a building warm/cool and subsequently, how much energy will be needs to warm or cool a building throughout the year. In terms of ICF, this test is used to estimate the wall's ability to trap heat and also help estimate how the extent of any additional required costs that may be incurred via home electricity and heating. "R value measures how fast or slow something conducts heat. Conduction is the scientific term for what happens when something hot warms up the things it is touching, like when hot tea pored into a cup heats the cup. Conduction accounts for a lot of heat loss from a building. In the winter, the warm air inside hits the walls (and windows and doors and ceilings) and warms them up, ad the warm wall touches the cold air inside and warms it up. In this way the inside air inside gradually looses its heat, it gets cool inside and the furnace has to come on to get the temperature back up. The same thing happens in reverse in the

summer, when warmth gradually comes indoors and the air conditioning kicks on”.^{xxxvii}

Not all materials slow down the process of heat loss as well as others, therefore calculating the R-value for all used materials during a construction process is important. “A standard 8” thick CMU wall has an R-Value of 2.0. However, it’s fairly typical to install 1/2” rigid insulation board over a block wall. This rigid insulation board has an R-Value of 3.2, bringing the total R-Value of the CMU wall to 5.2. The Fox Block ICF system has been rigorously tested to determine its effective R-Value. The EPS panels on the blocks have an R-Value of 10 each, the 6” of solid concrete has an R-Value of .36, and these means the total R-Value of the Fox Block system is 20.36 alone. This is a 391% increase in R-Value. What this means for a homeowner is that you will use less energy to heat and cool your home and you will retain heating and cooling much more effectively than in a traditional CMU home. In addition, an ICF home will require a smaller HVAC system to heat and cool.”^{xxxviii} As there are many different companies using ICF and therefore differing techniques may cause slightly different R-value results, but generally it can be seen that the R-value of ICF is quite good in comparison to more traditional building methods.

17. DRAWBACKS OF ICF

Although there are a multitude of reasons why ICF is a valuable and beneficial construction technique, there are also certain drawbacks to ICF that must be discussed and analyzed through a regional perspective. One key disadvantage of ICFs is actually directly related to some of the technique’s benefits. While ICF are highly effective at barring sound from transmitting through the home, the walls themselves are also slightly thicker than regular walls. “ICF walls tend to be very thick, and total wall assemblies (the structure plus interior finish and exterior cladding) can be upwards of 14 inches thick. It is easy to see that choosing ICF means giving up some interior space to the wall.”^{xxxix} While this drawback will really only effect projects that are hard-pressed to utilize as much space as possible within a worksite, it is nonetheless vital to take this issue into account since many Middle Eastern construction projects are based in rapidly developing urban environments where residential or even commercial projects may be situated within highly restricted worksites that require a certain size in order to fit in next to other buildings. For one family considering ICF for the construction of their residential home, the benefits of ICF did not stop them from pointing out the financial drawbacks based on lost space. “The next big item we looked at was the cost of the lost square footage. If you build it, you pay for it, even if you never get to ‘use it’. For us, we multiplied out the cost for an ICF house by the lost 260 square feet and realized we would be spending a whopping \$41,600 on lost space!”^{xl}

Another drawback is based on ICF’s inability to accommodate certain design elements that are irregularly used on some ultra modern construction projects. “A few design features are harder for ICFs. Mostly these are spans and projections – overhangs

where some of the wall of an upper story does not line with the walls below, but just float in space. Most houses don’t have them, and if they do they can usually be designed out”. Taking the unique technical characteristics of ICF into account, it is clear that ICF can handle most design elements on a project, but some elements just do not match the characteristics of ICF and would be suited to a different concrete construction technique.

Lastly, working within the Middle East as an international construction company comes with its own specific challenges to overcome – particularly when working with a fairly new construction technique like ICF. In terms of finding the right accessory products to finish ICF homes and buildings was one challenge noted by many ICF users within the Middle East. “Accessory products, for example, are non-existent. Wall bracing and bucking is accomplished with dimensioned lumber; concrete is placed with chutes, crane buckets, and other “old-school” technology. In short, it’s at about the same stage the North American market was at 20 years ago. Business and cultural difficulties also still need to be worked out. One ICF executive who wished to remain anonymous described the region as “an incredibly difficult place to do business.” Yet those who can manage the risks may strike it rich pioneering ICFs in the Middle East.”^{xli} One way of mitigating this issue is to establish connection with local construction leaders and strengthen this professional relationship over time through collaboration. Not only will this help an international company take advantage of localized knowledge and the perks that come along with local status, it will also help transfer ICF knowledge and expertise into the country, making ICF a more established and sought after technique that will benefit international and local ICF using companies alike overtime.

18. ICF AS LONG-TERM URBAN REFUGEE HOUSING

In terms of serving the needs of people and companies living in conflict zones throughout the Middle East, there is a huge amount of untapped potential for the use of ICF, yet remains a virtually un-explored and un-researched research area. In an attempt to look beyond ICF’s ability to withstand regional environmental elements, it is highly interesting to explore the possibility ICF’s value as an excellent construction technique for building highly durable buildings and shelters in conflict zones to serve internally displaced people and other groups of people living in dangerous locations (including the US and international militaries). In conflict zones and areas affected by war, the built environment must be highly durable and be easily enough to be built quickly by individuals who may not have extensive professional construction experience – all of which affirms the value of utilizing ICF construction.

Some companies have just begun to take advantage of this need for high quality, quickly buildable and highly durable construction within Middle Eastern conflict zones. “*IntegraSpec ICF*, headquartered in Kingston, Ontario, Canada, has likely done as much ICF work in the Middle East as any other

manufacturer. They've built projects in half a dozen different countries, including Yemen, Israel, the Kingdom of Jordan, and the United Arab Emirates. One of the more notable projects was literally built in a war zone. "We were asked to supply ICFs to a vehicle maintenance shop to be built in the 'Green Zone' in Baghdad, Iraq. This was a U.S. Marine Corps facility where they repair Humvees and other military transports that get hit by roadside bombs, machine gun fire, and so forth. The U.S. military wants ICFs for the force protection they provide".^{xliii} Knowing how particular any military must in regards to quality, durability and safety be before they utilize a construction method to build homes and buildings that their forces and communities of displaced people will be using, the US Military decided to put ICF to the test and see how well this method would stand up to close-range explosions – similar to what one could expect to ensure in a conflict zone.

“Just in case there was any doubt about the ability of ICDs to withstand severe forces, the military is trying to blow them up. Every so often the U.S. Department of Defense conducts its Force Protection Equipment Demonstration (FPED) at the Quantico Marine Corps Base in northern Virginia. This series of blast tests shows how various products perform in an explosion. The latest FPED, in May of 2003, included six “boxes” of ICFs. These were cubes shaped structures that measured 8ft X 8ft X 8ft, or about the size of a small room. According to Joe Lyman, the Executive of the Insulating Concrete Form Association, who observed the tests: “We blasted the boxes (8ft X 8ft X 8ft, concrete at 4000 PSI, 6 inch slump, 3/8” aggregate pump mix, horizontal and vertical rebar at 16” on center) from 10 feet away and 6 feet away on the final day with a 50 lbs. charge of TNT.

The boxes experienced very limited cracking (less than 2 millimeters across) with no structural damage at all. In fact, the boxes didn't even crack when they were craned onto the flatbed to take them off site. All three days, we experienced the impact resistance the foam provides. The box blasted 6 ft. away, experienced about 275 lb. of pressure per square inch, and our blast designer said we should have had a hole in the face of the box at least 1 ft. in diameter with major deflection. However, it survived with limited damage. It appears that on all six boxes the foam compressed against the face of the concrete and absorbed the brunt of the blast”

As this particular test showcases, ICF is highly durable and could potentially be a favored method of construction within conflict zones through companies serving the military, refugees or internally displaced persons, and the civil society.

19. STAKEHOLDER ANALYSIS

Looking specifically at five key stakeholders who could be impacted by the use of ICF, as well as individually impact ICF's ability to be used, this stakeholder analysis, as seen in Figure 1, will examine each group's varying influence on ICF as well as ICF's influence on them. Additionally, an analytical analysis, as seen in Figure 2, is included below to explain the factors impacting stakeholder's respective place in the Stakeholder Analysis grid. All analysis is conducted in relation to establishing long-term housing for urban-based refugees in the Middle East.

		← Stakeholder Influence (In Relation to ICF)	
Stakeholder Importance (In Relation to ICF) →		- Local Construction Companies - Host-Government	Non-Governmental Organizations (Funding Orgs.)
		Long-Term Urban Refugees	Urban Host-Community

Figure 1: Stakeholder Analysis

Stakeholder	Analysis
<p>Long-Term Urban Refugees</p>	<p>The option to utilize ICF benefits LTUR in terms of design flexibility, ease and timeliness of construction, and resilience in regards to harsh weather conditions and possible conflict-related physical impacts. On the other hand, the cost of ICF can be seen as a significant challenge that could limit LTUR’s ability to access and utilize ICF, unless humanitarian or charitable organizations and/or governmental entities covered the costs associated with this construction method.</p>
<p>Local Construction Companies</p>	<p>ICF is becoming a more widely utilized and better-understood construction technique within the Middle East, with a growing number of companies becoming experienced in this method. Due to this familiarity, more experts may be available to be hired by humanitarian or charitable organizations to either construct housing for LTUR or even conduct training sessions to instruct refugee groups the skills necessary to construct housing themselves, as ICF can largely be constructed without extensive construction experience. As ICF has been largely used for military structures as of yet, construction companies may welcome the chance to work in the residential construction and humanitarian fields in order to expand their building portfolios and establish/strengthen professional relationships with new organizations and governmental entities (i.e. governmental humanitarian branches, local charitable organizations funding LTUR housing projects, and international NGOs).</p>
<p>Host-Government</p>	<p>The perspective of the local and/or national government of the community hosting LTUR can be complex and multi-layered. Nations accepting refugees across their borders have typically committed to providing resources and services to those vulnerable populations, some of which may be used to provide housing. Utilizing on ICF to meet the housing needs of LTUR may be seen as a strong choice due to the ease of construction, flexibility of design to match the landscape of the host community, the durability against weather and human-made impacts, and the ability to hire local construction companies to complete the projects rather than importing pre-fabricated structures from outside the country. On the other hand, the cost of this method must be weighed against other available methods, taking into account the significant long-term benefits and challenges, and comparing areas such as durability, design, ease of construction, and materials/labor costs.</p>
<p>Urban Host-Community</p>	<p>From a construction standpoint, the perspective of the urban host-community and their impact on the effective completion of ICF homes is vital to consider through both social and technical lenses. The influx of newly constructed ICF homes into urban host communities may cause disparities between the original homes and the newly constructed dwellings. Considering the social and economic landscape of host-communities where many LTUR establish lives, it is wise for Governmental entities or NGOs providing ICF housing to design projects that take into account the existing host-community environment from social, economic, and environmental standpoints so that new structures to not place unforeseen burden on the existing community or deepen any pre-existing social or economic divides.</p>
<p>Non-Governmental Organizations (Funding Orgs.)</p>	<p>For NGOs, many of which depend on grant funding, selecting the most cost-effective building method and materials that will adequately provide housing while staying within the organization’s financial parameters. ICF can be a costly building method compared to some other options and does require specific materials (i.e. Styrofoam building blocks), although ICF’s numerous attributes (i.e. durability design flexibility, etc.) may still make ICF a desirable construction method for ling-term usage.</p>

Figure 2: Analytical Analysis of Stakeholder Influence

20. RESEARCH GAPS AND RECOMMENDATIONS FOR FUTURE ANALYSIS

Testing the real-life feasibility of utilizing ICF as a method of housing for LTUR has, as of yet, not been scientifically explored within the Middle Eastern context. Therefore, there is an underdeveloped or lack of available data and insight into this specific topic. In the future, as additional data and technical research is conducted, a deeper analysis will be possible utilizing case studies and best practices based on projects and insight from the key stakeholders impacted by and impacting the usage of ICF.

In the future, a detailed, technical comparison between ICF and the most commonly used refugee housing options for urban, long-term usage should be completed in order to gain insight into the exact differences between each method. Additionally, a greater amount of insight from funding organizations (governments, GOs, and NGOs) should be collected so that an economic feasibility study could be consisted in regards to ICF's potential usage as refugee-specific housing. Similarly, data should be collected from municipal entities in regards to land usage regulations, permits, building requirements, etc. that could restrict or influence ICF usage in certain urban areas.

Thorough analysis is impossible without full, in-depth interviews with LTUR populations themselves in order to better understand the housing needs, desires, and challenges faced by this population as they reconstruct life in urban areas following displacement. Interviewing refugees living in officially recognized refugee camps on issues related to housing, as well as LTUR that currently live or have previously lived in urban based housing of all forms is vital to best understand the ways in which ICF might better serve their needs.

Lastly, an area worth further investigation is the possibility of utilizing the ICF concept in a localized manner by decreasing reliance on western-based ICF form distributors and creating home-grown alternatives that serve the same purposes. By identifying ways to utilize previously used materials to create locally recycled ICF forms from used Styrofoam and other materials, funds channeled into ICF construction could stay within the local economy while helping reduce ICF's environmental footprint.

21. CONCLUSION

Insulated Concrete Forms are an innovative and highly beneficial construction technique that has significant, although largely untapped, potential within the Middle East for the purpose of housing urban-based refugees. With significant advantages and benefits in terms of long-term savings, high durability, ease of construction and the potential for highly valuable utilization in conflict zones, ICF construction is a construction technique that is on an upward trajectory in terms of industry growth and

increased utilization on projects throughout the region. At the same time, however, there are ICF drawbacks as well that must be taken into account for each individual project. Issues with higher short-term costs, the inability to perform as well for certain specialized design elements, and challenges arising from the fact that ICF is still a fairly new introduction to the Middle East and local companies may not fully understand the method's potential. Additionally, the lack of substantive and peer reviewed research on ICF within the Middle East, particularly in terms of utilizing ICF as refugee housing, poses issues in terms of providing comparative research through a regional and issue-specific lens.

As conflict within the Middle East continues to take a devastating toll on the region, and one of the largest migration of refugees in history continues to displace millions, it is vital for governments and NGOs to think carefully about the long-term housing needs of these vulnerable populations. By utilizing ICF, homes can be developed to last long far longer than the commonly used temporary refugee housing methods, and therefore could possibly serve numerous families overtime as refugee families eventually transition into permanent housing once their legal statuses and employment situations become finalized and stable.

It is clear that the long-term housing needs of urban refugees must be fully considered and met with the same attention provided to short-term refugees if stability and peace within conflict-affected areas is ever to be achieved. The many attributes of ICF position the method as a viable option to meet the growing needs of LTUR while helping local construction companies grow as experienced service providers within the humanitarian sector. As further in-depth research and case studies may showcase in the future, utilizing ICF as long term urban housing for refugees may truly help to change the course of the future for the most vulnerable victims of violent conflict who strive to regain long-term stability after devastating displacement.

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