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Rebuilding Ahmadi Township: An Approach towards a Sustainable and Smart Future

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ABSTRACT

This paper offers a glimpse into the process of “Rebuilding” Ahmadi-Kuwait’s Oil Town, developed by the Kuwait Oil Company (KOC). The Company envisioned transforming Ahmadi into an oil town, which reflects modern sustainable values while taking into consideration and retaining the rich, historical heritage of Ahmadi and State of Kuwait. Core to the redevelopment is to incorporate a smart sustainable strategy that not only informs and connects KOC employees, residents, and visitors but also enhances the efficiency and functioning of the infrastructure and all other services across Ahmadi. This paper includes a comprehensive view to illustrate various aspects considered during the process of transforming Ahmadi Township into a sustainable smart town - such as the context, history, vision and objectives, issues and challenges faced, approaches explored and considered. The approach illustrates an enhanced corporate social responsibility in the region and uplifting the housing integrity in the surrounding context.

Keywords: Rebuilding; Ahmadi; Sustainable; Smart City; Oil town

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REBUILDING AHMADI TOWNSHIP ... AN APPROACH TOWARDS A SUSTAINABLE & SMART FUTURE

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Abstract

This paper offers a glimpse into the process of “Rebuilding” Ahmadi-Kuwait’s Oil Town, developed by the Kuwait Oil Company (KOC). The Company envisioned transforming Ahmadi into an oil town, which reflects modern sustainable values while taking into consideration and retaining the rich, historical heritage of Ahmadi and State of Kuwait. Core to the redevelopment is to incorporate a smart sustainable strategy that not only informs and connects KOC employees, residents, and visitors but also enhances the efficiency and functioning of the infrastructure and all other services across Ahmadi. This paper includes a comprehensive view to illustrate various aspects considered during the process of transforming Ahmadi Township into a sustainable smart town - such as the context, history, vision and objectives, issues and challenges faced, approaches explored and considered. The approach illustrates an enhanced corporate social responsibility in the region and uplifting the housing integrity in the surrounding context.

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1. Introduction

Rebuilding Ahmadi Township Project has resulted from the previous studies led by the KOC Ahmadi Township Redevelopment Steering Committee and conducted by international consultants (i.e. M/s Atkins, Gulf Consult and Ernst & Young). The need to redevelop the Ahmadi Township was identified as a top priority by the higher management of the Kuwait Oil Company with the main objective of carrying out total reconstruction of all Company Houses in Ahmadi and re-structuring the town into a modern oil town; complete with all amenities necessary for its effective functioning. Furthermore, one of the other prime reasons for the Rebuilding Ahmadi Township development program was addressing the issue of high and the escalating maintenance and operation cost of the dilapidating houses of the existing township in addition to, providing better housing facilities and environment for its employees and occupants.

2. Background Review

2.1.Site Location & Climate:

Ahmadi Town is located 40 km southeast of the Kuwait City center and is spread over an area of 5.12 sq km.



Location of Ahmadi Township, Kuwait.

Kuwait has an arid desert climate with a huge temperature difference between the

winter and summer months and some marginal rain during a brief period each year. Kuwait experiences soaring temperatures in summers with average summer temperatures ranging from 42-48°C. The highest ever temperature recorded in Kuwait was 54°C in July 2016, which is the highest recorded temperature in Asia and the third highest in the world.

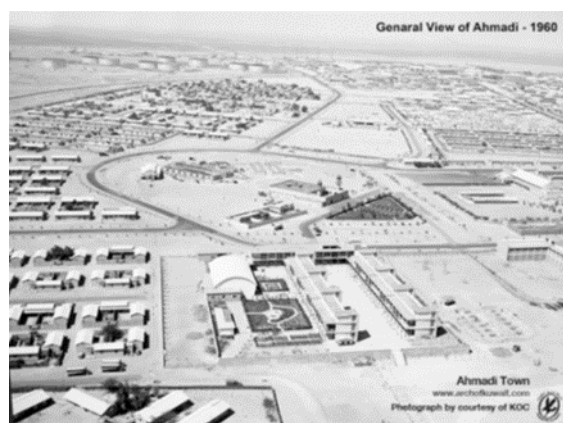
2.2. Historical Context:

Ahmadi is one of the most important suburbs of Kuwait City and has been crucial towards the development of the state of Kuwait.

Further to the discovery of oil in the region in 1930s, Kuwait Oil Company (KOC) was established in 1934 through a joint venture between British Petroleum and Gulf Oil to manage oil production in Kuwait. In 1938, one of the world's largest oil field was discovered at Burgan, in the southeastern desert. In order to support the oil production in the Burgan oil field, the township of Ahmadi was developed in 1946 and it became the Headquarters for the Kuwait Oil Company (KOC).

The township continued to expand including the administrative headquarters and offices for Kuwait Oil Company, housing for KOC employees, and supporting amenities including parks, sports centers, shopping, schools, and government functions. In 1975 with the transition of Kuwait Oil Company (KOC) to the full ownership of Kuwait Government, KOC retained the responsibility of Ahmadi Township including housing and various other facilities for its employees.

Ahmadi Township is strategically located in the Greater Burgan Oil Field area with proximity to the Ahmadi Port to facilitate the exploration and export operations.



View of Ahmadi Township in 1960s

The following salient features of the existing Ahmadi Township provides a rich heritage, unique character and importance, which needs to be preserved in future:

- i. Ahmadi illustrated a new way of urban designing and planning in Kuwait during that time. The whole system of construction in Ahmadi was different from the rest of Kuwait. In fact, the plumbing and the sewage system installed by the British in the township continues to be different until this day.

- ii. The town planning illustrates a very western layout that catered to the needs of the British expatriates and their families in the 1940s who lived there.
- iii. It was designed to be environmentally friendly and climate responsive.
- iv. It is famous for its vibrant green surroundings, beautiful parks and is one of the greenest settlements in Kuwait, which is a rarity in the given arid desert context.
- v. It is known in the region for its western architectural style with pitched roof detached housing units, front gardens and roads flanged with green shaded trees.



2.3.Evolution of the Urban Fabric:

Ahmadi was built on a slope facing the Arabian Sea located 11 km away with the orientation based on the cardinal axes (N-S & E-W). On the ridge of the hill, at the center of these cardinal axes, the main headquarters of the Kuwait Oil Company (KOC) was sited.

The town followed a grid pattern layout with roads laid out at right angles to each other. The main roads called 'Avenues' running down the slope in W-E direction (given numeric names i.e. 1st Avenue, 2nd Avenue etc.) and the Arterial roads called 'Streets' running in N-S direction (given numeric names i.e. 1st St North, 2nd St. South etc.).



The old town planning of Ahmadi town designed by the Company architect Wilson Mason & Partners illustrated a hierarchical layout with the street that ran across the top of the hill called "the main street" housing the upper echelons of the KOC including KOC Main Offices, and streets progressing down the hill with houses in order of KOC ranks.

Also planned within the town were other amenities like the Hubara Club - a complex of buildings with a swimming pool, meeting rooms, restaurants, squash courts, tennis courts etc. Other recreational facilities were designed towards the bottom of the 'hill' such as the 'souk' or shopping area; banks, cinema etc. with the easy access link to the areas outside the township.

3. Methodology

3.1.Setting up of Vision and Objectives:

In 2014, KOC decided to Rebuild Ahmadi Town and its future on the foundation of its rich historic past by setting clear vision and objectives/ goals.

The Company's vision was to transform Ahmadi into an oil town which reflects a modern oil industry image while taking into consideration and retaining the historical and cultural heritage of Ahmadi and its contribution to the oil industry of Kuwait.

The following objectives were set for the redevelopment of the existing Ahmadi town:

- i. **Redevelopment Stewardship:**
Company's aspirations to be an employer of choice by providing quality service to the employees in the form of a modern, safe, secured and healthy living environment.
- ii. **Preserve Historic Heritage:**
As it had been over 60 years since the inception of the township, the intent was to preserve/ enhance the township outlook by modernizing it, being in line with the other modern cities and to set a positive precedent in the region for sustainable and inclusive growth.
- iii. **Social Commitment:**
Illustrate Company's social commitment not just towards its employees by uplifting the housing integrity, but extending beyond and contributing to the communities beyond its premises and towards Kuwait.
- iv. **Support Kuwait's 2030 Vision:**
To extend its support and commitment to the Kuwait's 2030 vision by taking a lead to reduce energy and water usage per capita and increase the energy supply from renewables to 15%.

4. Analysis & Results

4.1.Development Strategies:

As part of the strategy to achieve these objectives, an initial study was carried out, to check the relevance of the various development approaches, options, models for the three project drivers namely, Finance, Logistics and Design.

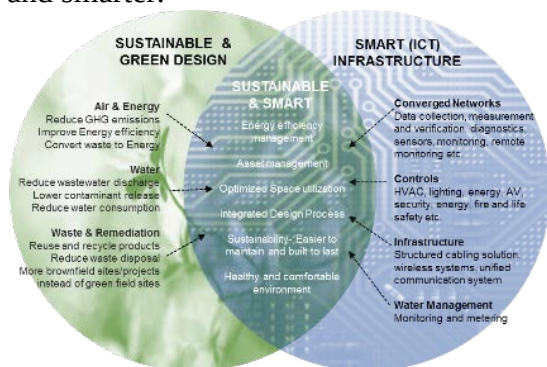
For the financial aspect, three approaches were considered for the study, namely the Built-Operate-Transfer (BOT) approach, Private Sector Partnership (PSP) approach and Do-It-Yourself (DIY) approach. Owing to the logistical and legal concerns highlighted during the study at that time, the BOT and PSP approaches were excluded and the Company decided to rebuild the township on its own following the Do-it-yourself (DIY) approach.

The logistical constraints included Rebuilding the entire township within 10 years timeframe while keeping the existing township and facilities operational at all times. In light of the above, a phased development strategy was considered including development of the vacant parcels of the land within the township initially in order to facilitate the subsequent evacuation and shifting of the occupants of the existing units as required to redevelop the existing developed areas of the township.

For the design aspect, the strategy included the study of the relationships and design components of the development models of various modern cities such as the Eco City, Green City, Sustainable City and Smart City/Digital City etc. This allowed the Company to pick the most comprehensive and relevant system applicable in the given context. The preferred components were then further analyzed for its applicability with respect to the site context, concurrence with the Company's objectives, cost implications and its

benefits. Another study was carried out for verifying the elements and facilities including services infrastructure in the existing Ahmadi Township that could be retained, enhanced or integrated with the proposed design resulting in optimized utilization of resources.

A holistic design approach was adopted using Sustainable & Green design principles with the Smart Technology (ICT) as an enabler to achieve a more comprehensive sustainable development that is more relatable, simpler, better, faster and smarter.



Fundamental to the strategy was an integrated design approach involving various disciplines & Company stakeholders in the design process from the beginning. The sustainable and smart design strategy was formulated to be applied at two levels, i.e. macro level (in master planning & urban design) as well as micro level (in detailed design of houses and various facilities) of the existing Ahmadi Township.

4.2.Design Considerations:

Sustainable design approach in urban planning at macro level included identifying the urban nodes and destination points in the existing Ahmadi Township and creating new nodes/hubs to ensure a good equal dispersion of retail, recreational, leisure, worship facilities across Ahmadi. This helped in easing or dispersing the traffic movement across the town, and ensuring that the residents across the town have easy access to these nodes/hubs.

The nodes help residents to orientate themselves, judge distances, act as points of reference and importantly give a sense of identity to their surroundings.

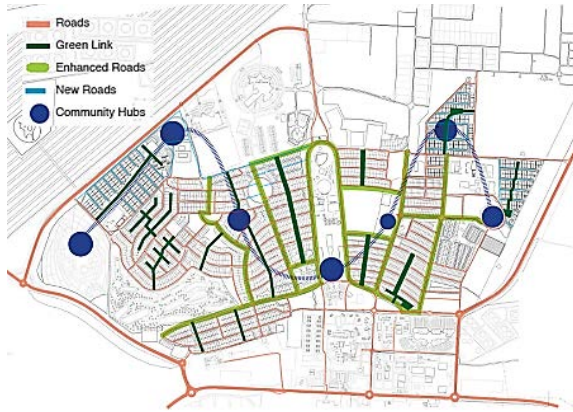
Furthermore, some urban nodes were designed to be more significant than others, to help draw visitors from the local vicinity and extended community participate and generate a vibrant environment. These nodes act as community hubs spread across Ahmadi to give a sense of cohesive identity to the town instead of their peripheral positioning in the old town layout.



Following the intent to further enhance one of its rich heritage of 'Green' Ahmadi, as it is known for in the region; these community nodes were connected through 'Green Links'/'boulevards' forming a well-connected green network of pedestrian walkways and bicycle lanes across Ahmadi. This helped to enhance social environment, add vibrancy to the internal streets of the township while ensuring pedestrian, and bicycle safety by including limited interaction with main vehicular traffic network. The existing green parks were also integrated to form part of this green network to increase its effectiveness.

In addition, the existing designated public open spaces and recreational areas were enhanced with the introduction of new functions and activities to meet the particular needs of Ahmadi residents.

Improvements were also designed in terms of legibility, accessibility and connectivity. Improved levels of planting local plant species further resulted in the creation of new habitats and enhanced biodiversity.



The urban design included a hierarchy of key spaces including squares, avenues, streets and parks that have a specific role and function to play within the landscape regeneration that have been bridged through these green links. Interventions such as widening of the existing pedestrian paths and defined site edges as well as the strategy for the formal arrangement of the hardscape and low maintenance softscape are introduced to create an elegant environment, while being easier to maintain.

Exciting public landscaped spaces create inspiring and animated environments as they act as focal points for communities, which are the fundamental platform for civic life.

Within the green links, different hierarchies of the landscape zones are created which can be defined into three types:

Zone A - The 'route' typology, forming connections across the housing sites, connecting points of origin and destination and facilitating pedestrian journeys away from the highway network.

Zone B - 'Delight' spaces punctuating the routes, acting as highlights in a journey from one point to another. Designed to be

more lush, spatially contained and 'special', encouraging people to spend time in them rather than move through them. They were designed to include some sort of active function for community use, making them lively and animated places.

Zone C - Plaza spaces marking the arrival at a public destination in the community: a mosque and shopping precinct. They have a secondary role as a breakout space for the residents use and includes places for children to play and shaded areas for adults to rest.



Furthermore, this helps the neighborhood greenspace to support a range of formal and informal recreational activities. The plazas are designed as multifunctional spaces to be used for sport & recreational activities, outdoor markets and events held by the Company, which enhances the interaction of the community. The scale and design treatment of each of these spaces across the township reflect their intended function, creating a vibrant mix.

The proposed master plan also optimized the design interventions at macro level by retaining all the main streets & avenues of the existing urban fabric and restricting it to few minor enhancements to some roads and junctions required in order to cater to the future traffic for next 50 years based on traffic studies carried out for the township.

Sustainable design approach at building level included the following design considerations:

- i. Use of Renewable Energy Source- Solar PV cells for all houses and facilities without affecting the visual outlook from the streets and the character of houses. Achieving Minimum 15% energy saving (around 8MW approximately from the total houses power by use of Solar PV cells.
- ii. Proposed use of solar car parking ports to help achieve 15% of energy requirement for the facility/ office building in the township.
- iii. Provision of adequate front and rear gardens for the houses, green shoulders along the streets and shaded streets and walkways to help reduce the effect of the heat island effect.
- iv. Layout of houses and buildings, size and fenestrations of windows designed to optimize the use of natural daylight to reduce the energy consumption for general lighting and cooling loads without any additional cost.
- v. Use of 400mm thick insulated external walls with lightweight thermal blocks and sand lime bricks cladding with higher U values to help reduce the cooling loads inside the houses by 30%.
- vi. Use of existing sand lime bricks cladding to retain the character of the existing Ahmadi town.
- vii. Use of low maintenance landscaping and local trees and shrubs species reducing the irrigation water demand for the landscaped areas and using brackish water for irrigation to further reduce the use of potable water.
- viii. Use of locally sourced and manufactured building materials preferred and specified.

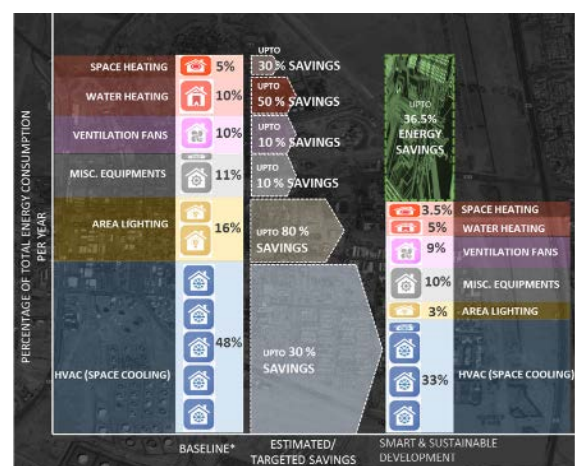
Smart Integrations were also considered along with the abovementioned Sustainable

design strategies to gain maximum benefits as envisaged. This included the following considerations:

- i. Optimize and upgrade the Main services infrastructure networks by including smart controls, meters etc. and GIS.
- ii. Provision of Home Automation system for houses.
- iii. Provision of Smart services such as Energy management system environmental monitoring system, KOC communication platform for community, Outdoor signage system, security system, street lighting remote control and waste management.
- iv. Provision of a centralized command and control center to control and monitor the operations of the overall town.

5. Discussion & Conclusion

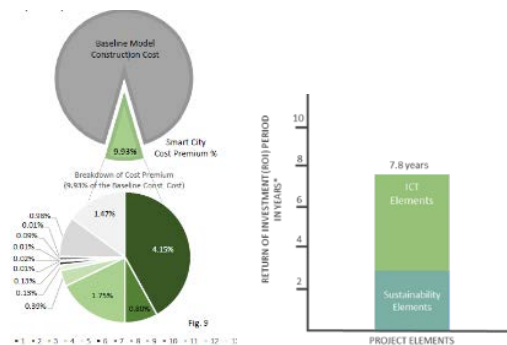
The factors driving the viability of this sustainable & smart approach with convergence of smart and sustainable building technologies and processes are as outlined below.



Energy Consumption: Comparison with other Residential buildings in Kuwait. [1]

1 Moncef Krarti, *Analysis of Economical and Environmental Benefits of Promoting Energy Efficiency - Case study Kuwait. United Nations Development Account Project, ESCWA*

- Energy efficiency and savings of 36.5%.
- Financial impact:
 - Up-front estimated cost premium (as compared to conventional system) – 9.93%
 - Returns on Investment- less than 8 years. (based on highly subsidized energy tariffs in Kuwait)



- Water conservation: 20% reduction of water consumption.
- Reduction in operation and maintenance cost.
- Enhanced Building transparency and visibility controlled by the Company through auditing, reporting and diagnostics

Furthermore, Smart and Sustainable development approach not only caters to the future trends but also supports the Company to achieve its goals through the following:

- i. Enhanced Livability:
 - Access to a comfortable, clean, engaged, healthy and safe lifestyle.
 - Access to diverse recreational and cultural options.
 - More reliable services to the occupants.
 - Improve the quality of the urban management and create new modern values in life.
 - Improve employees' quality of life by improving the efficiency of the services.

- ii. Enhanced Health & Safety:
 - Enhanced vigilance and security aspects within the township.
 - Safer neighborhood and community.
 - Faster emergency response system.
- iii. Enhanced Sustainability:
 - Planning for future while catering to the present needs of the Company employees and occupants.
 - Efficient use of natural, human and economic resources and promotes cost saving.
- iv. Enhanced Employee Workability:
 - Efficient working environment and increased employee retention.
 - Easy Access to Company & Community services.
- v. Enhanced O&M efficiency:
 - Making services available to employees, company and authorities with reduction of the energy costs and operation/maintenance costs of the Company.
 - Reduced energy and water consumption.
 - Getting the Infrastructure do more and last longer for less.

The Rebuilding Ahmadi Township project exemplifies an approach and Company's commitment to extend support in all its endeavors and serve as a platform to showcase and set a positive example in the region- for a comprehensive, sustainable and inclusive growth and paving way for a sustainable & smart future by addressing the three pillars of sustainability.



6. References

[1] Krarti, M. (2014), Analysis of Economical and Environmental Benefits of Promoting Energy Efficiency - Case study Kuwait, Promoting Energy Efficiency Investments for Climate Change Mitigation and Sustainable Development *United Nations Development Account Project. (July 2014)*: pp. 17.