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EGYPT GREEN BUILDING COUNCIL

BUILD ME Project – Phase II

Status of Energy Efficiency in the Egyptian Building Sector

Dr. Dalia Sakr, Egypt Green Building Council

Cairo, Egypt
March 2020

| About Egypt GBC

Egypt Green Building Council (Egypt GBC) was founded on November 2012 as a non-for-profit organization. Egypt GBC is a Prospective Member affiliated to the World Green Building Council among a global network of over 70 Green Building Councils and their 32,000 member companies to create green buildings for everyone, everywhere - enabling people to thrive both today and tomorrow.

| Egypt GBC Members and Partners

30
Individual Members

Architects, Engineers, University Professors, other disciplines

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MAJID AL FUTTAIM

REDCON Construction Co.

KNAUF

السويس للأسمنت
Suez Cement
HEIDELBERGCEMENT Group

THE AMERICAN UNIVERSITY IN CAIRO
الجامعة الأمريكية بالقاهرة

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GBC FRANCE
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Magyar Környezettudatos Építés Egyesülete
Hungary Green Building Council
GRÆNNI BYGGÐ
GREEN BUILDING COUNCIL ICELAND
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CONSEIL DU BÂTIMENT DURABLE DU CANADA
GBC Chile
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CCCS
Consejo Colombiano de Construcción Sostenible
GREEN BUILDING COUNCIL C.R.
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Kuwait Green Building Council
LGBC
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المجلس الفلسطيني للأبنية الخضراء
Palestine Green Building Council
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QATAR GREEN BUILDING COUNCIL
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GHANA GREEN BUILDING COUNCIL
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GREEN BUILDING COUNCIL NAMIBIA
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gbcm
GREEN BUILDING COUNCIL SOUTH AFRICA
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ASIA PACIFIC REGIONAL NETWORK
green building council australia
HKGBC
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Indian Green Building Council
Greening India since 2001
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GREEN BUILDING COUNCIL OF SRI LANKA
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Vietnam Green Building Council
Hội đồng Công trình xanh Việt Nam

Accelerating Solutions

Green Building Councils are independent non-profit organisations made up of businesses and organisations in the building and construction industry.

They bring together industry, government and civil society to facilitate market transformation, positioning buildings as a key response in the fight against climate change.

Collaborate		123,400 people participate in GBC events and networks annually
Innovate		GBCs invest $7m in innovative research each year
Communicate		GBC communications have an estimated reach of +500m people
Rate		2.65 billion m^2 of buildings have been certified sustainable by 36 GBC rating tools
Educate		46,800 people trained by GBCs annually
Advocate		GBCs strengthened policy in 35 countries last year alone

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Advancing Net Zero

A World Green Building Council global project

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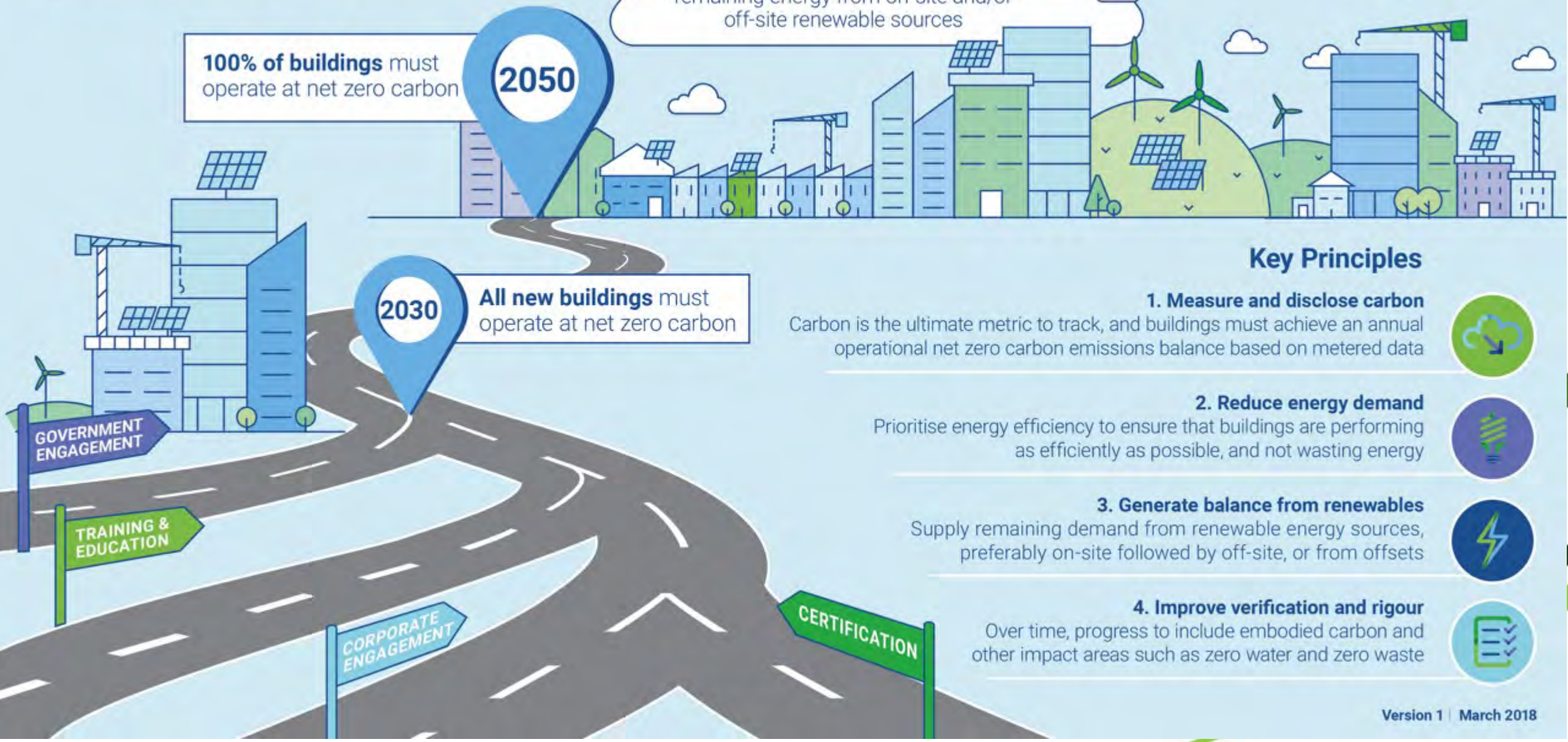
WorldGBC definition:
A net zero carbon building is highly energy efficient with all remaining energy from on-site and/or off-site renewable sources



Key Principles

1. Measure and disclose carbon
Carbon is the ultimate metric to track, and buildings must achieve an annual operational net zero carbon emissions balance based on metered data

2. Reduce energy demand
Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy

3. Generate balance from renewables
Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets

4. Improve verification and rigour
Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste

Version 1 | March 2018

Building Sector in Egypt: Overview

- Egypt's population exceeds **100 million** (CAPMAS, 2020) with close to **65% of Egyptians** living in Greater Cairo and the Nile Delta region.

- Egyptian building stock comprises of about **14.7 million buildings** (CAPMAS, 2019):
  - **66%** of buildings are in the **residential sector**, i.e. about 9.7 million buildings.
  - 5.4% are commercial buildings,
  - 6.75% are buildings of combined use for commercial & residential; and
  - 12.5% are unoccupied, 2.24% are closed, 3.95 % under construction.

- Majority of buildings (69%) are in **rural areas**.

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Building Sector in Egypt: Economic Importance

- Role of the **private sector** in housing construction has become increasingly important, supplying around **68% of formal housing construction (77 billion EGP investments)**. The remainder of formal construction is done by the public sector.

- Construction sector represents **5% of GDP** and employs approximately **11% of the national workforce**.

- Construction sector contributes to **48% of the total new investments** (petroleum investment not included).

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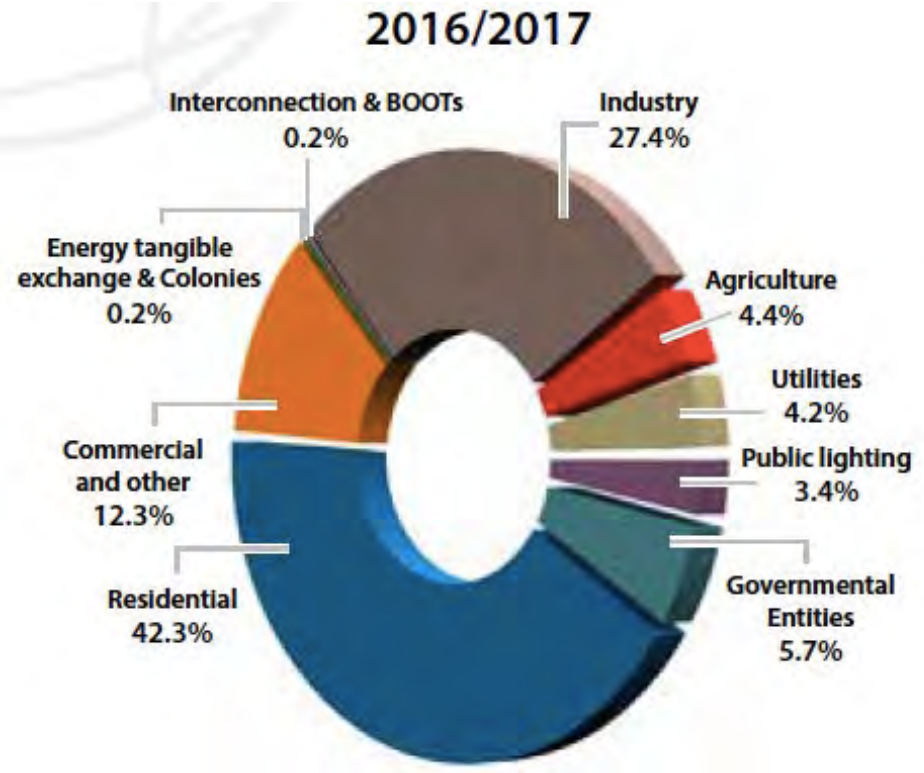
Building Sector in Egypt: Energy Consumptions and GHGs

- Almost **60%** of the nearly **151,606 GWh of electricity consumed in 2016/17** in Egypt satisfied the demand of residential, commercial, and public buildings.

- Building sector (**54,224 $GgCO_{2e}$**) accounts for about **17 % of the total GHGs emission of Egypt** (BUR, 2019).

- In 2035 the electricity consumption in Egypt by residential, commercial, and public buildings is expected to reach **278,945 GWh, an increase of 1.8 times** (Egypt Energy Strategy 2035).



Source: Egyptian Electricity Holding Company

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Building Sector in Egypt: Main Challenges

- Between 2006 – 2017 increase by **45% in number of buildings** and extra infrastructure system for about **45 million people in 2040** is needed.
- Concentration of urban population in the two main cities (Cairo and Alexandria). Over concentration of population on **6% of the total area**.
- **70% of existing buildings** in Egypt are in the **informal** sector and that over **50% of new housing stock is built informally**.
- Simultaneously with an **over-supply of more expensive urban housing**, there is a **shortage of urban housing for low and even middle-income households**.
- Deterioration of the built environment and **higher energy consumption** compared to peer cities.

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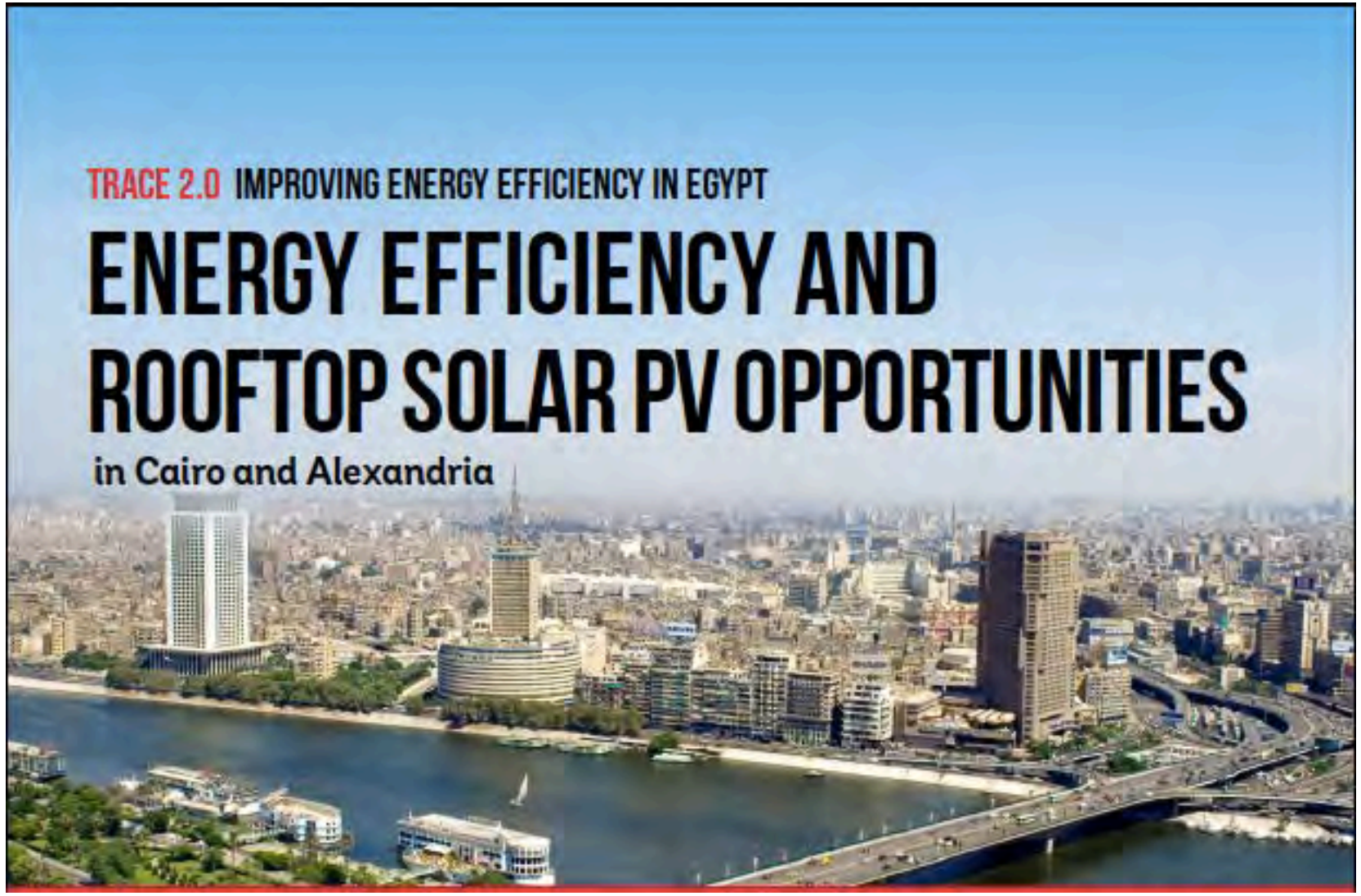
Benchmarking: Global



Report No: ACS22504

Arab Republic of Egypt

Egypt Energy Efficiency Implementation

Energy Efficiency and Rooftop Solar PV Opportunities: Report Summary

June 15, 2017

THE WORLD BANK

ESMAP

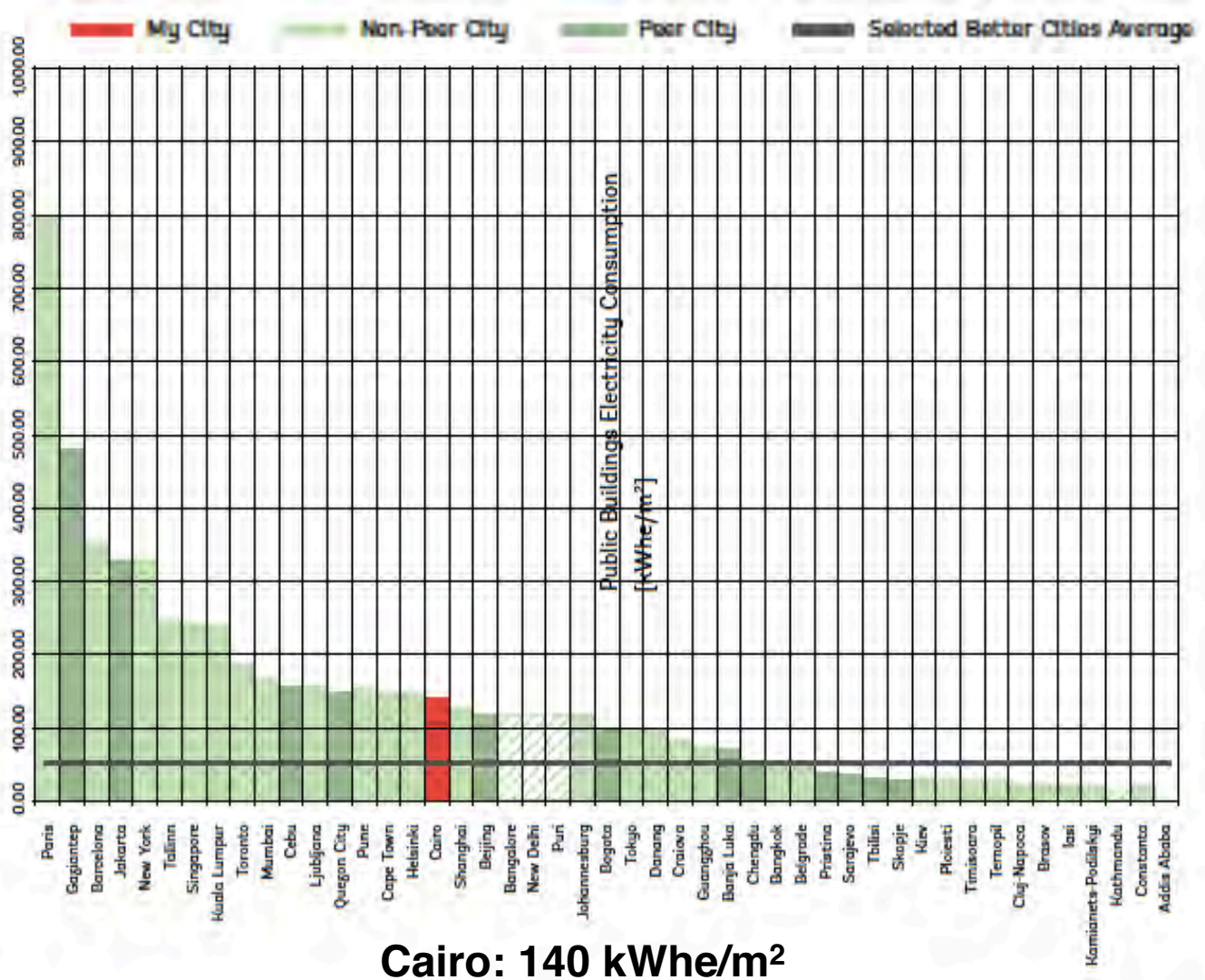
Benchmarking: Global

A] Public Buildings

- Buildings managed and/or owned by municipal, governorate, or national government.
- **345,078** public buildings in Egypt that represent about **3%** of the buildings stock in the country (WB, 2017).
- **11%** of the electricity consumed in Egypt in the 2013-2014 period (including utilities).
- Most public buildings are equipped with fans for cooling, and a few have central air conditioning system. Additionally, only a few public buildings are equipped with roof top solar panels to help meet the electricity consumption needs of the buildings.

Benchmarking: Global

A] Public Buildings



Cairo: 140 kWhe/m²

EE only:	30 – 50%	25 – 45%
	Cairo	Alexandria
kWh Saved	1,241,405,000	511,659,132
Energy Cost Savings (US$/year)	99,312,400	40,932,731
Energy Savings (%)	48%	49%
CAPEX (US$)	147,440,000	58,646,575
Domestic Content of Investments (US$)	44,232,000	17,593,972
CO_2 Saving per Year	6,207,025	2,558,296
Simple Payback (Years)[12]	1.7	1.4

* Results in the tables are estimates based on TRACE 2.0 models, and detailed pre-feasibilities are needed to improve the specific accuracy

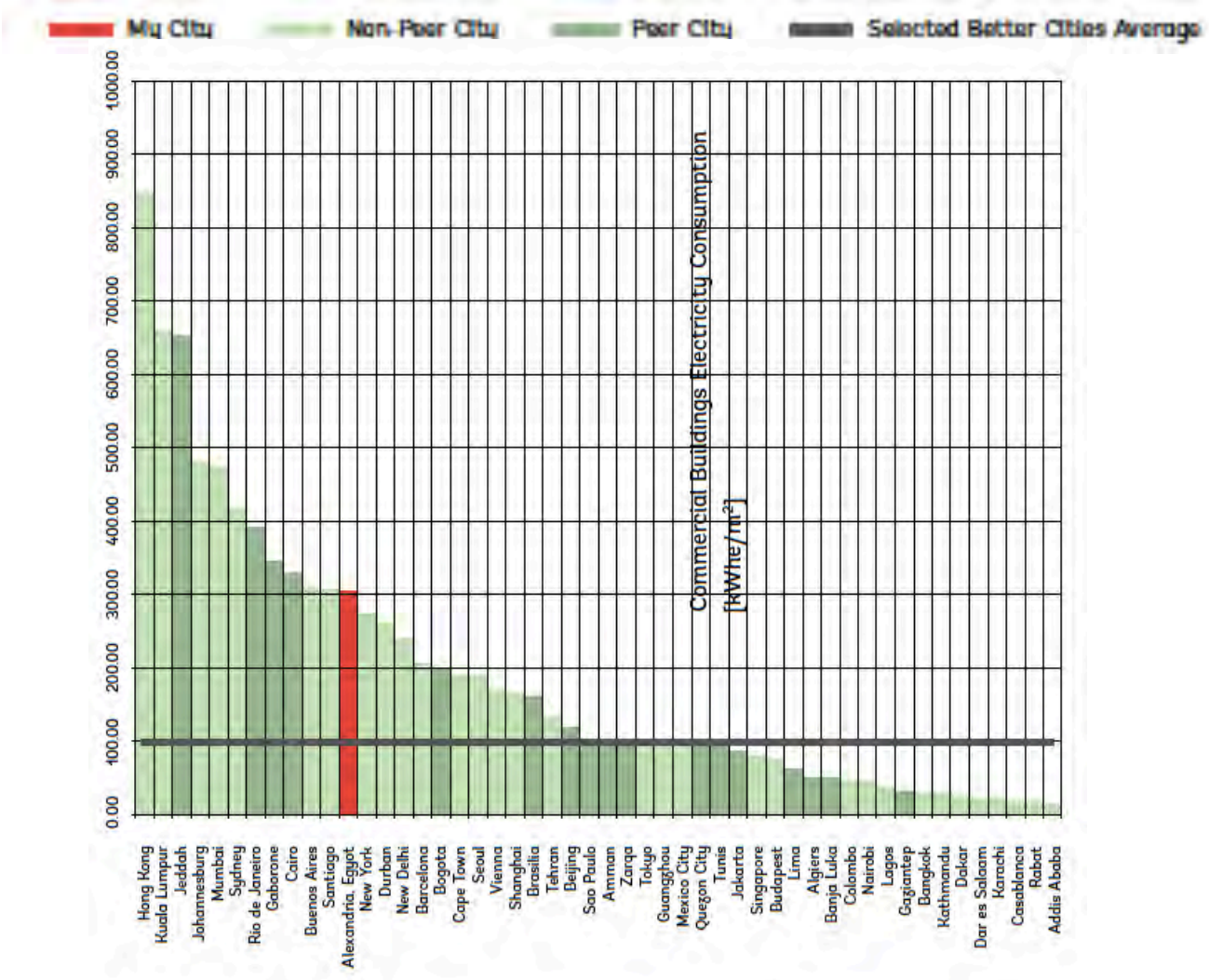
Benchmarking: Global

B] Commercial Buildings

- Buildings exclusively used for commercial activities, such malls, hotels, banks, clubs, shops, and office buildings.
- **802,231** commercial buildings in Egypt (doesn't include mixed use) and represent about **5.4%** of the buildings stock in the country (CAPMAS, 2019).
- Consume 18,585 GWh which is **12.3%** of all electricity sold in Egypt.
- About 36% of the total energy consumed in commercial buildings is consumed for lighting, 35-40% for cooling, ventilating and air conditioning (HVAC) systems, and the rest for other uses.

Benchmarking: Global

B] Commercial Buildings



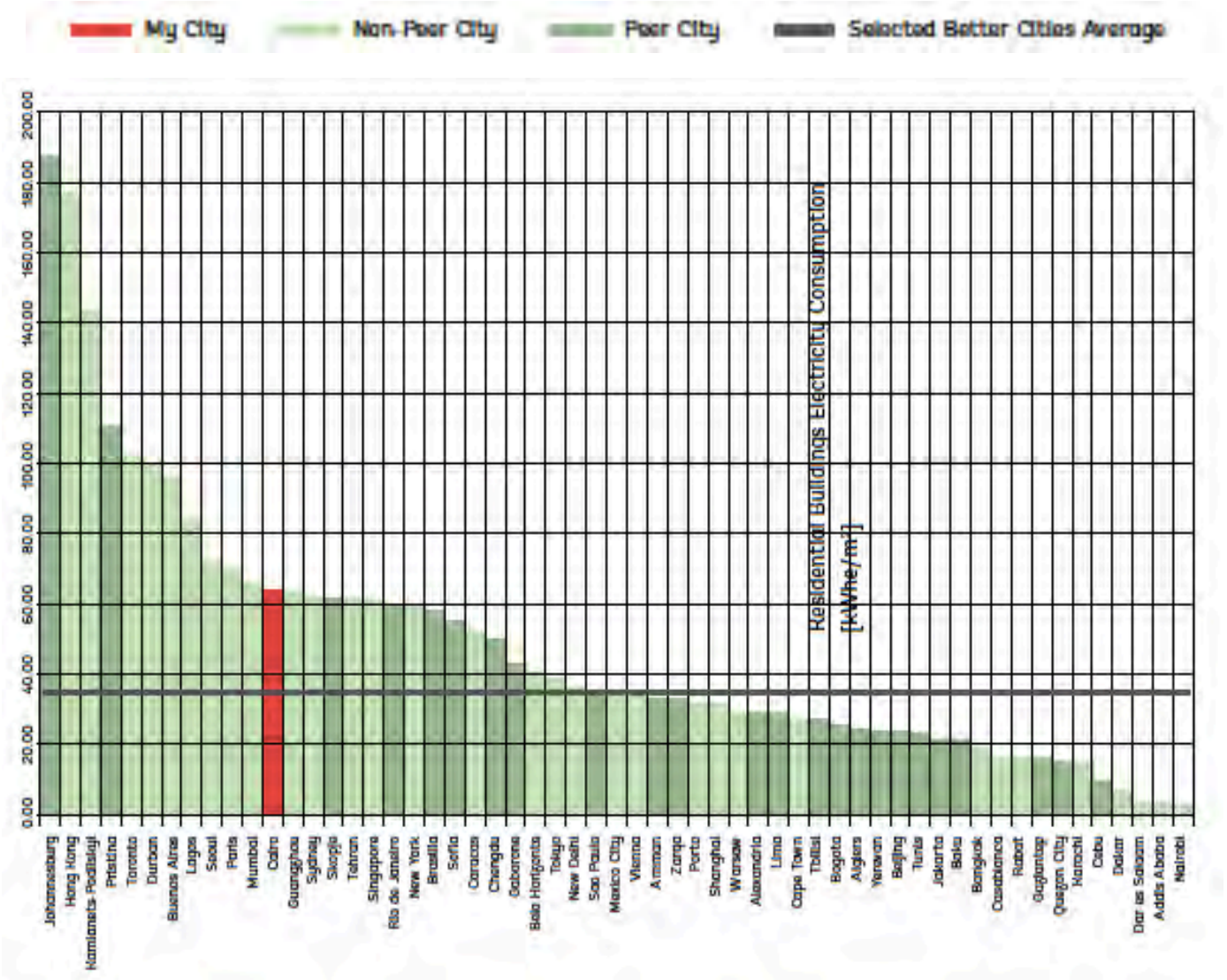
Cairo: 328 kWhe/m² **Alexandria: 306 kWhe/m²**

EE only: **40 – 60%**

	Cairo	Alexandria
kWh Saved	692,203,729	513,158,165
Energy Cost Savings (US$/year)	55,376,298	41,052,653
Energy Saving (%)	56	53
CAPEX (US$)	28,936,682	23,104,441
CO_2 Savings Per Year	3,461,019	2,565,791
Simple Payback (Years)[14]	0.52	0.56

Benchmarking: Global

C] Residential Buildings



EE only:

Cairo: 64.5 kWhe/m² — **59%**

Alexandria: 60.5 kWhe/m² — **52%**

Source: World Bank/Manuela Mot

Benchmarking: Local

C] Residential Buildings

BENCHMARK MODELS FOR AIR CONDITIONED RESIDENTIAL BUILDINGS IN HOT HUMID CLIMATE, By Shady Attia and Arnaud Evrard (2013)

- Data was collected from surveying almost 1500 apartments in Egypt.
- Two apartment benchmark models have been constructed representing typical residential buildings in Alexandria, Cairo and Asyut.

Parameter	Cairo	Alexandria	Asyut
Average use of air conditioning yearly	44 - 57%	29 – 49%	57 – 65%
Average yearly energy use per apartments in Typology 1	26.6 kWh/m^2	22.4 kWh/m^2	31 kWh/m^2
Average yearly energy use per apartments in Typology 2	14 kWh/m^2	11 kWh/m^2	18 kWh/m^2

Best Practices and Available Tools

- Numerous **previous energy efficiency/green buildings initiatives and projects** (i.e. NEEAP, UNDP 12 million LED lamps, EGYSOL Solar Water Heaters, EU MED-ENECC, GIZ Green Star Hotel)
- **Energy Efficienct Codes** for Residential and Commercial Buildings (HBRC)
- Proposed **Buildings Energy Efficiency Ordinance** (UNEP – Ministry of Housing - RCREE), Mediterranean Investment Facility (MIF). Focus on reducing the cooling needs of buildings through development of an ordinance on the reduction of building's cooling needs, and a financial mechanism to support the adoption of the recommended measures.
- **Green Building Rating Systems** (voluntary)

| Green Building Rating Systems

Egypt:

US GBC: Over 40 LEED projects

HBRC: Green Pyramid Rating System

Egypt GBC: TARSHEED (3 certified buildings)

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TARSHEED

HBRC
المركز القومي لبحوث الإسكان والبناء

GREEN BUILDING COUNCIL
EGYPT

U.S. GREEN BUILDING COUNCIL
LEED CERTIFIED
USGBC

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Award Ceremony of first TARSHEED Certificates (3 buildings) during Arab Sustainability Week, 3 – 6 November 2019

Project Name: Guesthouse Residence
Owner: Royal Herbs Ottoman Group
Designer: ECOnsult Design Co.
Address: El Wahat El Baharia, Western Desert, Egypt

TARSHEED Categories

Energy

Water

Habitat

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Tarsheed Residential
Project Checklist

Yes	?	No

					New Residential	Existing Reisdential
0	0	0	**Energy**	Possible Points:	**46**	**43**
Y			Prerequisite	P01 Energy Management Plan	Required	Required
Y			Prerequisite	P02 Commissioning	Required	N/A
			Credit	E01 Window-to-Wall Ratio	3	3
			Credit	E02 Reflective Roofing Materials	2	2
			Credit	E03 Reflective Paint for External Walls	3	3
			Credit	E04 External Shading Devices	2	1
			Credit	E05 Roof Insulation	3	3
			Credit	E06 External Walls Insulation	3	1
			Credit	E07 High-Performance Glazing for Windows	4	4
			Credit	E08 Air Tightness	1	1
			Credit	E09 Natural Ventilation	1	1
			Credit	E10 HVAC System Efficiency	0	0
			Credit	E11 Space Heating	2	2
			Credit	E12 Efficient Interior Lighting	4	4
			Credit	E13 Efficient Exterior Lighting	2	2
			Credit	E14 Photovoltaic Systems for Exterior Lighting	2	2
			Credit	E15 Lighting Control Sensors	2	2
			Credit	E16 Heated Water	3	3
			Credit	E17 Pump Motor Efficiency	1	1
			Credit	E18 Energy Metering	1	1
			Credit	E19 Renewable Energy	4	4
			Credit	E20 Vertical Transportation	2	2
			Credit	E21 Innovation and Creativity in Energy Management	1	1

0	0	0	**Water**	Possible Points:	**19**	**19**
Y			Prerequisite	P03 Water Management Plan	Required	Required
			Credit	W01 Water Efficient Landscaping	2	2
			Credit	W02 Irrigation Efficiency	2	2
			Credit	W03 Rainwater and A/C Condensate Harvesting	2	2
			Credit	W04 Greywater Treatement and Reuse	5	5
			Credit	W05 Water Metering	2	2
			Credit	W06 Water Saving Devices	5	5
			Credit	W07 Innovation and Creativity in Water Management	1	1

0	0	0	**Habitat**	Possible Points:	**35**	**38**
Y			Prerequisite	P04 Construction Activity Pollution Prevention Plan	Required	N/A
Y			Prerequisite	P05 Solid Waste Management Plan	Required	Required
			Credit	H01 Heat Island Reduction: Reflective Materials For Outdoor Paving	1	1
			Credit	H02 Heat Island Reduction: Shaded Parking and/or Underground Parking	3	3
			Credit	H03 Construction and Demolition Waste Management	5	5
			Credit	H04 Municipal Waste Management	5	5
			Credit	H05 Organic Waste Management	N/A	N/A
			Credit	H06 Local Materials	4	2
			Credit	H07 Recycled Content	4	2
			Credit	H08 Low VOC Materials	5	5
			Credit	H09 Kitchen/ Pollutants Exhaust	2	2
			Credit	H10 Entryway System	1	1
			Credit	H11 Green Roof/ Green Walls	3	3
			Credit	H12 Green Expert	1	1
			Credit	H13 Preventive and Corrective Maintenance	N/A	7
			Credit	H14 Innovation and Creativity in Habitat Design	1	1

0	0	0	**Project Totals (For Certification)**	100	100

Bronze: 40-49 points, Silver: 50-59 points, Gold: 60-69 points, Platinum: 70+ points

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TARSHEED

TARSHEED Rating Systems

TARSHEED rating systems starting Edition 2018 have the same three categories, however the requirements are more advanced, where they include:

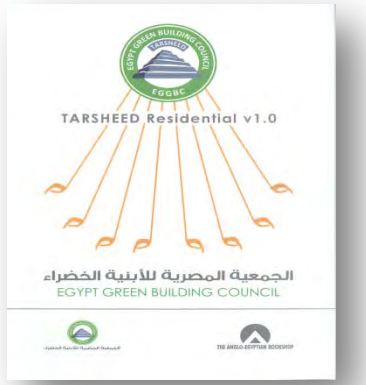
- Prerequisites (mandatory acts)
- Credits for points achievements
- Four level of certifications
- More stringent requirements that suits the Egyptian market

TARSHEED Certification Levels	Credit Points Achieved
TARSHEED Bronze	40-49 Points
TARSHEED Silver	50-59 Points
TARSHEED Gold	60-69 Points
TARSHEED Platinum	70 Points and Above

TARSHEED Rating Systems

Egypt GBC developed a new initiative to have a new rating system based on Cradle to Cradle approach through full utilization of all natural resources:

- TARSHEED - Residential Basic (Edition 2015)
  - New buildings
  - Min 20% savings in all 3 categories
  - “Affordable Buildings”
- TARSHEED - Residential Advanced (Edition 2018)
  - New and existing buildings
  - Credits based: 4 certification levels
- TARSHEED – Commercial (Edition 2018)
  - New and existing buildings
  - Credits based: 4 certification levels
- TARSHEED - Communities (Edition 2018)
  - New and existing communities
  - Credits based: 4 certification levels



Residential

Commercial

Communities

TARSHEED Rating Systems (Cont'd)

- **Egypt GBC in the process of developing a new initiative to have a new rating system based on cradle to cradle approach through full utilization of all natural resources:**

Schools

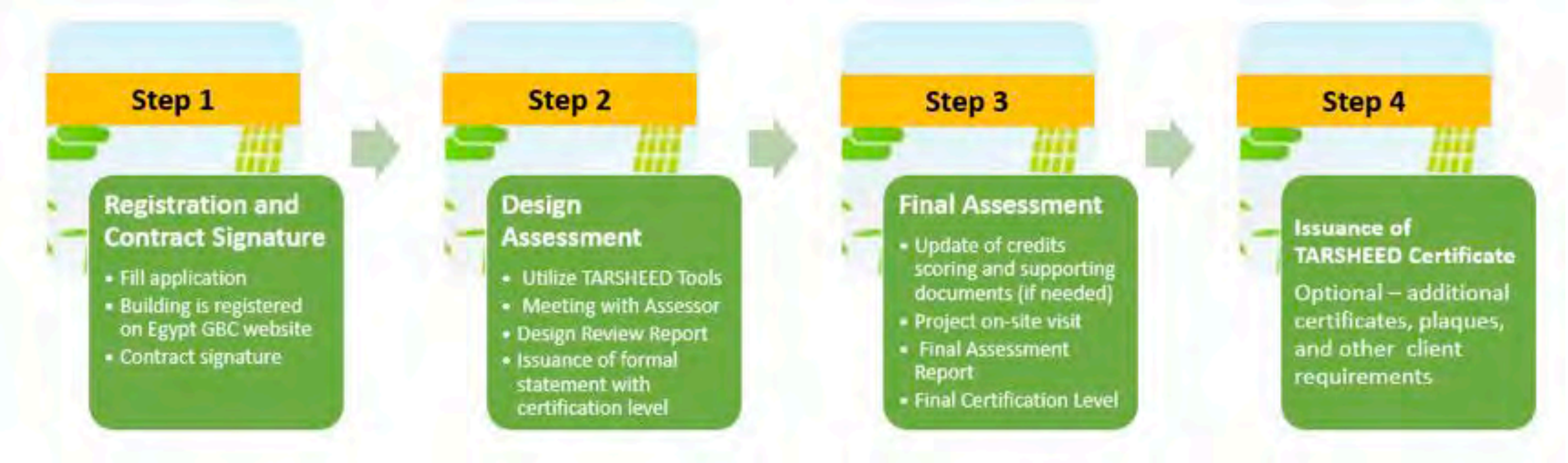
- TARSHEED – Schools (Edition 2019)
  - New and existing schools
  - Credits based: 4 certification levels

- TARSHEED – Healthcare (Edition 2020)
  - New and existing buildings
  - Credits based: 4 certification levels

Healthcare

I TARSHEED Certification Process

TARSHEED



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THANK YOU

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