

5 - 8 DECEMBER 2022
DUBAI WORLD TRADE CENTRE

How to launch and deliver a successful energy retrofit project

OMNIA HALAWANI – grfn global

December 7, 2022



about us

We are a progressive independent **multi-disciplinary consultancy** that delivers **energy-efficient** and **sustainable** engineering, design solutions, and advisory services that best serve our clients and the well-being of their local communities.

Our expert team of designers, engineers and technical consultants are committed to providing you with solutions and services that remit **tangible** and **quantifiable value** throughout the **lifecycle** of your project.

Our proven track record and portfolio of projects ranges from **new construction**, **intervention** and **policy and advisory** services. No matter the sector, size or type of the built environment, we embrace your needs and complexity with our unique skillset, and promise to provide efficient, functional, future-proof solutions and sound technical advice that drives transformative outcomes.

our mission

To provide energy-efficient, progressive and functional engineering & design solutions for sustainable built environments



established in **2013**



50+ team members in **2022**



certified
ISO 9001:2015
ISO 14001:2015
ISO 45001:2018



Active on the local and regional boards of Governors/Directors of **ASHRAE** and **CIBSE**



Ex-board Member of **Emirates Green Building Council**

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services



>

buildings

- Project Development Consultancy*
- Architecture and Interior Design*
- Buildings Engineering*
- FM & Operational Consultancy*
- Commissioning Management*

>

infrastructure

- District Cooling*
- Smart Cities*
- Data Centers*
- Sustainable Infrastructure*

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energy and resilience planning

- Energy Retrofit Management*
- Energy Audits*
- Energy Modeling*
- Resource Efficiency*
- Building Performance*
- Net Zero*
- Regenerative Designs*

>

strategy and advisory

- Trainings and Capacity Building*
- Transactional due diligence*
- Technical Expertise and Arbitration*
- Technical Studies*

>

sustainability and environmental consultancy

- Green Building Rating Systems*
- Human-centric Design*
- Sustainable Design*
- Carbon Management*
- Environmental and Social Impact Assessments*
- Sustainability Strategy and Reporting*

Sectors

- Infrastructure & District Cooling
- Buildings High-rise and Low-rise
- Villas
- Oil & Gas
- Retail, food & beverage
- Corporate

in numbers



>135,000,000

kWh of Identified Energy Savings



>17,000,000

kWh of Verified Energy Savings



>1,000,000

TR of District Cooling Designed, Assessed, and/or Optimized



UAE Pavilion for EXPO 2020

LEED Platinum Achieved!
grfn was the Independent Commissioning Agent



BURJ KHALIFA MEP RETROFIT

Highest **water-cooled chillers installation in the world to segregate the chilled water supply in the top 15 floors.** Innovative design of condenser cooling by return water from the return chilled water of the rest of the tower.



Technical and Project Management Consultants for some of the largest **Energy Retrofit Projects** worldwide

Over 200 buildings in Abu Dhabi
Residential, Commercial, Retail, Hospitality and Schools



Dubai
106 buildings, 41 boutique offices, 9 warehouses, 5 souks and various other types of buildings



>22M SQM of Area
9 Malls + 1 Hotel



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WHAT, WHY, AND HOW

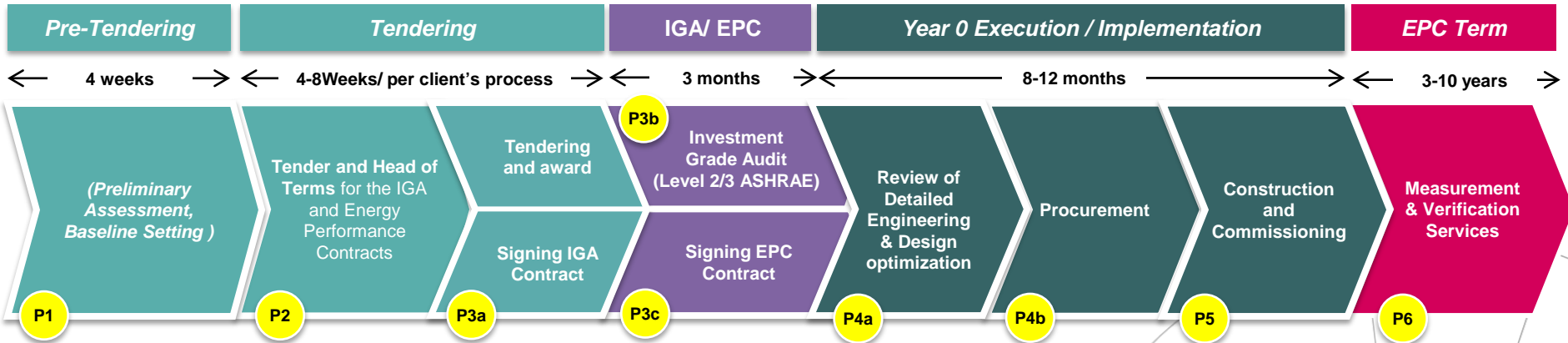
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ENERGY RETROFIT STAGES

A Typical Timeline



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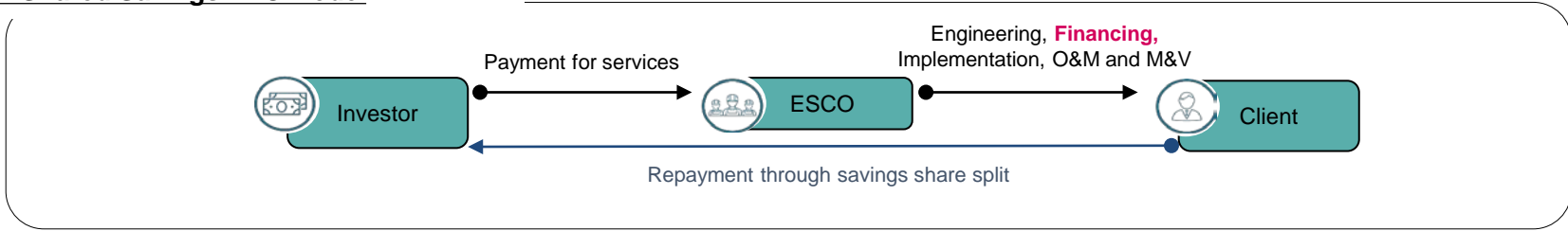
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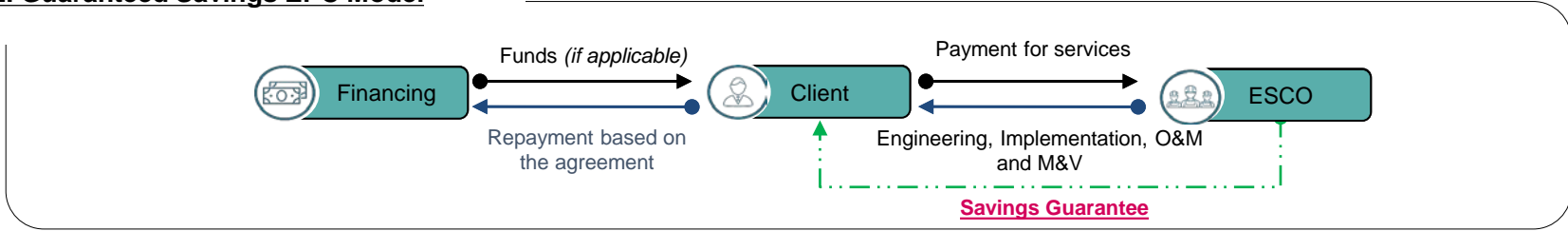
Background Information

Types of EPC Contracts

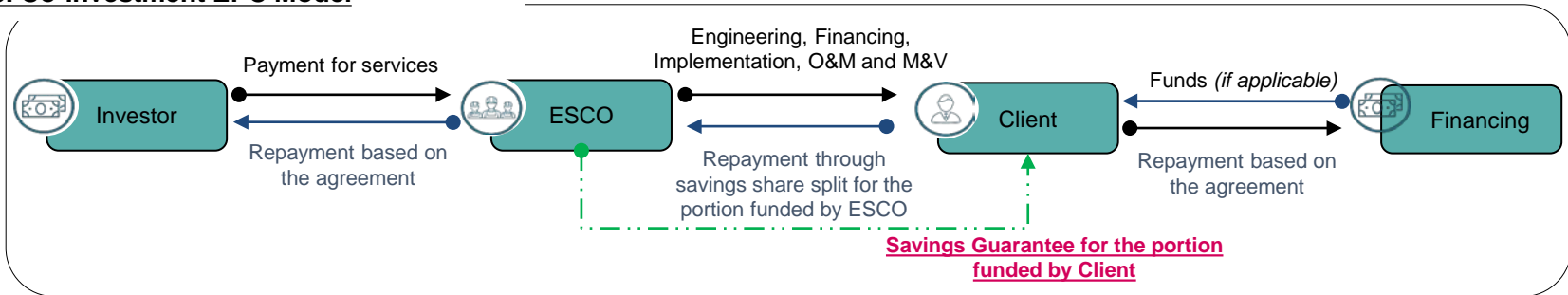
1. Shared Savings EPC Model



2. Guaranteed Savings EPC Model



3. Co-Investment EPC Model





CHEAT SHEET FOR SUCCESSFUL ENERGY RETROFITS

CHEAT SHEET FOR ENERGY RETROFITS

An Owner's Guide

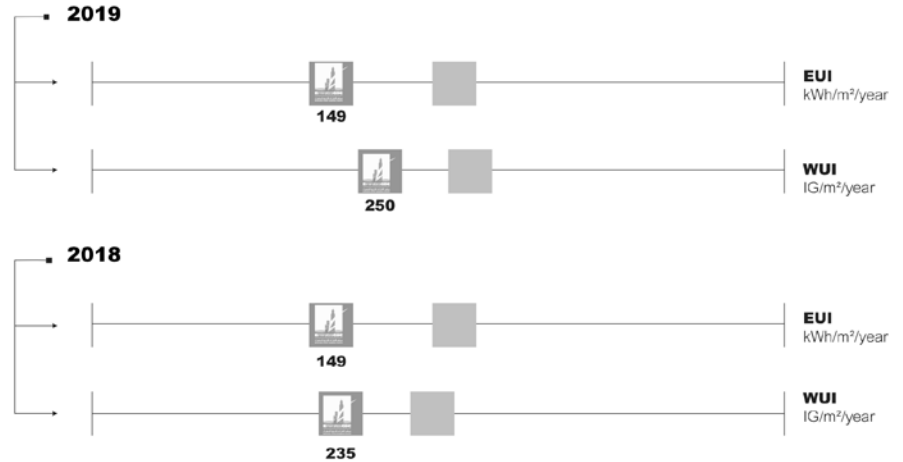


Start with Preliminary Energy Assessments

- **Benchmark** facilities
- **Prioritize** facilities

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FINDINGS & RESULTS



Emirates Green Building Council Median

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Sufficient Time & Budget for Detailed Assessments

- Each building is **unique**
- Sound **baselines**
- Harnessing **opportunities**
- Accurate **savings calculations**



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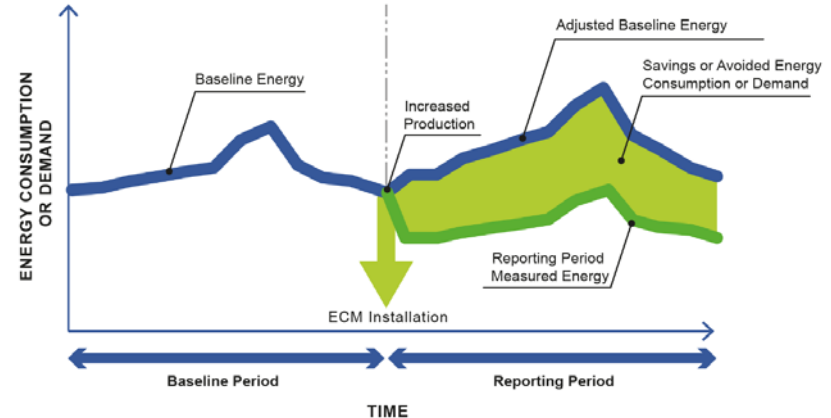
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Measurement & Verification

- **Budget** for M&V
- Select **M&V options** suitable for the ECMS



Savings reported for any period =

Baseline Period Energy – Reporting Period Energy +/- Adjustments

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OPTION A

Retrofit Isolation with Key Parameter Measurement

E.g.; Lighting retrofit projects

OPTION B

Retrofit Isolation with All Parameter Measurement

E.g.; Installation of new electric motor with a variable-speed drive and associated controls

OPTION C

Whole Facility Measurement

E.g.; Replacement of a chiller plant and lighting

OPTION D

Calibrated Simulation

E.g.; Comprehensive retrofit involving multiple interactive conservation measures in a large building with lack of utility data

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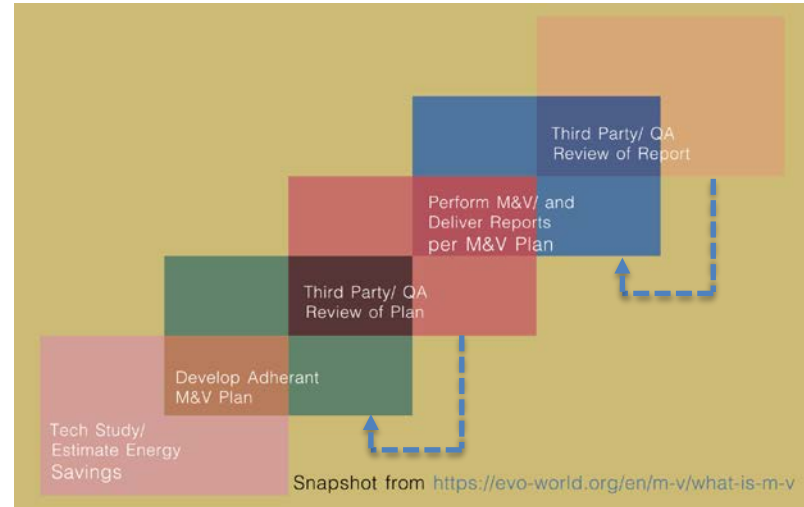
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Hire a 3rd Party Measurement & Verification Reviewer

- Choose a **certified** and **experienced** 3rd party reviewer
- Hire the M&V expert at **early stages**
- Verify the contractual **M&V Plan**



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Hire a 3rd Party Measurement & Verification Reviewer

A requirement in many countries' public programs

The **IPMVP** states that an owner may need an **independent verifier** to:

- **review** the savings reports.
- ensure **measurements validity and prevent conflicts**.
- **Resolve conflicts**, if any

According to the IPMVP, the independent verifiers are typically **engineering consultants** with **experience and knowledge** in ECMs, M&V, and energy performance contracting.

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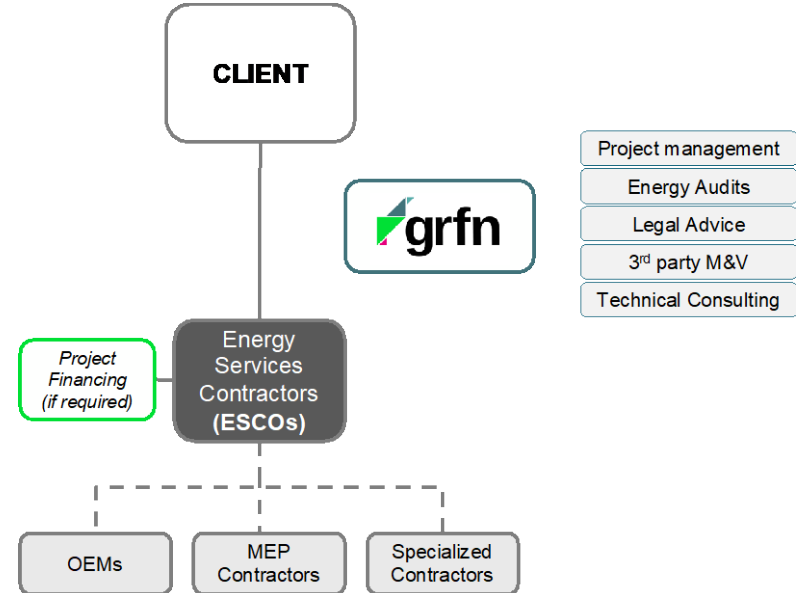
An Owner's Guide



Consult an Energy Advisor

- Establishing **baselines** and **scope**
- **Successful tendering process**
- **Contracts** drafting and negotiations
- Successful **M&V Plan** set up
- Adherence to **industry best practice**
- No **exaggerated savings**

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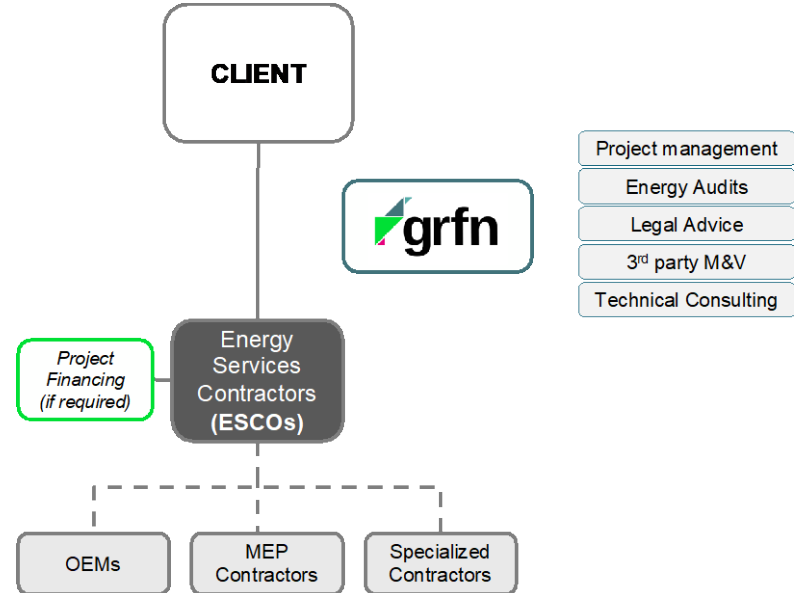
An Owner's Guide



Consult an Energy Advisor

- Proper **supervision on site**
- Manage **adjustments**
- Manage **timeline**
- **Maximize savings**
- Drawing on **lessons learnt** from previous experiences

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Our Large Energy Projects

DoE in ABU DHABI

Consultancy for Energy Retrofit Management (ESCO selection, supervision, M&V) for 8 pilot buildings and selection of 150 further buildings eligible for energy retrofit.

AAE Middle East Energy Retrofit Project of the Year 2020

CIBSE BPA Retrofit Project of the Year 2021

EMAAR

Energy benchmarking for all of Emaar properties and setting a plan for energy management. Done twice in 2016 and 2019.

of buildings **58**

Types : Retail, residential, commercial hotels

TECOM

Consultancy for Energy Retrofit Management for 9 large communities managed by TECOM in Dubai: ~160 buildings. Scope spans selection of ESCO all the way through implementation supervision, commissioning management, and M&V.

of buildings **160+**

Types: 41 boutique offices, 9 warehouses, 5 souks and various other types

ALDAR PROPERTIES

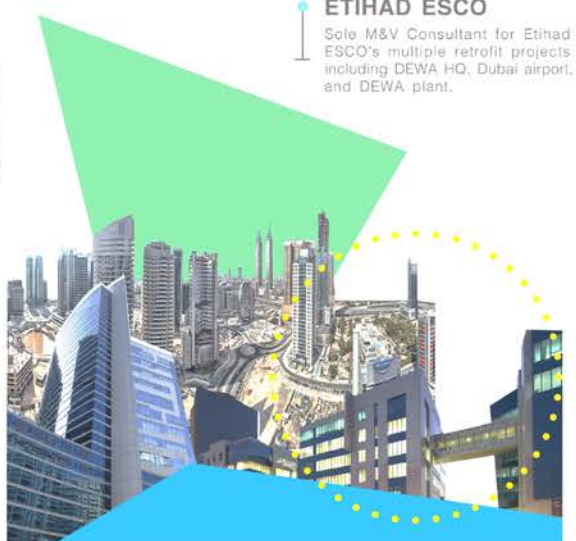
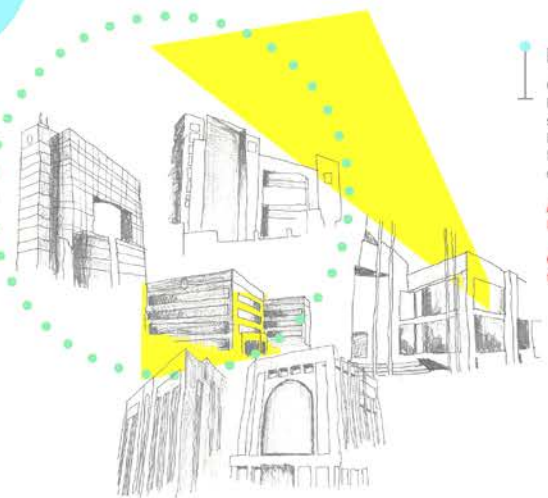
Consultancy for Energy Retrofit Management for 90+ assets owned and managed by Aldar Properties in Abu Dhabi. Scope spans selection of ESCO all the way through implementation supervision, commissioning management, and M&V.

of buildings **200+**

Types: residential, commercial, schools

ETIHAD ESCO

Sole M&V Consultant for Etihad ESCO's multiple retrofit projects including DEWA HQ, Dubai airport, and DEWA plant.



Our large energy projects

NAKHEEL

• Consultancy for Energy Retrofit Management for 8 malls. Scope spans audit, selection of ESCO, implementation supervision, commissioning management, and M&V.

• Consultancy for Energy Conservation Study across multiple Nakheel communities. Spanning between Level 3 audits for 30 buildings (each type) and Level 1 for all other buildings.

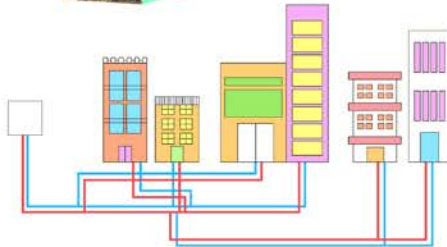
of buildings **9 malls + 1 hotel**

Types: **Malls, Residential**



EMICOOL

Consultancy for Energy Retrofit Management for 3 district cooling plants owned by Emicool in Dubai. Scope spans audit, selection of ESCO, implementation supervision, commissioning management, and M&V.



MERAAS

Consultancy for Energy Retrofit Management for 59 buildings in Discovery Gardens in Dubai. Scope spans audit, selection of contractor, implementation supervision, commissioning management, and M&V.

of buildings **59**

GITEX 2019 - Energy Sustainability Champion Award



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An Owner's Guide



Lessons Learnt

- 1. SUFFICIENT IGA DURATION** → Maximize savings, reduced timelines, reduces uncertainties.
- 2. EXISTING EQUIPMENT CONDITIONS** → avoiding issues during the implementation stage.
- 3. LACK OF COORDINATION** → between ESCO and other stakeholders (building owner, FM, sub-contractors, Consultant) are the cause of nuisances, delays, and eventually disputes.

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Lessons Learnt

- 4. PLANNING** → Between different buildings and teams at different stages and paces.
- 5. MAINTENANCE PROCEDURES** → added to cost of implementation and adopted into the project plan.
- 6. ECMs SELECTION** → selection to consider the equipment condition, savings impact, longevity and proven technology.

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Lessons Learnt

7. DELAYS → contracts should adopt a penalty for delay

8. INTERNATIONAL STANDARDS → accuracy of calculated savings and verified results

9. SAVINGS ATTRIBUTION → cross relations, double counting, and non-contributing ECMs

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Lessons Learnt

- 10. END OF LIFE** → timing cost-intensive retrofits with equipment end of life makes a retrofit more viable.
- 11. OCCUPANTS** → Prioritize occupant and building health
- 12. MEASUREMENT & VERIFICATION** → starting with the M&V Plan all the way to managing the reporting period and adjustments

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THE EXTRA MILE

Value Added Services



Digitalization of Energy Management

- **Cloud**-based
- Pushing data from **BMS** and **IoT sensors** to cloud
- **Data validation**
- **Metrics** for **AI-enabled data analytics**

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THE EXTRA MILE

Value Added Services



Optimization Software for District Utilities

- **Proactive controls**
- **What-if analysis**
- Improved **hydraulic performance**
- Optimization across **multiple plants**

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Q&A



OMNIA HALAWANI

Co-CEO & Founder

omnia@grfn.global

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Management

Talks

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& Engineering

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HVAC R

Talks

Offsite
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Talks

Project
Management

Talks

Solar

Talks

Stone Design

Talks

Technology

Talks

Urban Design
& Landscape