

**Track : Innovations in Energy Efficiency**

**Session: Building Energy Efficiency  
(Focus on Cooling)**



## **A Sustainable 3-Pronged Approach In Energy Management Program Implementation For Office Space Cooling**

**Dr. Aldrin Calderon, Ph. D.**  
**Associate Director for Energy & Sustainability**

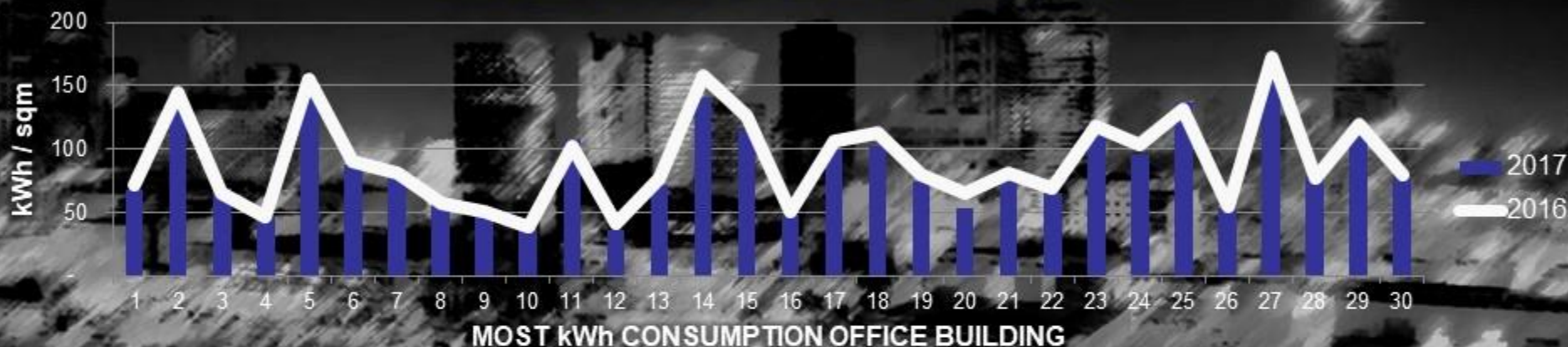


## APMC Business Units Electricity Consumption





## OFFICE BUILDING PERFORMANCE



20.7M  
kWh

1. Tactical Activities Being Performed by Each Property;

2. Intensity of Program Implementation is Different Per Property

3. No Defined Targets per Property;

4. Best Practices are not Maximized;

5. Program Accountability and/or Ownership are not Clearly Defined;

1. Structured Program (Process dependent not people dependent)

2. Implementation Consistency (Best practices applicability and replicability);

3. Properly Measure and Validate Success Stories

4. Optimum results and maximize implementation

5. Establish accountability and Ownership mentality

**3 YRS REDUCTION (2014-2016)**

**5 YRS ROADMAP (2017-2021)**

# Self-Assessment and Building Characteristics... **APMC**

## 1<sup>st</sup> APPROACH (Best Practices)



Ozone Generators



Drives Technology



Capacitor Banks



LED



VSD



BMS



GMBD  
review



Equipment Flexibility



Operational Efficiency



Central Performance Monitoring

## 2<sup>nd</sup> APPROACH (Engineering Intervention)



Equipment Replacement  
Program



High Efficiency Motors



Oil Free Chiller / Smart Chiller



Equipment during weekend



Thermal Wheel



Harmonics Review



Regular Energy Audit

## 3<sup>rd</sup> APPROACH (Organic R&D)



Performance Contracting for  
Cutting Edge Technologies



International Grants  
Project



High Performance Buildings



ISO 50001: Energy  
Management System



Cutting Edge but  
practical technology



# Identifying What Works and What Doesn't...



## Chiller Capacity Count

80% Chiller  
7% CHWP  
11% COWP  
2% CT

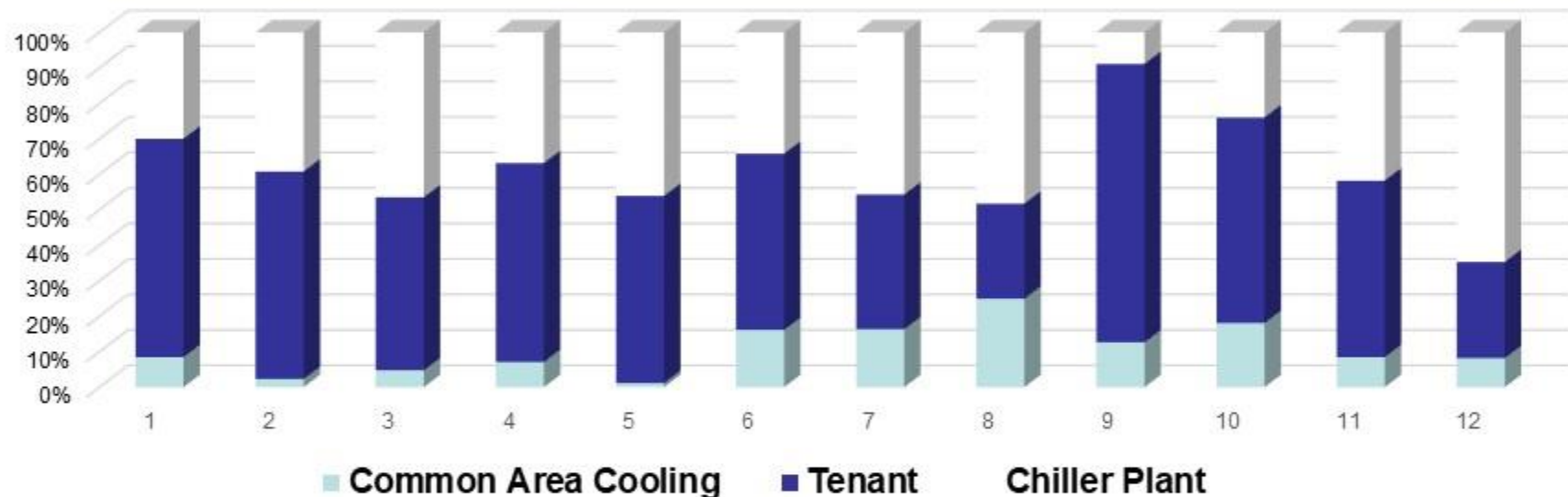
Chiller Refrigerant Used



■ R123 ■ R134A ■ R22



## Cooling Consumption in Centralized Chiller Buildings



1<sup>st</sup> YEAR REDUCTION  
**10.3M**   
3.4%





2018

THROUGH A NEW LENS

steps to **success**

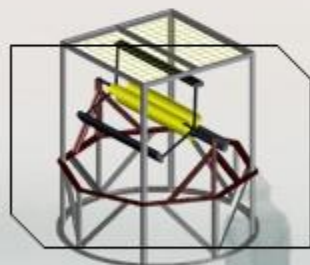
Focus Area

# Project: "Officiency"

BEST  
PRACTICES

ENGINEERING  
INTERVENTION

CUTTING EDGE  
TECHNOLOGIES



COOLING  
TOWER WIND  
TURBINE



ROOFTOP  
SOLAR

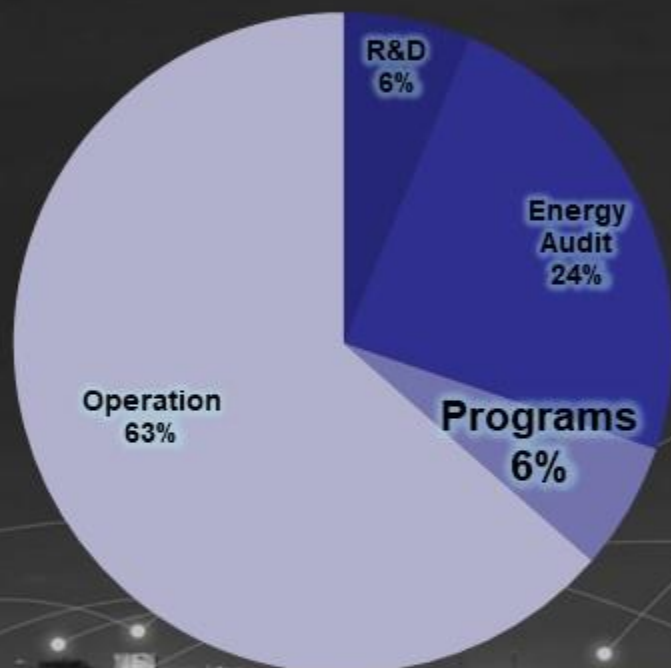


CHILLER  
OPTIMIZATION



HIGH EFFICIENCY  
MOTORS

# Cascading Programs on How We Do It...



**APMC HQ**  
100% on Renewable Energy

**APMC e-ENERGY**  
Computerized Energy Management System

**APMC Green Star Award**

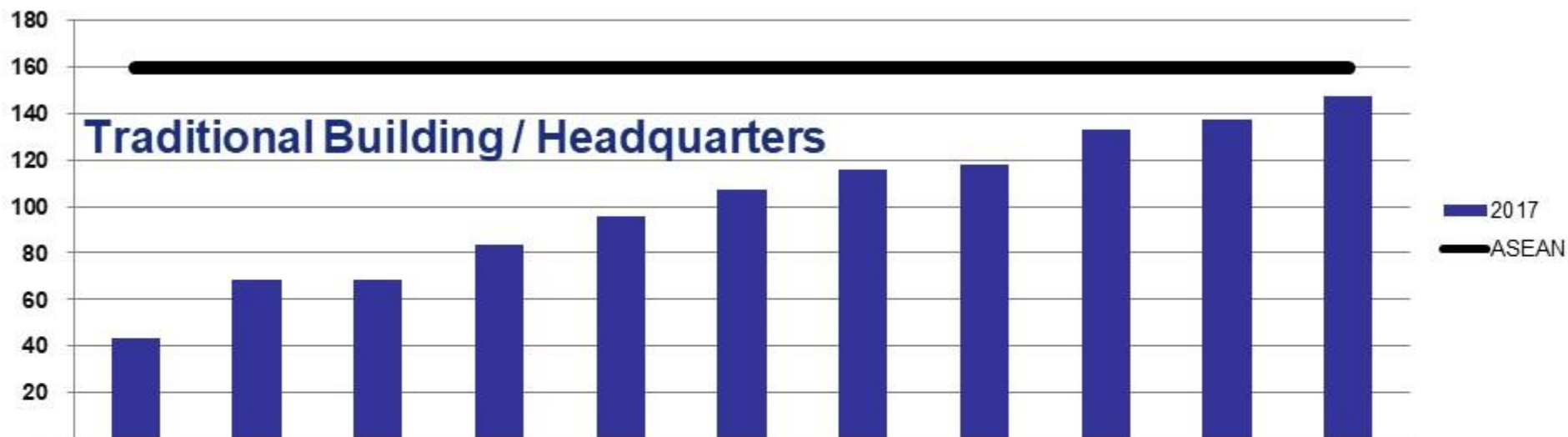
Office Building Sustainable Consumption



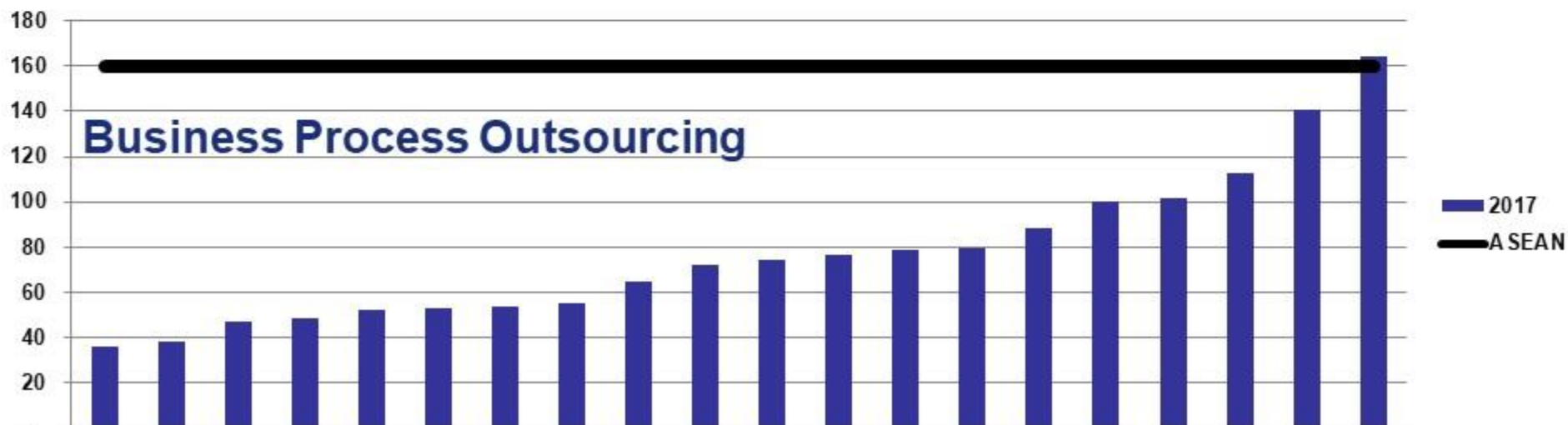
# Office Building Energy Performance Index



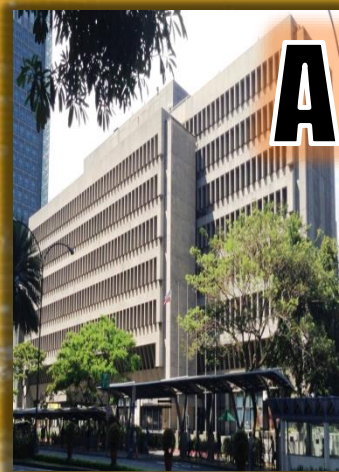
## Traditional Building / Headquarters



## Business Process Outsourcing



# Success stories and 2018 ahead...

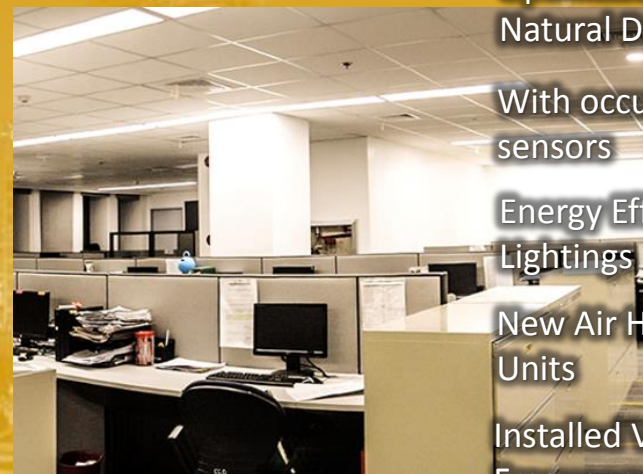


## APMC HQ

Running on Green Energy



"On-going USGBC review"



Optimization of  
Natural Daylight

With occupancy  
sensors

Energy Efficient  
Lightings

New Air Handling  
Units

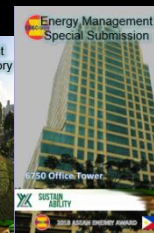
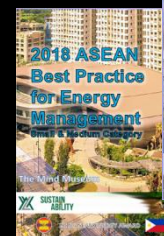
Installed Variable  
Frequency Drives



**DON EMILIO ABELLO**  
**ENERGY EFFICIENCY**  
**AWARD** CITY, PHILIPPINES 163.

# 1

ASEAN Energy Award



# 100%

Applicable APMC Managed Properties

**BETTER THAN**  
ASEAN Energy Standards



2016 vs 2017

# 15

# 21





In our BUILDINGS,  
It's COOL to be EFFICIENT

END OF SLIDES

**ALDRIN CALDERON**  
Post grad in Leadership for Sustainability, United Nations University  
Ph. D. in Energy Engineering  
M. Sci. in Materials Science and Engineering  
B. Sci. in Mechanical Engineering



[calderon.aldrin@ayalaproperty.com.ph](mailto:calderon.aldrin@ayalaproperty.com.ph)

<https://www.linkedin.com/pub/dir/aldrin/calderon>

Innovation & Sustainability