Clean Energy Business Council
مجلس صناعات الطاقة النظيفة
Middle East & North Africa
الشرق الأوسط وشمال افريقيا

CEBC Clean Energy Webinar Series
Webinar #5

"The Impact of COVID-19 on the Energy Efficiency Market"

Brian Motherway
Head of Energy Efficiency
International Energy Agency

Graeme Sims
Executive Director
Dubai RSB

Firas Obeido
CTO
Smart Automation Energy

www.cebcmena.com

Become a member: ahmed@cebcmena.com

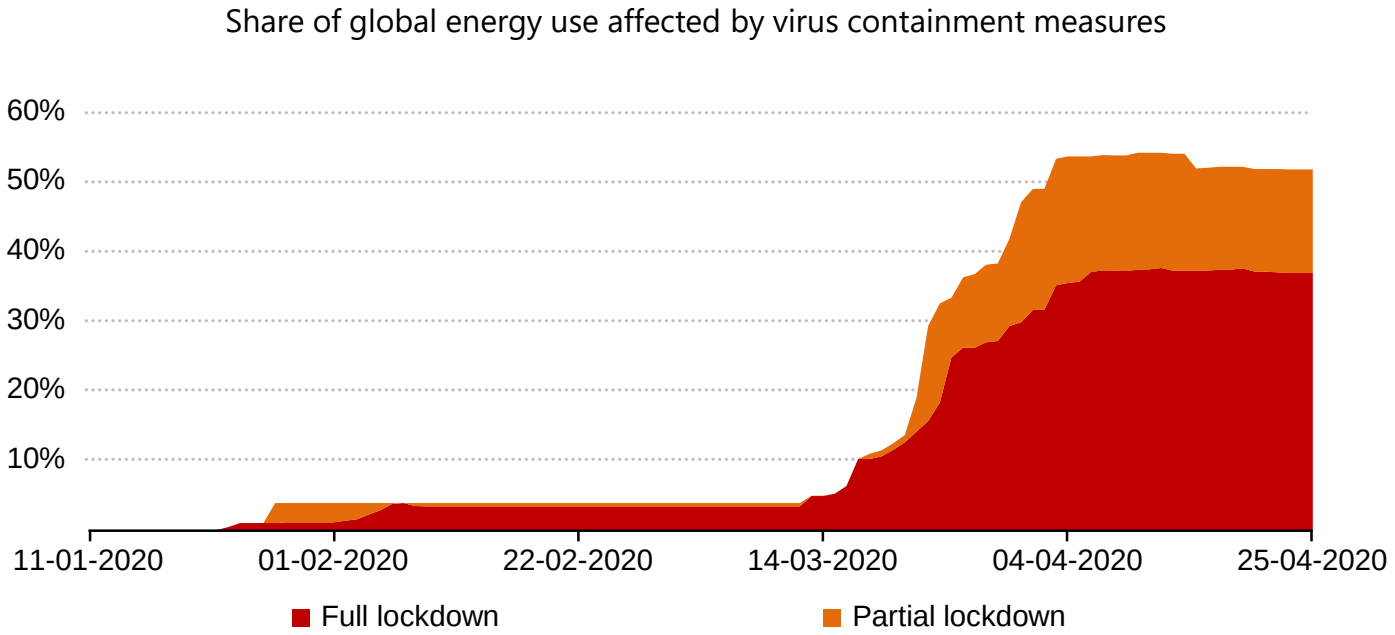
International Energy Agency

The Impact of COVID-19 on the Energy Efficiency Market

Brian Motherway

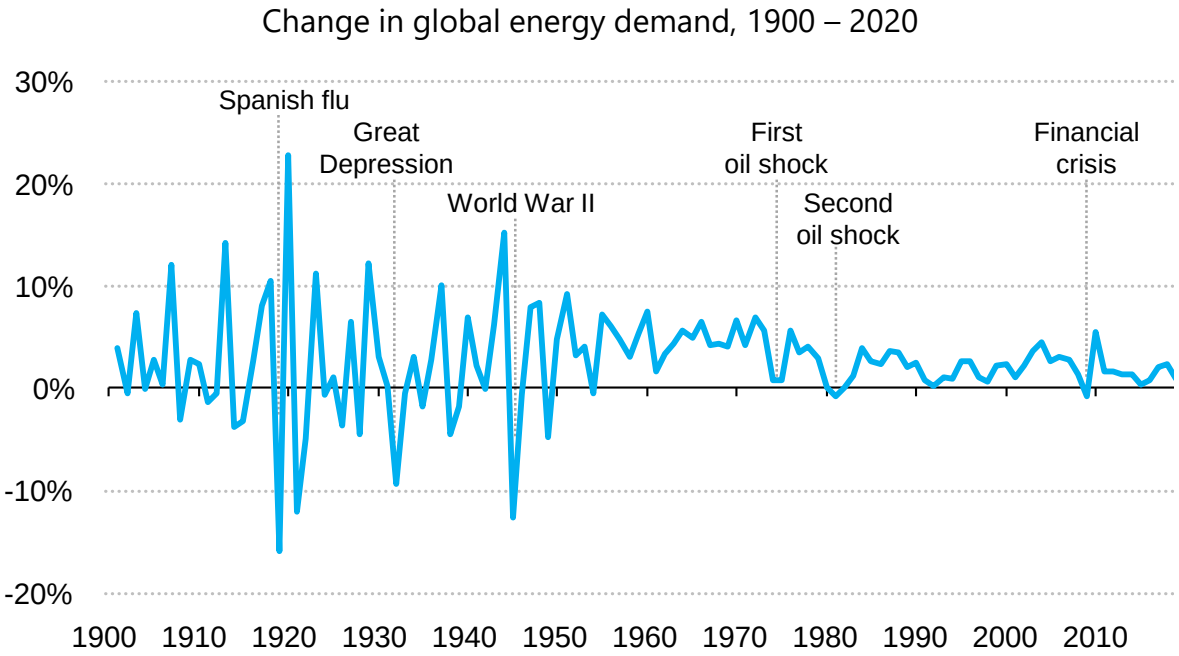
@BrianRMotherway

A world in lockdown



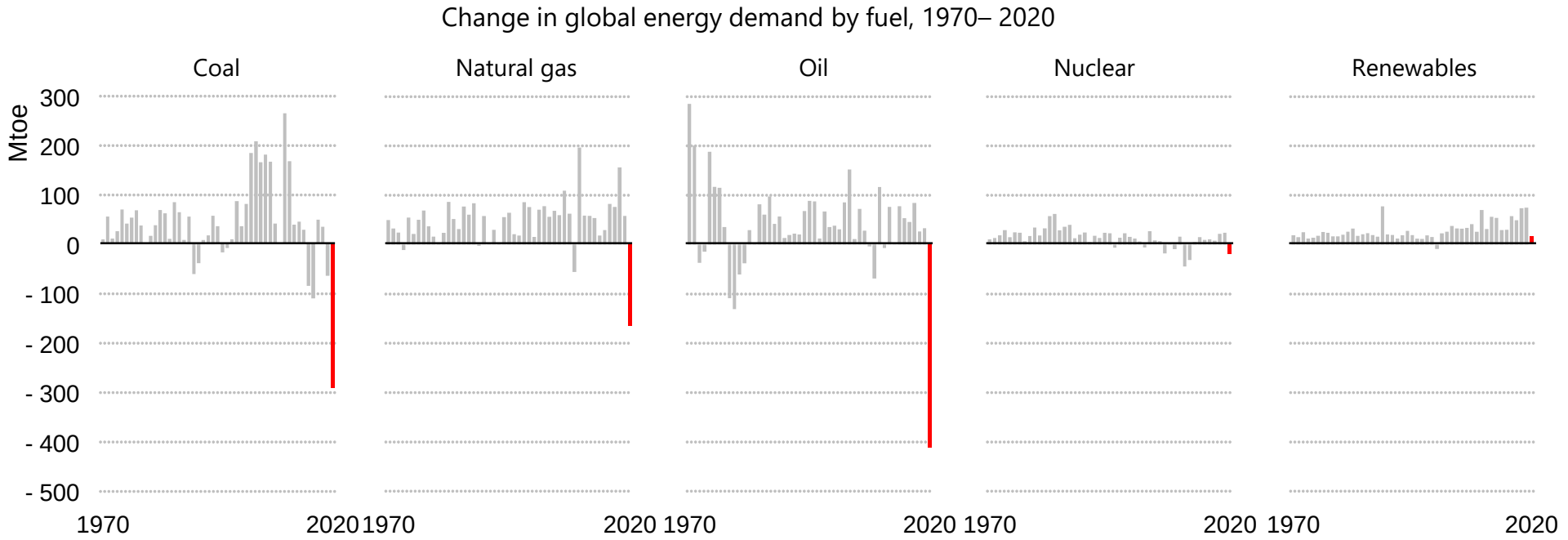
The coverage of COVID-19 lockdown measures jumped from 5% of global energy demand in mid-March to over 50% by early April. Measures are expected to ease in a handful of countries in early May.

Coronavirus: a once in century event for energy demand



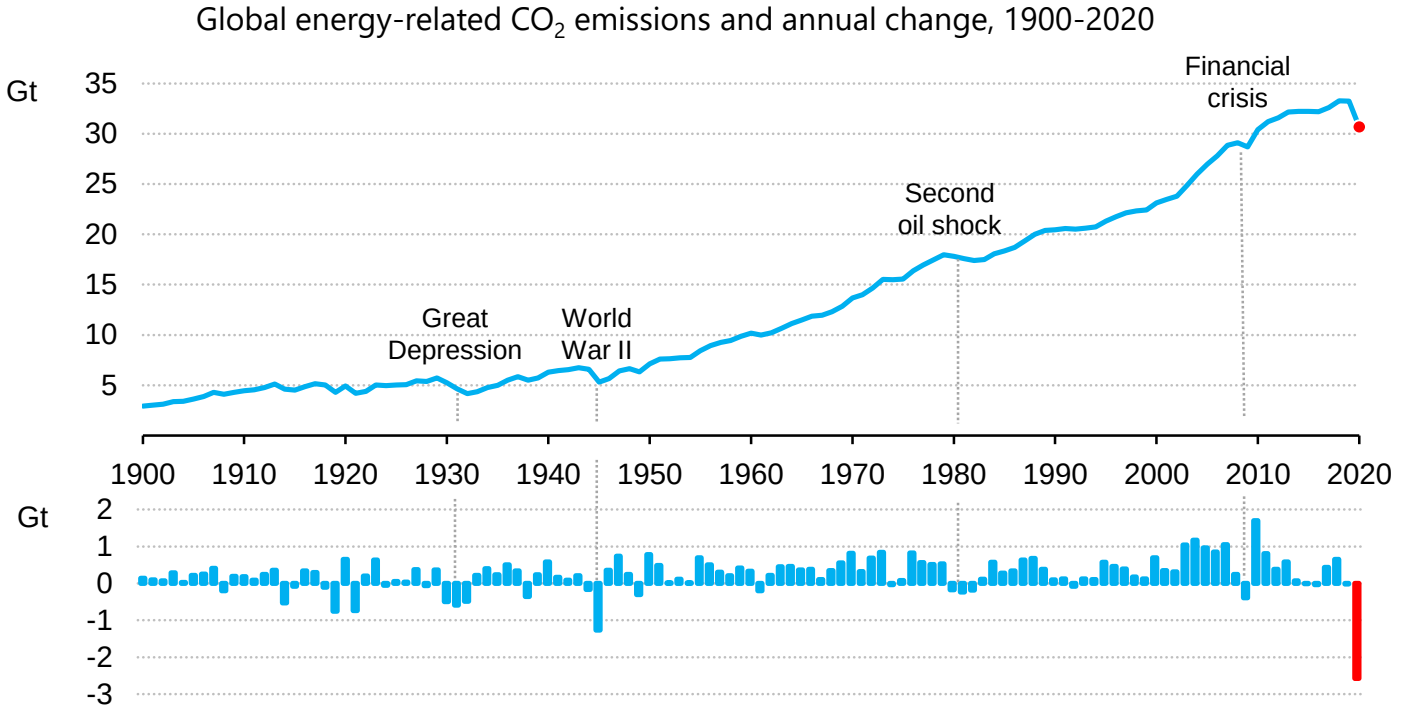
The shock to energy demand in 2020 is set to be the largest in 70 years. In our estimate, global energy demand declines by 6%, a fall seven times greater than the 2009 financial crisis.

Fossil fuels are set for a dismal 2020



Coal is set for the largest decline since World War II, alongside sharp reductions for gas and oil. Nuclear power is less affected by lockdown measures, while renewables are the only energy source on the rise in 2020.

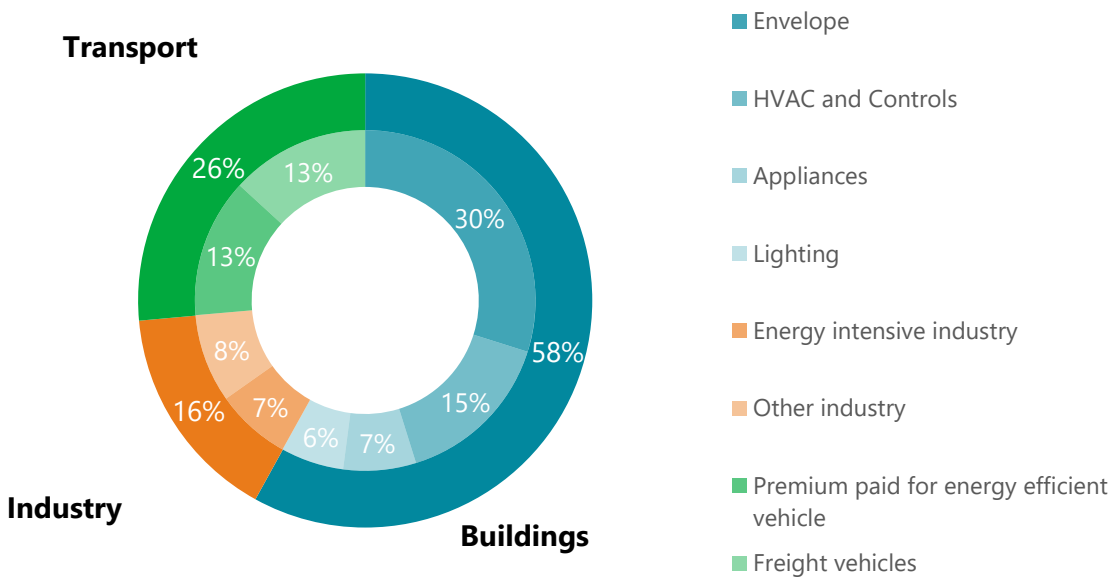
CO_2 emissions drop the most ever due to the COVID-19 crisis



Global energy-related CO_2 emissions are set to fall nearly 8% in 2020 to their lowest level in a decade. Reduced coal use contributes the most. Experience suggests that a large rebound is likely post crisis.

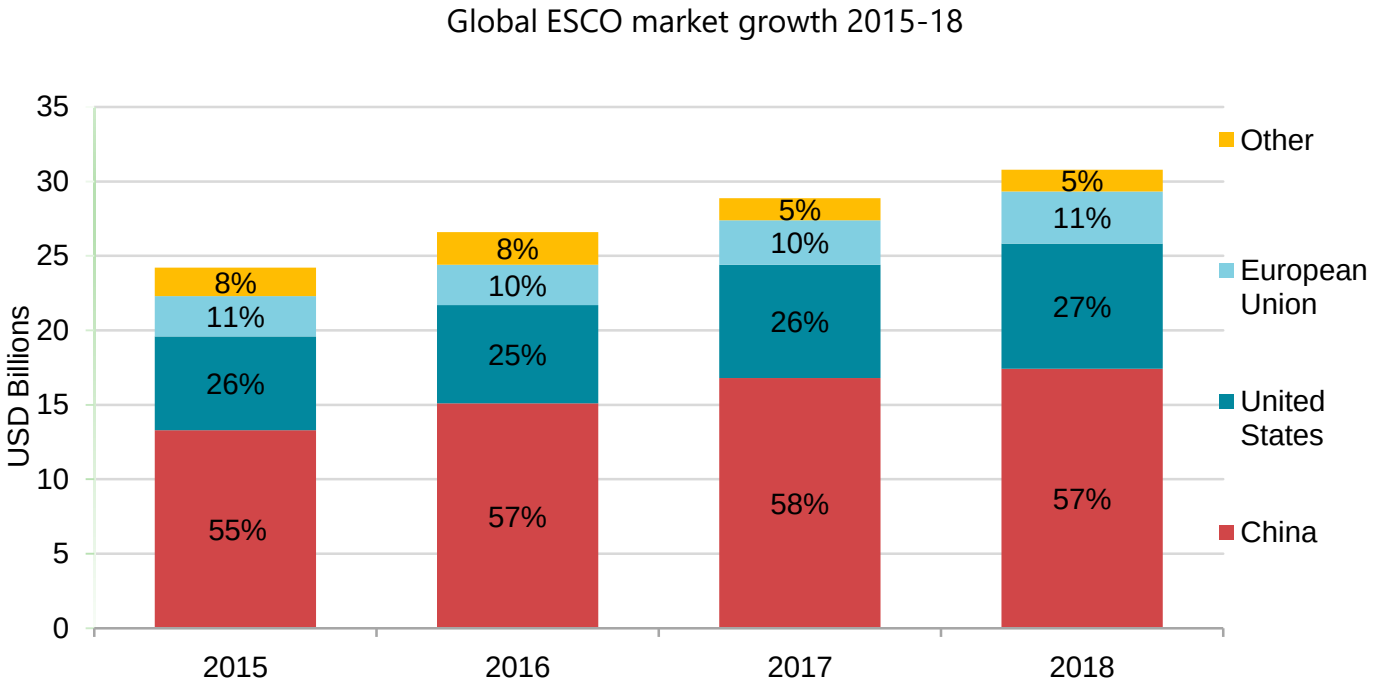
Energy efficiency investments

Energy efficiency investment by sector (2018)



Investments in efficiency stayed flat. Returning to a 3% annual improvement in intensity requires annual investments to double on average, between now and 2025.

The global ESCO market



China continues to be the largest share of the global ESCO market. The rate of ESCO market growth has declined in recent years, from 10% in 2016 to 7% in 2018.

Issues for energy efficiency

- Financial health of both service providers and customers
- Willingness to invest
- Practicalities of efficiency actions
- Risks of policy pause

- Opportunities in the positive impacts of efficiency
- Stimulus, jobs and growth
- New business and finance models
- New focus on resilience, quality of life, lower costs

IEA is Focused on Stimulus & Clean Energy

IEA is working with governments around the world on this priority issue:

- IEA's COVID-19 Hub: https://www.iea.org/topics/covid-19

- WEO Special Report on Sustainable Recovery – June 19th
- Global Commission for Urgent Action on Energy Efficiency – June 22nd
- IEA Global Conference on Energy Efficiency – June 23rd

Impact of COVID-19 on the Energy Efficiency Market

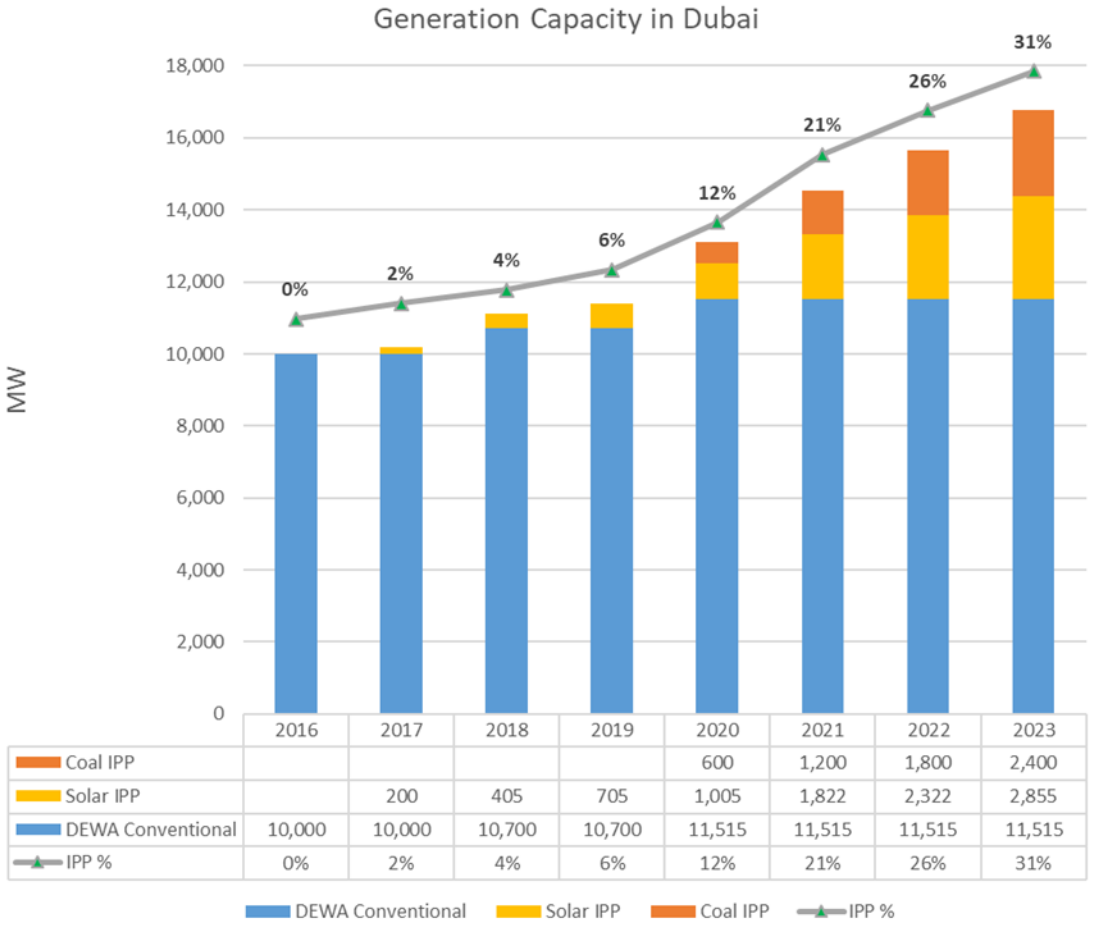
Graeme Sims, Executive Director

CEBC Webinar

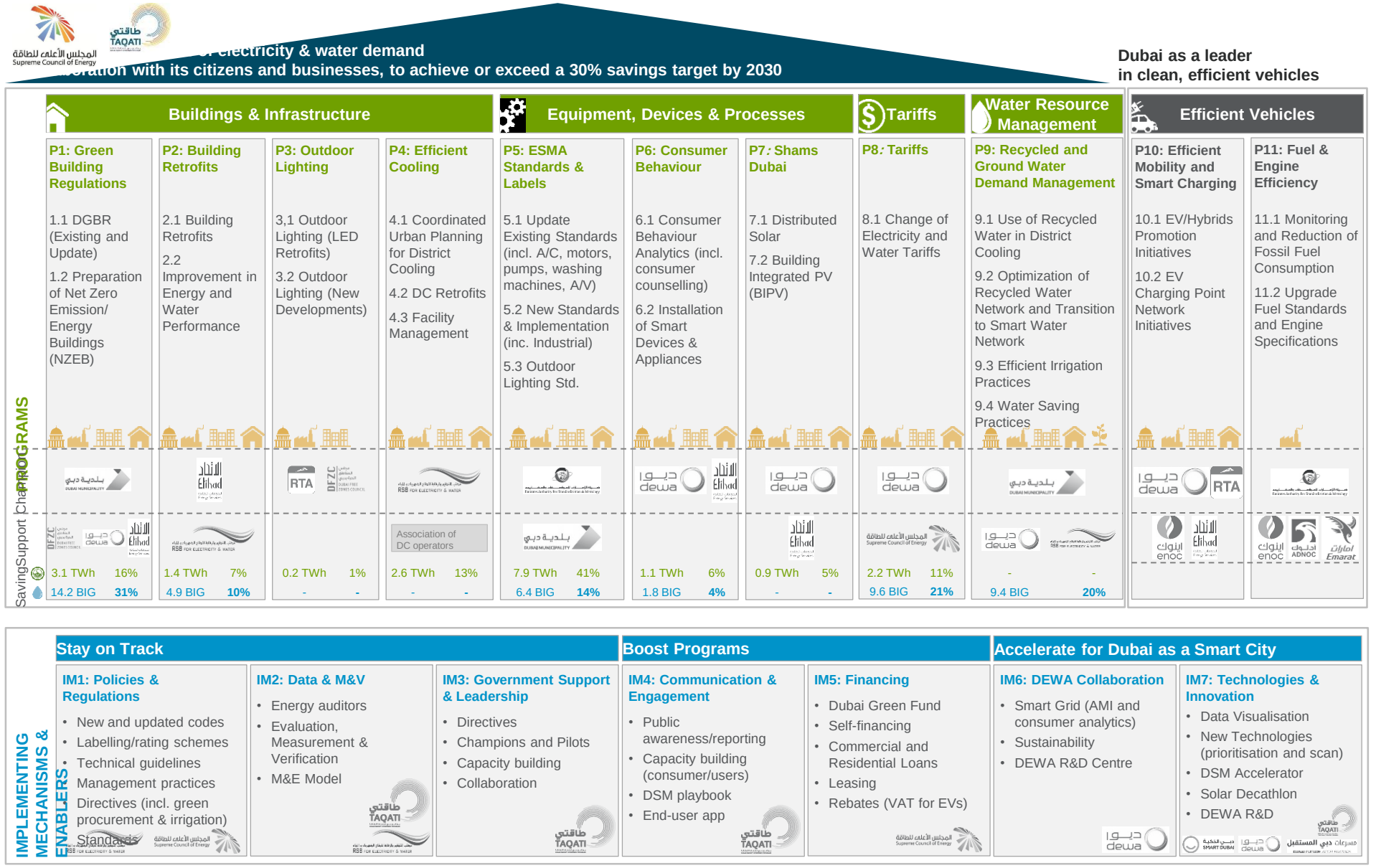
12 May 2020

About the RSB

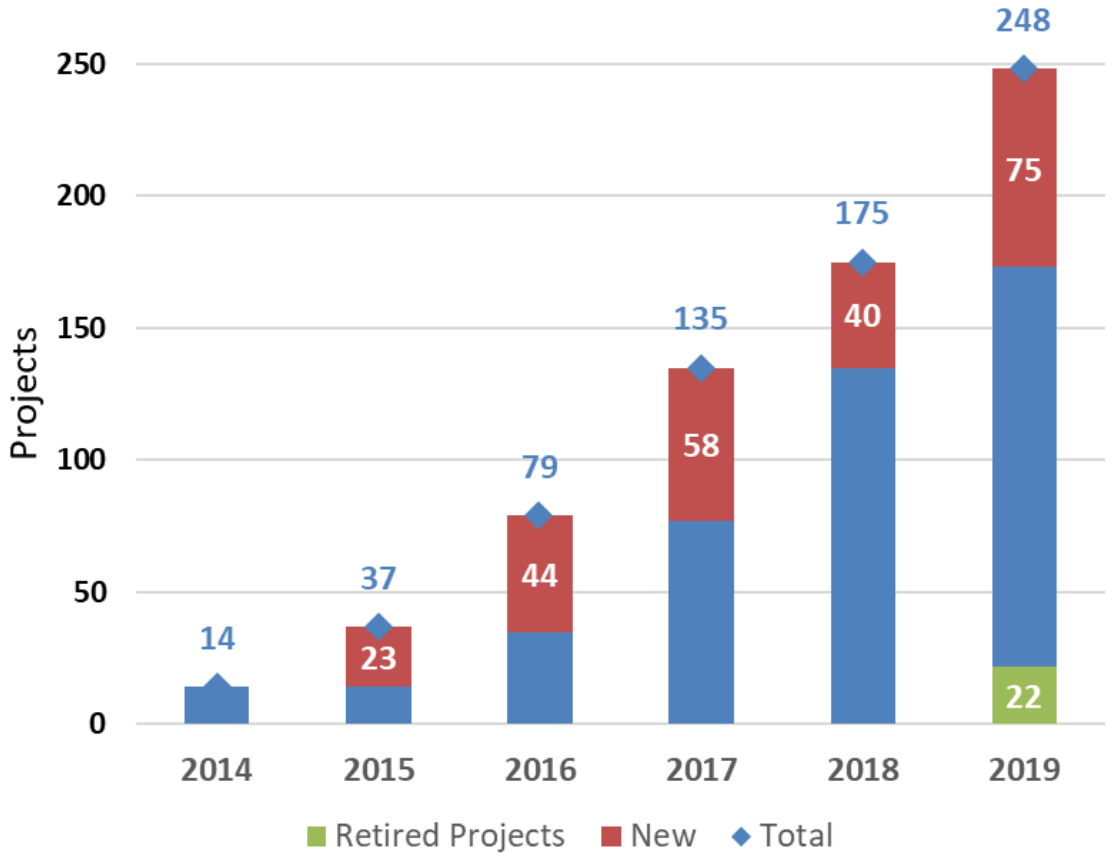
- Licensing Dubai's private power plant – 9 licensees ranging from 1.3MW to 2400MW
  - Plant already contracted will represent more than 30% of DEWA generation capacity early this decade
- Joint owner of DSM programmes for building retrofits and efficient cooling
- Development of regulatory frameworks in support of Supreme Council of Energy

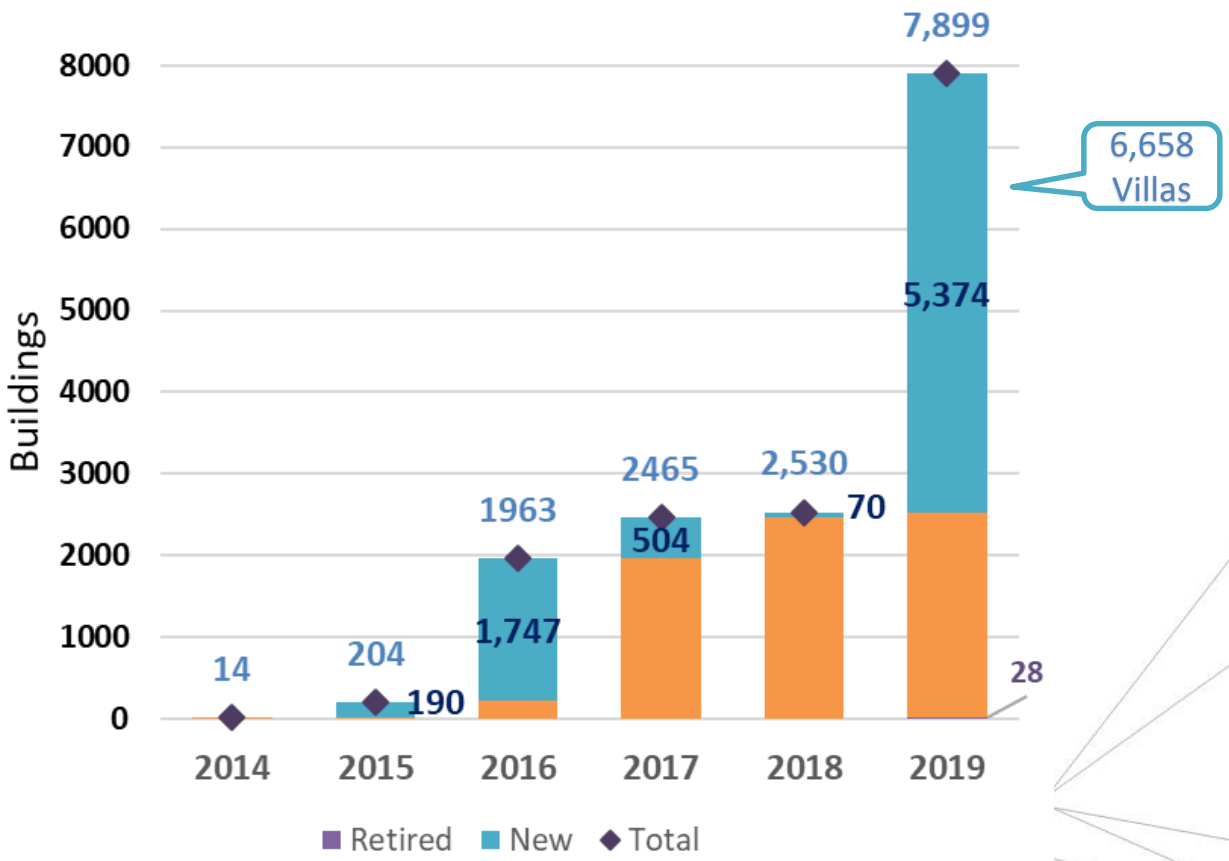


	2016	2017	2018	2019	2020	2021	2022	2023
Coal IPP					600	1,200	1,800	2,400
Solar IPP		200	405	705	1,005	1,822	2,322	2,855
DEWA Conventional	10,000	10,000	10,700	10,700	11,515	11,515	11,515	11,515
IPP %	0%	2%	4%	6%	12%	21%	26%	31%


...electricity & water demand
...boration with its citizens and businesses, to achieve or exceed a 30% savings target by 2030
Dubai as a leader in clean, efficient vehicles
PROGRAMS
Buildings & Infrastructure
Equipment, Devices & Processes
Tariffs
Water Resource Management
Efficient Vehicles
P1: Green Building Regulations
1.1 DGBR (Existing and Update)
1.2 Preparation of Net Zero Emission/ Energy Buildings (NZEB)
P2: Building Retrofits
2.1 Building Retrofits
2.2 Improvement in Energy and Water Performance
P3: Outdoor Lighting
3,1 Outdoor Lighting (LED Retrofits)
3.2 Outdoor Lighting (New Developments)
P4: Efficient Cooling
4.1 Coordinated Urban Planning for District Cooling
4.2 DC Retrofits
4.3 Facility Management
P5: ESMA Standards & Labels
5.1 Update Existing Standards (incl. A/C, motors, pumps, washing machines, A/V)
5.2 New Standards & Implementation (inc. Industrial)
5.3 Outdoor Lighting Std.
P6: Consumer Behaviour
6.1 Consumer Behaviour Analytics (incl. consumer counselling)
6.2 Installation of Smart Devices & Appliances
P7: Shams Dubai
7.1 Distributed Solar
7.2 Building Integrated PV (BIPV)
P8: Tariffs
8.1 Change of Electricity and Water Tariffs
P9: Recycled and Ground Water Demand Management
9.1 Use of Recycled Water in District Cooling
9.2 Optimization of Recycled Water Network and Transition to Smart Water Network
9.3 Efficient Irrigation Practices
9.4 Water Saving Practices
P10: Efficient Mobility and Smart Charging
10.1 EV/Hybrids Promotion Initiatives
10.2 EV Charging Point Network Initiatives
P11: Fuel & Engine Efficiency
11.1 Monitoring and Reduction of Fossil Fuel Consumption
11.2 Upgrade Fuel Standards and Engine Specifications
Association of DC operators
Savings
Support
3.1 TWh 16%
14.2 BIG 31%
1.4 TWh 7%
4.9 BIG 10%
0.2 TWh 1%
-
2.6 TWh 13%
-
7.9 TWh 41%
6.4 BIG 14%
1.1 TWh 6%
1.8 BIG 4%
0.9 TWh 5%
-
2.2 TWh 11%
9.6 BIG 21%
-
9.4 BIG 20%
IMPLEMENTING MECHANISMS & ENABLERS
Stay on Track
Boost Programs
Accelerate for Dubai as a Smart City
IM1: Policies & Regulations
New and updated codes
Labelling/rating schemes
Technical guidelines
Management practices
Directives (incl. green procurement & irrigation)
Standards
IM2: Data & M&V
Energy auditors
Evaluation, Measurement & Verification
M&E Model
IM3: Government Support & Leadership
Directives
Champions and Pilots
Capacity building
Collaboration
IM4: Communication & Engagement
Public awareness/reporting
Capacity building (consumer/users)
DSM playbook
End-user app
IM5: Financing
Dubai Green Fund
Self-financing
Commercial and Residential Loans
Leasing
Rebates (VAT for EVs)
IM6: DEWA Collaboration
Smart Grid (AMI and consumer analytics)
Sustainability
DEWA R&D Centre
IM7: Technologies & Innovation
Data Visualisation
New Technologies (prioritisation and scan)
DSM Accelerator
Solar Decathlon
DEWA R&D
GOVERNMENT
INDUSTRIAL
COMMERCIAL
RESIDENTIAL
AGRICULTURE
...realising the Dubai Smart City vision

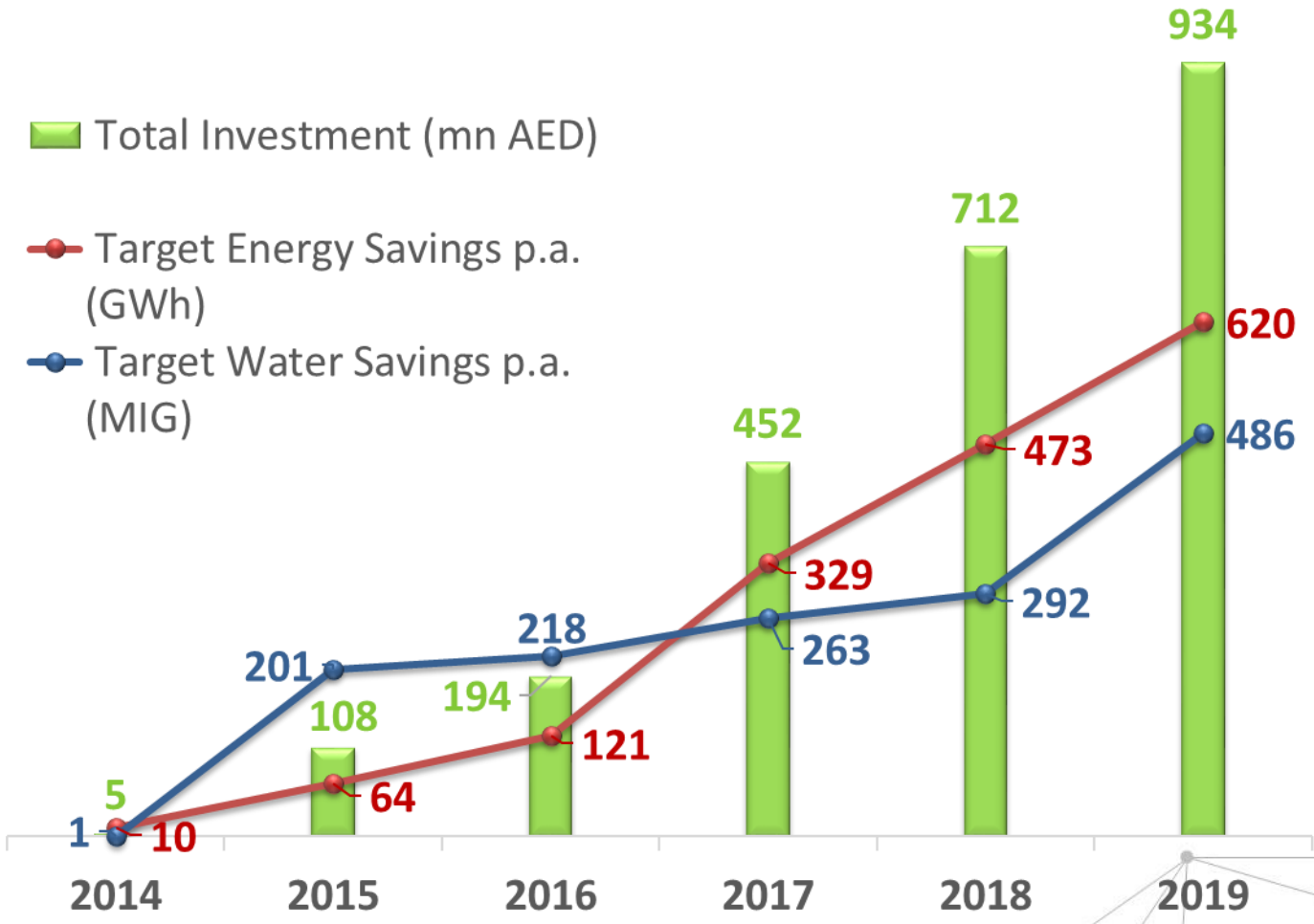
250 Projects and 8,000 Buildings in Dubai's Retrofit Programme to Date





Retired projects: no longer reported by ESCOs and the RSB could not assume continued savings

Close to AED1 billion in investment. Electricity savings approaching half the 2030 target, some way to go on water.



We surveyed our 34 accredited ESCOs to gauge the impact of the Covid 19 pandemic – 20 responded

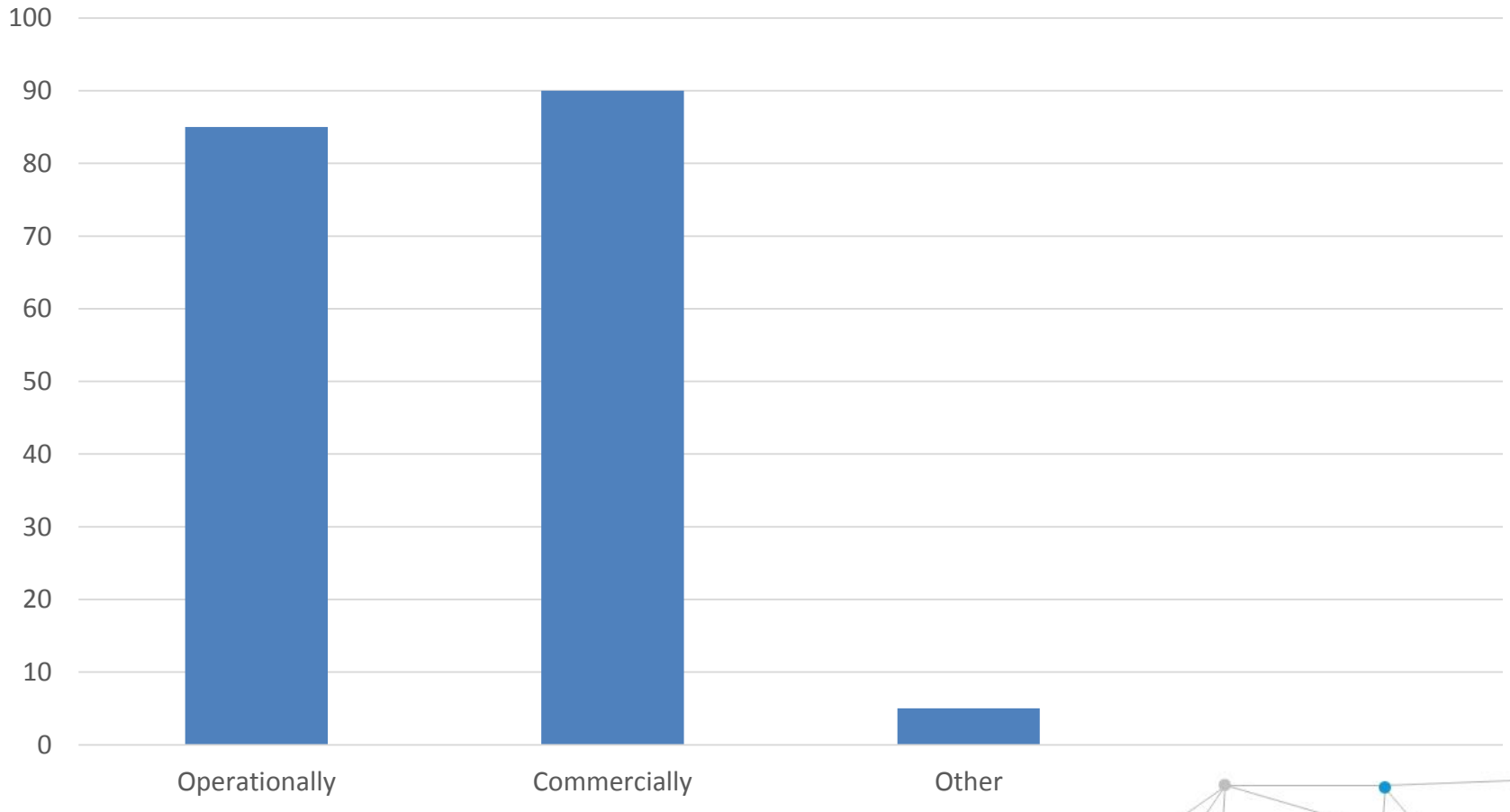
1. Has the Covid 19 pandemic affected your business?

2. Looking at 2020 as a whole, by how much do you anticipate your revenue to reduce against expectations as a result of Covid 19?

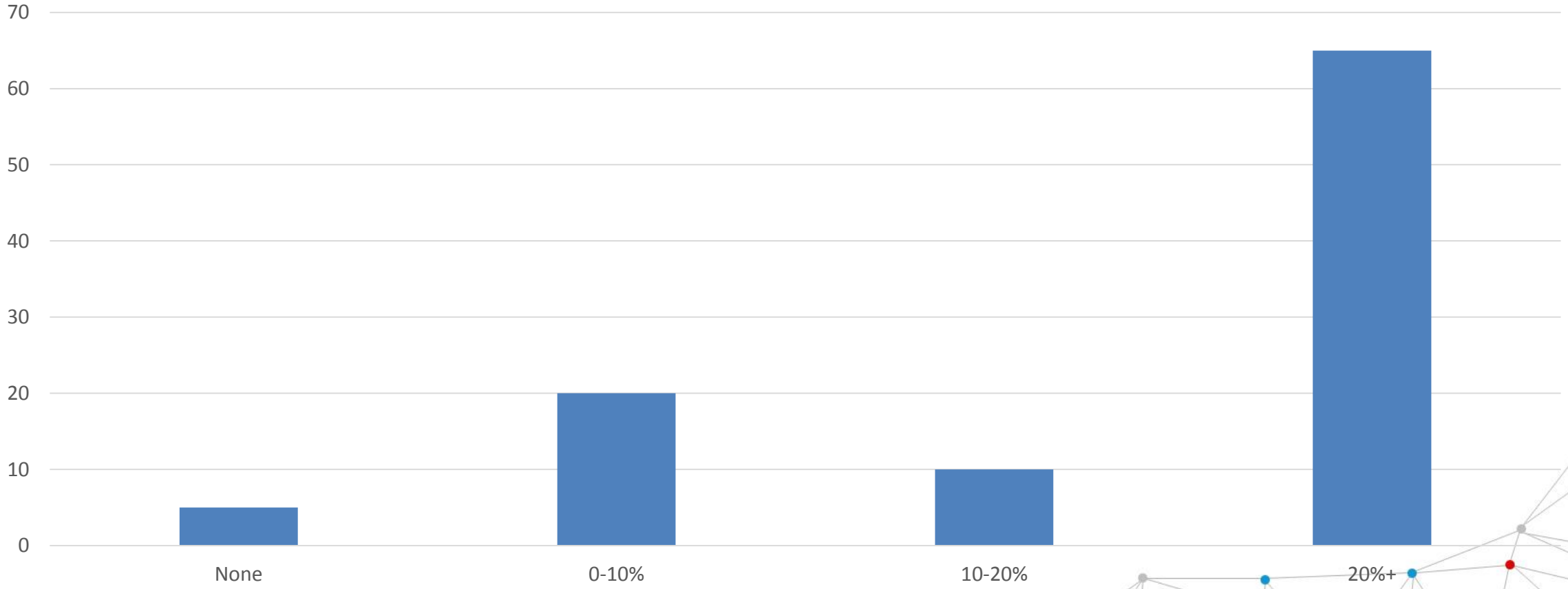
3. When do you expect a return to normal business activity?

4. Do you see similar impacts across the UAE and GCC?

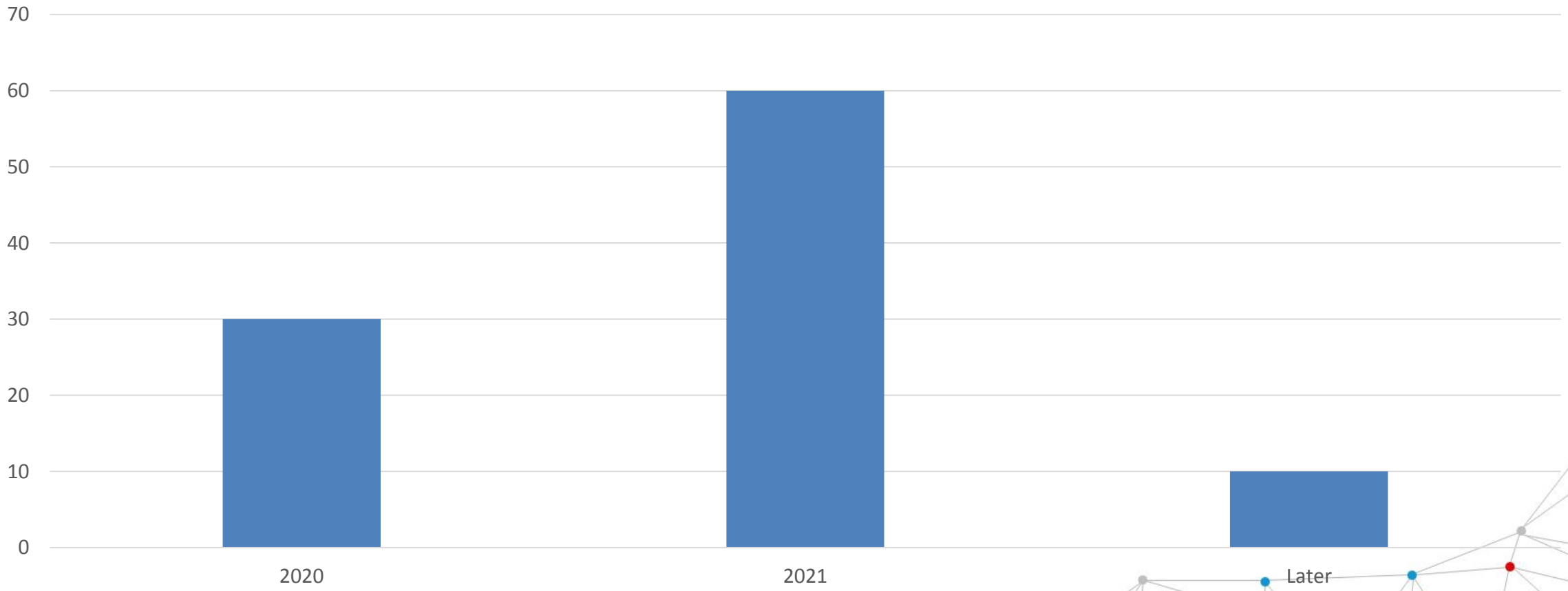
Has the Covid 19 pandemic affected your business?



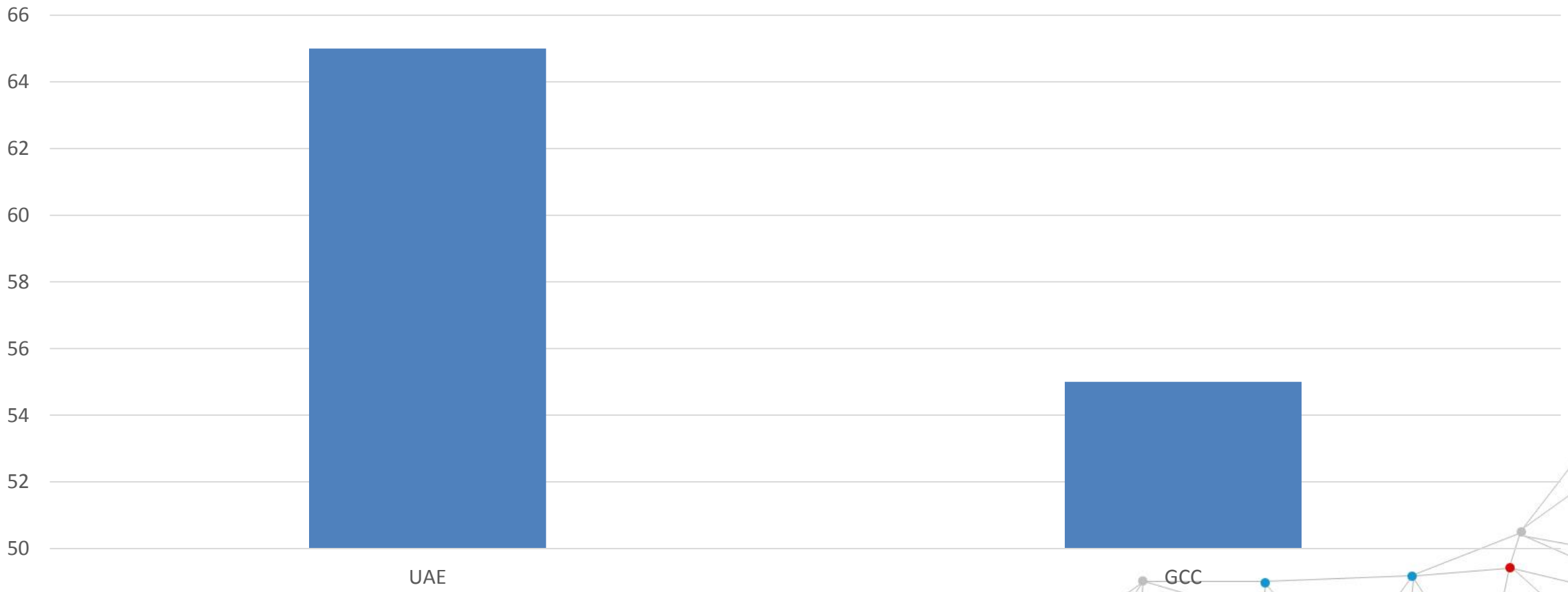
Looking at 2020 as a whole, by how much do you anticipate your revenue to reduce against expectations as a result of Covid 19?



When do you expect a return to normal business activity?



Do you see similar impacts across the UAE and GCC?

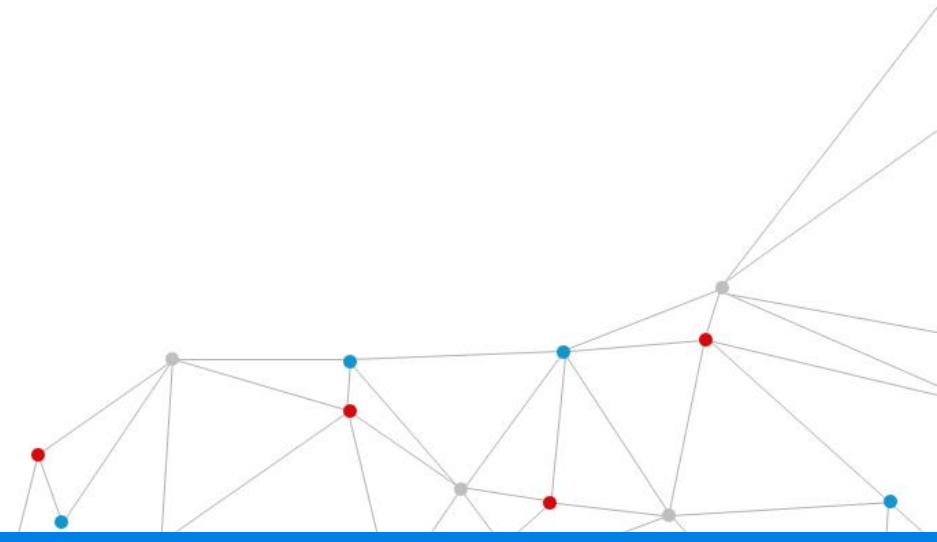


Clouds & Silver Linings

- Clouds
  - Unprecedented reduction in GDP for, at least, Q1 and Q2 of 2020
  - Fossil fuel price reductions drain purchasing power from MENA
  - Fuel price reductions might make the energy efficiency case harder to justify

- Silver linings
  - Further impetus to reduce energy price subsidies
  - Focus on reducing opex to sustain businesses through crisis
  - Opportunity for deep retrofits in vacant facilities
  - Focus on managing costs of office space when occupancy is required to remain low
  - Increasing role for sensors and remote devices to manage infection transmission rates

Thank you.



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Project highlights

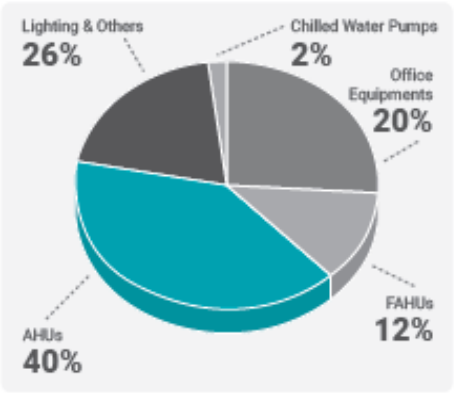
Energy Performance Project

Project Highlights

16,500m² Floor Area

7 storey building

Annual Energy Highlights



3.3 M AED
Energy Bill

7.33 M kWh
Energy Consumption

Challenges

- High Energy Bills
- Temperature Fluctuation causing Human Discomfort

Solution

- Demand Controlled Ventilation
- Digi-VAV® Control System on AHU
- VFD Control on AHU
- Intelligent Building Analytics Platform

Financing

- Guaranteed Savings

Project Results

Environment

1.53 M kWh Savings

↓ 1,109 Tonnes

↓ 238

↑ 28,738 ten-year old seedlings

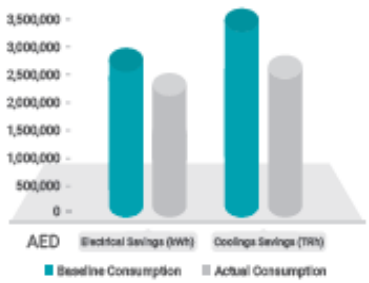
Economic

682,380 AED
Annual Energy Cost Savings

2.1 years
Simple payback

20.6% Energy Savings

Energy Savings Profile



Delta T Project

Project Highlights

Standard Chartered Bank at DIFC, Dubai

Annual ΔT Highlights Performance

413,758 AED
Annual Penalties Pre-Retrofit

5.2°C
Average ΔT at the building side Pre-Retrofit

0 AED
Projected Annual Penalties Post-Retrofit

8.9°C
Projected Average ΔT at the building side Post-Retrofit

Project Results

Above 9°C
Achieved Delta T after controls

413,758 AED
Projected Annual Cost Reduction

1.23 Years
Projected Simple Payback

Challenges

Low Delta T (ΔT) Syndrome
Low difference between the temperature going inside the building and that returning, causing a penalty by the district cooling provider

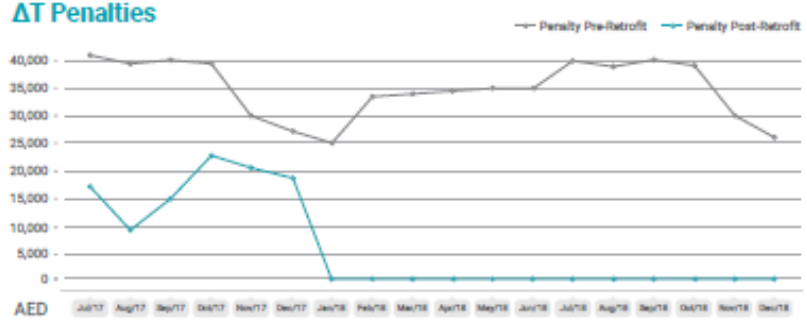
Solution

Controlling chilled water flow at the Secondary side of the hear exchanger to maintain the desired ΔT

Financing

- Cost Reduction Contract
- Guaranteed Performance

ΔT Penalties



Intelligent Building Analytics Platform

Adaptive Energy Modelling:

- Automatically learns the building's thermal characteristics and energy requirements
- Adapts to changes in space usage or the building envelope over time.

Forecast Energy Use:

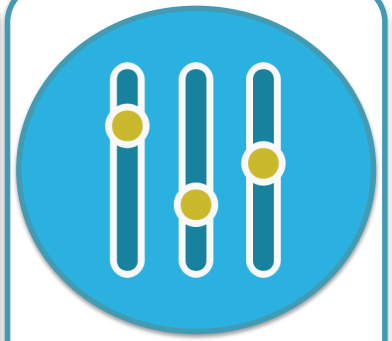
- Incorporates weather forecasts, utility data and proprietary algorithms

- create an optimal forecast for the building's energy usage, cost and tenant comfort.

Optimized BMS Management:

-Continuously optimize operations based on current and predicted conditions sending command changes

- Supply air temperature and Supply air static pressure as well as Zone air temperature



Variable Parameters:

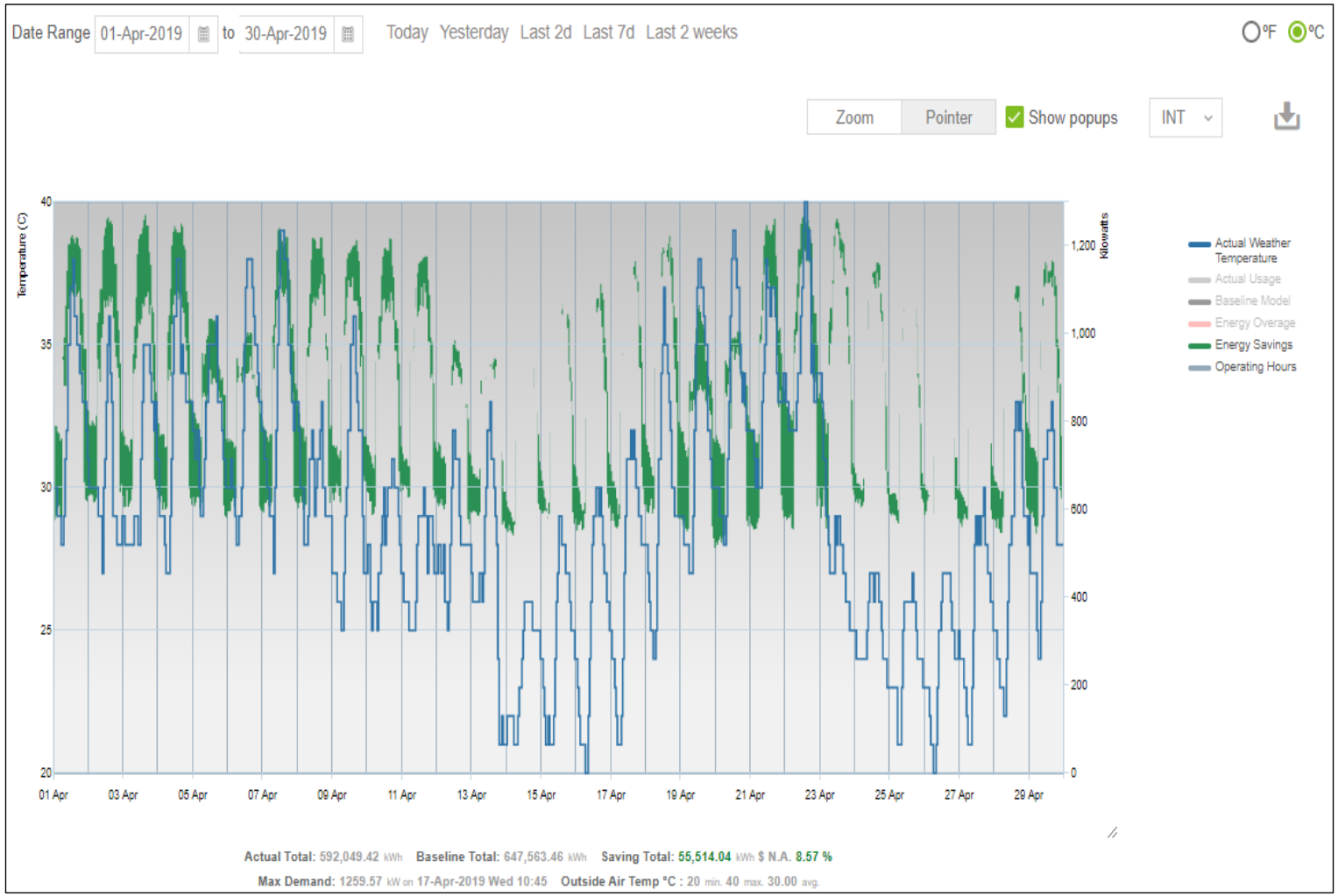
Operators can set key parameters to influence the optimization process depending on their priorities for reducing energy, cost or increasing comfort performance (or any combination thereof).

Reports and Dashboard:

All historical and management information is made readily available along with event reporting.

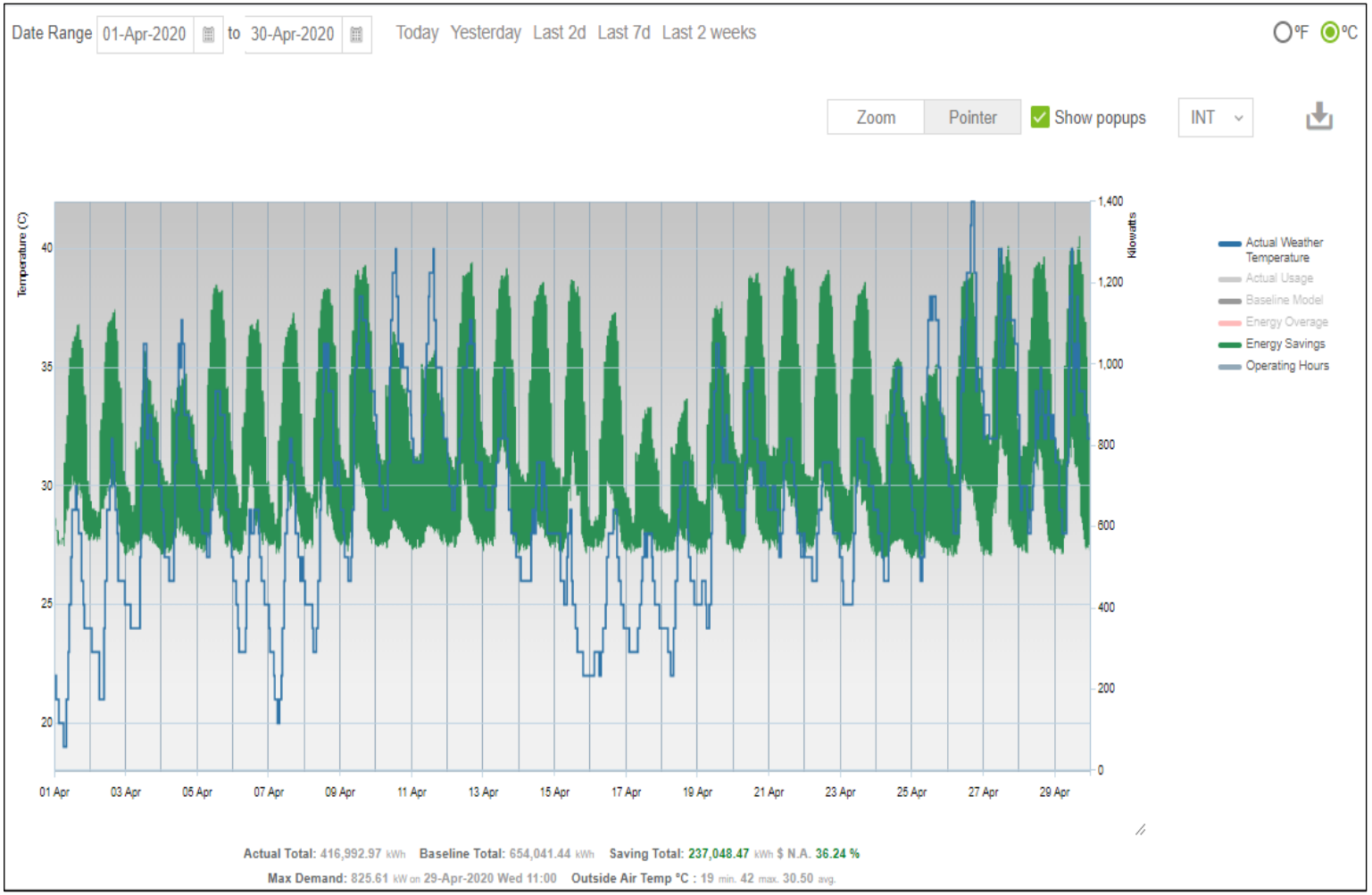
IoT Energy Performance Dashboards

ENERGY SAVING DURING 1st to 30th APRIL 2019 = 8.6% due to Energy efficiency Project



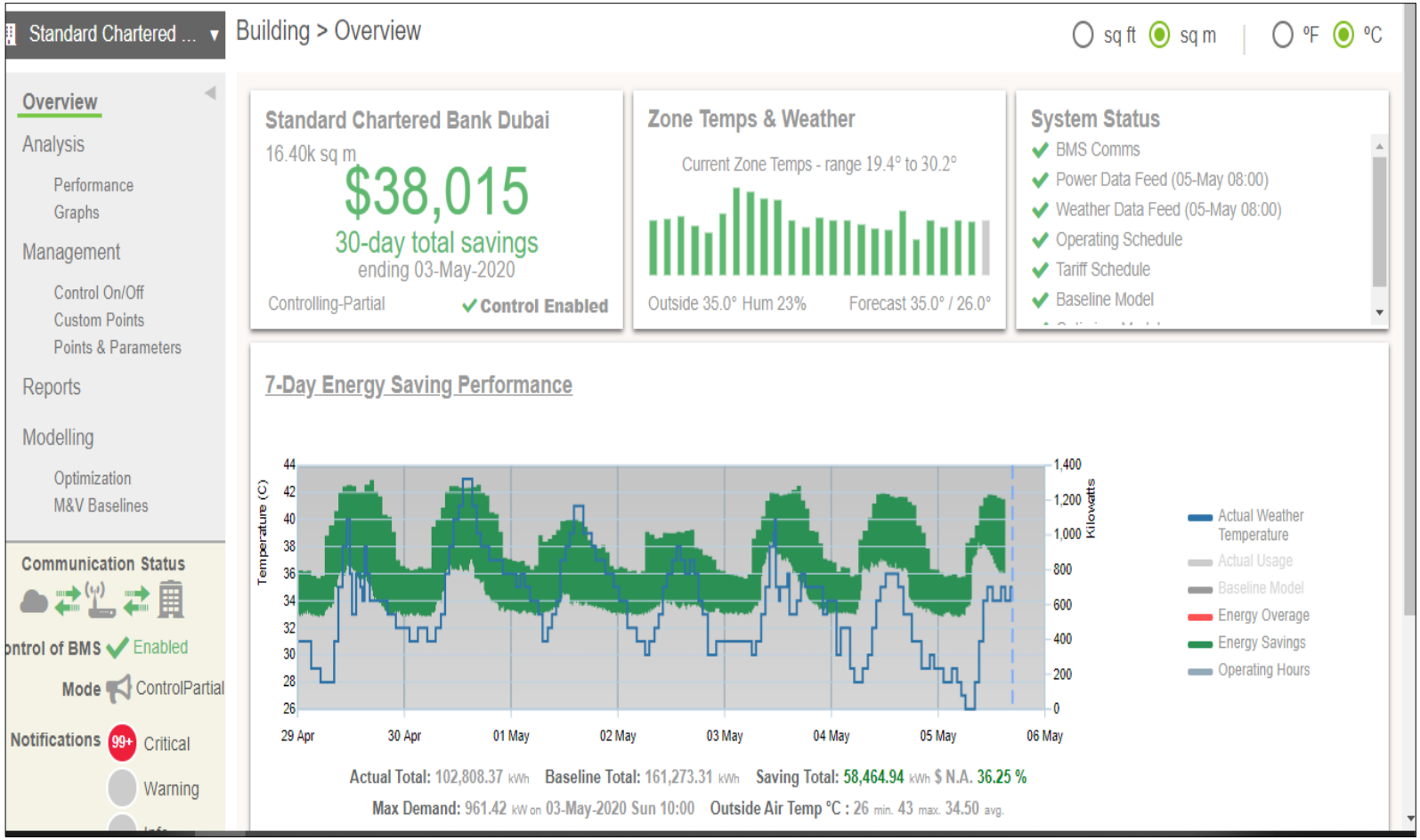
IoT Energy Performance Dashboards

ENERGY SAVING DURING 1st to 30th APRIL 2020 = 36.24% due energy efficiency project + AHUs kept off due to low occupancy in the building



IoT Energy Performance Dashboards

ONE WEEK ENERGY SAVING DURING 29th APRIL to 06th MAY 2020 = 36.25% due energy efficiency project + AHUs kept off due to low occupancy in the building

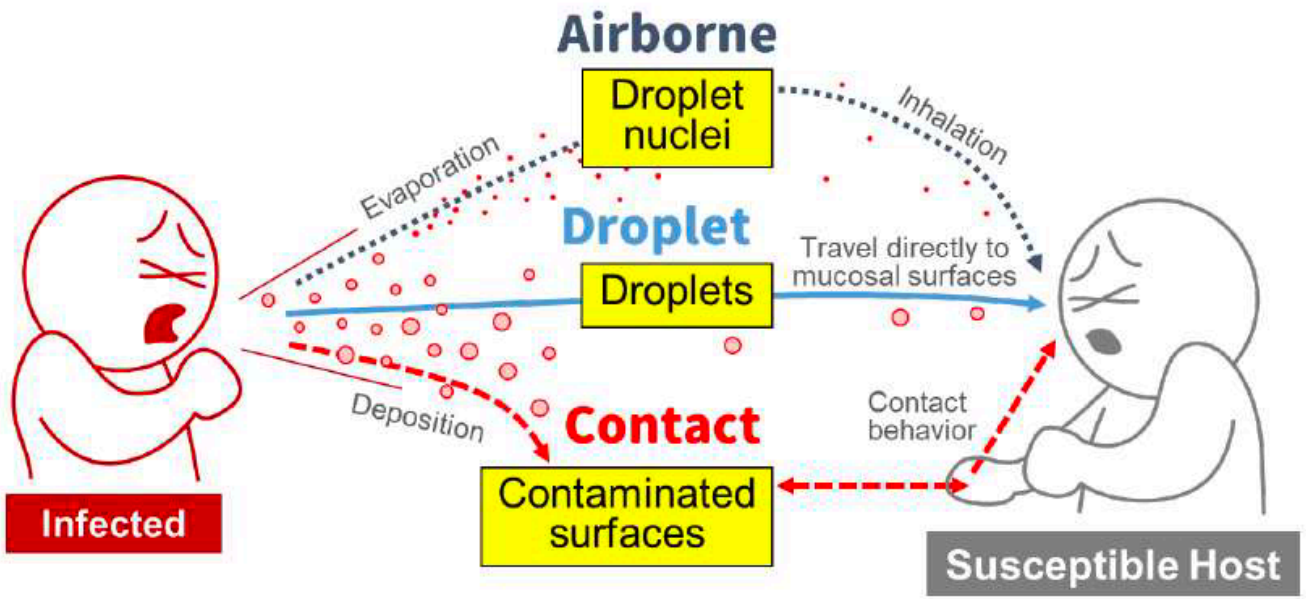


Energy Savings differences between occupied & unoccupied status

PERIOD	CONSUMPTION	COMMENTS
Baseline consumption in April 2019	647,563 kWh	depending on the building energy model & weather data (CDD)
Baseline consumption in April 2020	654,041 kwh	depending on the building energy model & weather data (CDD)
Actual consumption in April 2019	592,049 kWh	Actual from utility meters
Actual consumption in April 2020	41,6992 kWh	Actual from utility meters

% reduction in actual consumption from April 2019 to April 2020 is **30%**. This can be considered as due to low occupancy during lockdown due to COVID-19.

Viruses Modes of Transmission

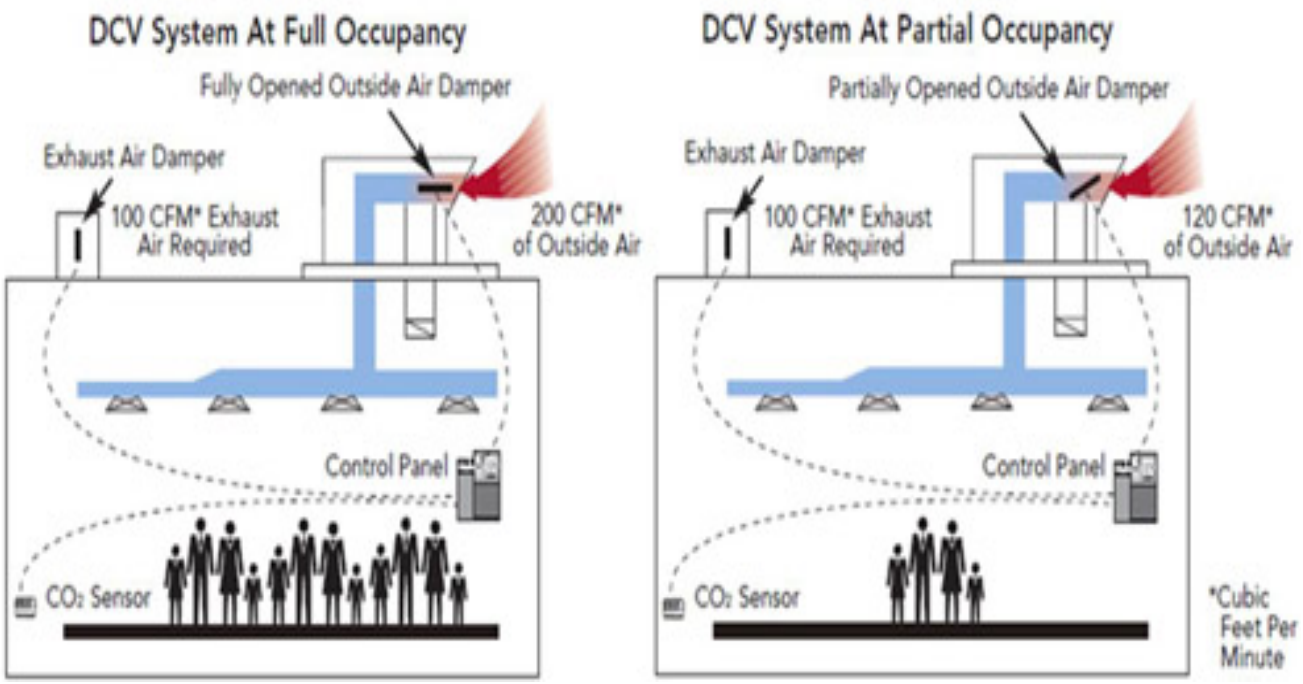


For the Airborne Transmission Mode: Where particles will typically have dimensions less than 10 µm, decreasing the concentration of these particles can be achieved by diluting them with fresh air provided by the ventilation process

Modes of Transmission from Exhaled Pathogens (adapted from leaflet of the Office of the Prime Minister and the Ministry of Health, Labor and Welfare of Japan (2020))

Demand Controlled Ventilation

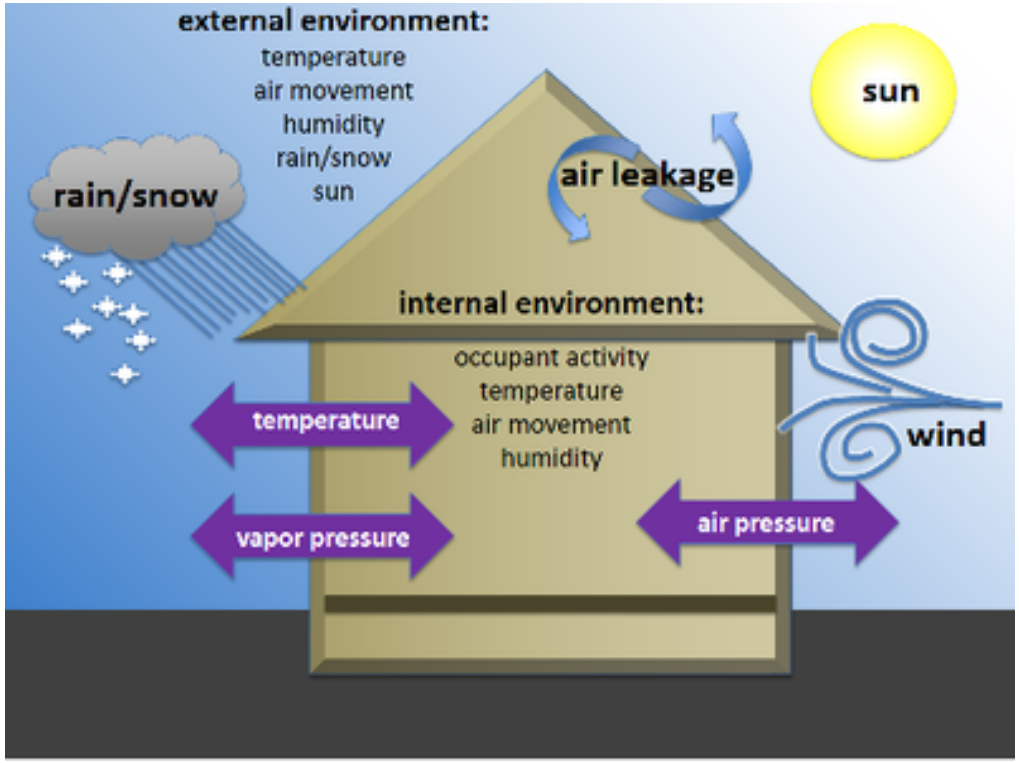
Demand Controlled Ventilation (DCV)



Instead of increasing the ventilation and fresh air to the maximum to remove the airborne. Like DCV that is based on CO2, we can optimize DCV based on PM by adding PM sensors in the zones.

Positive Building Pressure

Positive Building Pressure & Sick Building Syndrome



- To deliver healthy indoor air quality is to properly balance the building so that it maintains positive pressure versus outside.
- This will mitigate moisture and air infiltration and prevent related contaminants from entering via uncontrolled pathways.
- To achieve that goal, it's important to ensure that the facility is airtight.
- Buildings should be properly commissioned and balanced
- Recommissioning should occur every three to five years
- Building pressure should be monitored and trended via the building automation system to confirm it remains within limits.

Key Takeways

Adaptive Energy Modeling/ Advanced Building analytics: Building retrofits for the purpose of energy efficiency, increases comfort conditions as well as heathenness and Indoor Air Quality (IAQ).

Demand Controlled Ventilation (DCV) based on Particulate Matter PM: Instead of increasing the ventilation and fresh air to the maximum to remove the airborne. Like DCV that is based on CO2, we can implement DCV based on PM by adding PM sensors in the zones.

Positive Building Pressure: This will mitigate moisture and air infiltration and prevent related contaminants from entering via uncontrolled pathways. To achieve that goal, it's important to ensure that the facility is airtight. Building pressure should be monitored and trended via the building automation system to confirm it remains within limits.

Good air distribution & Air Balancing: In addition to good ventilation, it has been pointed out that a strong air flow from one person to another might cause infection. Therefore, good air distribution, i.e. providing even ventilation rate at low air velocity within all points in the room is important.

Sick Building Syndrome: The COVID-19 pandemic has drastically increased the need to resolve sick building syndrome, so building retrofits

Virus transmission modes: There are three possible modes of virus transmission: Airborne, droplets and contact. Among all three modes, airborne transmission can be eliminated through the ventilation.

Energy Efficiency & Indoor Air Quality (IAQ): Building retrofits for the purpose of energy efficiency, has a positive impact on comfort conditions as well as heathenness, wellbeing and Indoor Air Quality (IAQ).

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Firas Y. Obeido
Chief Technology Officer
Firas.Obeido@smartae.ae
Smart Automation Energy LLC
(Smart AE)
Dubai, UAE