



European ESCO Conference

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10/18/22

BENEFITS FOR PURSUING A STRATEGY & A PROCESS FOR **SUSTAINABLE BUILDINGS**



ACCOUNTABILITY

- Lower operating costs
- Higher return on investment
- Reduced liability and risk
- Productivity benefits
- Demonstration of a commitment to corporate ESG

ENVIRONMENT

RESILIENCE

- Enhanced marketability
- Greater tenant attraction
- Future-proofed assets
- Competitive advantages
- A healthier place to live and work

CHALLENGE 1- START SOMEWHERE: ESTABLISHING THE BASELINE

Q: What are the largest sources of CO2 across the asset portfolio?

Starting Knowledge

Baseline Established



Asset Audits


Emissions Assessments

Opportunities Analyses

Primary Asset Classes Contributing to CO2 Emissions



Buildings




Transport




Factories



Warehouses



Fleet



Aviation

CHALLENGE 2- SETTING THE OBJECTIVE: DEFINING TARGETS

Q: What is my business trying to achieve?

Enhance Performance

ESG Stocks
outperformed the S&P
by
45%¹

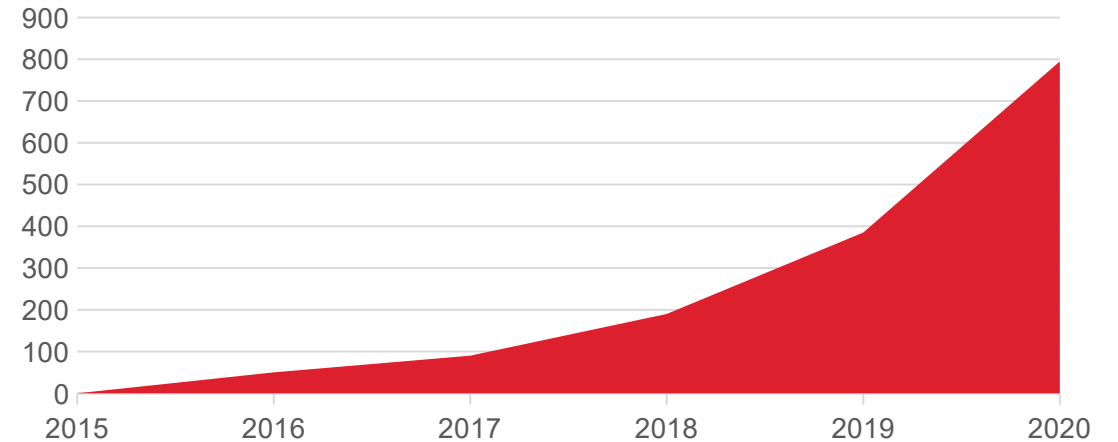
Drive Investment

Institutional investors
that apply ESG
principles to a quarter or
more of their portfolios
grew from **48%** in 2017
to **75%** in 2019²

Attract Customers

73%
of consumers say they
would definitely or
probably change their
consumption habits to
reduce their
environmental impact³

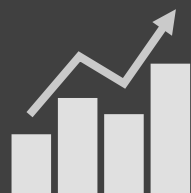
Number of Businesses with Science-Based Targets⁴



Potential Approaches to Sustainability



Decarbonize
Operations



Minimise Costs &
Maximise Revenue



Technology
Investments



Operational
Strategies



Regulatory
Compliance



Business-Specific
Objectives

1. <https://www.forbes.com/sites/brendancoffey/2019/11/12/esg-stocks-are-having-a-fantastic-year/?sh=b7b87652fbb5>

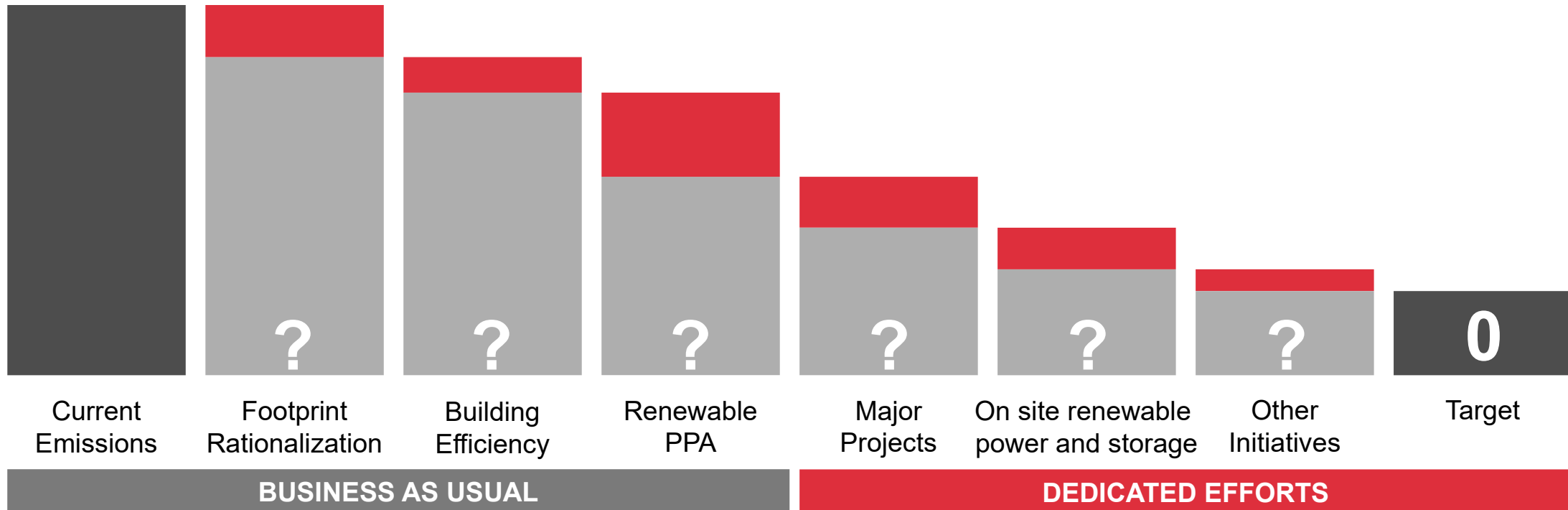
2. <https://www.alva-group.com/blog/the-esg-metrics-that-matter-most-to-investors/>

3. <https://www.nielsen.com/us/en/insights/report/2018/unpacking-the-sustainability-landscape/>

4. BloombergNEF

CHALLENGE 3 - PATHWAYS TO THE GOAL

Q: how much effort and capital intensity should be dedicated in each category?

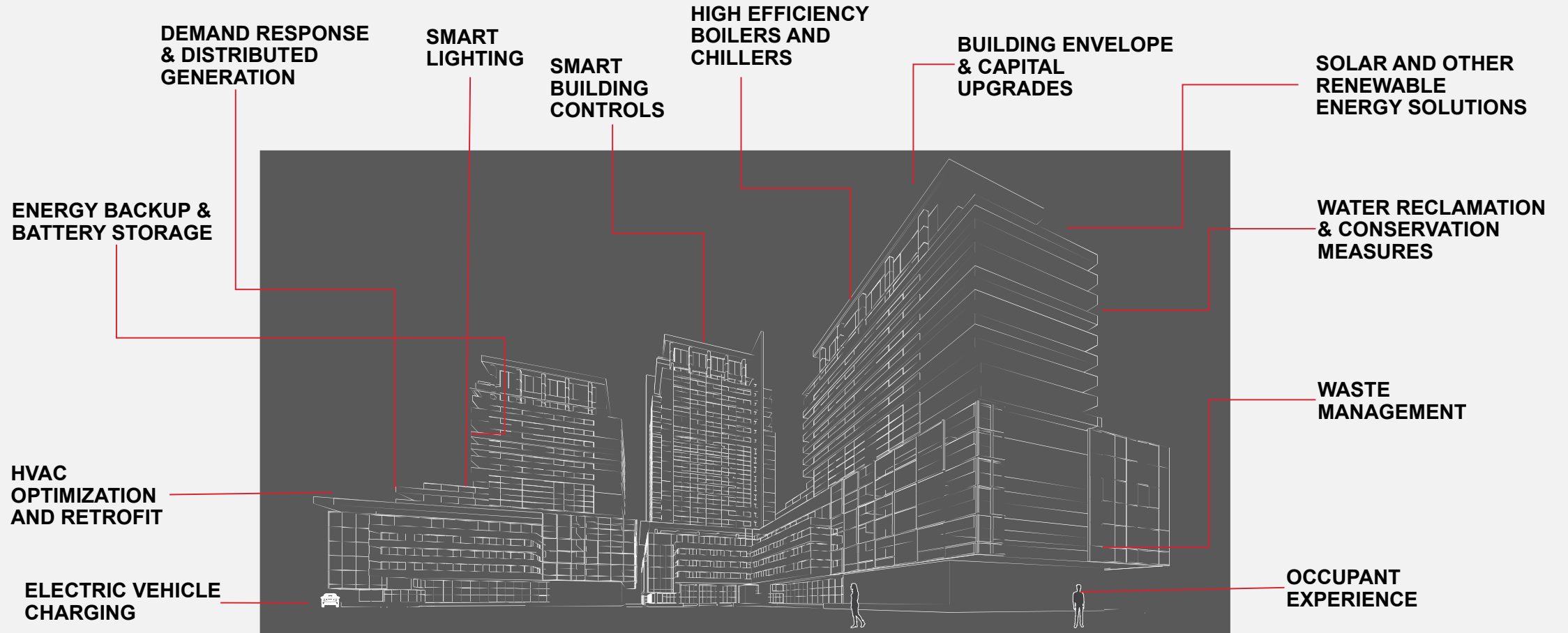


An aerial, high-angle photograph of a city street grid. A prominent skyscraper is under construction, showing its steel framework. The image is dark and moody, with a white square in the top right corner.

DECARBONISATION JOURNEY

DECARBONIZE – SOLUTION SPACE

DECARBONIZE



HOW TO GET STARTED PATH TO SUSTAINABILITY

01

ASSESS

Fast, Repeatable, Scalable
Digitized Assessment at
portfolio level across
geographies

02

VISUALIZE

System agnostic, Real time
Visibility for Reducing
Energy Consumption

03

OPTIMIZE

Advanced AI/ML for Efficiency and
Occupant Comfort at system level
Identify Capex efficient Retrofit projects
to Reduce Embodied Carbon

04

DECARBONIZE

End to End Off-grid solutions
for reducing operational cost,
achieving resiliency, and net
zero goals

**NET
ZERO**

Differentiated offerings to help achieve net zero

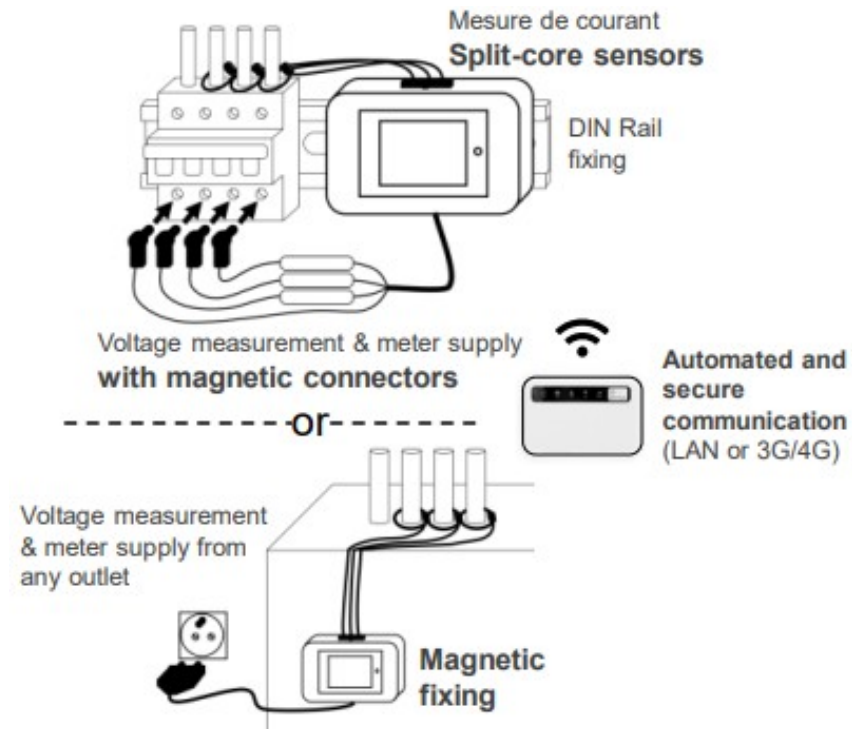
An aerial, high-angle photograph of a city skyline, likely New York City, featuring several prominent skyscrapers. The image is dark and has a blueish tint. In the top right corner, there is a solid white square. The text is overlaid in the center-left area.

AI/ML DRIVEN APPROACH TO LOAD MONITORING & DISAGGREGATION SOFTWARE-DEFINED METERING

1 NON-INVASIVE LOAD MONITORING & DISAGGR.

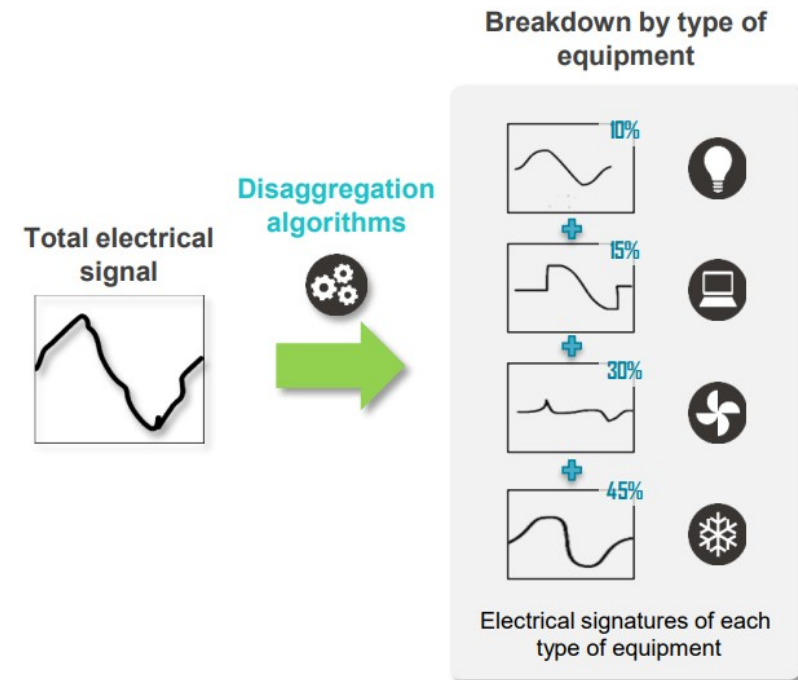
1. SMART METER

- Can be used as Smart Meters – whether as Main Meter or Sub-Meter inc. **daisy chaining**
- Up to 99% accuracy of measured load



2. LOAD DISAGGREGATION


- Used for load disaggregation across asset classes
- ~95% accuracy for load disaggregation




2 ENERGY BASELINING

1. INPUTS

1 Schedules

 Weekday/Weekend

 Time of Day

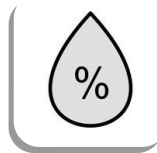
2 Outdoor Weather Conditions



Temperature



Humidity

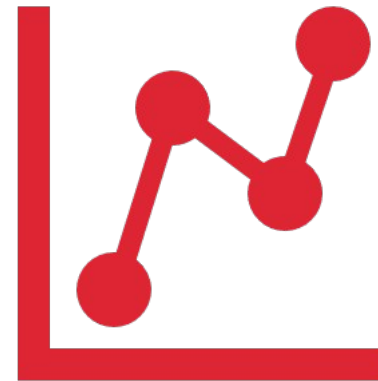


Dew Point

3 Historic Energy Consumption Data



2. MODELLING CHOICE



AI/ML Enabled Linear Regression model with L1 Regularization

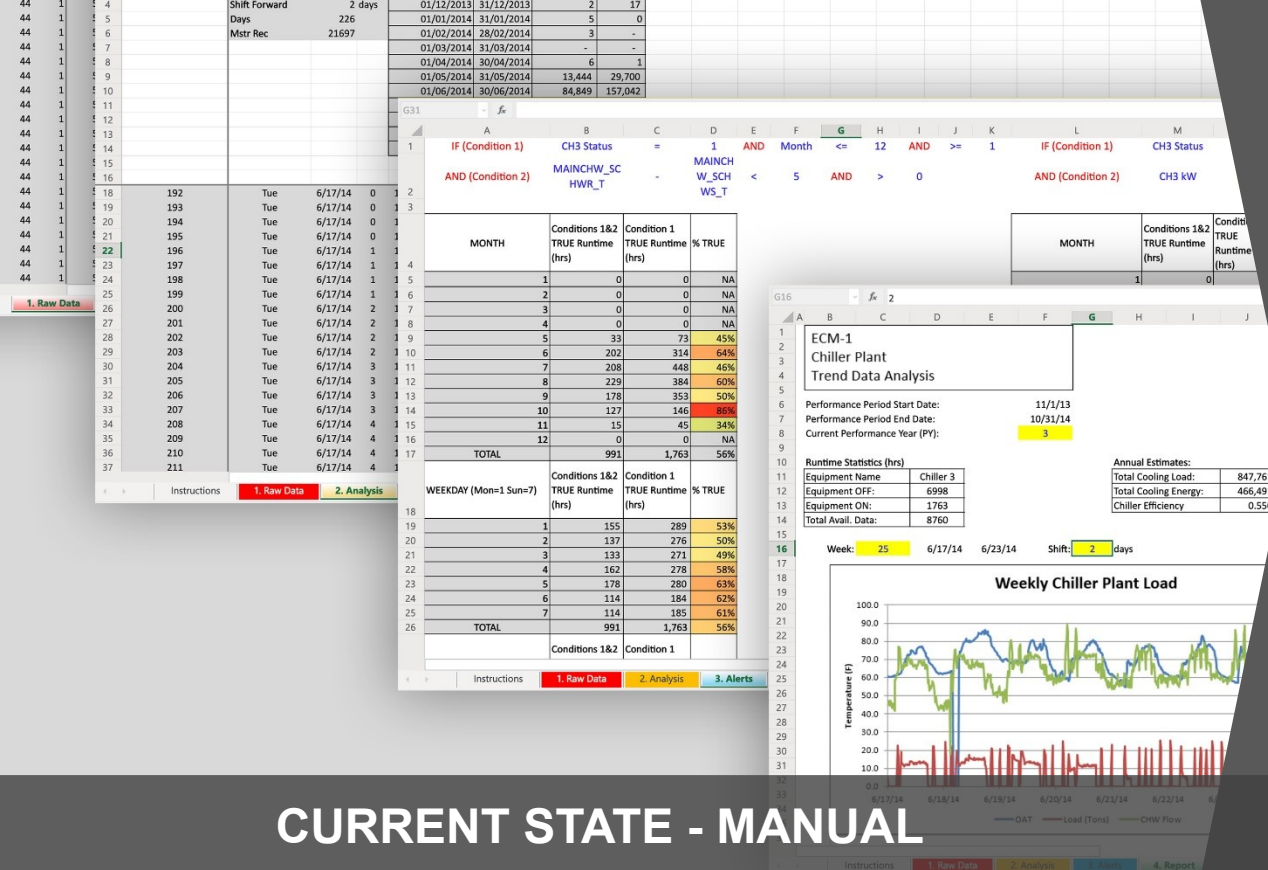
BASELINE

Consumption Regression Model

The Regression Model - given outside weather conditions and the day of week and time of day predicts the Baseline Consumption of the meter as per the selected baseline period

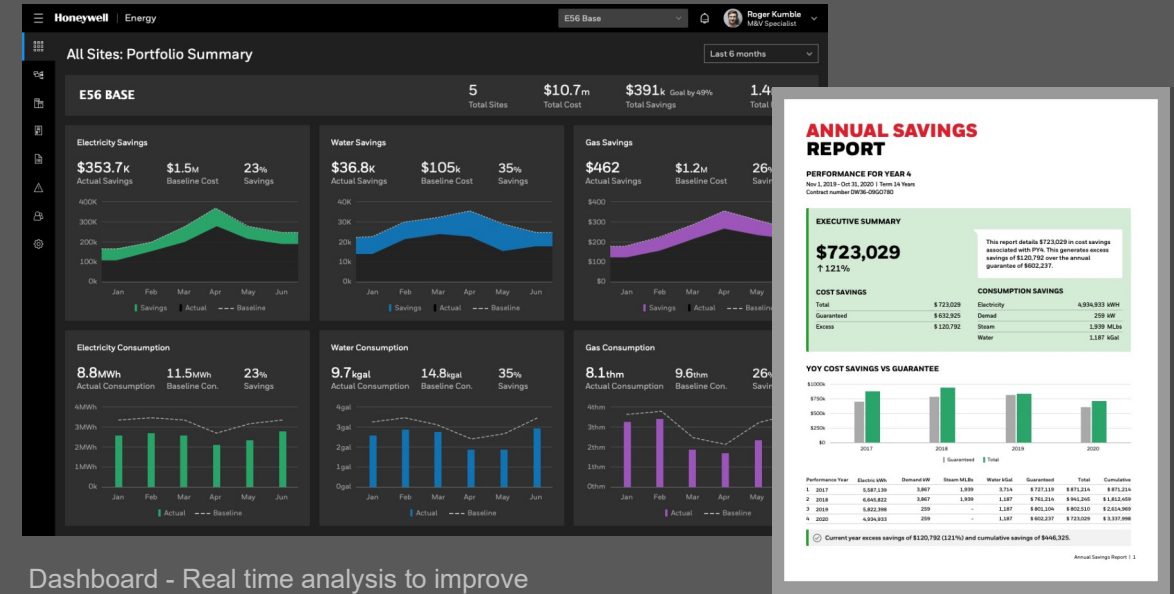
An aerial, high-angle photograph of a city street grid. A prominent skyscraper with a stepped, tiered design is the central focus, extending from the bottom towards the top. The image is dark and moody, with a white square in the top right corner. The text is overlaid in the center-left area.

AI/ML DRIVEN APPROACH TO AUTOMATED MEASUREMENT & VERIFICATION



CURRENT STATE - MANUAL

1. Manual process – Significant usage of spreadsheets, data is static, slow and outdated
2. Current process is a lagging indicator – Creates guarantee risk
3. Risk in data quantity & quality: Human errors, data is missing or accuracy of data (missing data recreated manually)
4. No real-time visibility on savings
5. Not competitive - Low technology, limited Cx and not scalable



Dashboard - Real time analysis to improve business efficiency and demand response

FUTURE STATE - AUTOMATIC

1. Automated process to collect, analyze and optimize – Improve the granularity of data for performance
2. Leading indicator for the performance guarantee & outcomes
3. Data cleansing algorithms to improve data quantity & quality (Automated) - Improving response to negative deviations and minimizing impact to guarantee
4. Dashboards, automated alerts and exception reports for Data Quantity and Quality and cost avoidance
5. Integrated solution on Forge platform (Utilities, Weather & BMS)
6. Higher guarantee to projected savings ratio can produce **larger project bundles** (currently 92% guarantee can move to 99%)

M&V SOFTWARE ECOSYSTEM

Personas & Outcomes



FIELD SERVICE TECHNICIAN

- Collect data (Project, Asset & Utility) quickly and easily



SOLUTION DEVELOPMENT ENG

- Onboarding utility and weather data quickly



M&V SPECIALIST

- Maximize revenue while optimizing energy/cost more efficiently
- Provide real-time data insights to improve business efficiency, demand response
- Data driven decision to enable better decision making



FACILITY MANAGER

- Provide real-time data insights to ensure reliable operations and make smart investment decision through benchmarking

Touchpoints & Features



COLLECT

1. ECM Configuration details (Manual)
2. Trend Data collection through Forge Connect



COLLECT

1. Utility Data (Urjanet)
2. Weather data integration (3rd Party)



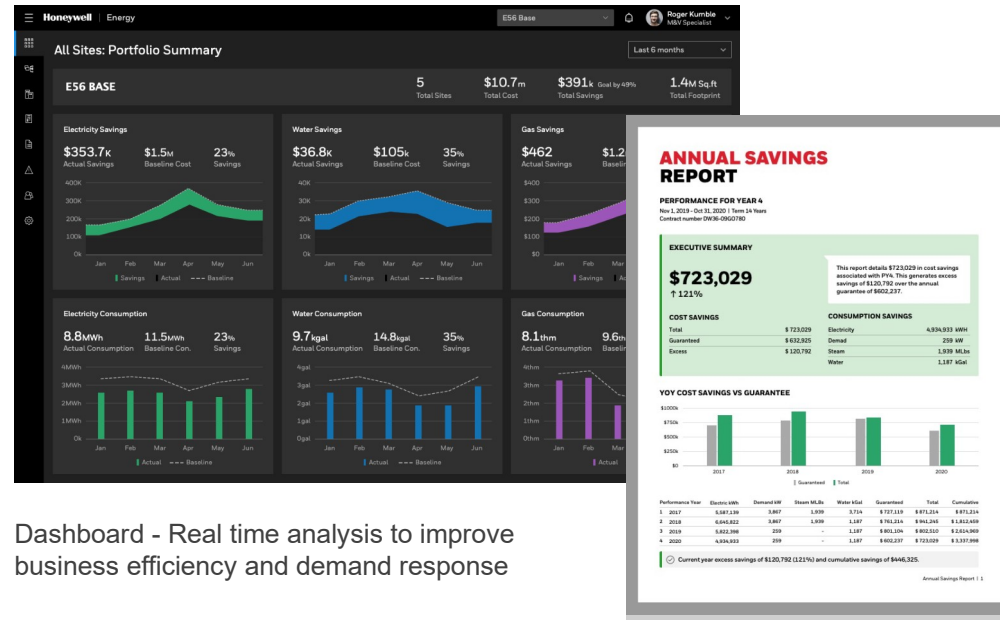
ANALYZE, MONITOR & ACT

1. Data Cleansing for Quality and Quantity – Enter missing data and rectify abnormal data
2. Data quality monitoring
3. Data Normalization – Evaluate the impact of energy conservation efforts
4. Utility Cost (Tariff escalations)
5. Baseline adjustments
6. Dashboard - Real-time Monitoring & Tracking to evaluate (consumption, savings, performance, benchmark)
7. Reports (KPIs, Analytics, Comparison and repository)



MONITOR

1. Dashboard - Real-time Monitoring & Tracking to evaluate (consumption, savings, performance, benchmark)
2. Reports (KPIs, Comparison and repository)



Dashboard - Real time analysis to improve business efficiency and demand response

Reports (KPIs, Analytics, Comparison and repository)



Honeywell > Aero Houston HC

Date from 28-06-2021



Aero Houston HQ - Carbon and Energy Overview

Last updated on 28/06/2021, 11:00

35.80 kWh/SqFt
EUI

700 k Sq.ft
Total Footprint

Carbon Emissions (CO2e)

4.74 kton

0.07 kton (1.5%)

Actual



4.81 kton Previous period

[VIEW DETAILS](#)

Energy Usage

12.53 GWh

0.23 GWh (1.80%)

Actual



12.76 GWh Baseline

[VIEW DETAILS](#)

Utility Bill Overview

\$833.52 k

\$15.53 k (1.8%)

Actual



\$849.05 k Previous period

[VIEW DETAILS](#)

Project Savings

\$78 k

Cost savings

[VIEW ALL PROJECTS](#)

Energy Loss

762 kWh

Increased Consumption

\$685

Cost Impact

[VIEW DETAILS](#)

Identified ECMs

\$41 k

Total potential savings

[VIEW DETAILS](#)

Top performing projects Savings

1. Intelligent Building Optimization	\$ 2,200
2. Chiller Analytics	\$2,160
3. Setpoint Optimization	\$1,900
4. RTU Optimization	\$ 1,230
5. Installing VFD	\$ 900

Top Anomalies Cost Impact

1. Low power factor	\$ 800
2. Peak demand	\$760
3. Alerts due to high energy consumption	\$ 520
4. Equipment failure	\$ 260
5. Air Filter clogging	\$ 190

Top Recommendations Potential Savings

1. Upgrade AHU	\$ 20,200
2. Install VFD	\$8,600
3. Pump efficiency improvements	\$ 5,200
4. Motion sensor lighting	\$ 2,600
5. Equipment schedule review	\$ 900

PROJECT PERF. TRACKING



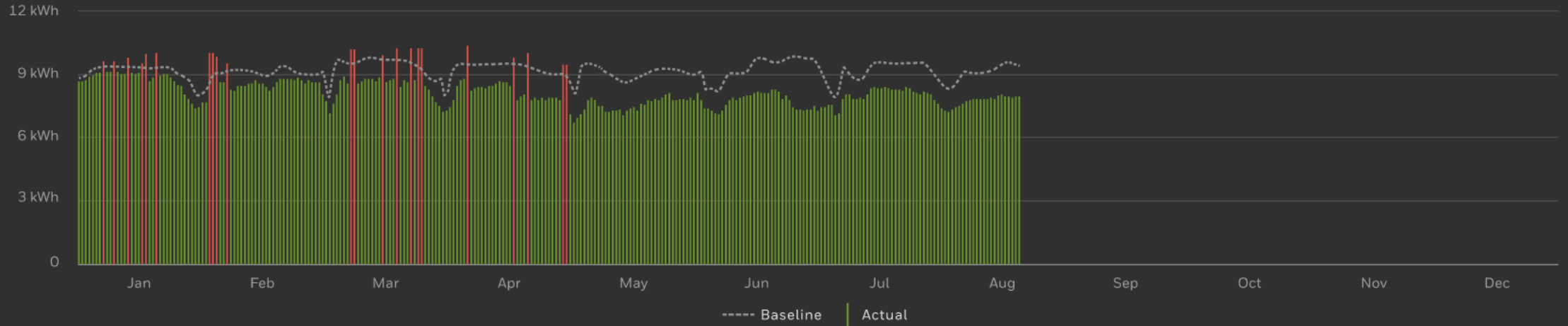


Project Performance (i)

42.63 kWh
Actual Cons.

52.86 kWh
Baseline Reference

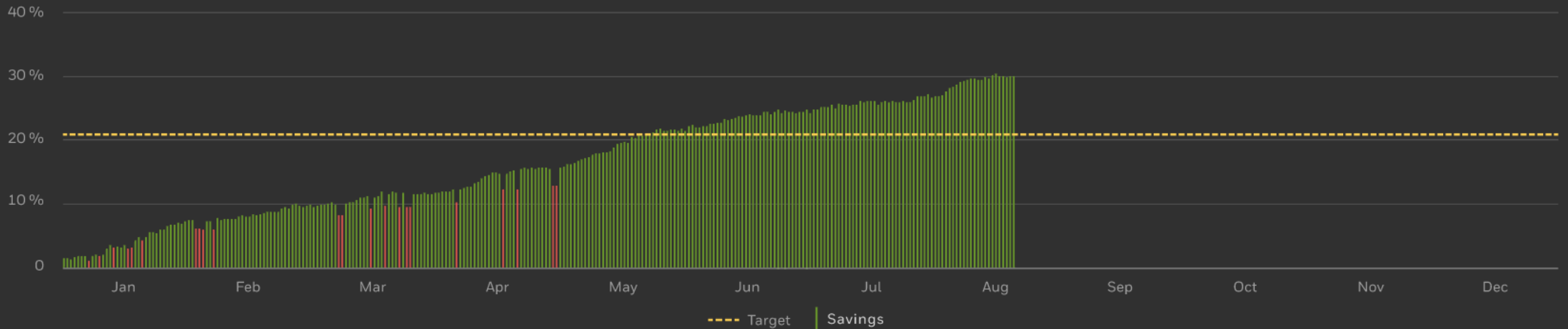
10.23 kWh ● 34%
Savings



Savings

34 %
Savings

25 %
Target

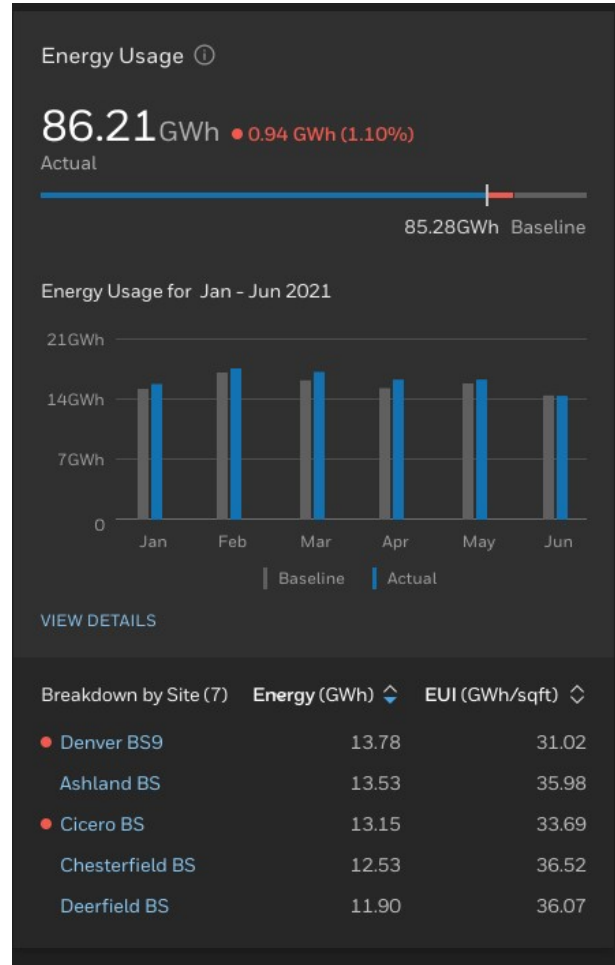


An aerial, high-angle photograph of a city street grid. A prominent skyscraper with a stepped, Art Deco-style top is the central focus. The image is dark and moody, with a white square in the upper right corner. The text is overlaid in the center-left.

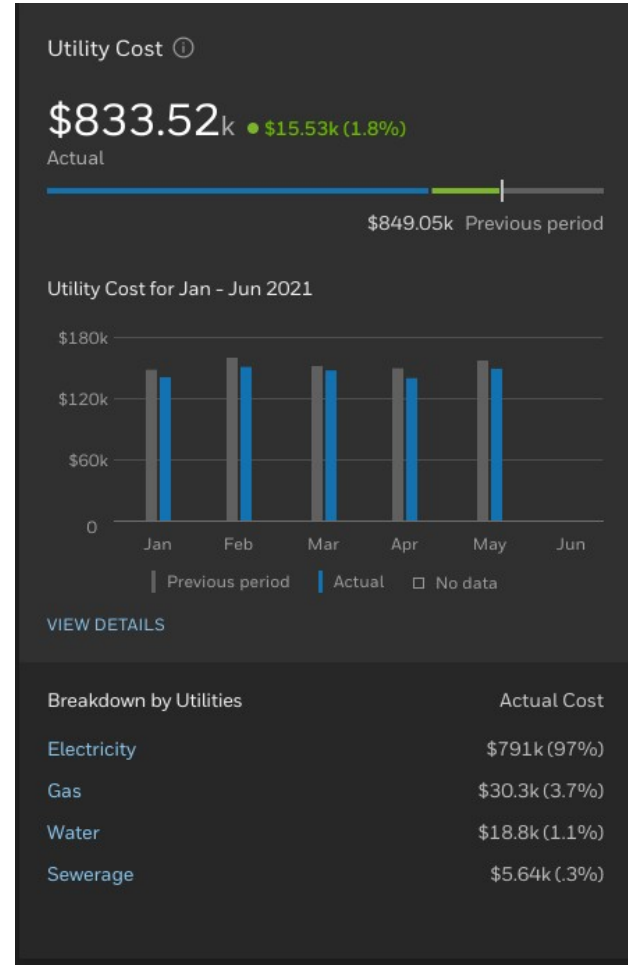
ENERGY EFFICIENCY MEASURES
CARBON MEASUREMENT

ENERGY EFFICIENCY AND CONTROLS

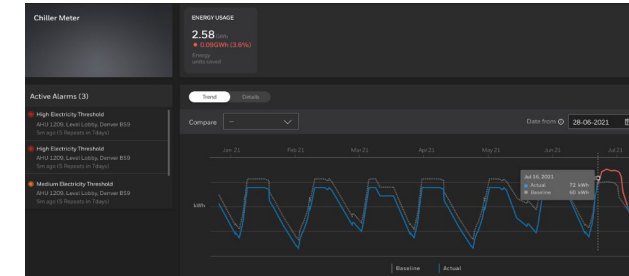
BASELINING, CONSUMPTION TREND



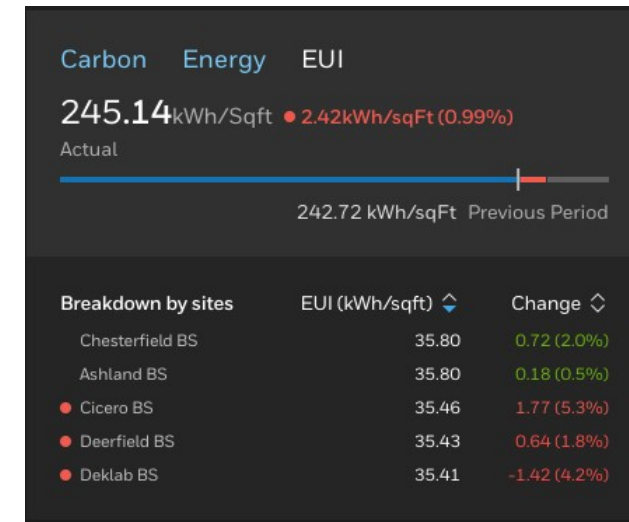
..AND ASSOCIATED COSTS ANALYSIS



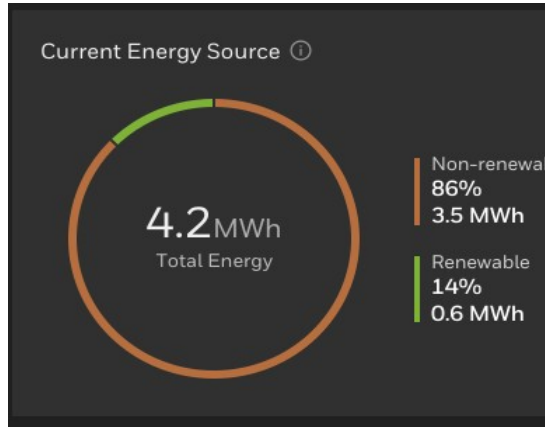
..WITH ASSET LEVEL CONTROL & OPTIMISATION



...AND BENCHMARKING

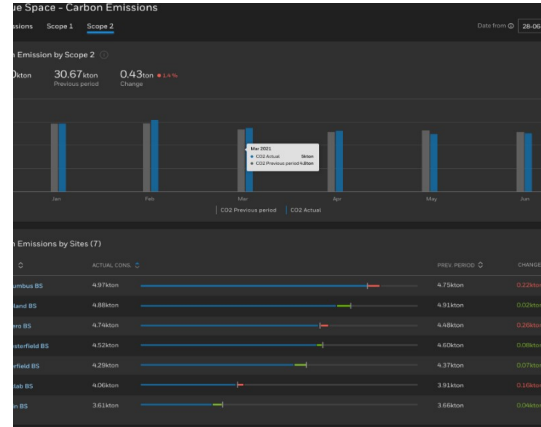


CARBON MEASURE AND INSIGHTS



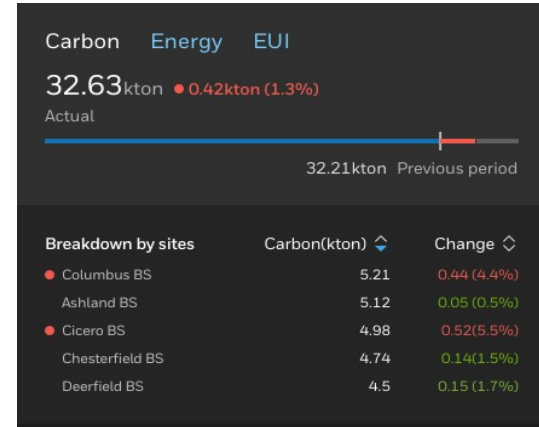
DISTRIBUTION BY SOURCE OF ENERGY

- Green vs brown
- Required for regulatory reporting (EU)
- Ability to track towards desired energy-mix



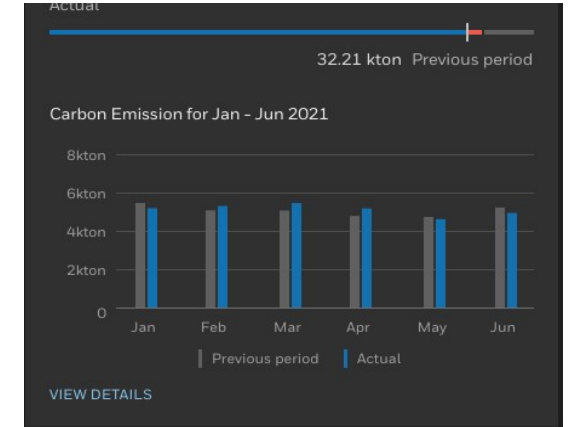
SCOPE 1 & 2 REPORTING & ANALYSIS

- Breakdown of emissions into scope 1 & 2
- Assign emissions to site/asset level
- Analyse trends in CO2E
- Allocate performance against objectives



ENTERPRISE CO2E ANALYSIS

- Benchmark site CO2E Performance
- Site-level CO2E Trends
- Performance against objectives
- Ability for portfolio/site/asset level drill-down



CO2E EMISSION REDUCTION INSIGHTS

- Trending over defined period
- High emitting assets called out
- CO2E Related alerts and alarms
- Ability to link ECMs To carbon reduction targets

An aerial, high-angle photograph of a city street grid. A prominent skyscraper with a stepped, tiered design is the central focus, extending from the bottom right towards the top center. The image is dark and moody, with a white square in the top right corner. The text is overlaid on the left side of the image.

SMART POWER FOR SUSTAINABLE OUTCOMES & COST CONTAINMENT

DECARBONIZE - RENEWABLE ENERGY MGMT

DECARBONIZE

SMART POWER MGMT SOLUTION

WHAT IS IT?

End to End Renewable smart power management system



DELIVERABLE

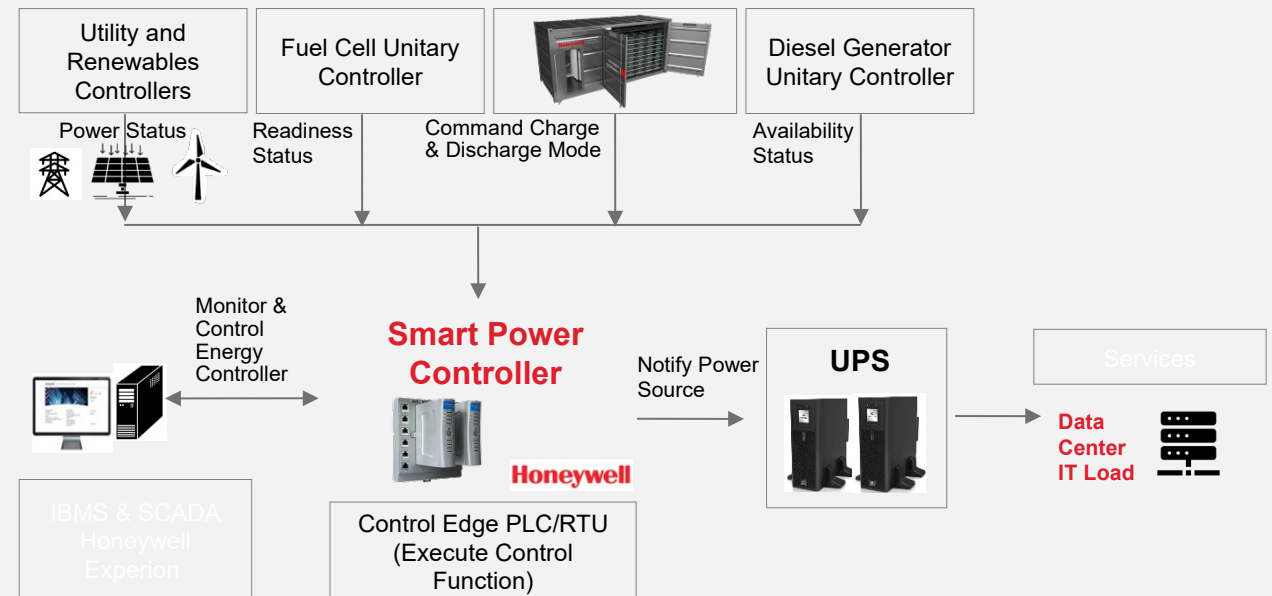
- Onsite renewable energy generation solution
- BESS: Battery energy storage system
- Smart power controller
- Remote monitoring
- Demand response
- Peak shaving and load balancing solutions

OUTCOME

End to End Off-grid solutions for guaranteed uptime and carbon footprint reduction



HOW SOLUTION WORKS | ARCHITECTURE



**PERFORMANCE BASED CONTRACTING
BASED ON KPI's**

SMART POWER

Weather Alerts, Notification & Workflows

Microgrid KPIs (Status, Usage, Notifications)

Critical Asset Identification (HVAC, Lighting, Water)

Net Carbon Emissions Calc & Energy Savings

User configurable Microgrid controls

Forecast Consumption (Grid, Onsite, Demand)

Dynamic Load

SMART POWER EXAMPLE

POWERED BY HONEYWELL FORGE

Aero Houston HQ

TODAY

Smart Power Overview

Last Updated 15 mins ago

Grid Connected | Isolated 0.69 MWh

Should Peak | Target consumption 345 KWh

Carbon (CO2e)

2.14 kton Actual | 0.07 kton (1.5%)

2.14 kton Previous Period

MicroGrid Backup Capacity

100/120 Hrs

BACKUP CAPACITY FROM:

- Solar 32 hrs
- Battery 44 hrs
- Generator 24 hrs

Connectivity

- Online 168/168 ONLINE DEVICE CONNECTIVITY
- Online SITE CONNECTIVITY

Energy Utilization

\$5,090 Total Cost | \$7,540 + Grid Cost Avg. | \$2,450 - MicroGrid Name

80 kW | 60 kW | 40 kW | 20 kW | 0

1 am | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 pm | 1 | 2

Grid | MicroGrid | Peak Period | Baseline

Energy Consumption

Last Updated 15 mins ago

1.14 MWh From Grid | 0.150 / 1.39 MWh From MicroGrid

Zone	High
EV Charging	477 KWh
HVAC	181 KWh
Lighting	150 KWh

Schedules (1)

Schedule for NOW

MicroGrid

Switch to Island

MicroGrids Backup Capacity

1,560/2,000 Hrs

BACKUP CAPACITY FROM:

- Solar 420 hrs
- Battery 680 hrs
- Generator 460 hrs

Smart Power Overview

Infrastructure 01-06

Grid 11 MWh | Isolated 7.5 MWh | Peak > 345 KWh

8 No.s Total Islanding | 5 No.s Peak Limit Cross

EMERGENCY WARNING

Thunderstorms and Cyclone

WILL LAST 8-10hrs

DETAILS | 11:45:00 25/6/2022

📍 Hernando Beach, Brookfield

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WE'RE READY.
ARE YOU?



Honeywell

NET ZERO FUTURE

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