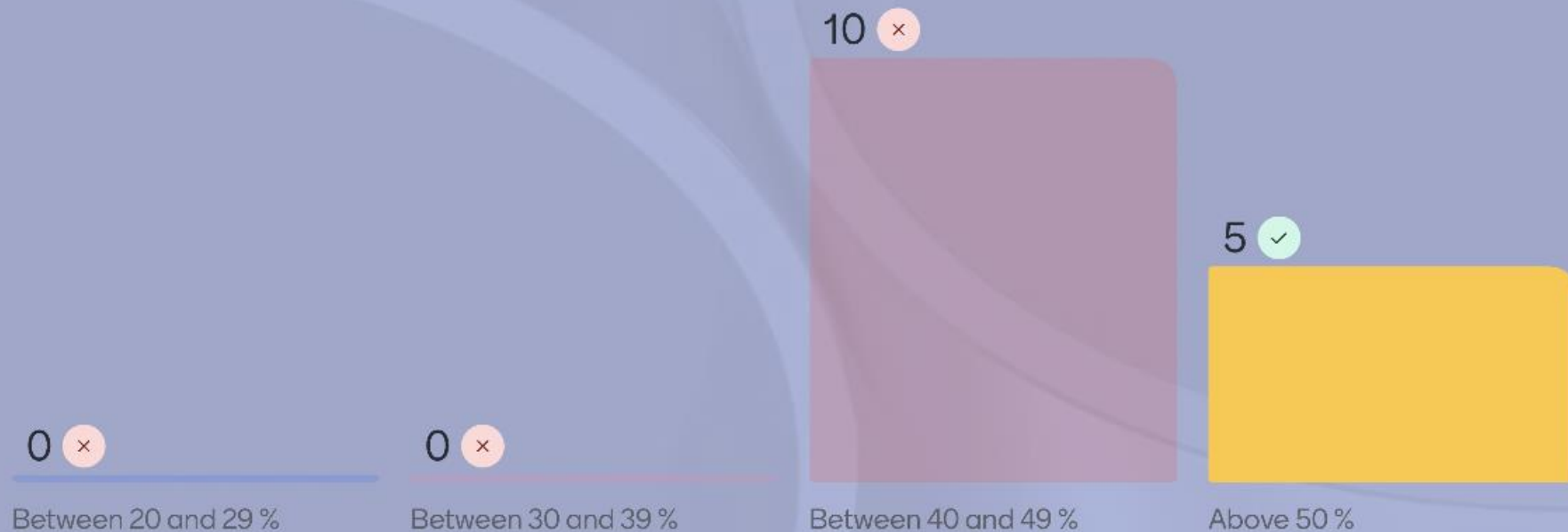


Driving customer value beyond maintenance Foster collaboration and operational efficiency

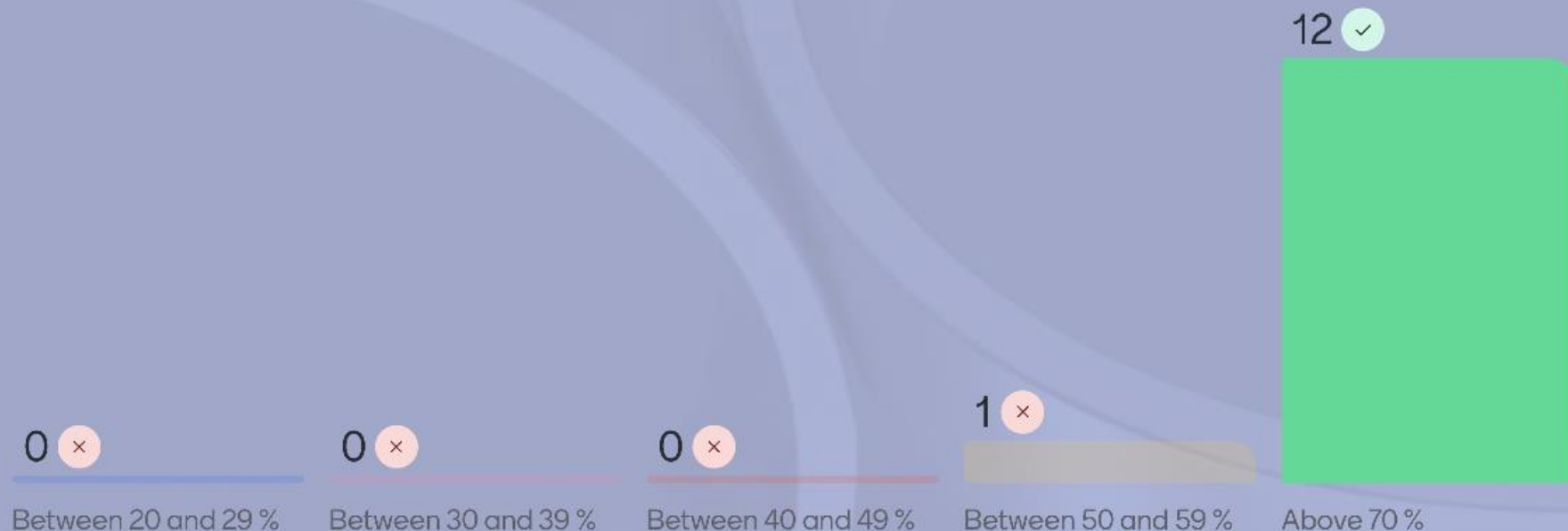
Amsterdam 13 Nov 2024

Jean de Kergorlay

Technical workforce age average in EMEA ?

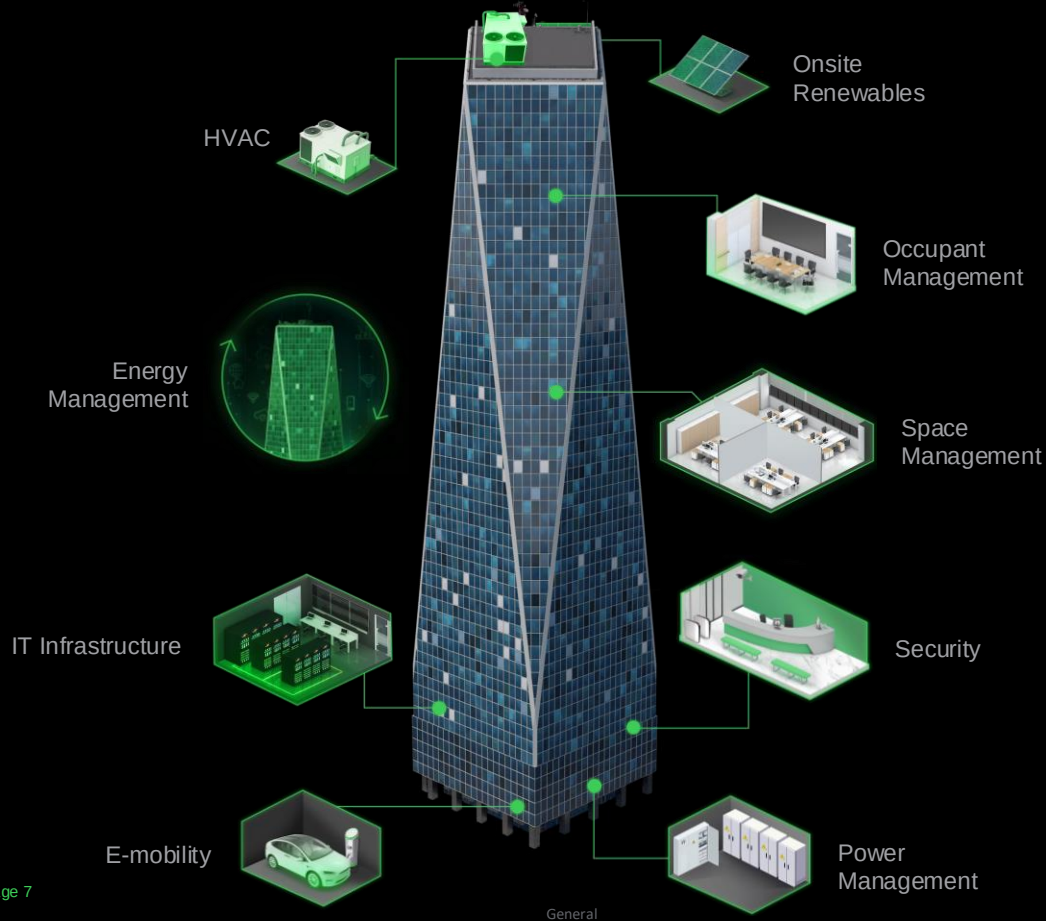


How many employers complain to recruit technical workforce?

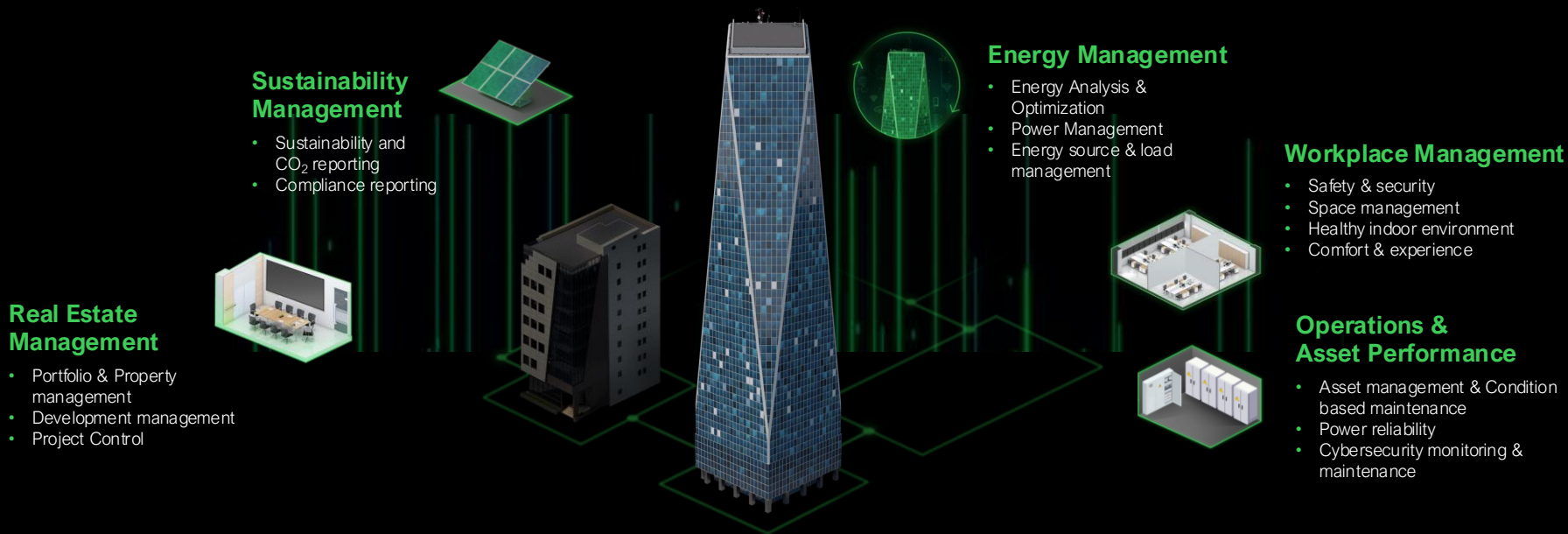


Context & problem statement

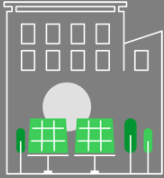
Buildings are complex: with multi-vendor systems, architecture and occupants



Our mission is to help customers achieve decarbonization, resiliency & efficiency with digitization of buildings, power & microgrids

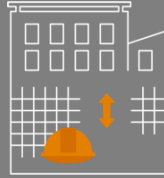


Sustainability is at the core of Buildings of the future



Sustainable

On the path to net-zero,
digital and electric for
decarbonization



Resilient

Stay competitive
with minimal business
disruptions



Hyper-efficient

Flexible energy assets
seamlessly controlled by
end-to-end digital platform



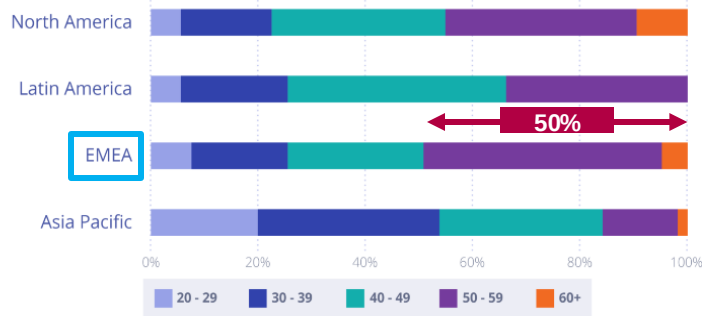
People-centric

Designed to delight
people and optimize
experience

Technical skilled workforce scarcity

A critical challenge for the next decade

Field service employee population by age group



- 46% of North American field techs are 50+.
- 50% of field techs in EMEA are 50+.

As these experienced techs leave the workforce, technology firms are struggling for strategies to replace them.

There are few available candidates with the same level of skills and experience, and the cost of hiring similar skill sets is cost-prohibitive.

TSIA Aug 2021 | <https://fieldnation.com/resources/field-service-staffing>

If everyone had the knowledge and skills to perform like the top 20% of the workforce, **service costs would be reduced by as much as 22%.**

- Over 25% of service leaders reported that “pulling and analyzing data to understand organizational performance” was the most difficult challenge they faced in 2023.⁴

- Globally, 77% of employers reported difficulty finding the skilled talent they need to staff their organizations.¹

- By 2031, more than one-quarter of the labor force will be 55 or older.²

Building maintenance challenges

Building and facility managers must strike a balance between their goals and challenges

>55%

of tasks in buildings maintenance are reactive¹



>40%

of occupants are dissatisfied with comfort levels²



>80%

of equipment fails prematurely or before expected age³



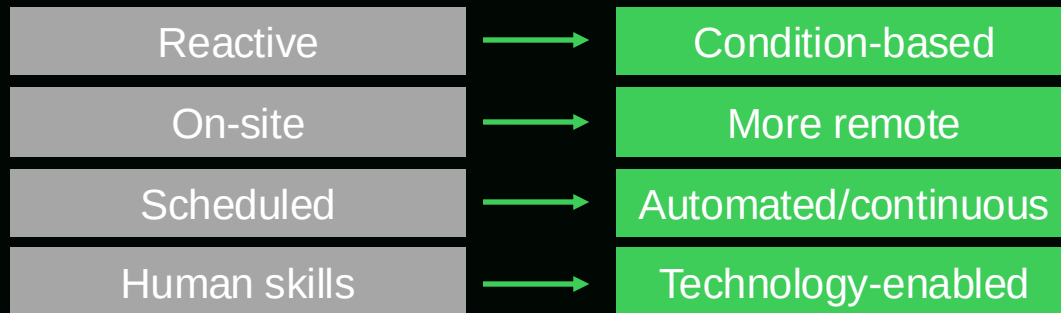
1 https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-19634.pdf

2 <https://cbe.berkeley.edu/research/occupant-survey-and-building-benchmarking/>

3 <https://www.lifetimeline-reliability.com/cms/free-articles/maintenance-management/condition-based-maintenance>

A more digital and remote approach is needed

Maintenance services must evolve from:

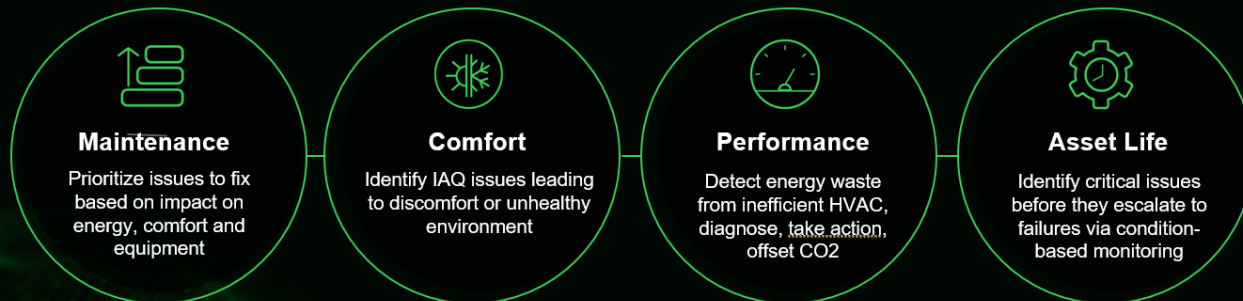


Goals

- Higher energy efficiency
- Enhanced comfort
- Maximized asset value

Challenges

- Complex HVAC systems
- Constrained budgets
- Skills shortage

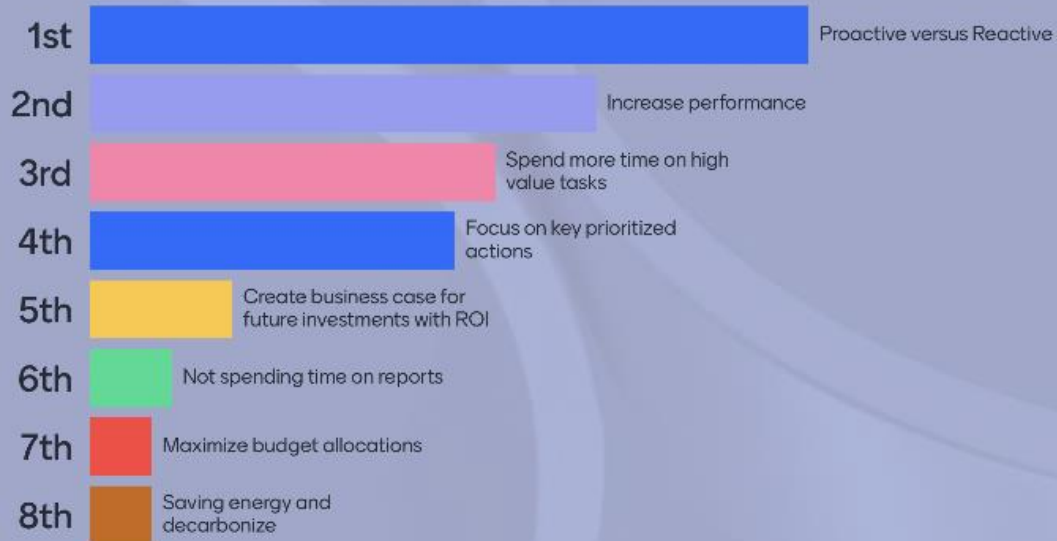


To conclude

- ⇒ Scarcity of resources
- ⇒ Value Vs Cost
- ⇒ Reactive Vs proactive
- ⇒ Adoption of digital and data driven decisions
- ⇒ Compliance with regulation (EPBD, EED, Net-zero journey....)

Current solution approach

What are for you the 3 key benefits of data driven services (incl AI, Analytics, remote control etc...)?



What are for you the 3 key issues of Data driven services (incl AI, Analytics, remote control etc...)?



More digital fosters new way of working/collaborating



Platform – Technology Impact

Cloud hosted application that leverages **Digital Twin, Big-Data, Analytics, AI** to bring Automation & Continuous Monitoring of systems to streamline building maintenance, optimize performance & extend asset life



People – People Impact

Leveraging a **hybrid model between on-site & remote team** of experts to bring the best-in-class service delivery that is responsive, outcome driven & extension of local team for a single site or across a global portfolio. **Higher value tasks and value for clients.**

How it works

3 Monitor

Frequency based on customer criticality

2 Collect / connect data

Data from BMS is collected and uploaded

1 On-boarding & Set-up

Activate service plan, meet with your new service team to define goals.

4 Analyze

Our experts will review and analyze the data and analytics provided by Building Advisor and create tasks for any anomalies found.

5 Notify

Tasks will be allocated to a field service representative for onsite verification

6

Scheduled Maintenance

On the next scheduled visit our field service representative will arrive to site with a list of priority tasks to investigate as well as any other PPM checks

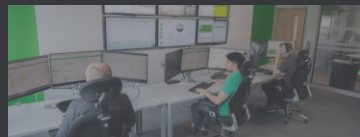
7 Reporting

On the completion of a scheduled maintenance visit, a fully integrated report will be sent to the customer detailing all work carried out.

Advise

8

You'll get insights and recommendations during a consultative meeting with our experts to ensure alignment with goals



Add-on Enhancements *

Monitoring of BMS Software and Hardware



Customer





Scheduled Onsite Maintenance

Experienced onsite service representatives, proven maintenance processes and onsite collaboration

- **Experienced** onsite Service Representatives to help you reach the full potential of your BMS
- To carry out onsite **condition-based maintenance** utilizing digital tools to **maximize efficiency**.
- Recommended **scheduled maintenance tasking** on BMS and HVAC equipment
- Which can be customized to **minimize downtime** as well as increased **building performance**

Result: Mitigate risk of equipment failure and increase performance



Customer Success Management



Customer Success Management: Our dedicated customer success team will guide you through the entire Service plan plan, offering support from onboarding and training to regular discussions on building performance, product adoption, and reporting

Success reporting

- Agreed goals are documented at the outset of each contract and regularly tracked and reported. These are typically consolidated in a Customer Success Plan, a collaboratively created document outlining the definition of success by both the customer and SE
- **Services & Consultation**
- **Dedicated Service Team** comprising of onsite and remote service representatives
- Consultation and guidance to **fully utilize** BMS to drive most efficient operation.
- **Regular meetings** to review performance of building , recommendations to improve performance and value derived from service
- **Dedicated Customer Success Manager** to escalate issues and provide guidance and support



Customer Focus

Ensure our end-to-end process is customer focused. Continual development of a service attitude and soft skills by the entire customer delivery team.



Communicate Value

Continually communicate value in all our actions and how we report digital services task closure, how our recommendations and quotes are aligned with the customer objectives, with the objective of becoming a trusted advisor and service provider.



Reselling

Keep reselling; bring fresh ideas to the table and introducing new offers. Plan ongoing training to make this happen.



Example of a shared Success Plan



Client Name	XXX Hospital
Service Type	Monthly Report / Condition Monitoring
Client accountable contact	Kevin McCarty

Customer Success Manager	Lee Cravens
Service Bureau Engineer	Roy Villanueva
No. of assets connected	2,754

Business Goals & Metrics
<ol style="list-style-type: none"> 1. Reduce unique anomaly count by 20%. <ol style="list-style-type: none"> A. Outpatient baseline = 480 unique weekly faults; reduce to 384. B. Comfort/IAQ= 351 unique weekly faults; reduce to 281. 2. 90% of prioritized/selected tasks completed in 202x to recognize impact

Stakeholders (Name / Title)	
James Law	Engineering and Ops Manager
Randy McNall	Sales Executive
Rudy Douglas	BAS Engineer

Key Challenges
<ol style="list-style-type: none"> 1. Access to rooms to check/repair zone issues. 2. Contouring/identifying diagnostics to meet needs. 3. Comply with AHSRAExxx

Potential Improvements
<ol style="list-style-type: none"> 1. Reduce false positives due to incorrect setpoints. 2. Adjust analysis thresholds to reduce nuisance faults. 3. Visibility for nurses (tickets progress, responsiveness)

What needs to be done ?			
No.	Activity Description	Timeline	Status
1	Identify common faults to reduce fault count using economies of scale.	By 2/28/2x	Complete
2	Change alarm delays and Building Advisor fault deadbands to reduce annoyance alarms/faults.	By 3/31/2x	In process
3	Focus AI/Analytics monitoring on reducing space temp related issues for 2-3 months	March-June 202x	Complete
4			

Outcome based services| Examples

To date, EcoStruxure Building Advisor Asset Health
has delivered the following results for our clients:

40+M

Sqm served

1800+

buildings

250+k

equipment monitored

1.3+M

Devices monitored

€20M

energy savings
realized

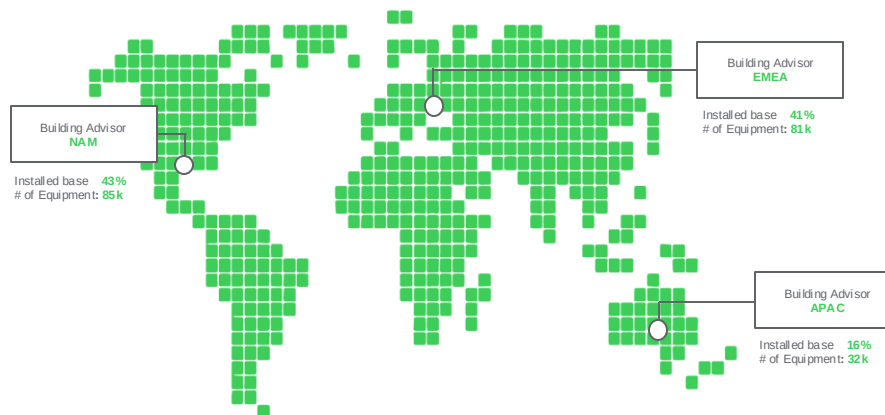
52 GWh

avoided

16,800

optimization tasks
finished

Deployed to Service provided across 20+ countries



Note: all numbers are approximate and as-of Q1 2022

Segment examples: Offices

optimize building operations and maintenance across portfolio; increase asset value



Optimize operations:

- Reduce on-site team's effort & skills needed to diagnose HVAC problems
- Detect issues before they escalate to critical failure causing disruptions

Improve occupant comfort:

- Quickly accessed hot and cold complaints through trending indoor air quality information from both real-time and historical data
- Identify faults in HVAC that lead to unhealthy IAQ or contamination risk

Achieve sustainability goals:

- Reduce energy consumption up to 20% by optimizing HVAC
- Leverage MBCx to lower energy usage & achieve M&V reporting

Safely return to the workplace:

- Created confidence among building occupants returning to work post-pandemic
- Improve IAQ and match ASHRAE guidelines on temperature, humidity parameters

Segment examples: Offices

Proven Outcomes, deployed at scale



CRE/Office

Sqm served

€
20M Sqm

of equipment

74,225

€ in energy savings

€8m

Electrical savings

26 GWh+

Typical Use-cases for Real Estate and Offices:

Identify HVAC systems running off-occupancy hours due to scheduling errors draining energy

Quickly access the hot/cold complains through trending IAQ data over period or specific time

Ensure continuous air-flow to match ASHRAE guidelines on temperature and humidity to foster higher confidence on return to work

Zone performance through automation of checks while minimizing disruption to tenants

Note: all numbers are approximate and as-of Q1 2022

Life Is On

Schneider
Electric

Segment examples: Life Sciences

improve operations and resiliency; enhance critical zone control; achieve sustainability goals



Optimize operations:

- Reduce on-site team's effort & skills needed to diagnose HVAC problems
- Identification of drifts and anomalies through continuous monitoring-based commissioning with equipment programming.
- Detect issues before they escalate to critical failure causing disruptions
- Single pane of glass for HVAC regardless of BMS vendor
- Benchmark performance

Optimize Maintenance & extend Asset Life:

- Identify faults in HVAC that lead to unhealthy IAQ or contamination risk
- Identify Critical issues with assets via condition-based monitoring before issues escalate

Improve environmental quality & Energy Efficiency

- Reduce energy consumption up to 20% by optimizing HVAC
- Leverage MBCx to lower energy usage & achieve M&V reporting
- Identify environmental issues pro-actively & address them
- Detect Energy waste due to inefficient HVAC, diagnose & take corrective action

BA for Life Sciences: improve operations and resiliency; enhance critical zone control; achieve sustainability goals



Life Sciences

Sq ft served

1.5Mm SqFt

of equipment

20,000

\$ in savings

\$6,8m

Electrical savings

6.7 GWh+

Typical Use-cases for Life Sciences Sites:

Improve critical zone control by identifying zones with supply air velocity pressure issues

Identify Maintenance issues associated to sensor errors and calibration issue of critical plant

Detect issues more accurately without causing equipment downtime or bring it offline for fault analysis

Energy saving from static pressure reset on Air Handlers or supply temp resets on Chilled Water loops

Automated diagnostic

From diagnostic to decision | site with 1 727 equipment

Details

Monthly AHU Fan analysis data for RTU-1 performed on 10/1/2024.

Analysis Name: AHU Fan

Organization Name:

Building Name:

Equipment Name: RTU-1

Display Interval: Monthly

Cost Savings: \$2,076

Comfort Priority (0-10): 0

Energy Priority (0-10): 10

Maintenance Priority (0-10): 6

PROBLEM: FLOW SENSOR DRIFT

- The return air flow sensor(s) was indicating positive values greater than 2800 CFM (10% of rated flow) while the fan(s) was off for 87.6 hours during the analysis period.

Possible Causes:

- Uncalibrated or malfunctioning flow sensor.
- Fan malfunction or failure.
- Manual override.
- Broken or stuck damper.

Annual Projection Model Notes

- Total Projected Avoidable Cost: \$25645
- Total Projected Avoidable CO2 emissions: 51.3 Metric Tons
- Supply air static pressure higher than setpoint:
 - electric savings opportunity = 128225 kWh (51.3 Metric Tons CO2) and \$25645
 - The projection was made using a regression model with the following inputs: Occupancy. Model statistics: $R^2 = 0.96$, normalized RMSE = 0.03.
- Available independent variables: Outdoor Air Temperature (OAT), Outdoor Air Relative Humidity (OARH), Occupancy, Equipment Runtime

Faults and opportunities investigated by this diagnostic:

AHU fan cycling check. Fan VFD opportunity check. Fan on while unoccupied check. Fan speed cycling check. Fan status data mismatch check. Flow and fan speed correlation check. Flow sensor drift check. Flow sensor miscalibration check. Flow sensor zero check. Fresh air flow setpoint tracking. Return air static pressure setpoint tracking. Room air static pressure setpoint tracking. Sensor checks. Setpoint error check. Static pressure sensor drift check. Supply air static pressure setpoint tracking.

Finally, it was the sensor to changeonly

Provider: (105), Org: (497), Groups: (116)...

Equipment

Dates: 11/1/2022 - 2/8/2023, Interval:...

Completed: Last 12 Months

Insights - Energy

Equipment Count: **241**

Energy Score: **91%**

Avoidable Cost: **57,258 EUR**

Completed Tasks Annualized Avoidable Total

14 Tasks Completed with 5,153 EUR of Avoided Cost

Avoidable Costs with Running Total

Air Handlers w/ Energy Opportun...: **26**

Zone Equip w/ Energy Opportuni...: **0**

Cooling Equip w/ Energy Opport...: **7**

Heating Equip w/ Energy Opport...: **6**

Equipment Count by Class

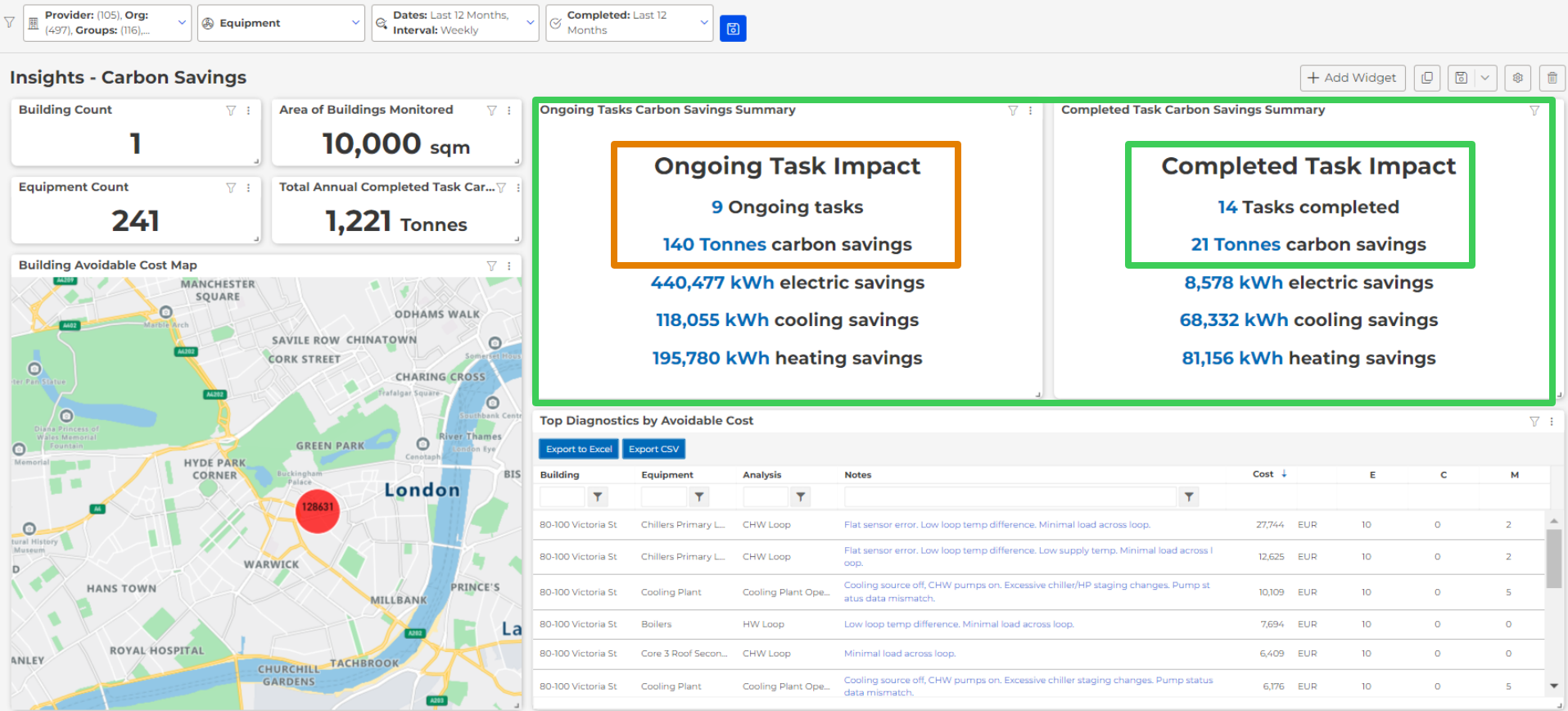
Equipment: Avoidable Cost by Equipment

Top 10 Diagnostic Results by Avoidable Cost

Date	Equipment	Analysis	Avoidable Cost	Diagnostic
1/8/2023	Chillers Primary Loop	CHW Loop	\$2,266	View
1/22/2023	Chillers Primary Loop	CHW Loop	\$1,989	View
1/15/2023	Chillers Primary Loop	CHW Loop	\$1,902	View

Top 10 Diagnostic Analysis Avoidable Cost Totals

Building Advisor | Asset Health | Carbon Savings



Stockholm School Properties Company, Sweden

Optimizing building control strategies for enhanced comfort & energy use through AI



Challenge

- Single solution needed for a wide portfolio of properties without replacing existing equipment
- Improve students' learning environments
- Increase energy and cost savings in already optimized systems
- Meet broad climate-related goals

The solution

- Digital Twins of each building created using thousands of CO₂ & temperature sensors
- AI system provides SISAB's BMS with HVAC adjustments for energy and climate control
- Ensures ideal comfort at lowest energy use and cost

Customer benefits

- Smarter, automated control of indoor climate and reduced energy consumption at each property

Results:

4% reduction in heat energy (2,500 MWh)

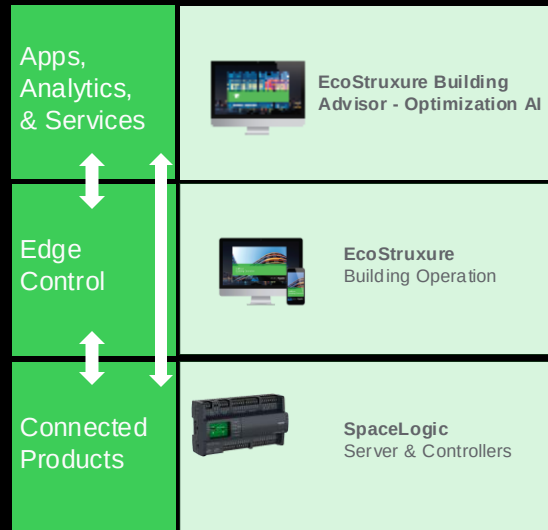
15% savings on HVAC electricity use (1.200 MWh)

23% fewer work orders from tenants

205 metric ton reduction in greenhouse gas (GHG) emissions

The largest consumer of electrical power in Stockholm with 600+ primary and secondary schools, this customer energy savings have positively impacted the local utility load.

EcoStruxure[®] for Buildings





From data to structured information will provide Outcome-based Services to create value to the customer

THANK YOU.