



# The Role of SAS<sup>®</sup> Analytics in Enabling Smart Buildings

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# Smart Analytics



Manufacturing



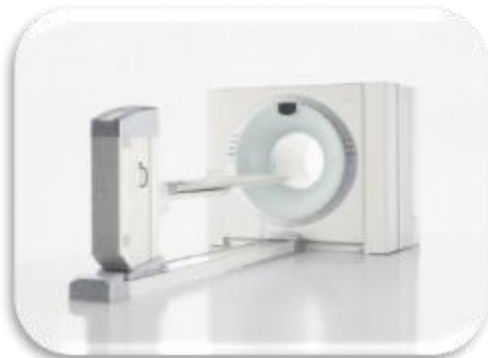
Transportation &  
Logistics



Energy



Government /  
Smart Cities



Healthcare & Life  
Science



Retail



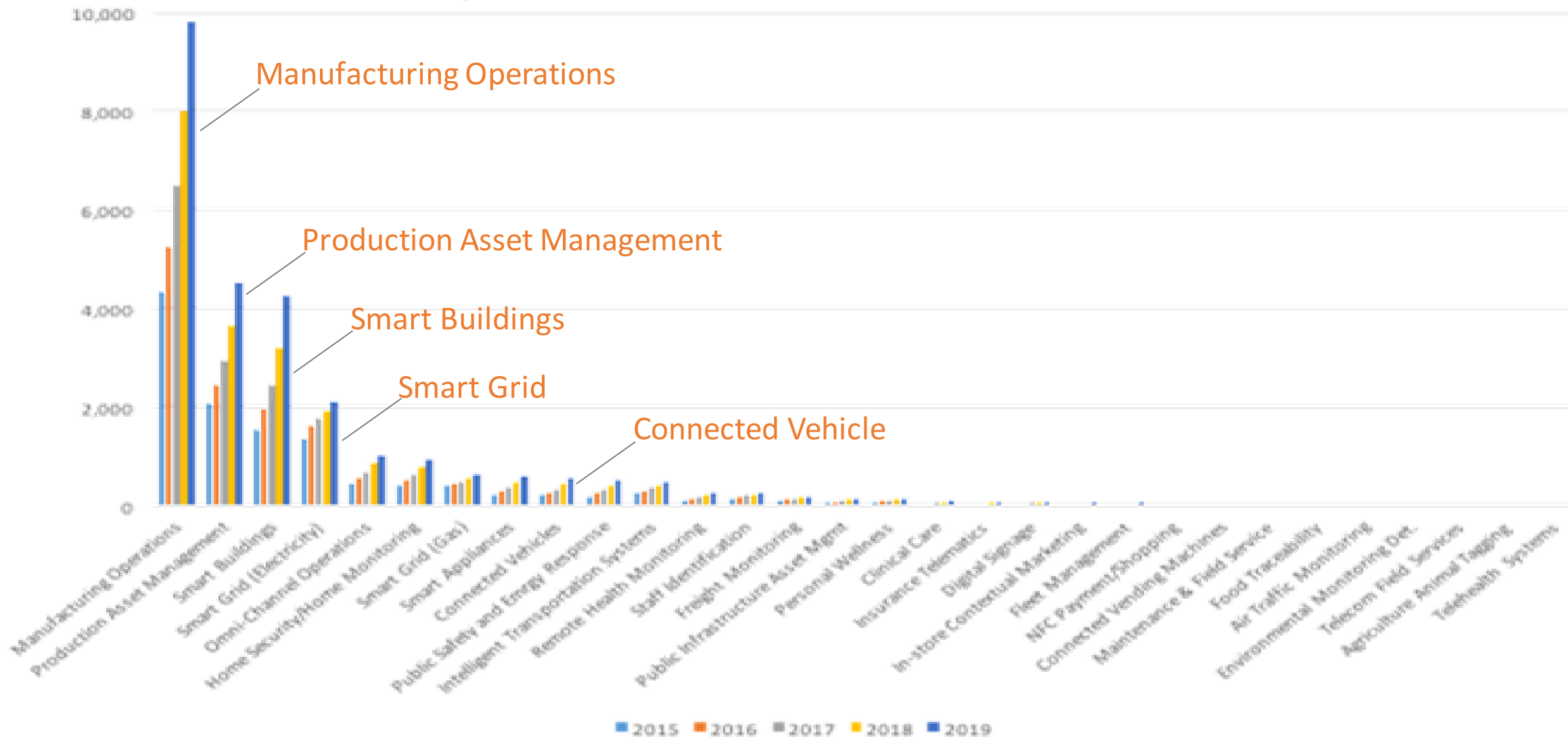
Grocery



Banking /  
Insurance

# Market Analyst Viewpoint

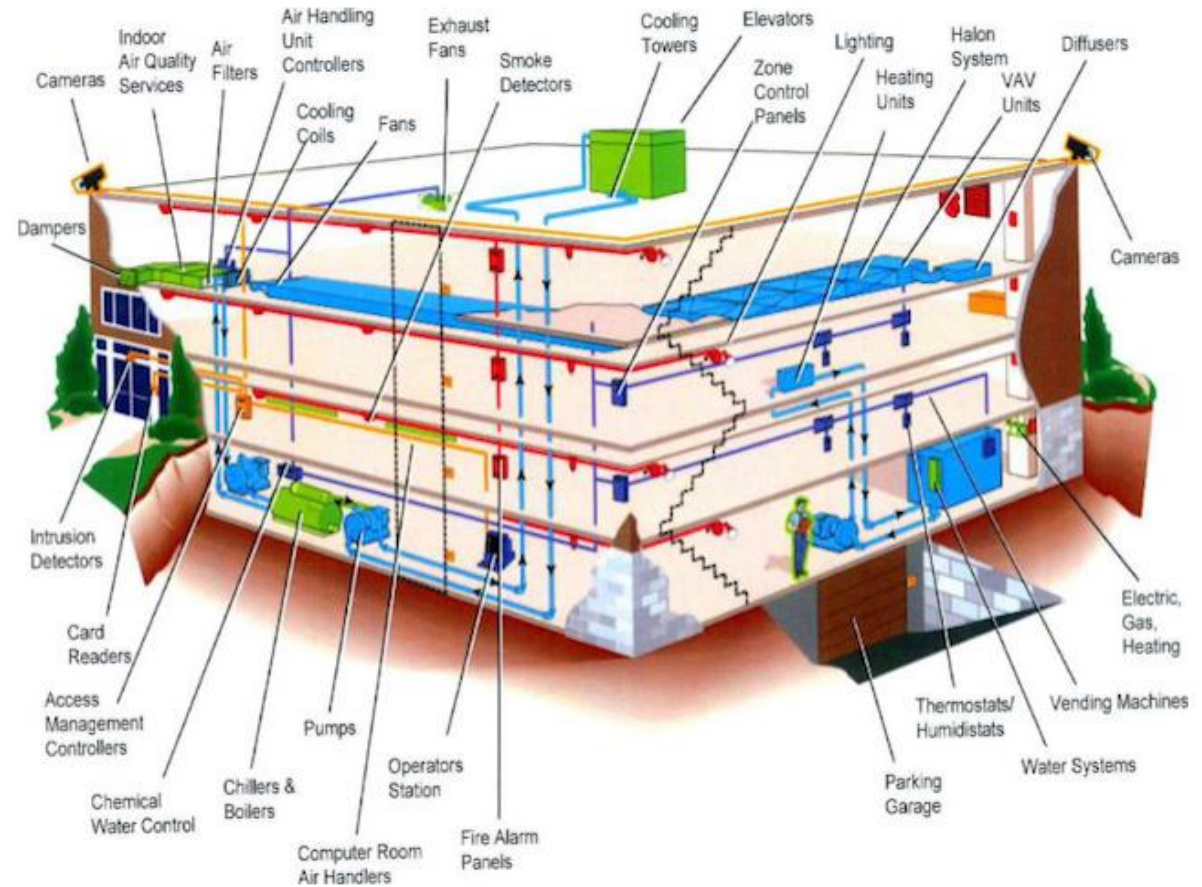
IDC's top IOT Use Cases Are Addressed by SAS Quality Analytic Suite



Source: IDC Worldwide IoT Spending Guide

# Smart Cities Viewpoint

- **Smart Building**
- **Smart Energy**
- **Smart Transportation**
- **Smart Water**
- **Smart Waste**



3 600 000 m2

6 000 workers

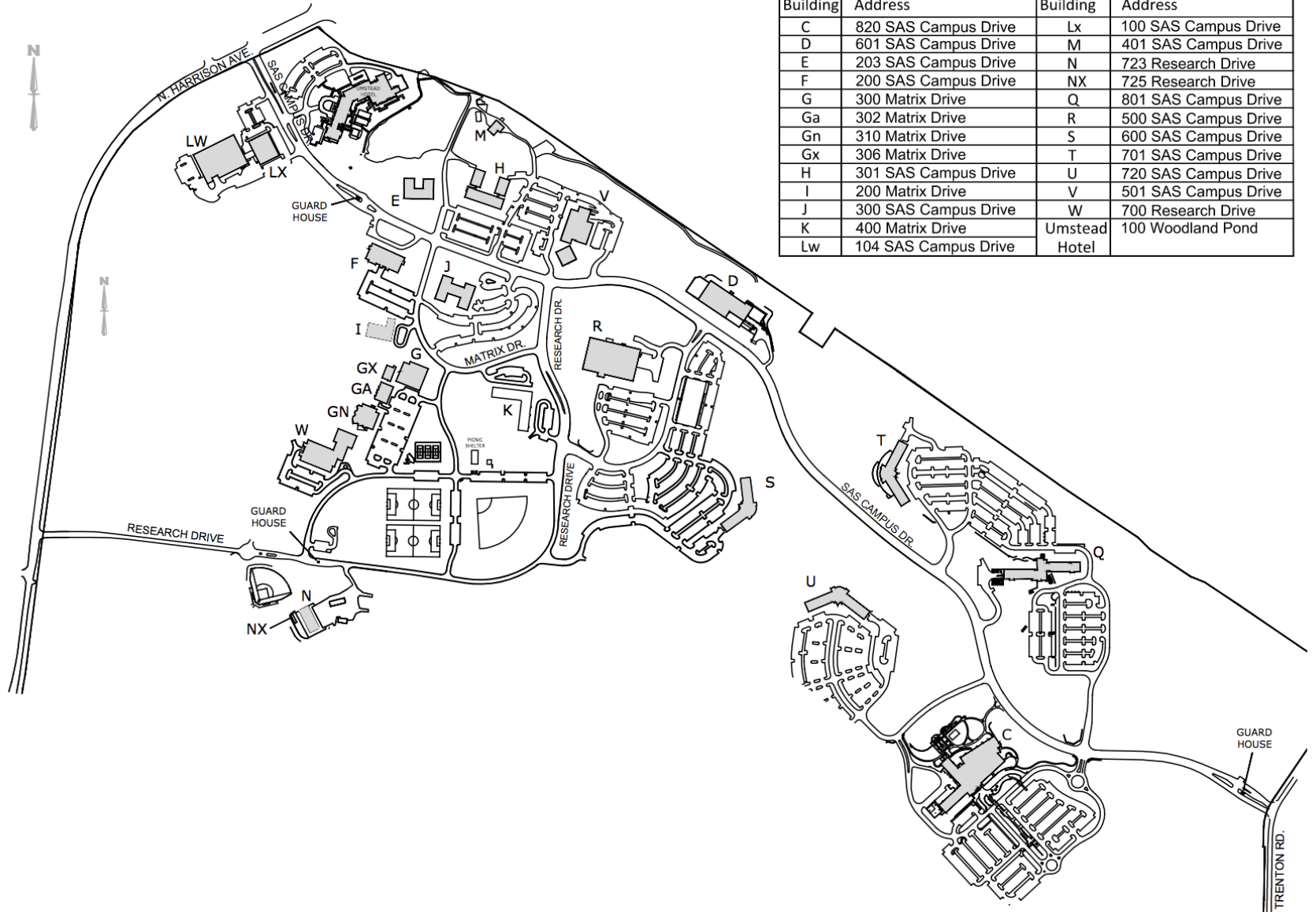
**24 Buildings:**

- Offices
- Restaurants & Coffee
- Hotel & SPA
- Swimming pool
- Sport center
- Hospital
- Pharmacy
- Facilities
- Kindergarten
- Children House
- Academy
- Film studio
- Library
- Datacenter
- Mail office
- Farm
- Distribution center
- Solar farms - 2.2 MWatt
- Utility buildings
- Outdoor sport camp
- 40+ EV charging stations

...

# Campus Map

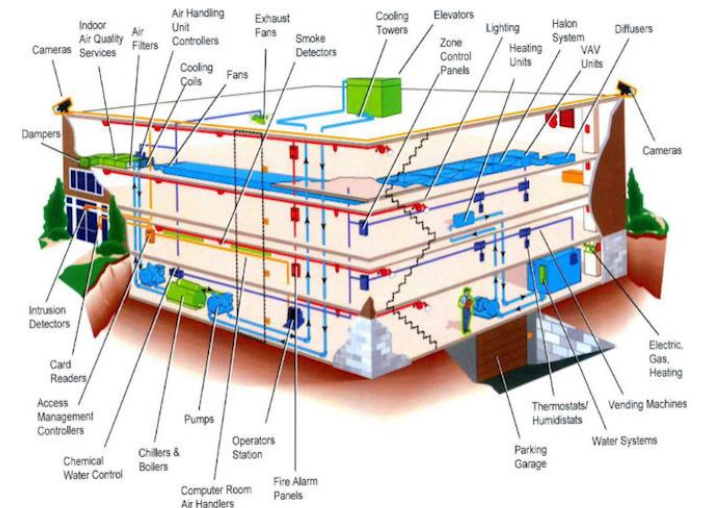
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and SAS Americas  
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Cary, NC 27513 USA  
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Fax:(919) 677-4444



Building	Address	Building	Address
C	820 SAS Campus Drive	Lx	100 SAS Campus Drive
D	601 SAS Campus Drive	M	401 SAS Campus Drive
E	203 SAS Campus Drive	N	723 Research Drive
F	200 SAS Campus Drive	NX	725 Research Drive
G	300 Matrix Drive	Q	801 SAS Campus Drive
Ga	302 Matrix Drive	R	500 SAS Campus Drive
Gn	310 Matrix Drive	S	600 SAS Campus Drive
Gx	306 Matrix Drive	T	701 SAS Campus Drive
H	301 SAS Campus Drive	U	720 SAS Campus Drive
I	200 Matrix Drive	V	501 SAS Campus Drive
J	300 SAS Campus Drive	W	700 Research Drive
K	400 Matrix Drive	Umstead Hotel	100 Woodland Pond
Lw	104 SAS Campus Drive		

## SAS Campus Project

- Goals: Improve energy efficiency and optimize predictive maintenance
- Focus:
  - Data, data, and more data
  - Monitor energy use in real-time – individual systems and aggregate
  - Alerts for potential energy savings based on models
  - Forecast peak usage patterns to help reduce cost
  - Model ‘normal’ functioning of systems and components
  - **Predict equipment degradation and failure**



# SAS<sup>®</sup> Smart Buildings

## SAS Campus Overview

- Data:
  - Sensors – More than 100,000 measurements per minute
  - Weather – Temperature, humidity, cloud cover, etc.
- Buildings (24)
  - Switchboards
  - Chillers
  - Boilers
  - Heat recovery units
  - Air handlers
  - Fan-powered boxes
  - **And more ...**

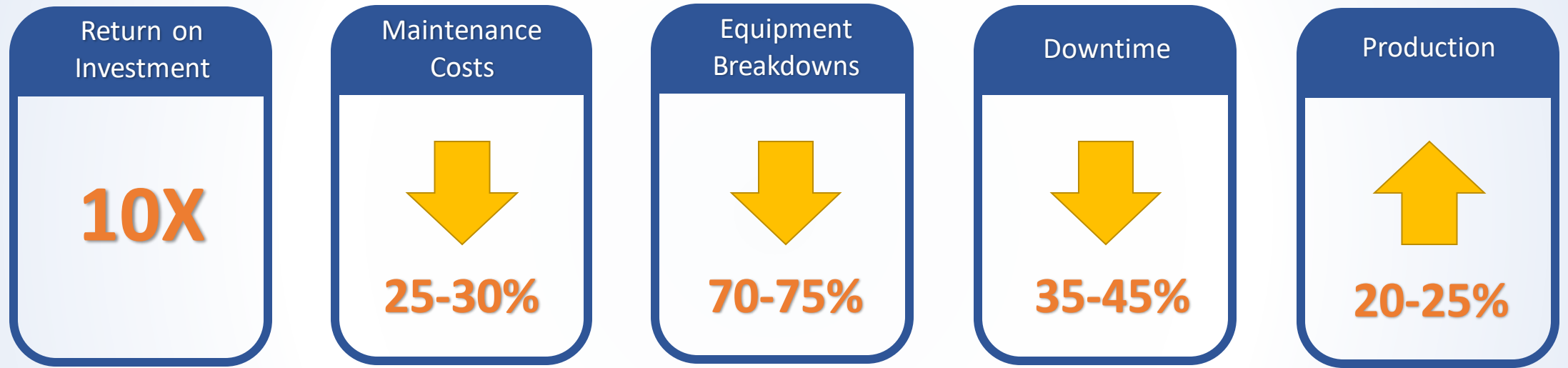


## Scope

- 6 Modeling Areas; 35+ models
  - Energy – Building switchboards
  - Chillers – Pumps, cooling tower, energy, etc.
  - Boilers – Pumps, energy, etc.
  - Multi-Zone Air Handler – Fan speed, damper position, energy, etc.
  - Single-Zone Air Handler – Fan speed, energy, etc.
  - Heat Recovery Unit – Fan speed, etc.
- Primary Use Cases
  - Energy consumption (change from baseline analysis)
  - Alerts based on analytic modeling
  - Explore systems/variables impacting performance
  - Predictive asset maintenance



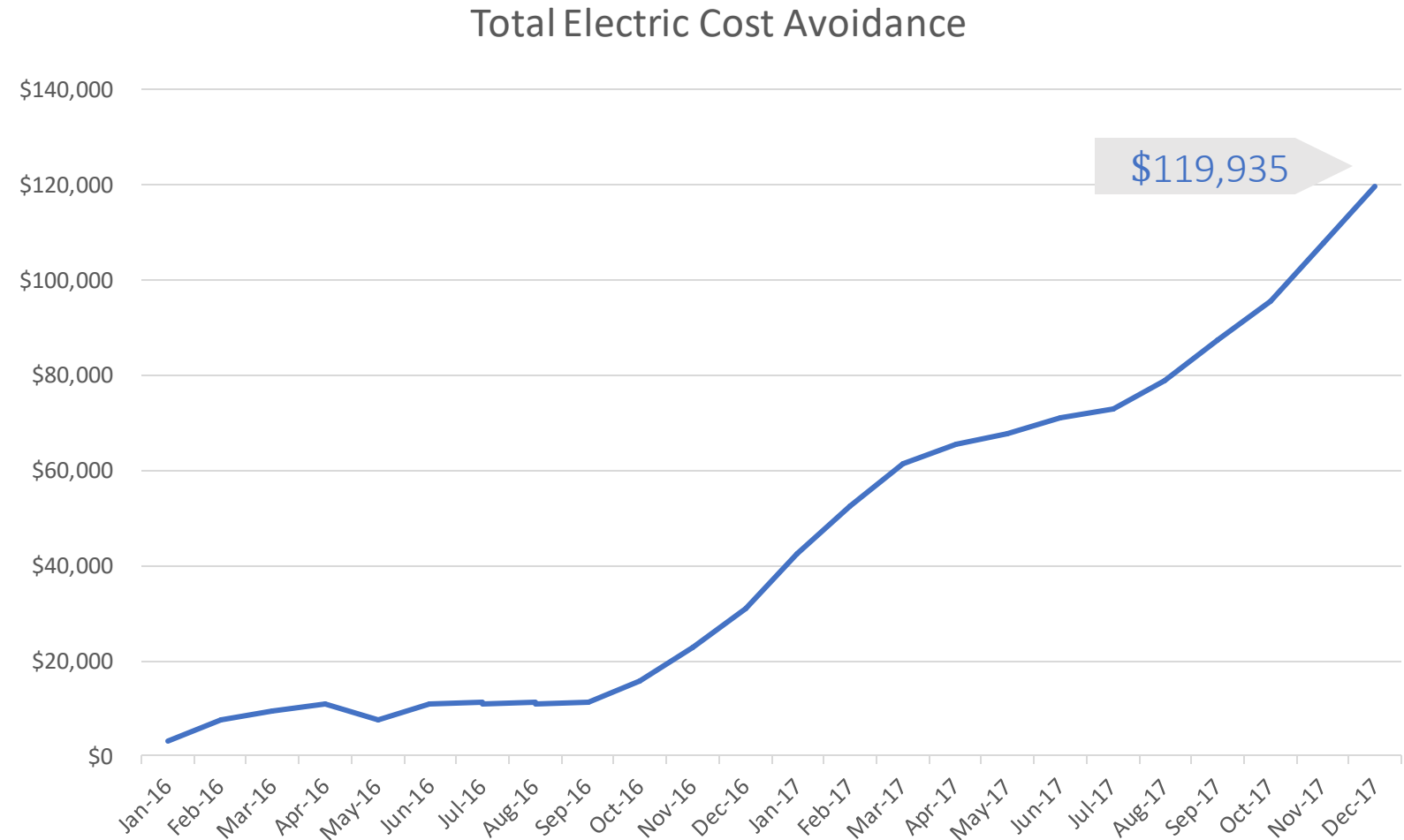
# Value – potential savings



*\*Source: Operations and Maintenance Best Practices Guide. US Department of Energy*

# Results - Electric Cost Avoidance

- Jan 2016 – Sept 2016 monitoring and data collection
- Oct 2016 – Dec 2017 first full year after the optimization and analytic monitoring
- \$100k+ (14% reduction) cost savings
- Maintenance cost reduction / Ecosystem impact – 50% unplanned, 25% in planned





THANK YOU