

Building Intelligence

Harnessing the Power
of IoT & Machine Learning

2022 ANGAN - BEE



75F

World's **fastest router**
(1 Tbps)

a.k.a. world's most
expensive
garage heater







The **EDGE**

Most advanced
building in the world

More than 40,000 sensors



Building controls are like **Lego blocks**

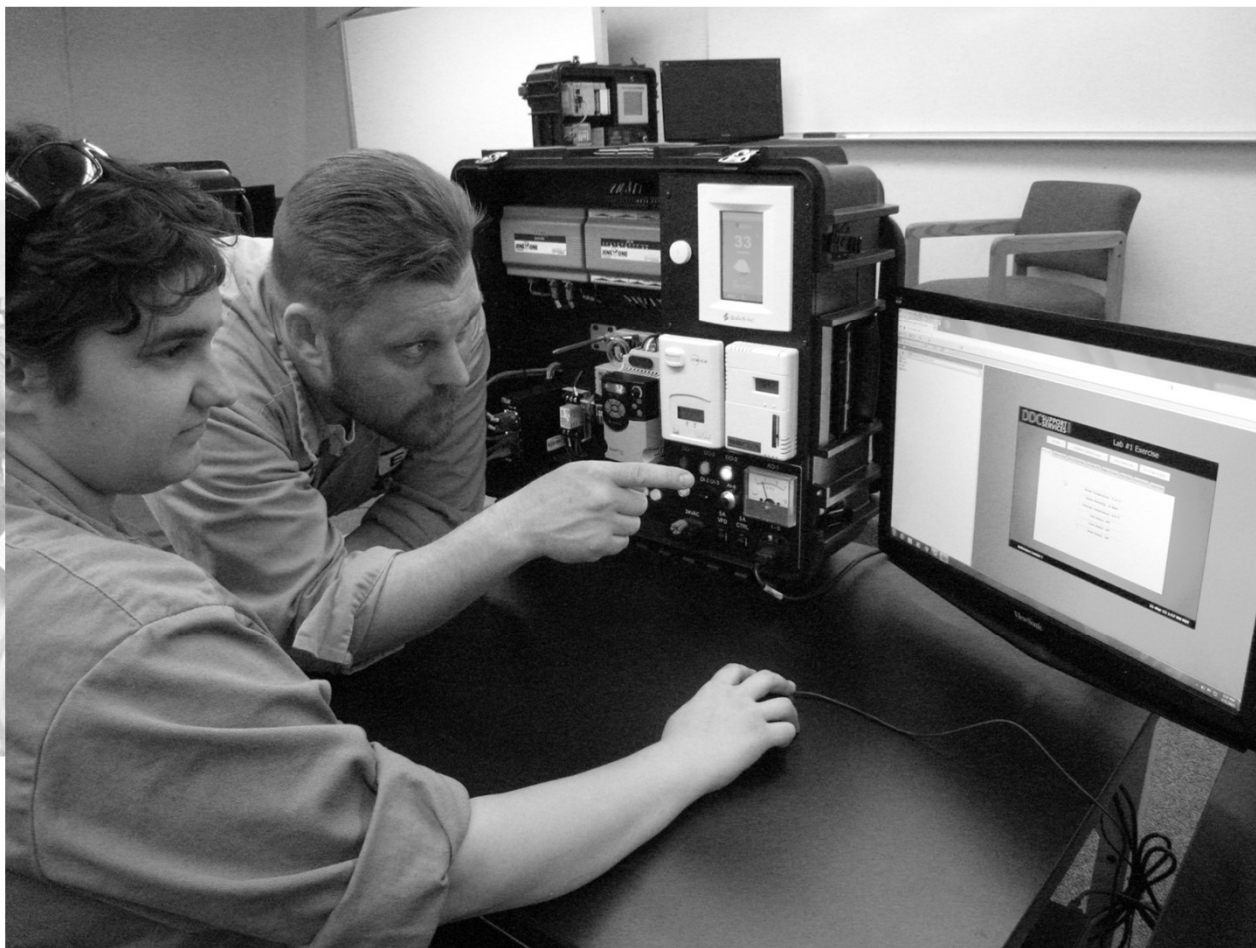




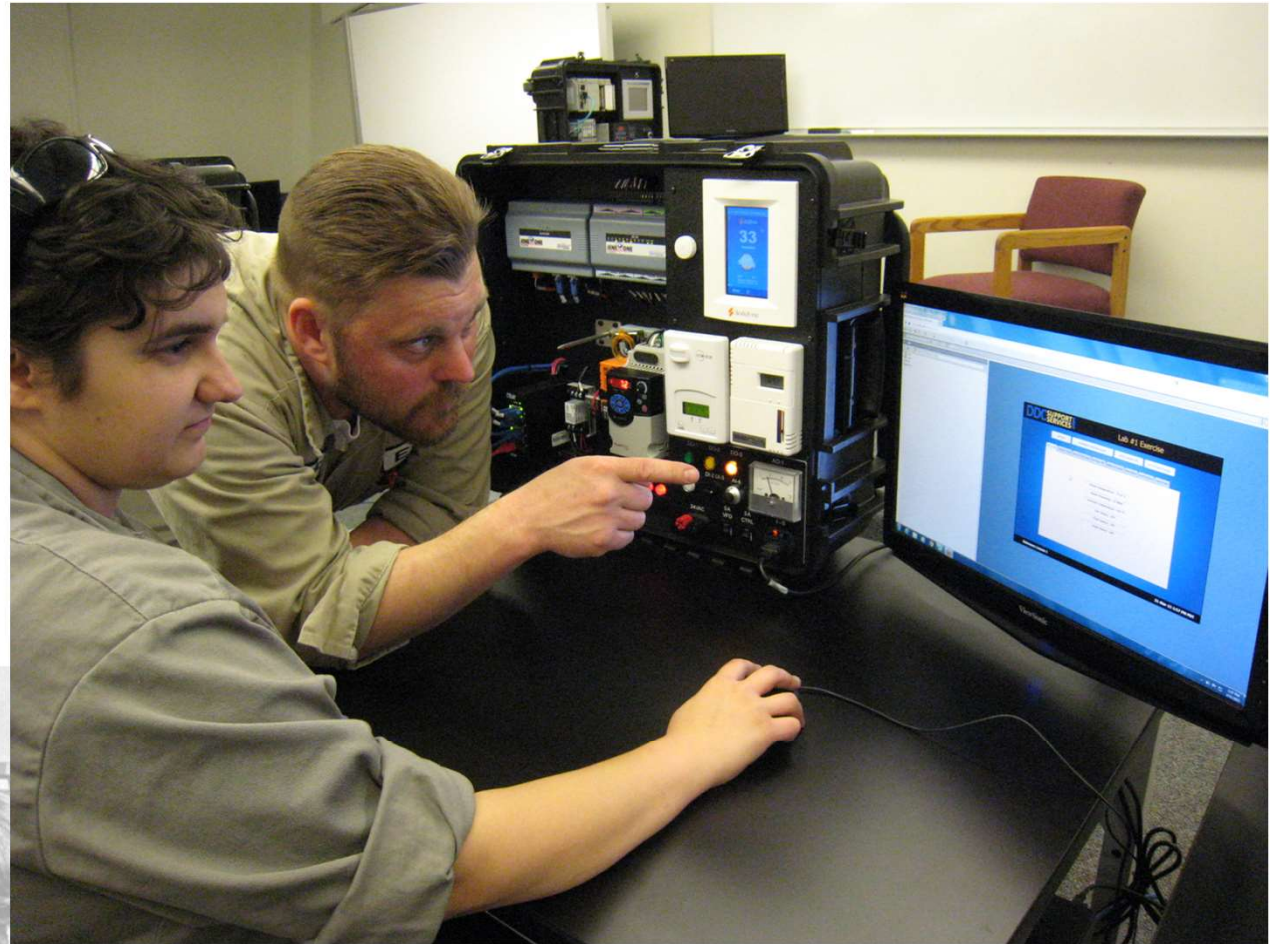
It takes a **Lego master** to make them into something useful..

The **Early Days** of the Computer Revolution





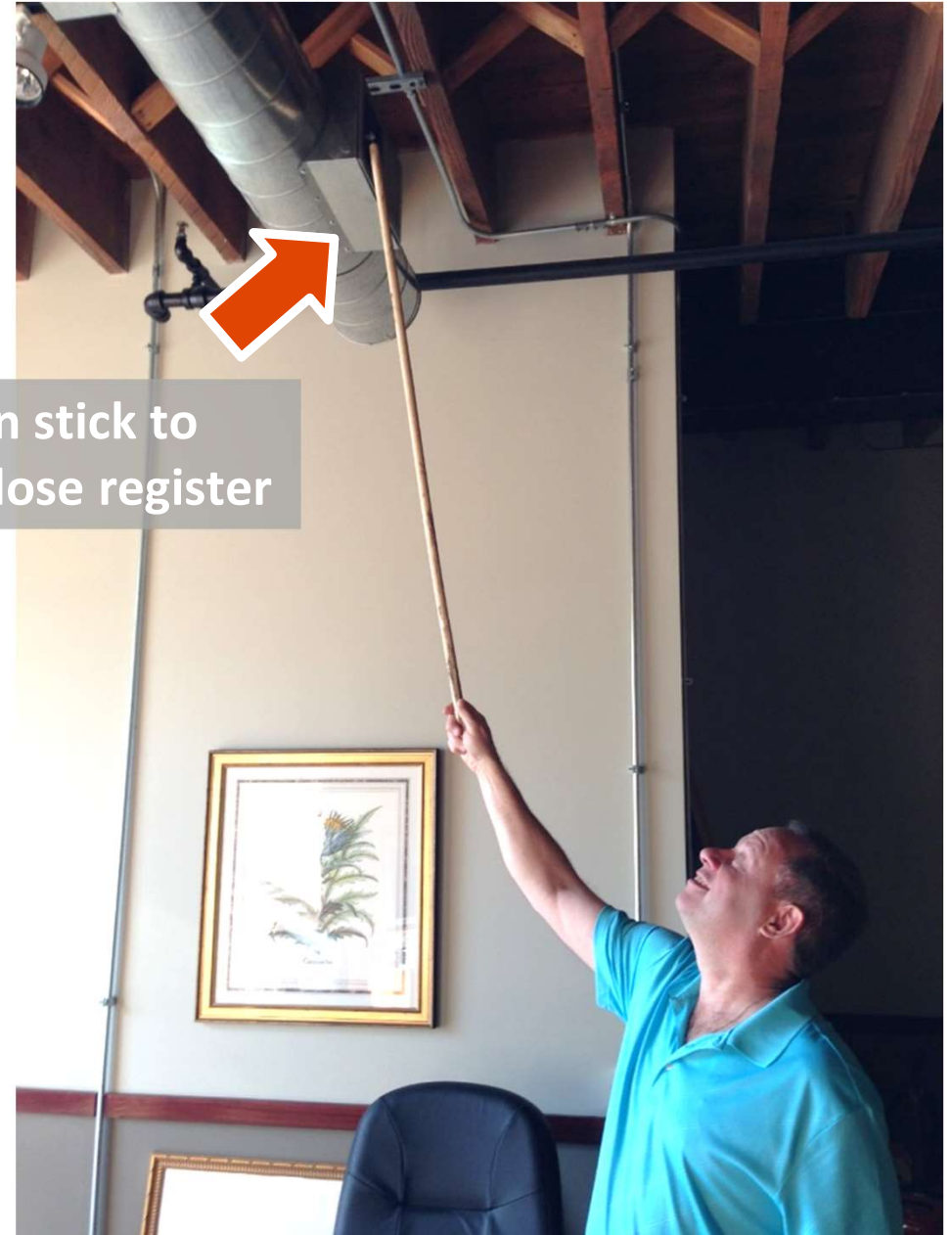
Relived **Even Today** in Building Automation



..most facility managers
don't know if the BMS
is working correctly

...or **how to use it**

Hook on stick to
open/close register



The Opportunity to **Disrupt**

be radical.

INNOVATION

Doing the **same** things, **better**



DISRUPTION

Doing **new** things

Doing **new** things, that make the old things **obsolete**.

Source: [The Disruptive Design Method](#) by [Leyla Acaroglu](#) / Photo: [Oliver Niblett](#) on [Unsplash](#)

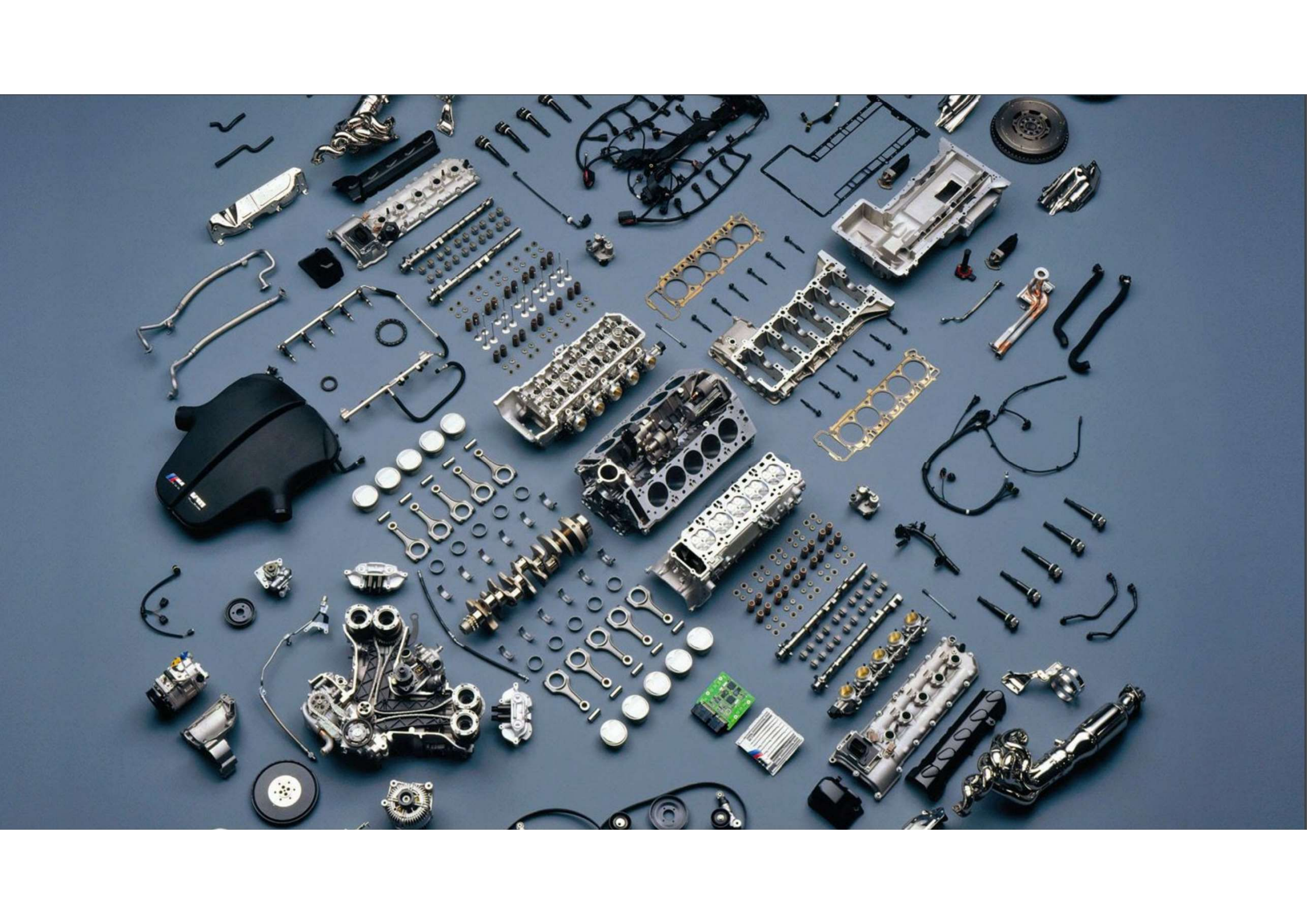


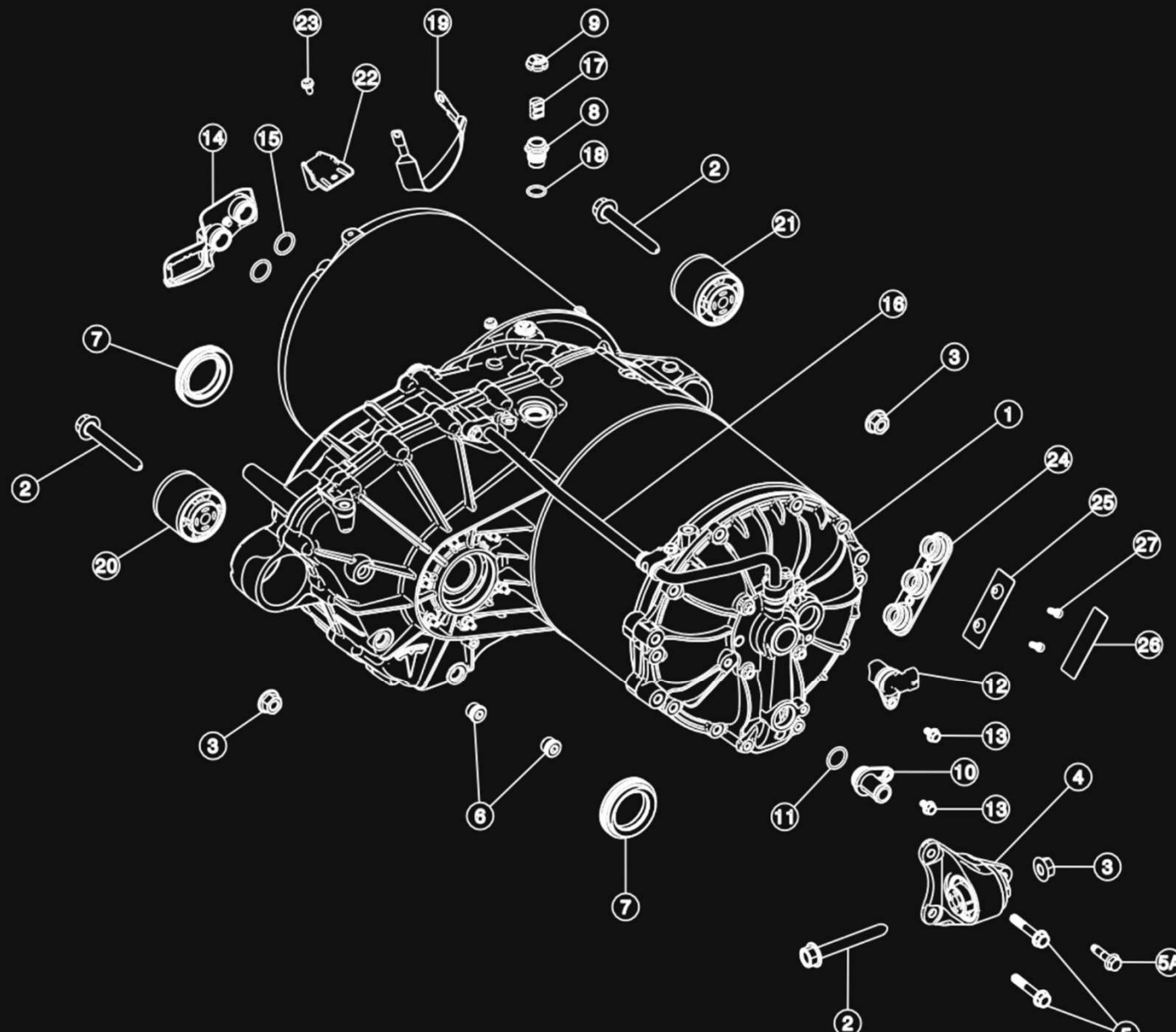


be radical.



Disruption is never **one** feature.







Your existing skills and processes
are **no longer relevant.**

mobilesolutions-ea.co.uk

MOBILE Solutions

Mobile Phone Repair Centre

Mobile
Repair
Centre

Eye Candy

PHONE
SOCKS
ONLY: £2.50

REWARD OR
WIRELESS
CREDIT/DEBIT CARD
FRAUD:
ONLY £1.99 FOR 3

EXCLUSIVE TO EYE CANDY
MORGAN TAYLOR







Disruption almost always reaches
a tipping point at the **go to market.**





Integrated sensors
measure all the
parameters required for a
Well building



75F® Smart Node™

Controls Equipment

- Dampers
- VAV
- WSHP
- Fan Coil
- Unit heaters
- Mixing valves
- Pumps
- ... and more



75F® Central Control Unit™

75F® Sensors™

**Software Defined
Hardware** adapts and
controls a variety of
equipment







75F® Smart Node™

- Controls:
- Dampers
 - VAV
 - WSHP
 - Fan coils
 - Unit heaters
 - Mixing valves
 - Pumps
 - ... and more

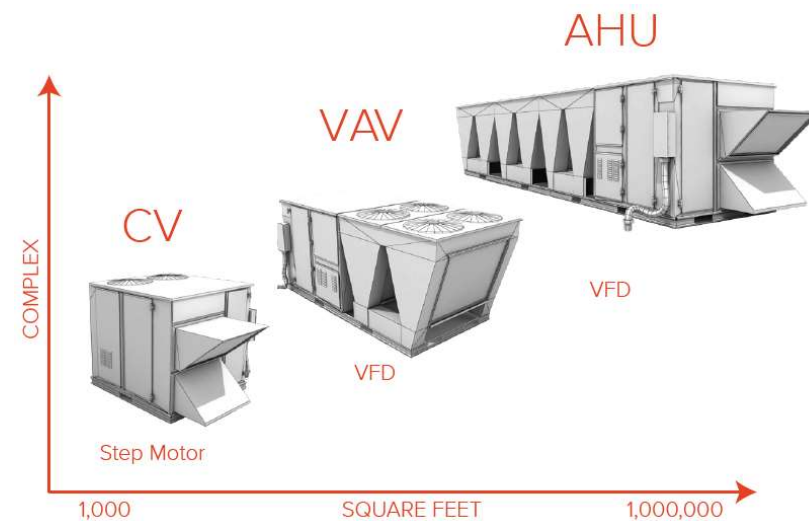


75F® Central Control Unit™

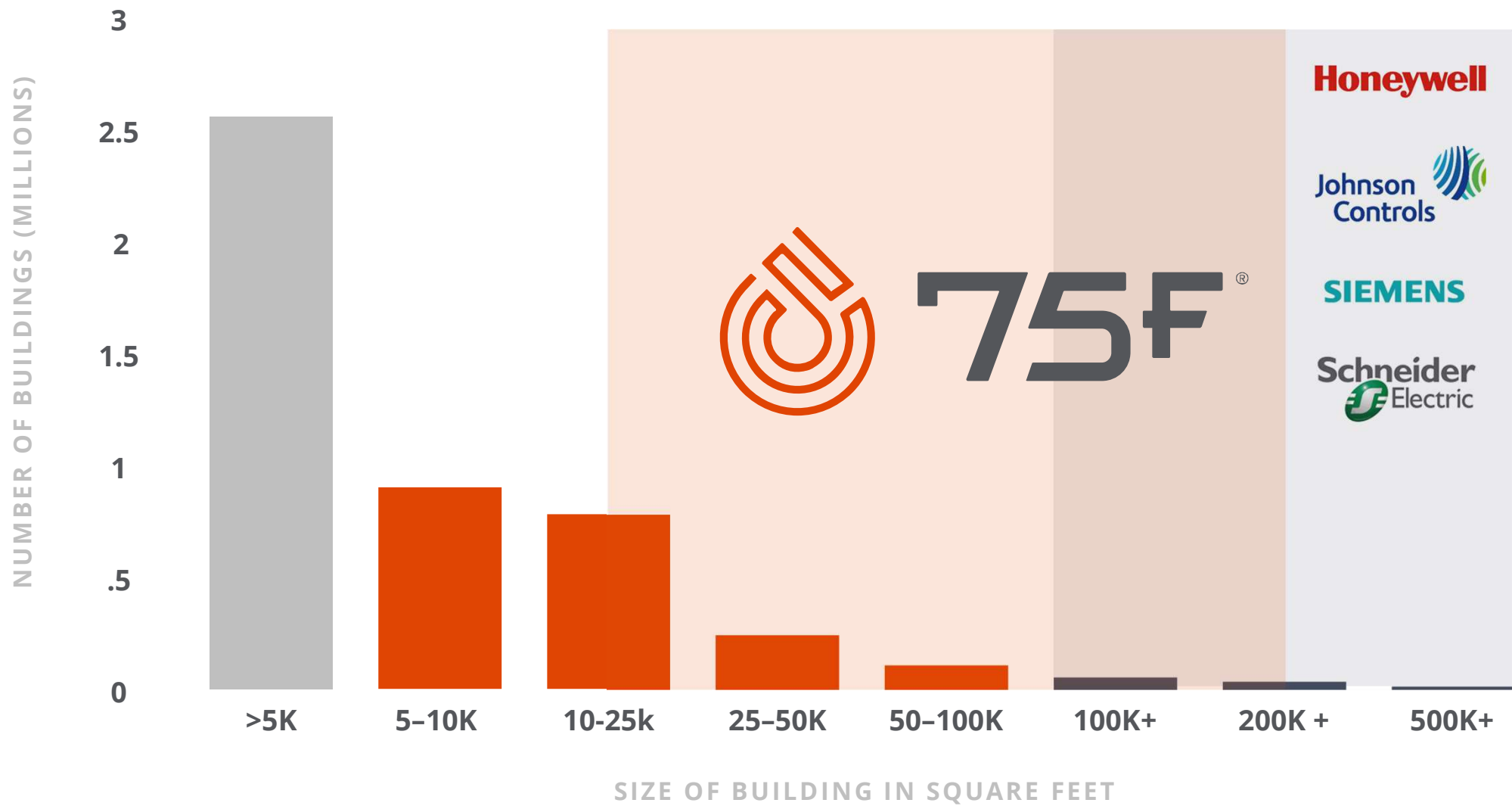
75F® Sensors™

- Temperature
- Humidity
- CO₂
- VoC
- Occupancy
- Light,
- Sound
- Pressure
- ...and more

**Complete,
Turnkey,
out-of-the-box
solution**



Scales from 10K to 1M+ sq. ft.



Machine Learning

User App

Facilisight



Applied IoT

75F® Smart Node™

Controls:
• Dampers
• VAV
• WSHP
• Fan coils
• Unit heaters
• Mixing valves
• Pumps
... and more

75F® Central Control Unit™

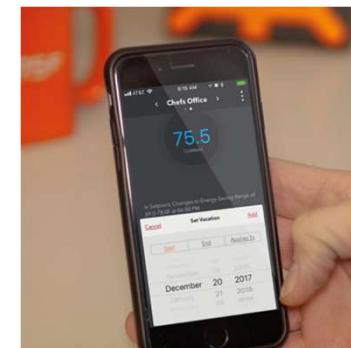
75F® Sensors™

• Temperature
• Humidity
• CO₂
• VoC
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• Light,
• Sound
• Pressure
• ...and more



Operational Efficiency

- Portfolio Energy Analysis
- Space management
- Energy Savings
- Equipment Lifecycle
- ...



Occupant Experience

- Temperature
- Indoor Air Quality
- Lighting
- ..

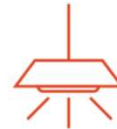
75F is EDGE out of the Box - Complete Building Intelligence



HVAC CONTROL
& AIR QUALITY



LIGHTING



ENERGY
MANAGEMENT



WHY? ▾

SOLUTIONS ▾

MARKETS ▾

RESULTS ▾

BLOG

CONTACT

LOGIN ▾

HOW IT WORKS



Products

- 75F® Facilisight®
- 75F® Central Control Unit™
- 75F® Smart Node™
- 75F® Smart Stat™
- 75F® Sensors™
- 75F® Occupant App™

Applications

- Dynamic Airflow Balancing
- Outside Air Optimization
- Indoor Air Quality
- Smart VAV With Reheat
- Hydronic Controls
- Dynamic Chilled Water Balancing
- Advanced Lighting
- Refrigeration Monitoring
- Portfolio Energy Manager
- Automated Demand Response



**Our buildings
are killing
our planet.**



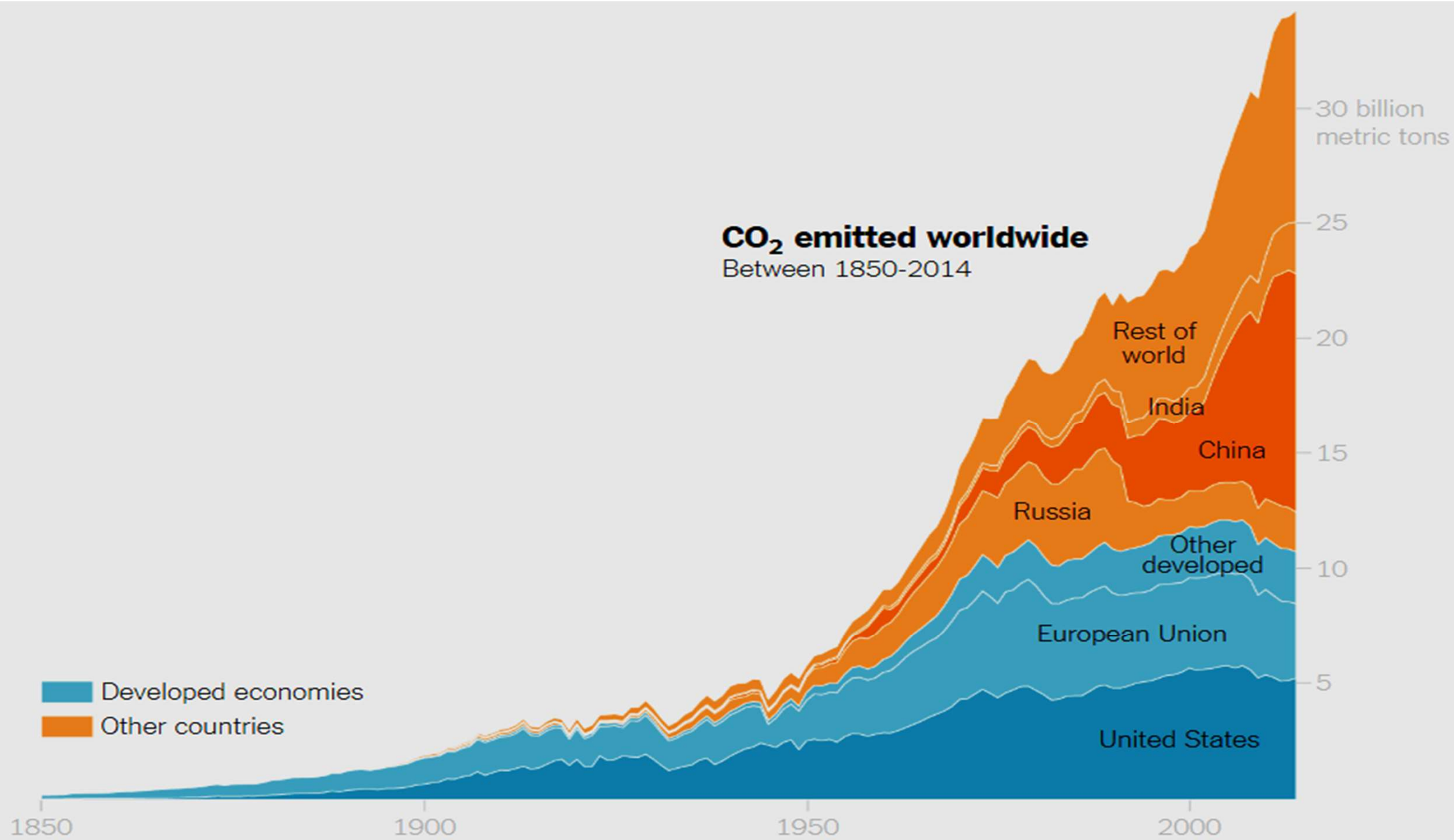
**Commercial Buildings are the 4th
largest emitter of greenhouse gases.**

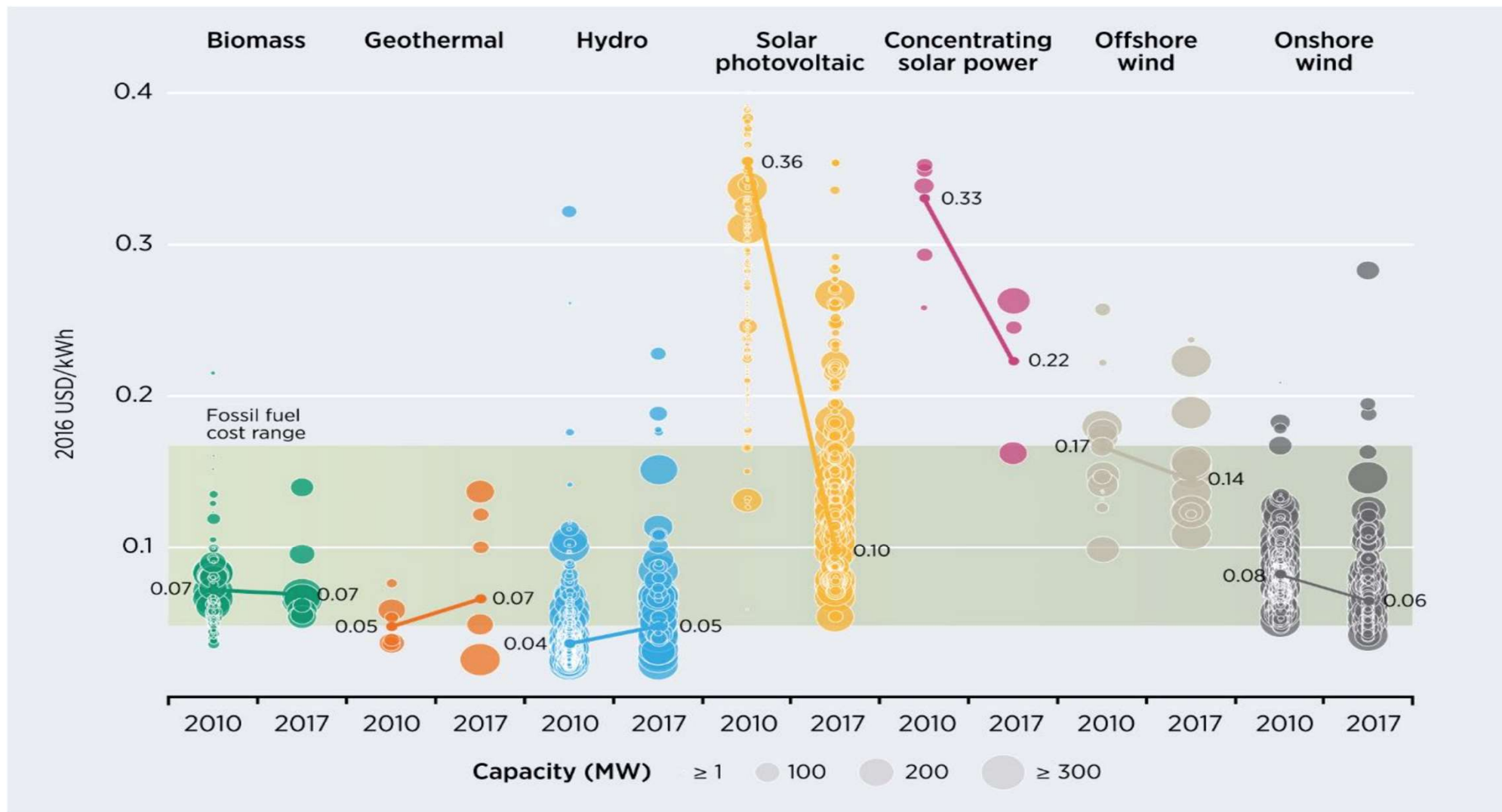
**A 2017 study showed that 67% of greenhouse gases
in NYC came from commercial buildings, with over a
third from HVAC.**

SOURCE: http://www.dec.ny.gov/docs/administration_pdf/nycghg.pdf

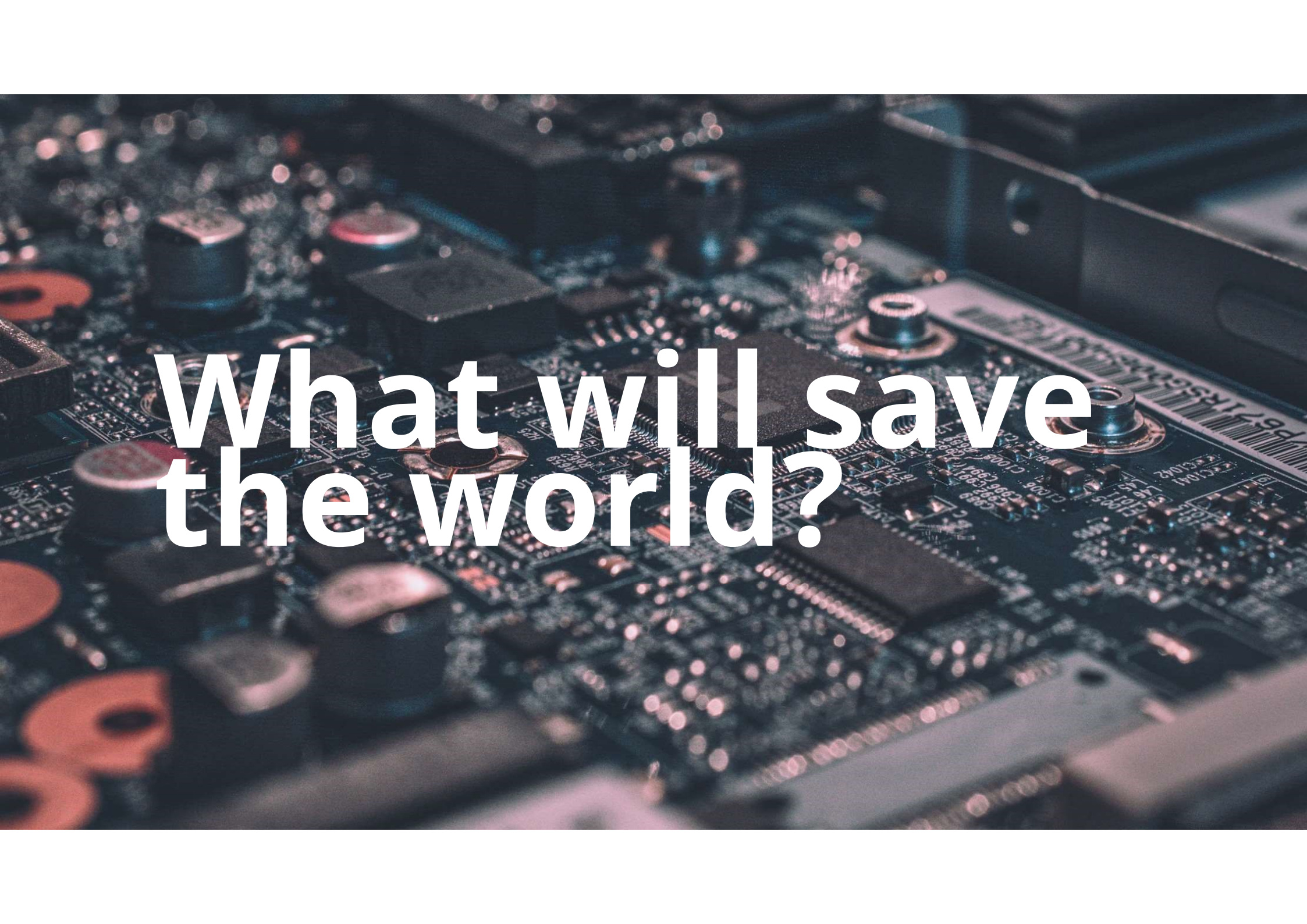
CO₂ emitted worldwide

Between 1850-2014

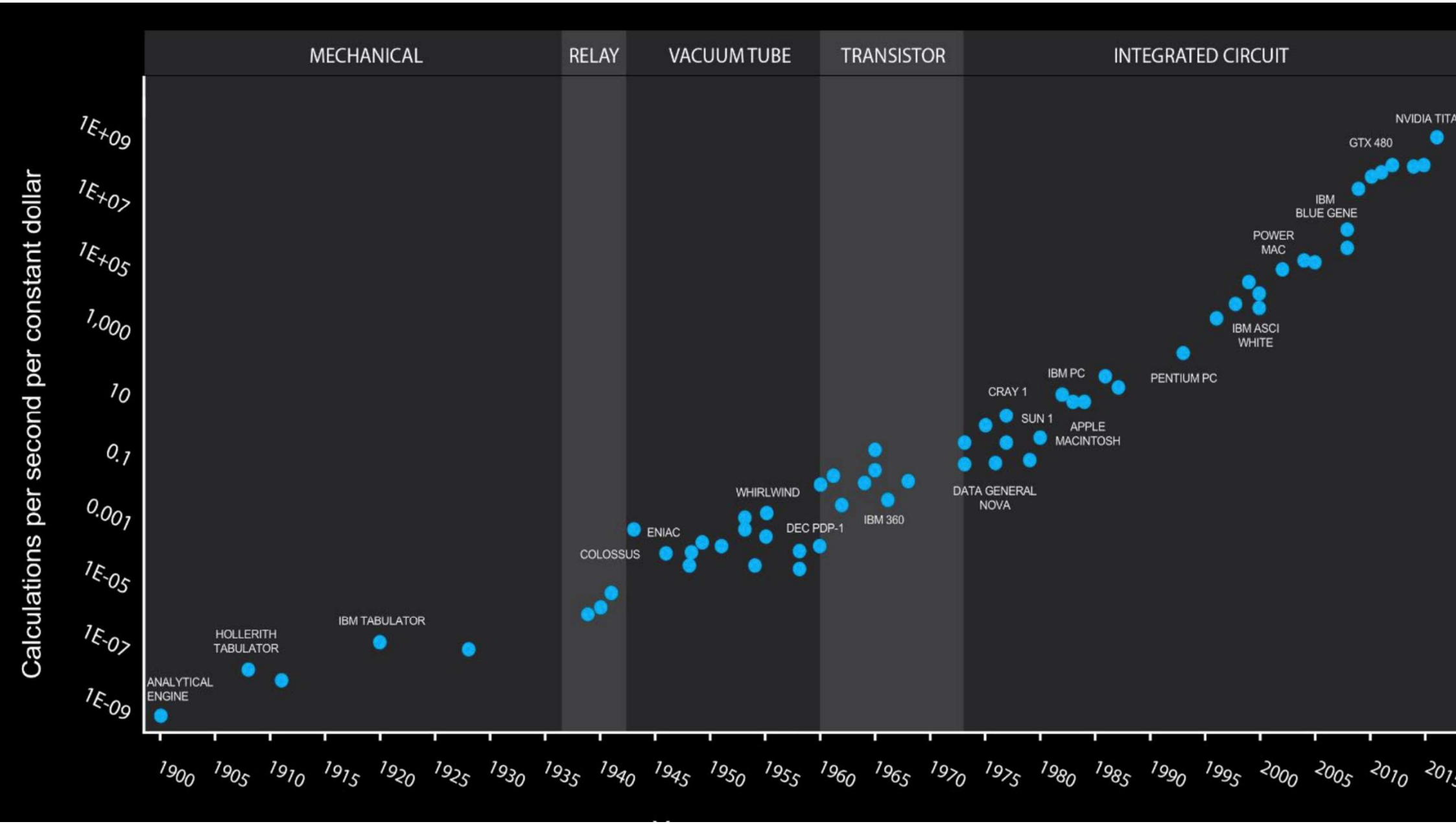


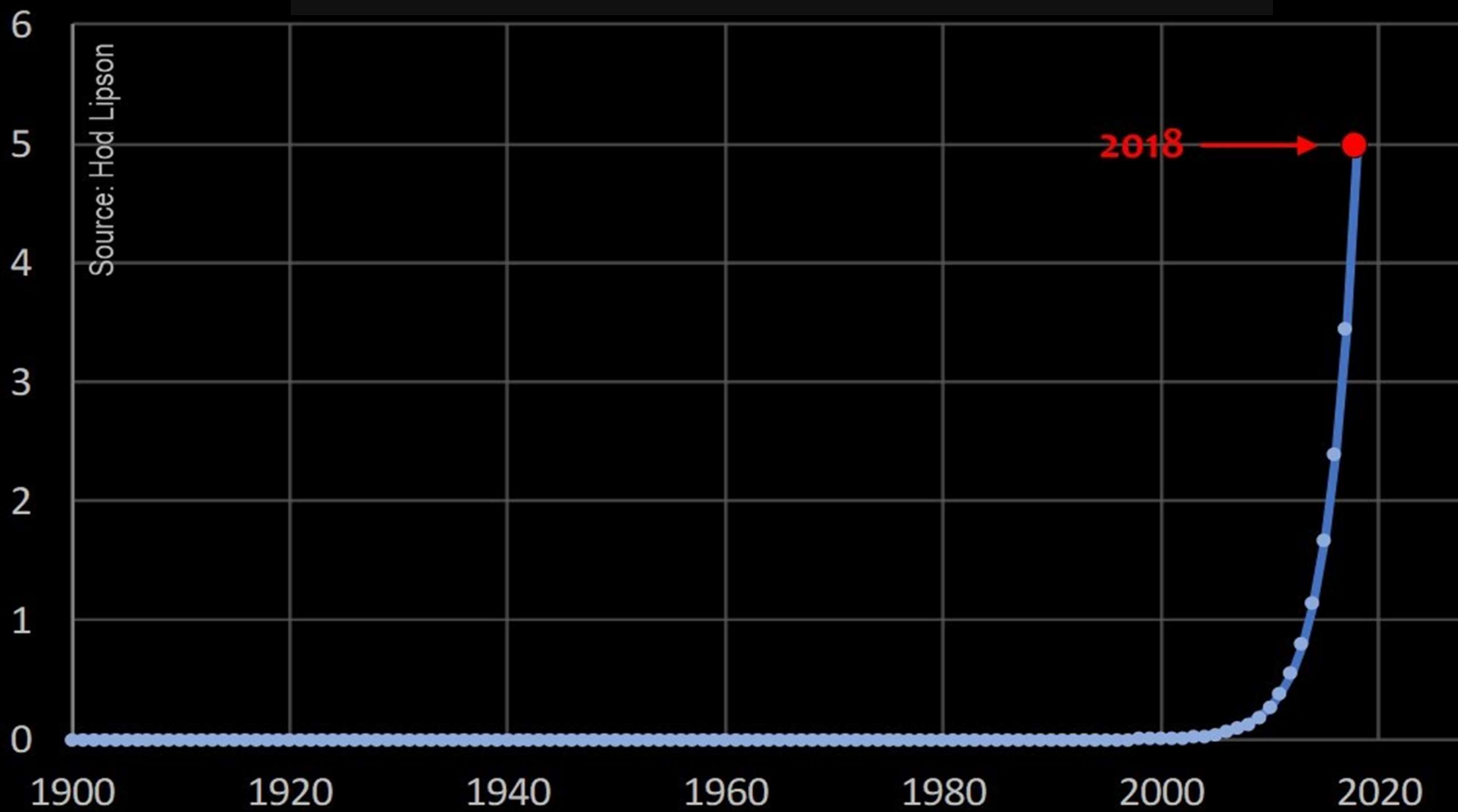


Global levelized cost of electricity from renewables 2010-2017



**What will save
the world?**





**75F uses smart sensors and controls
to make commercial buildings
more efficient and comfortable
than ever before.**

The Problems we address



70% of energy consumed in a commercial building is for **HVAC** and **Lighting** of which **50%** is wasted due to inefficient use



Thermal, lighting, air quality and varied Individual occupant's preferences leads to employee dissatisfaction and loss of productivity by **15-20%**.



Excessive dependence on manual control for building O&M leads to errors, inefficient operations and is labor intensive.



Inability to integrate equipment across multiple protocols and share on open platform

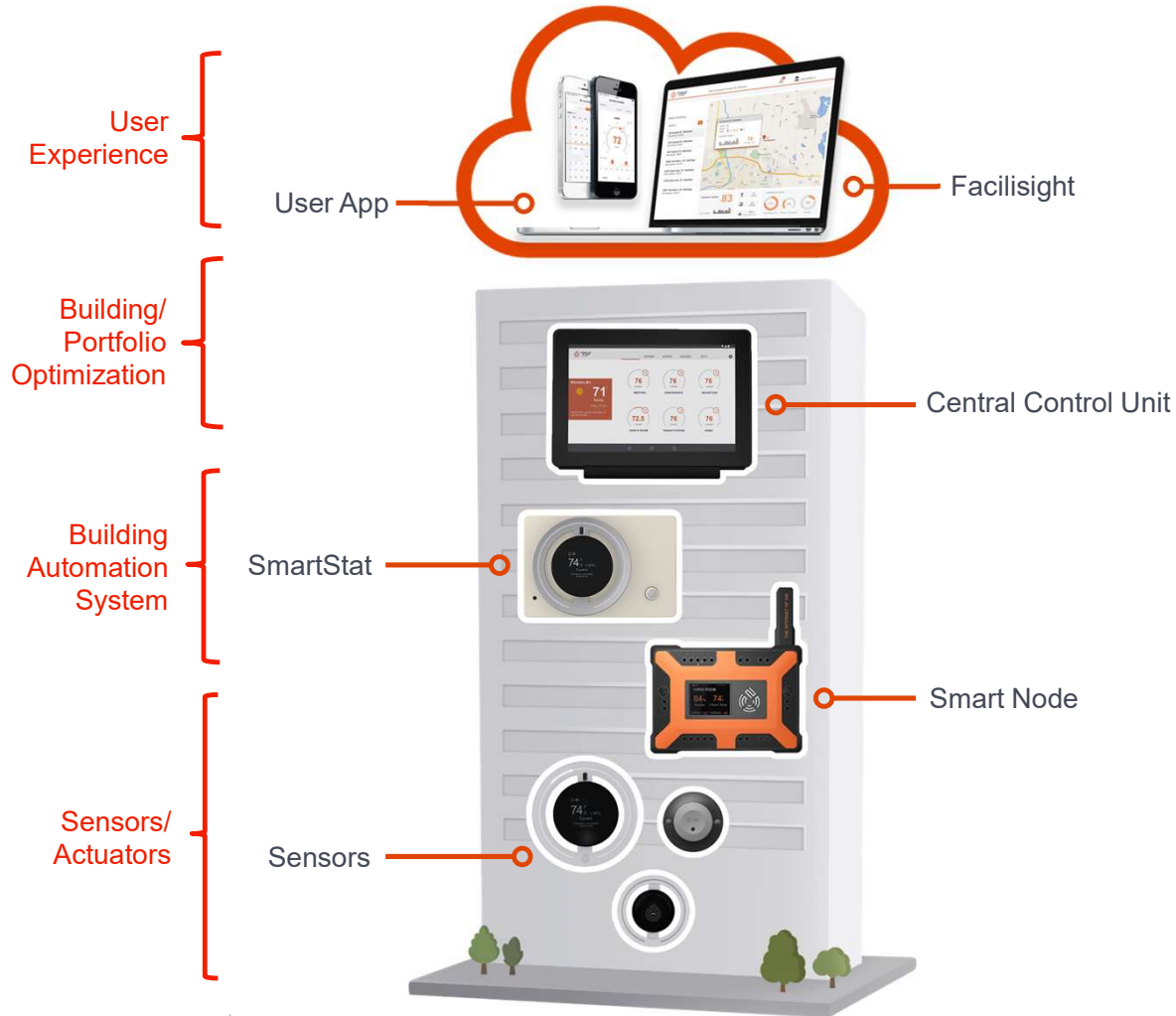


With existing solutions, inability to quickly and economically retrofit the latest technologies in older buildings



Lack of actionable trends and insights on key building parameters accessible in real-time, on smart phones/ tablets or laptops from anywhere in the world.

75F is uniquely positioned to address these problems



75F saves up to 50% on energy while improving Occupant Experience by up to 10%

- By deploying a vertically integrated suite of sensors, equipment controllers, software, building intelligence analytics and user interface
- Using Applied AI and Machine Learning to deliver predictive, proactive Building Controls
- Harnessing the power of IoT and Cloud Computing to predict, monitor and proactively manage various elements in a commercial building

Traditional Building Management Hierarchy

Supervisor of Supervisor

- Monitor across buildings
- Typically use BACnet over VPN

Supervisor / Management Layer

- Local database storage
- Server machine
- Communication over ethernet

Global Automation

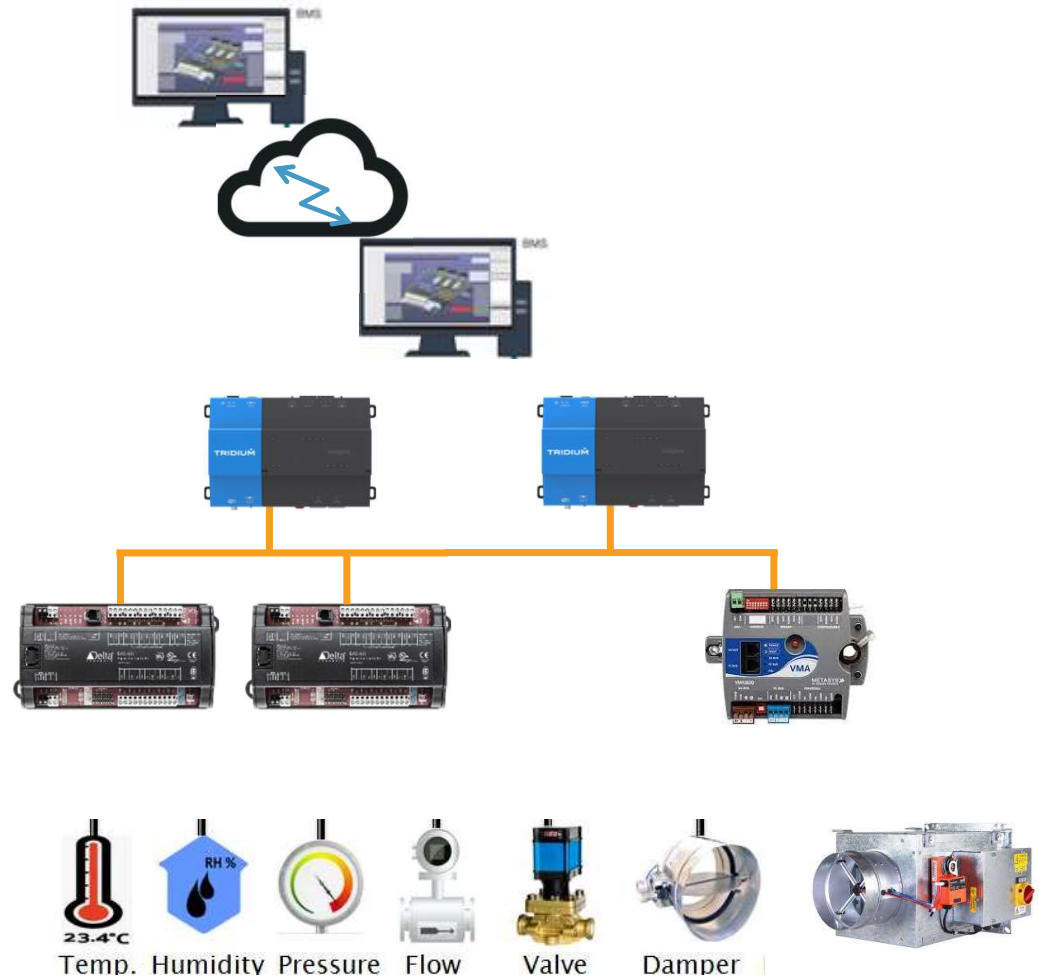
- Sequences across devices
- Communication over ethernet/ rarely twisted pair

Field automation

- Sequences for terminal units or rooms
- Specific to a function
- Communication over twisted/ rarely ethernet

Field devices

- Sensors
- Actuators
- Terminal units



Native IOT Building Management System

Supervisor of Supervisor

- Monitor across buildings
- Cloud native

Supervisor / Global Automation

- All sequences are run globally
- Communication over wireless network

Field automation

- Sequences run locally only in case of failure
- Communication over wireless upstream. Hard wired downstream

Field devices

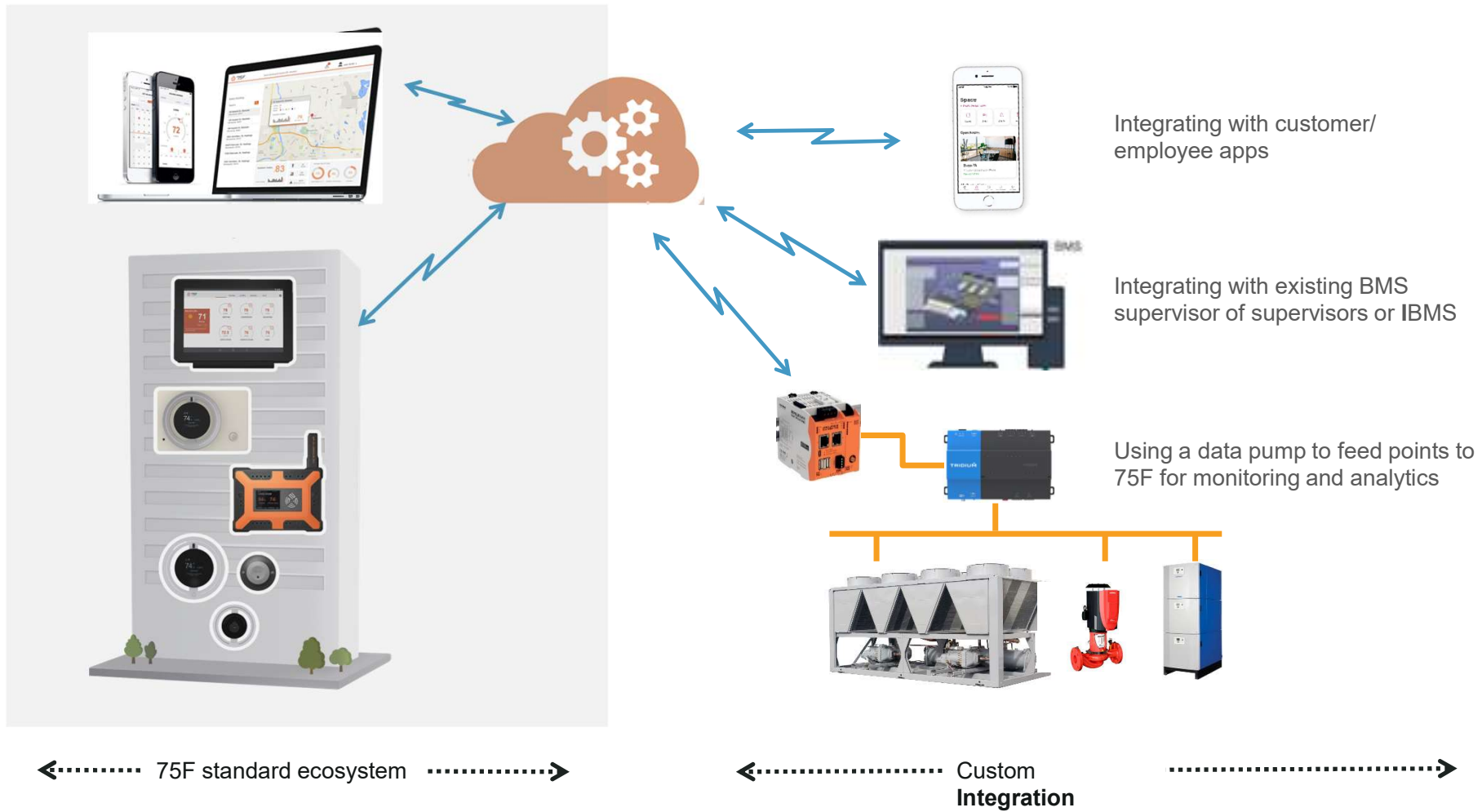
- Sensors
- Actuators
- Terminal units



Native IOT BMS – Ticking every box

	Traditional BMS	Cloud Supervisor	IOT Sensor Overlay	Native IOT BMS
Digital twin	X	X	X	X
Energy Efficient algorithms	X	X	X	X
Over the air upgrades	X	X	X	X
Historical Trend Storage	X	X	X	X
Sensor Data Integrity/richness	X	X	X	X
ML Optimization	X	X	X	X

75F External API Access



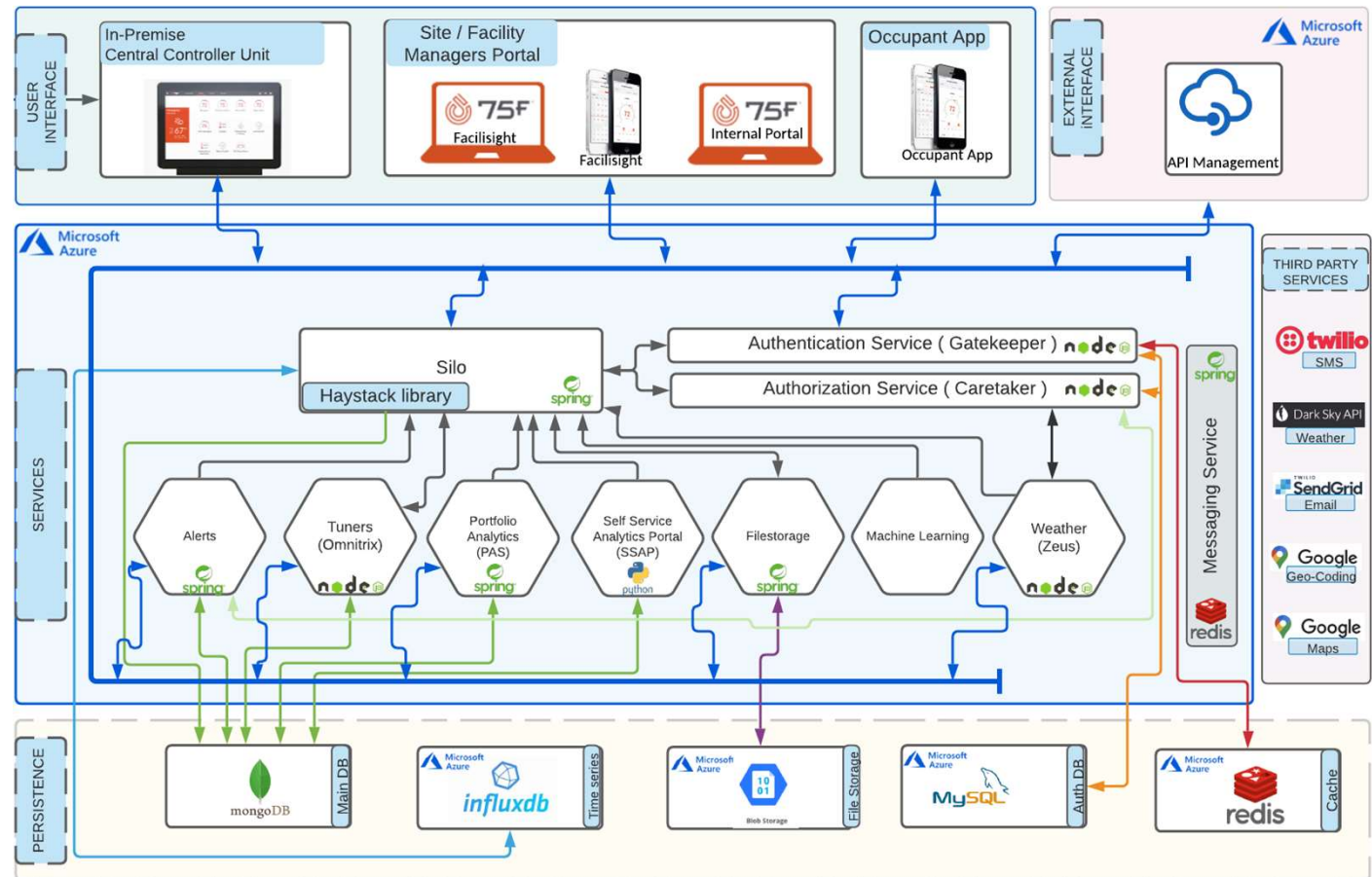
75F Co-hosted Cloud Services



Remote Access



Cloud services
Co-located
in customer
datacenter



75F Product Tree

Hardware

Gateway Controllers

- Central Control Unit

Nodes

- SmartNode
- HelioNode
- Occupancy and Temperature Node

Stats

- SmartStat
- HyperStat
- HyperStat+

Sensors

- Wall Sensor
- Ceiling Sensor
- Duct Sensor
- Flush Sensor
- HyperSense
- Pressure Sensor
- Local Interface Sensor

Accessories

- Wire Harnesses
- Damper Actuator

Software

Facilisight Portal

- Heatmaps
- Site Explorer
- Portfolio Analytics
- User Management
- Chiller Plant Monitoring
- Global Policy Editor
- Tenant Billing

Apps

- Facilisight App (iOS and Android)
- Occupant App (iOS and Android)

Internal Portal

- Site Explorer+
- Audit Trail
- Building Management
- Energy Configuration
- Alert Management and Insights

Cloud Services

- HayStack Database
- Authentication and Authorization
- Messaging

Services

Support

- Standard (10x5)
- Enhanced (12x7)
- Managed

Design and Implementation

- Standard
- Custom Control Packages
 - Central Chiller / Boiler Plant
 - Water-source Heatpump Plant
 - Plant Expansion
 - Advanced AHU
- Turnkey

Scaled Solutions

Cloud

- External API access
- Dedicated Site Server
- Cohosted Cloud
- Dedicated Cloud Instance
- Co Branded App/Portals

Hardware

- Co Branded Hardware
- Turnkey Integrations

Partner Level

- Prestige
- Reserve
- Select

HVAC CONTROL
& AIR QUALITY



LIGHTING



ENERGY
MANAGEMENT



We're a Bill Gates backed startup building the world's best BMS
and **our average customer today sees 41.8% energy savings.**

Award Winning Technology

Google



RISE
OF THE
REST
ROAD TRIP

MN **CUP**



EUREKA!
INNOVATION
AWARDS



ASSOCHAM
INDIA

MINNESOTA'S
tekNE
AWARDS

MINNEAPOLIS/ST. PAUL BUSINESS JOURNAL
TITANS
OF TECHNOLOGY®



<http://www.75f.io/award-winning-energy-savings>

3D Printing	Artificial Intelligence (AI)	Augmented + Virtual Reality (AR/VR)	Big Data + Analytics	BioTech	Blockchain
Computing	Education	Energy	Environment	FinTech + Cryptocurrency	Food
Internet of Things (IoT)	Marketing	Mobile	Real Estate	Space Tech	Stuff-as-a-Service (aaS)
Top Lists					

Top 100 Most Disruptive
Companies in the World in
2017

FROST & SULLIVAN

**Customer Value
Leadership Award**

The Building Automation

Market
GLOBAL



Tens of Millions of Square feet at Marquee Customers



Tens of Millions of Square feet at Marquee Customers

US Clients



APAC Clients



Over 500 buildings, totaling to 30 million sft under management

75F amongst top 10 global BAS companies in a study by Frost & Sullivan

Company Selection Process



Key Industry Participants Covered in the Analysis

Honeywell

75F

Johnson Controls

Schneider Electric

SIEMENS

azbil

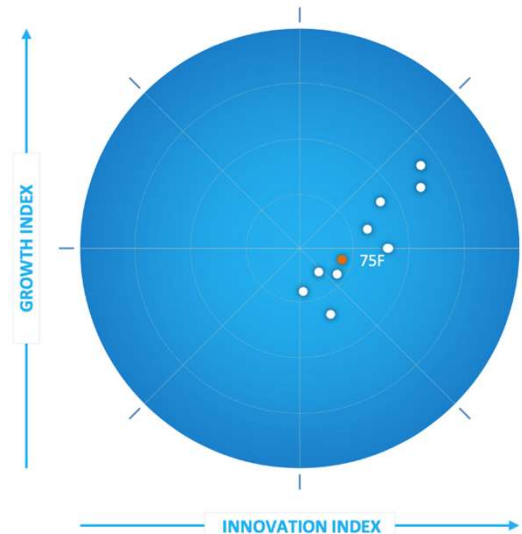
Delta
A Delta Group Company

SAUTER

DISTECH
CONTROLS

Kieback&Peter

Frost Radar™: Global Building Automation Systems Market 2020



In a field of more than 20 Global industry participants, Frost & Sullivan independently plotted the **top 10 companies** in this Frost Radar™ analysis. Parameters assessed in the analysis included:

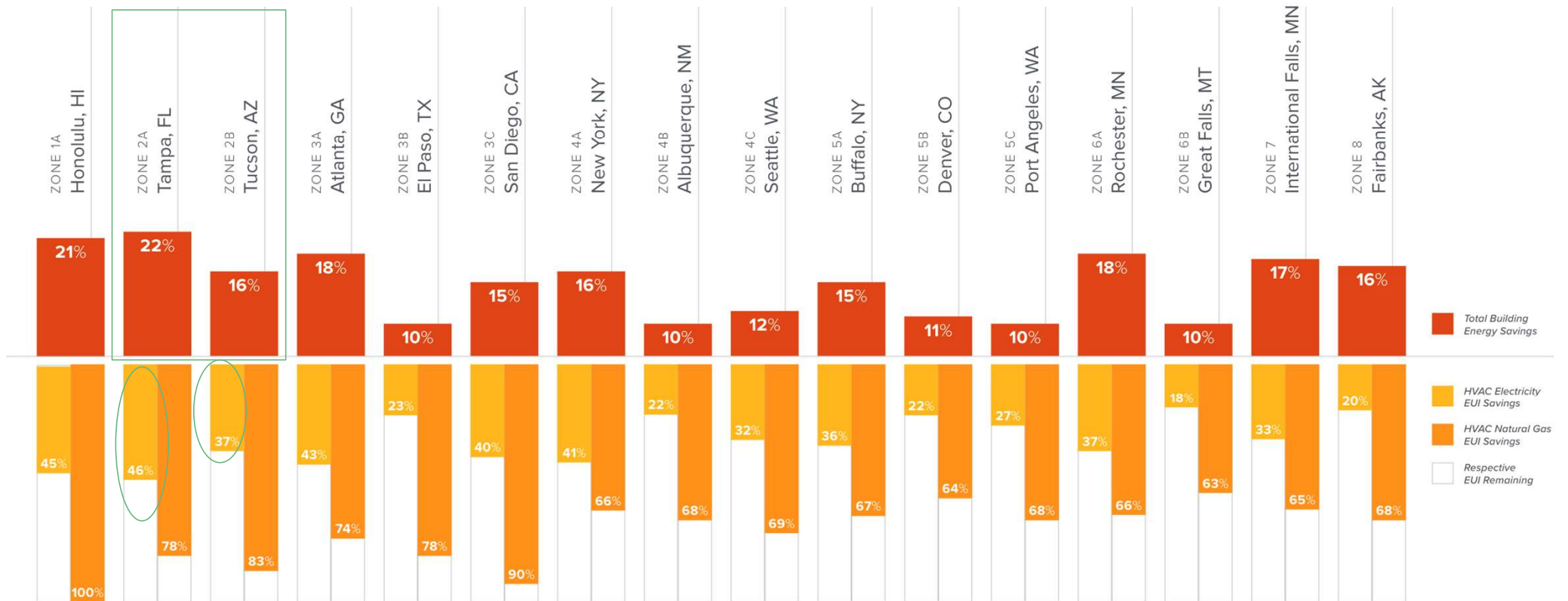
- Innovation Scalability
- Research and Development
- Product Portfolio
- Mega Trends Leverage
- Customer Alignment
- Growth Pipeline
- Vision and Strategy
- Sales and Marketing
- Revenue Growth
- Market Share Growth

Note - 75F is highlighted in Orange color

Frost Radar™ is a robust analytical tool to gauge Growth and Innovation. With through in-depth analysis it is built on 360-degree research methodology and objective evaluation of companies across multiple innovation and growth criteria

RESULTS | LARGE OFFICES, RETROFIT

◀ Methodology



Energy Savings Algorithm

○ DAB energy savings

Introduce Label for Greenmark

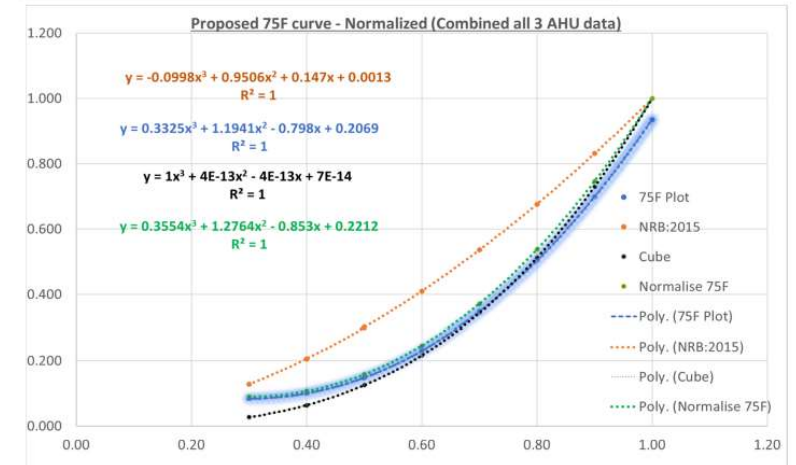
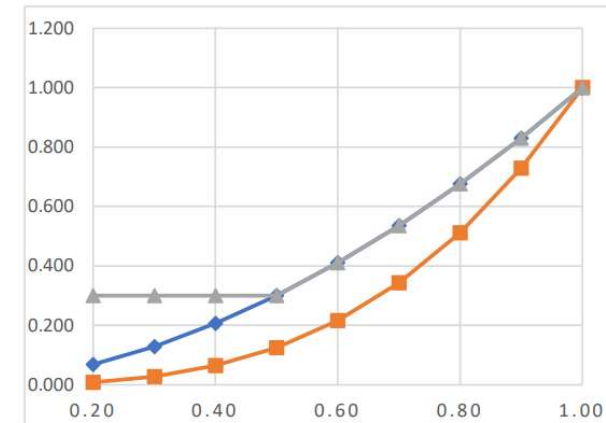
$$pFan = 0.0013 + 0.147 \times PLR + 0.9506 \times (PLR)^2 - 0.0998 \times (PLR)^3$$

VAV

PLR	Pfan			
Partload	NRB:2015	NRBv4.1	Cube Law	75F
1.00	0.999	1.000	1.000	
0.90	0.831	0.831	0.729	
0.80	0.676	0.676	0.512	
0.70	0.536	0.536	0.343	
0.60	0.410	0.410	0.216	
0.50	0.300	0.300	0.125	
0.40	0.206	0.300	0.064	
0.30	0.128	0.300	0.027	
0.20	0.068	0.300	0.008	
0.10	0.025	0.300	0.001	
0.00	0.001	0.300	0.000	

X	75F	Normalise 75F	Cube	NRB:2015
1.00	0.936	1.000	1.000	0.999
0.90	0.698	0.746	0.729	0.831
0.80	0.503	0.538	0.512	0.676
0.70	0.347	0.371	0.343	0.536
0.60	0.230	0.246	0.216	0.410
0.50	0.148	0.158	0.125	0.300
0.40	0.100	0.107	0.064	0.206
0.30	0.084	0.090	0.027	0.128

$$y = 0.3554x^3 + 1.2764x^2 - 0.853x + 0.2212$$



Backed by the Biggest Names in Climate Change



Breakthrough
Energy VENTURES



OIL AND GAS CLIMATE INITIATIVE



unreasonable

The power of 75F's Solution across just 16 Facilities in APAC in 2019



Addresses the **Triple bottom-line**:

ENVIRONMENTAL

4,672,461 kWh of
energy saved and
3,831,418 kgs
Of CO₂ emissions
avoided

SOCIAL

Occupant
comfort
improved by
7.5%

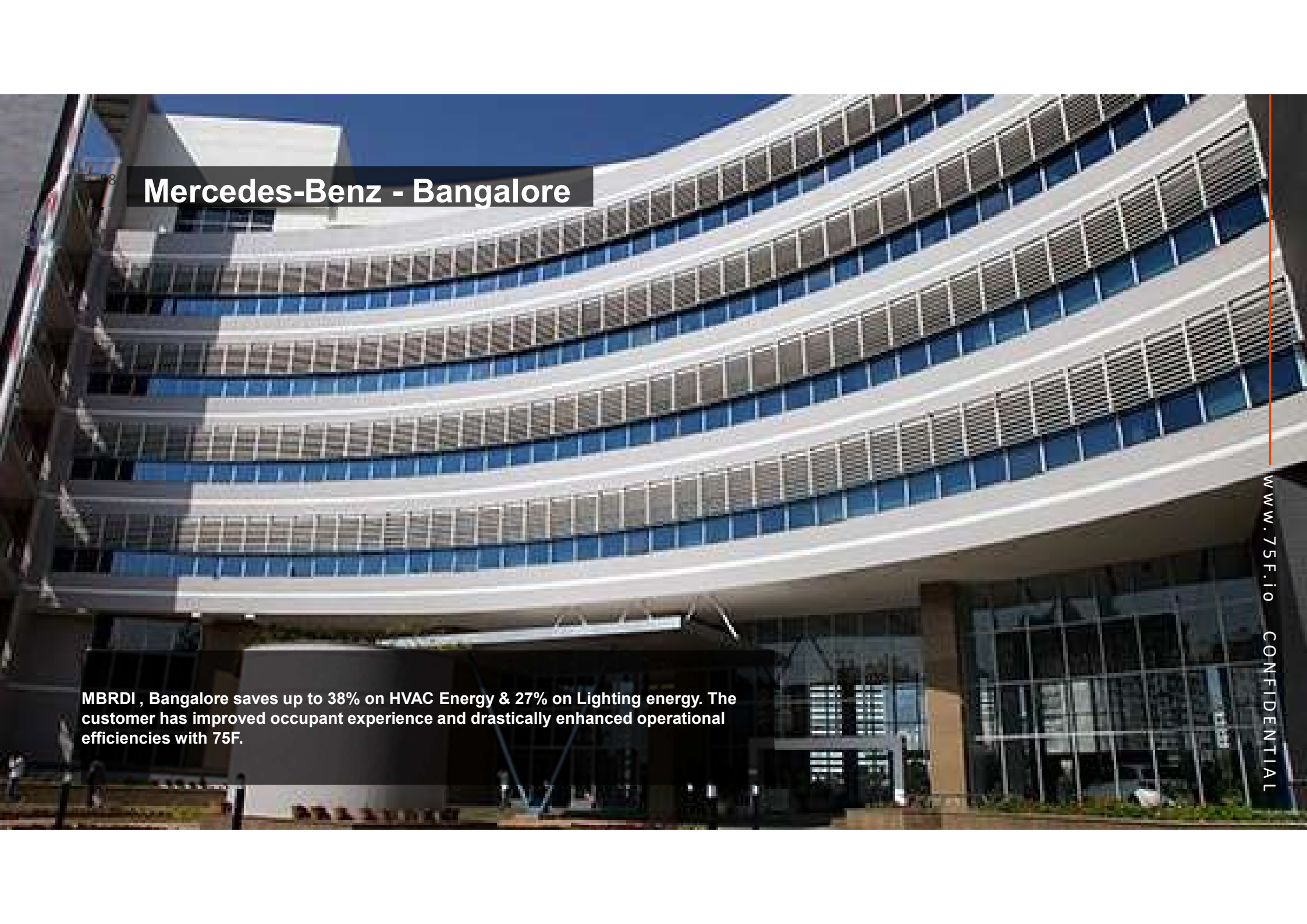
FINANCIAL

ROI ranging
from **1.5 - 3 years**



Shell – Bangalore, Chennai

75F system has been saving an average of 20-36% each month on AHU and Chilled Water energy consumption at Shell which amounts to 39,000 kWh savings per month.

A photograph of a modern, multi-story office building with a curved facade. The building features numerous windows and balconies with glass railings. The sky is clear and blue. The building is the Mercedes-Benz building in Bangalore.

Mercedes-Benz - Bangalore

MBRDI , Bangalore saves up to 38% on HVAC Energy & 27% on Lighting energy. The customer has improved occupant experience and drastically enhanced operational efficiencies with 75F.

Smartworks - Noida, Bangalore, Kolkata, Mumbai, Pune

75F 's HVAC Automation and Energy Savings Solution are deployed across 8 Facilities in India with a total area of more than 1,600,000 sq.ft. At the Bangalore, Noida, Kolkata & Mumbai facilities, Smartworks has achieved 23 - 35% energy saving over baseline consumption.

smartworks



WeWork – Bangalore, Hyderabad, Mumbai, Gurgaon, Noida

WeWork, Manyata covers a total of 167,000 sq.ft and has recorded savings of 20-32% in HVAC energy consumption. 75F is currently deployed at 5 WeWork sites in India.

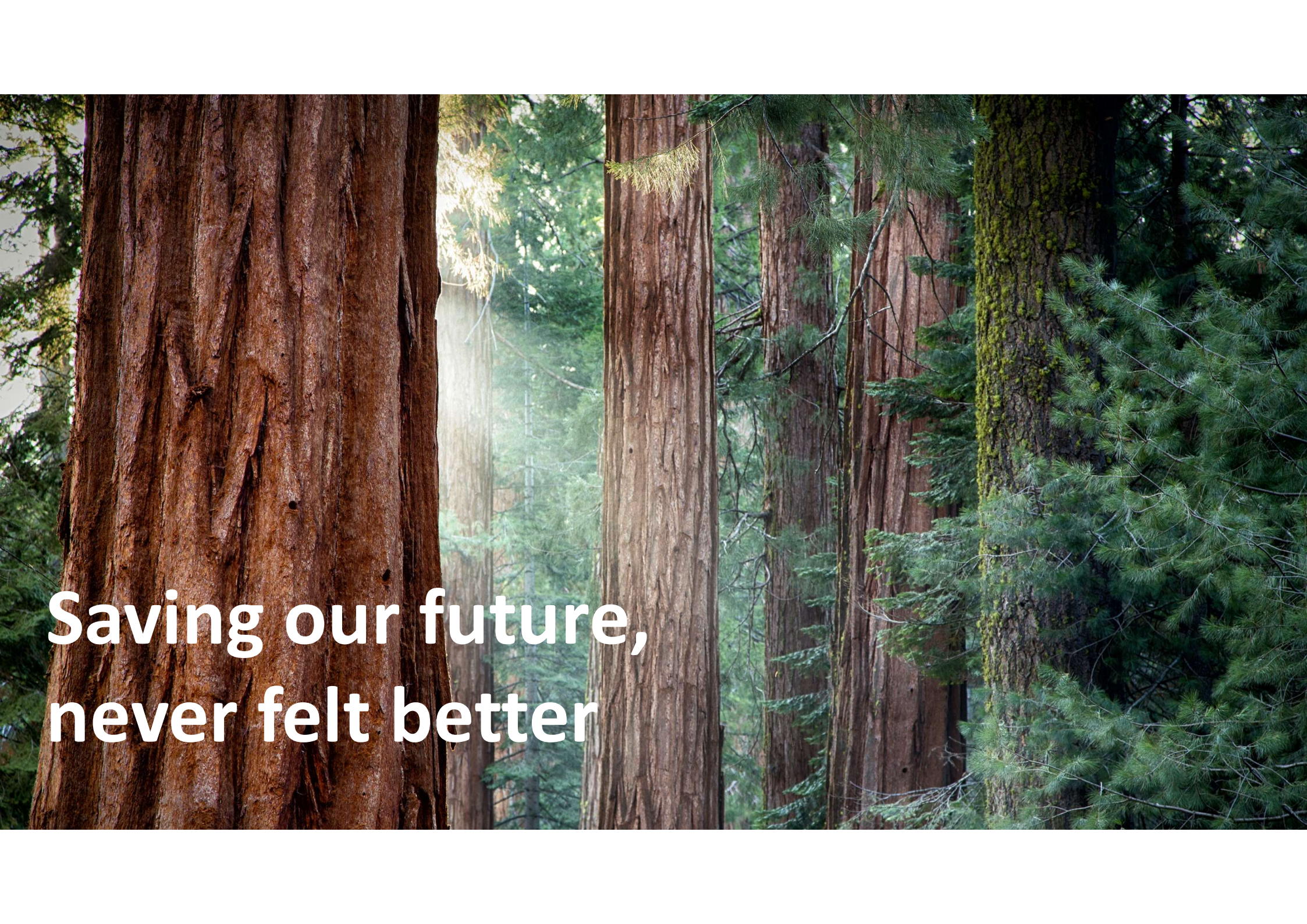
61

Flipkart Bangalore

With 1363 wireless sensors across 880,000 sft, this is the world's largest IoT/wireless deployment. Automation, comfort, visibility & energy savings of 18-22%

Overview of Revenue Models

Particulars/ Model	Capex	Subscription	OPEX
Upfront investment	✓	X	X
Credit appraisal required	X	✓	✓
Security deposit required	X	✓	✓
Monthly payments	X	✓	✓
Ownership of the project equipment	✓	✓	X
Payment for future ONM (Operation and Maintenance)	✓	✓	X
Requirement of a detailed contract	X	✓	✓
Project period	5 Y	3 Y	5 Y
Energy savings benefit	Maximum	Maximum	Reduced
Restrictions on ONM conditions	Suggestive	Suggestive	Mandatory



**Saving our future,
never felt better**