

Körber Supply Chain

# Master Class Series

Today's Class:  
Energy Efficiency in Cold Chain



# Today's Speakers



**Thomas Goldsby**

Professor

James A. Haslam, II Chair of Logistics  
The University of Tennessee Knoxville



**Mark Vogt**

Head of International Sales & Automation  
Körber Supply Chain

Why are we here? What are we trying to accomplish?

### Class Schedule:

Tuesday, February 16: Dark Warehouse Efficiencies: How Close Are We?

Thursday, February 25: Paper-Free Warehouse: What Tech Can Get You There?

### Master Class Series – On-Demand

- *Addressing Labor Challenges*
- *Cold Storage Trends*
- *Warehouse Technology Excellence*
- *Workplace Efficiencies & Safety*
- *SAP Supply Chain Excellence*
- *Disruption Mitigation*

# Housekeeping



All phone lines are muted

Recording of today's class and slides will be emailed to you within 48 hours

Questions:

- Ask questions during today's class in the GoToWebinar Questions window
- Questions will be addressed at the end of today's class or we will follow up via email after class

Handout: Körber Sustainable Supply Chain Infographic

Poll Question: What steps are you taking to improve energy efficiency in the cold chain?

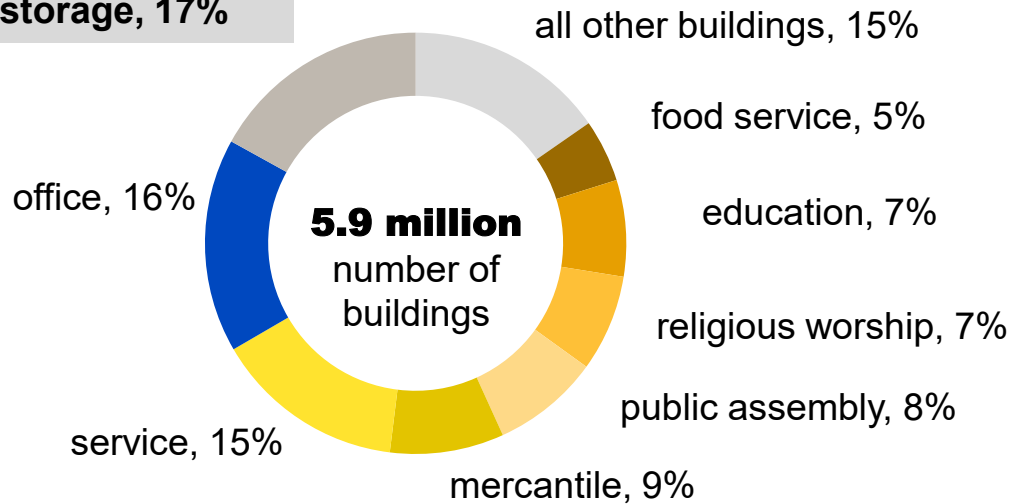
# Warehouse Count and Floorspace



Percentage of commercial U.S. buildings and floorspace by principal building activity

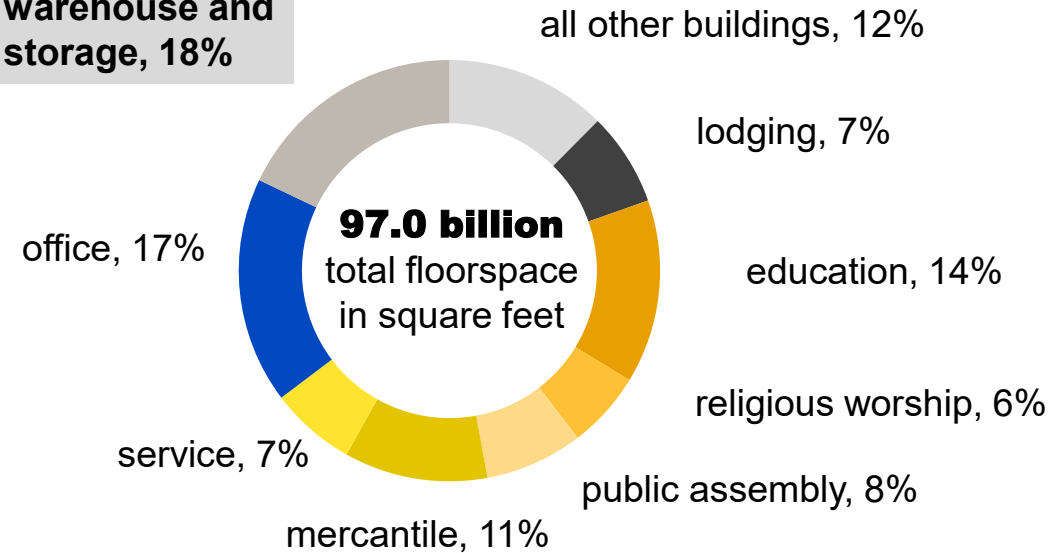
## Building Count

warehouse and storage, 17%



## Building Floorspace

warehouse and storage, 18%

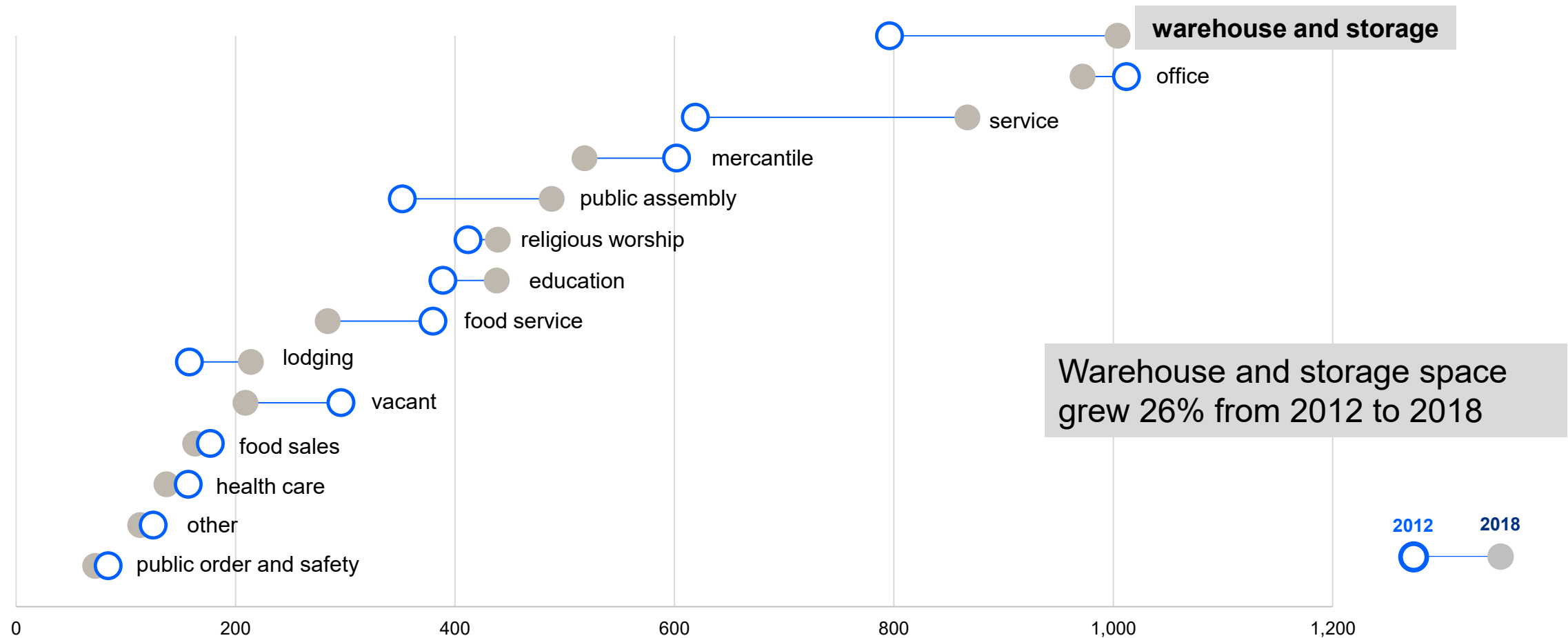


Warehouse and storage account for 17% of all commercial buildings and 18% of total commercial building floorspace

# Growth in Commercial Building Space, U.S. (2012 to 2018)



Number of commercial buildings (in thousands) by principal building activity

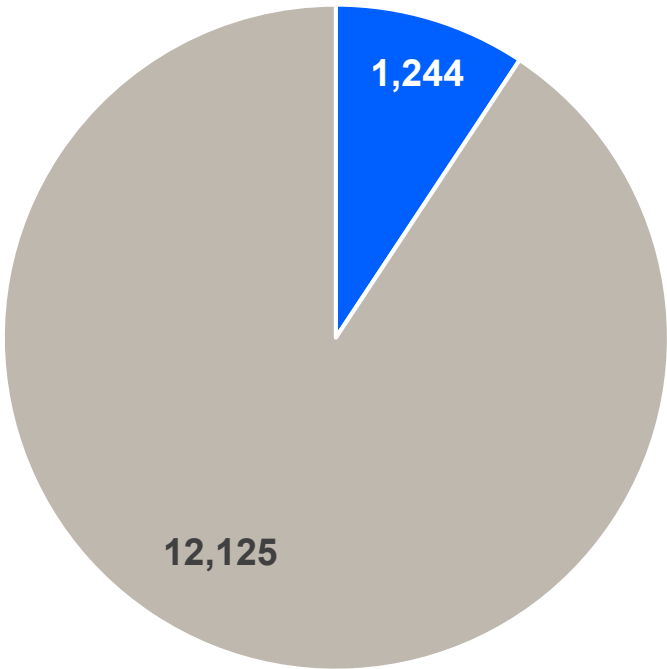


# Square Footage vs. Energy Consumption

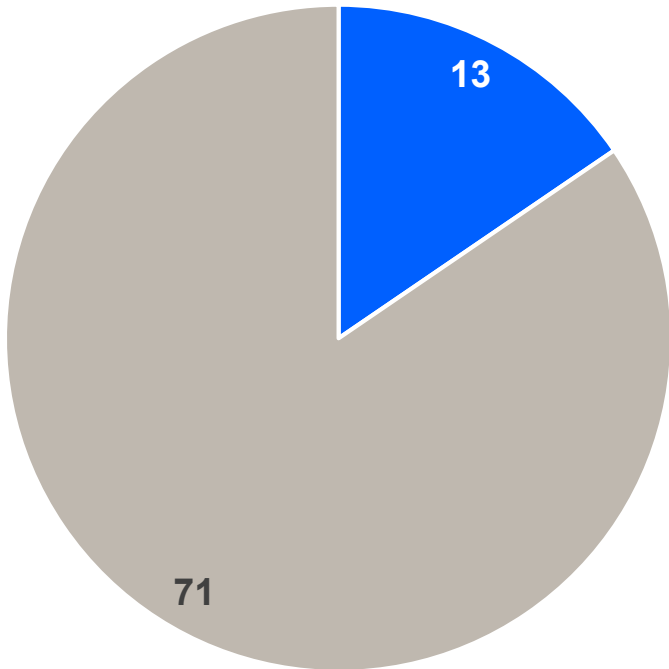
Refrigerated vs. Nonrefrigerated Space



Total Space (sq. ft., in millions)



Energy Consumption (kWh, in billions)



Refrigerated space accounts for just over 10% of all warehouse space BUT almost 16% of energy consumption

■ Refrigerated   ■ Nonrefrigerated

■ Refrigerated   ■ Nonrefrigerated

**Refrigerated space is 5X more energy intensive per square foot (28.8 kWh vs. 5.8 kWh per sq. foot)**

# Sustainability Revolution

Pressure Towards Green Logistics grows beyond being eco-friendly



**Companies' value is ever more dependent on their behavior and practices.**



Products marketed as sustainable grew **5.6x** faster than regular products

**73%** of global consumers would definitely or probably **change consumption habits** to reduce the impact on the environment

Sources: Harvard Business Review; Sustainable Brands; FSB; Glassdoor; Network for Business Sustainability; UN; Bain analysis

**1**

**Over 50% of the value** top 50 CPG\* companies have today **is made of expected growth in cash flows.**

**2**

**Sustainability factors** (e.g. carbon emissions, resources consumption) **can seriously affect growth projections** of CPG companies'.

**3**

**Consumers** and investors are watching and **acting based on sustainability practices** of the companies.

**COMPANIES NOW HAVE TO CARE ABOUT SUSTAINABILITY BECAUSE THEIR CUSTOMERS CARE ABOUT IT**

**Supply Chains became a central aspect being closely monitored by Customers**

Warehouses turned to be **one of the major causes of industrial emissions** and the progressing environmental pollution.

*University of London Study*

**THE NEXT BIG ITEM ON THE AGENDA:**

**ENERGY-EFFICIENT BUILDINGS AND WAREHOUSES**

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Note: \*Consumer Products Good

Source: Körber Supply Chain Automation

# The Case for Sustainable Warehouses

There is big money to be saved in the sustainability revolution



1

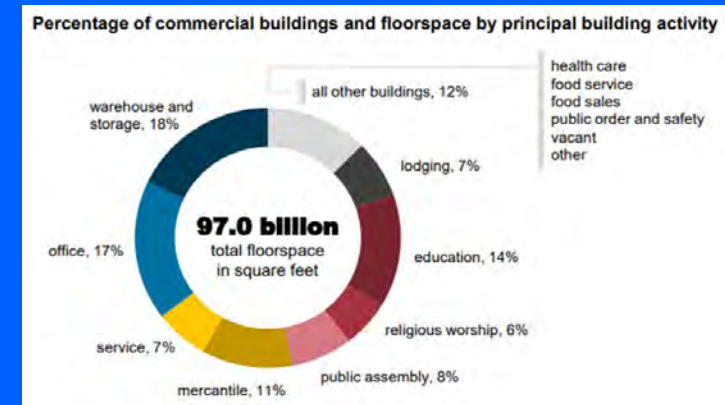
Warehousing costs can represent as much as **10% of company's revenue**



In UK alone, **energy-efficient equipment** investments can **save more than US\$260mi** only in warehouses.

2

Warehouses account for **18% of all total floor space** in US, adding up to 16,4 bi square feet.



With **utilities costs at US\$2,10 per square foot\*** and sustainable practices estimated to **reduce amid 9% to 16% cost\*\***, warehouses can **cut between \$3 and \$5,5bi expenditure** only in US.

## Efficiency practices can save in total up to 22% of energy expenditure.

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Note: \*Data from US Dep. of Energy 2018 / \*\*World Economic Forum 2019

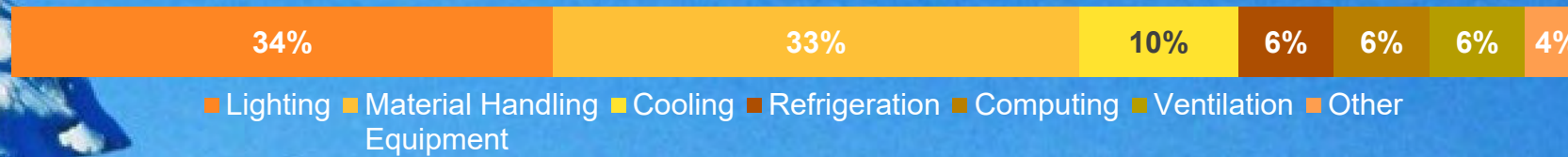
Source: Körber Supply Chain Automation

# Look Below the Surface

An individualized approach is needed

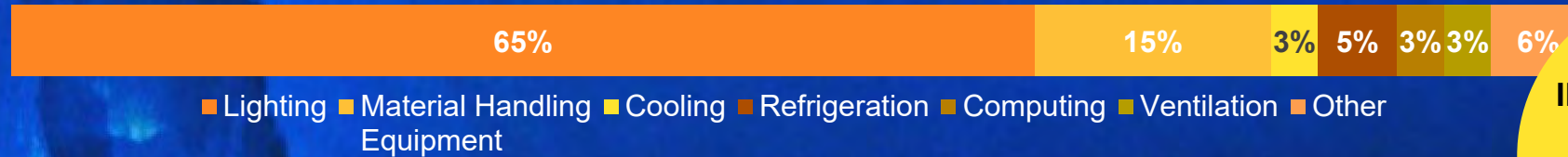
## Average Non-refrigerated Warehouses energy consumption distribution by end use:

(Source: US Energy Information Administration 2018)



## Energy efficiency Case Study on One Warehouse using WMS:

(Körber Supply Chain Automation)



**Each individual Warehouse presents unique processes, technology and systems that significantly impact its energy consumption behavior and energy-saving strategy.**

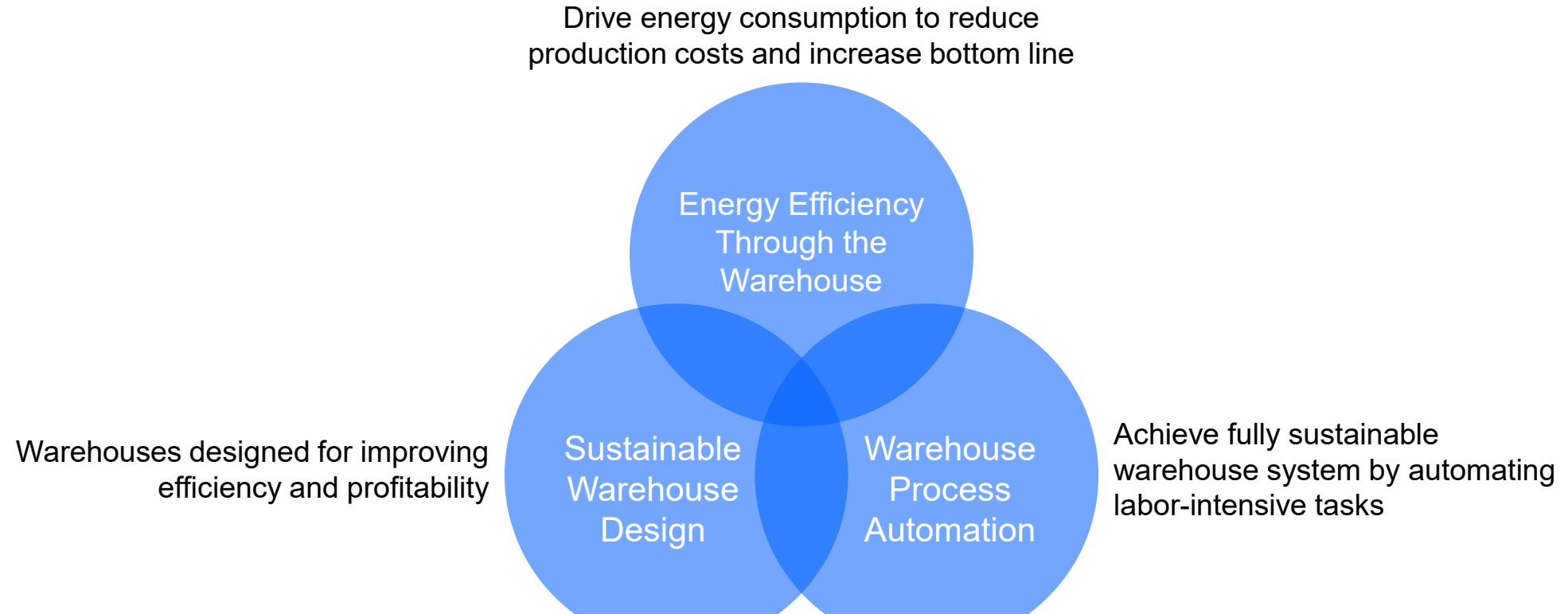
**INDIVIDUALIZED  
DEEP DIVE IS  
REQUIRED TO  
MAXIMIZE VALUE  
CREATION**

Note: WMS – Warehouse Management System

Source: Körber Supply Chain Automation

# How to Harvest the Opportunity

The 3 Pillars of Warehouse Management Sustainability



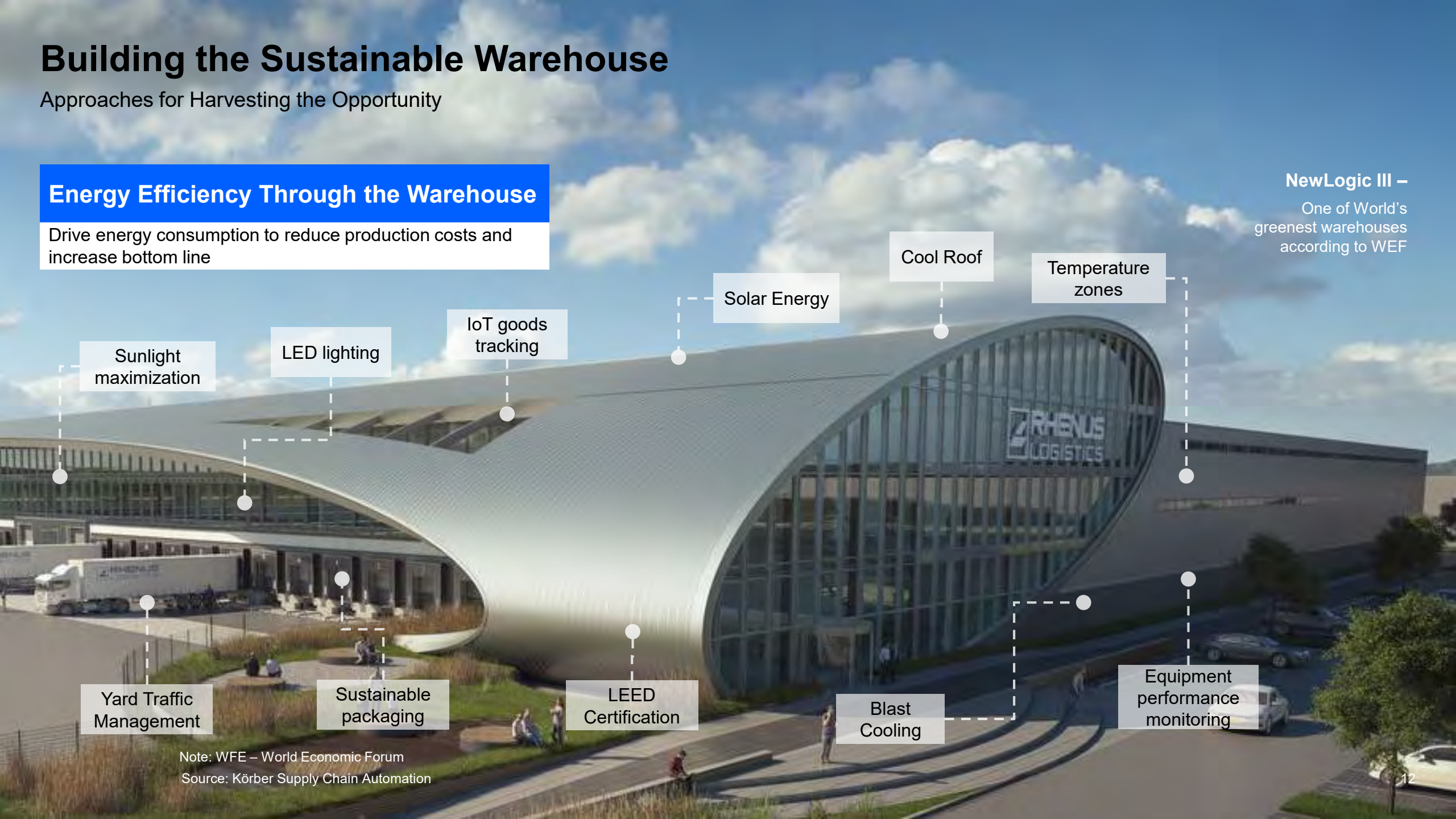
**OPERATORS MUST TAKE A HOLISTIC AND INDIVIDUALIZED APPROACH**

# Building the Sustainable Warehouse

Approaches for Harvesting the Opportunity

## Energy Efficiency Through the Warehouse

Drive energy consumption to reduce production costs and increase bottom line



**NewLogic III –**  
One of World’s  
greenest warehouses  
according to WEF

Sunlight  
maximization

LED lighting

IoT goods  
tracking

Solar Energy

Cool Roof

Temperature  
zones

Yard Traffic  
Management

Sustainable  
packaging

LEED  
Certification

Blast  
Cooling

Equipment  
performance  
monitoring

Note: WFE – World Economic Forum  
Source: Körber Supply Chain Automation

# Building the Sustainable Warehouse

Approaches for Harvesting the Opportunity



## Sustainable Warehouse Design

Warehouses designed for improving efficiency and profitability through Automated Material Handling Technology

Implement **energy efficient technology** and systems can **reduce up to 29%** of energy expenditure

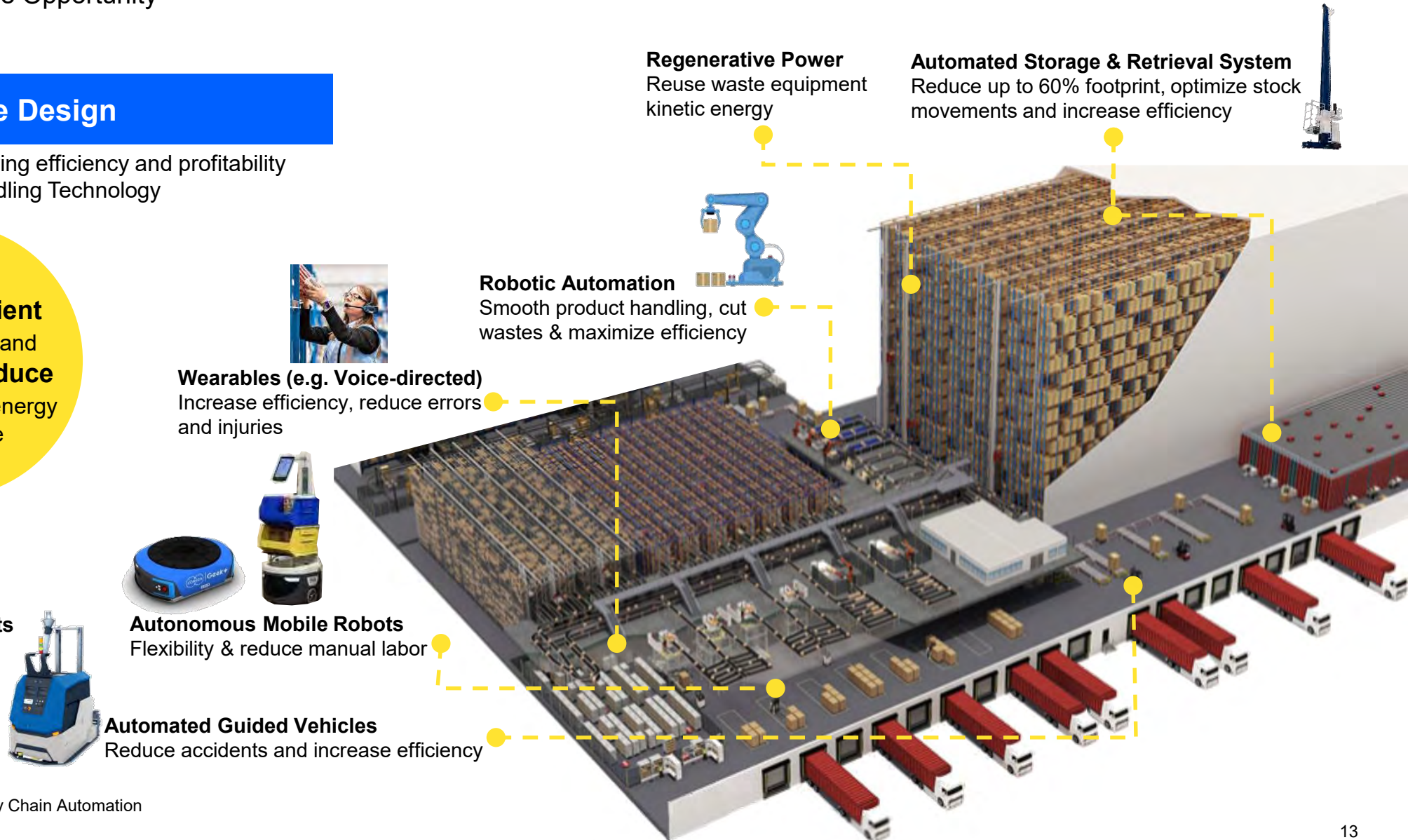
On **Deep Freeze Warehouses** energy efficient technology can:

- **improve work conditions**
- **increase system performance**
- **reduce up to 40 % energy costs**

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Source: Körber Supply Chain Automation



# Staker Crane Energy Regeneration

Körber Supply Chain Automation Case Study

1

Kinetic energy generated during hoist downward travel and trolley deceleration is lost

**MotionControl MOVI\_PLC Intelligent control** of the two axes ensures:

- the energy released by one axis is used as efficiently as possible by the other axis through intelligent movement planning.
- travel and lifting axes operate in energy-optimized manner without increasing cycle time.

**TOTAL ENERGY CONSUMPTION  
REDUCED UP TO 25%**

WITH MAXIMUM PERFORMANCE AND OPTIMUM  
UTILIZATION OF DEVICE DYNAMIC

**Next Stage:  
Regenerative  
Energy**

Hoist and trolleys' downwards and backwards movement energy is fed to a Regenerative Power Supply Module that stores energy and inputs it back in the system when needed.

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Source: Körber Supply Chain Automation



# Building the Sustainable Warehouse

Approaches for Harvesting the Opportunity

## Warehouse Process Automation

Achieve fully sustainable warehouse system by automating labor-intensive tasks

## Warehouse Management System

- Minimize movements of goods, equipment and people.
- Maximize cube-wise space to increase capacity.
- Optimize stock and reduce inventory turnover.
- Facilitate integration of new technology and equipment.
- Improve warehouse visibility and management.

## Energy Management System

- Monitor energy usage in the entire system
- Visibility of energy consumption behavior
- Building energy management (e.g. lighting and HVAC\*)
- Identify wastes and improvement opportunities
- Control building and devices to optimize energy efficiency

## CAPABILITIES OF COMBINED WMS AND EMS

- **Smarter control of equipment** (e.g. “deep sleep”, “off-peak” mode)
- **Adjust system speed and acceleration according to the demand.**
- **Optimized stock transfer strategy** (e.g. night inventory relocation)
- **Use case adapted energy storage strategy** (e.g. ad hoc, production supply, batch)
- **Machine learning energy management** strategy (e.g. anticipate zone cooling, predict peak demand)

Note: \*HVAC – Heating, Ventilating and Air Conditioning.

Source: Körber Supply Chain Automation

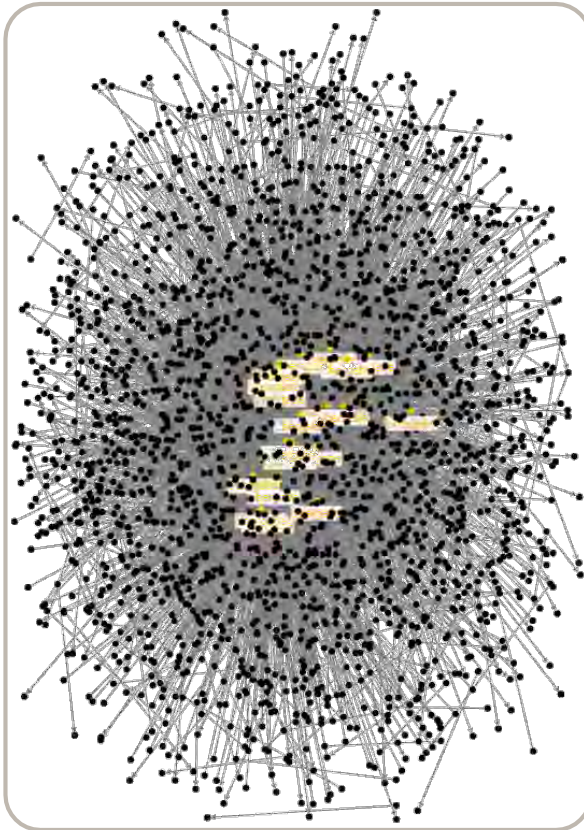
# Efficient Storage Strategies

Körber Supply Chain Automation Case Study



## ANALYSIS OF STORAGE SYSTEM EFFICIENCY WITH REAL STOCK ORDER DATA

BEFORE



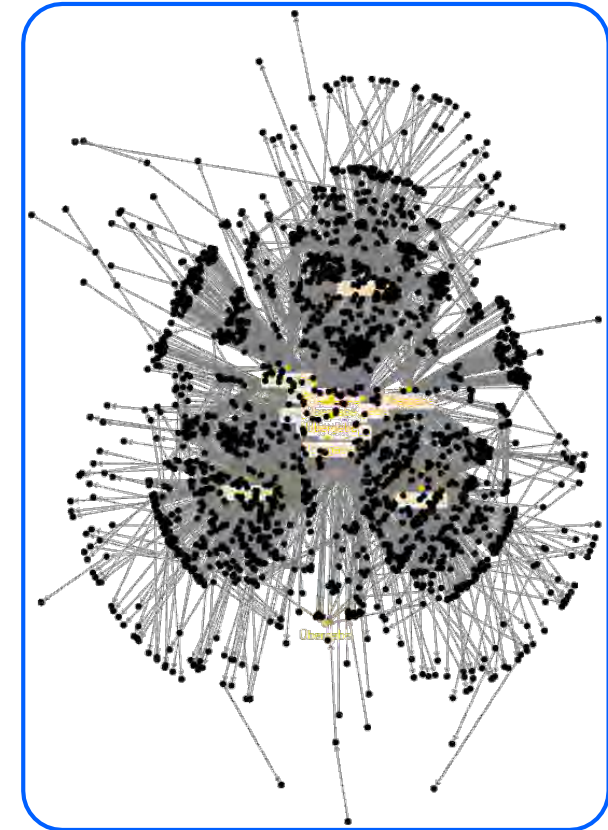
### STORAGE OPTIMIZATION

#### FINDINGS

- Substantial reduction of travel distances
- Meaningful efficiency gains are observed

**ADJUSTING STORAGE  
STRATEGY  
OR MASTER DATA SIGNIFICANTLY  
IMPROVES PERFORMANCE  
WHILE REDUCING ENERGY  
CONSUMPTION**

AFTER



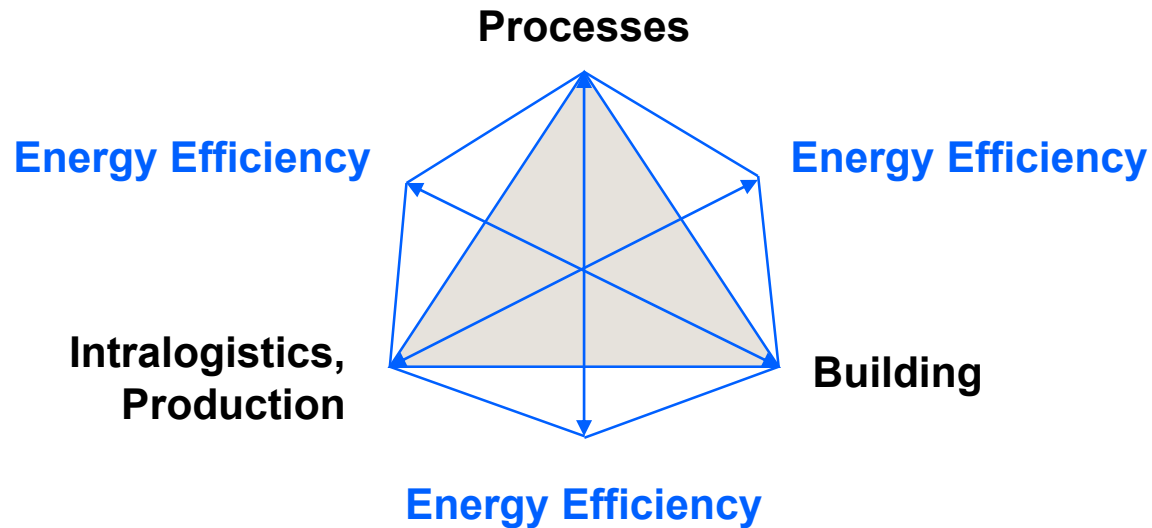
# Warehouse Sustainability Takeaways

Good business for the environment and for the bottom line



## ENERGY CONTROL CENTER RELATIONSHIP MODEL

"CUT ENERGY WHERE IT'S NO LONGER NECESSARY AND DIRECT IT TO WHERE IT IS NEEDED"



Determine the optimum of available technology, installed building and available orders, and then to manage processes as a command variable in distribution centers accordingly.

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Source: Körber Supply Chain Automation

## KEYNOTES

1

Choosing **the right drive technology** and associated intelligent control system lead to a **reduction up to 22% of energy demand** for RBG.

2

Further **measures with software optimization** can **save at least 20% of total consumption** in the plant.

3

In connection with building management, **further optimizations** can be achieved **10-15% energy savings**

4

**Future tax reduction possible** made possible through connection to energy management system

5

Demonstrable **energy or cost savings** are achievable **over 40%**

# Questions & Discussion

## **Dark Warehouses Efficiencies: How Close are We?**

February 16<sup>th</sup> – 12:00-12:30pm EST

Dark warehouses, or warehouses without lights or people, are a hot topic in today's supply chain. But are they truly feasible? Join John Santagate on February 16 to learn how close we are, and what technology is helping us get there.

### **John Santagate**

Vice President, Robotics  
Körber Supply Chain