



ENERGY STORAGE FOR THE COLD CHAIN

Enabling energy flexibility in a changing power grid

June 12, 2018



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Business Case for
Natural Refrigerants

June 12-14, 2018 – Long Beach

The power grid is changing



Greater variability

Solar grew 48x faster than predicted from 2006-2016. Wind was 4x.



Rise of decentralized energy

To grow 3-5x faster than centralized generation over next 10 years.

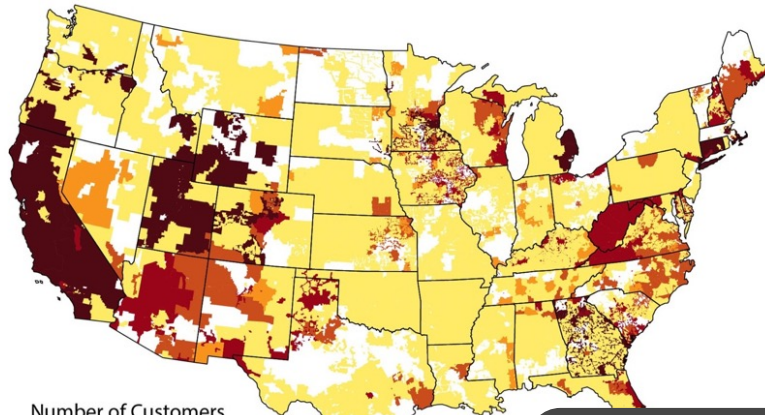


Shifting demand patterns

More heat waves, more AC, EV's | new peak demand highs and lows.

Utility response: Demand Charges, TOU Rates, Storage Incentives

1 in 4 U.S. businesses can save money today with energy storage – NREL (*areas shown below*)



18+ states with incentives or utility mandates for energy storage or load shifting

California*, Nevada, Oregon, New York, Maryland, Massachusetts, Arizona, Connecticut, Colorado, Florida, Indiana, Kentucky, New Mexico, North Carolina, Utah, Virginia, Washington, Vermont ...and the list is growing

California's SGIP incentive starts at \$0.4/Wh

US Energy Storage capacity expected to grow 70x from now to 2025

0.5 GW
2017

36 GW
2025

2017

2025

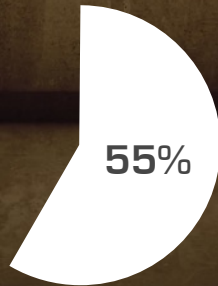
Sources: NREL 2017, US Energy Storage Association 2017

Confidential and proprietary – Axiom Exergy 2018

In the new grid, energy flexibility is a competitive advantage

- **Adjust** electrical load to price signals
- **Adapt** to changing utility rate schedules
- **Utilize** incentives, grid programs, etc. for additional \$
- **Monitor** to ensure operations don't create new peaks
- **Do this every day**... demand charges are based on your worst day of the month

For supermarkets, the Refrigeration System
is the elephant in the room



A SUPERMARKET'S BIGGEST LOAD IS FIXED

The central refrigeration system (CRS)
uses 55% of store electricity

Axiom turns central refrigeration systems into smart, flexible, money saving assets.

SUPERMARKET'S
CENTRAL
REFRIGERATION
SYSTEM

AXIOM'S
SYSTEM
INTEGRATOR

THERMAL
STORAGE
TANKS

NET EFFECT
cooling production is independent of cooling demand

The Refrigeration Battery

Energy storage for the cold chain

What it is

- Thermal energy storage (ice on coil) solution
- Size 150 kW / 1,100 kWh (adjusted to site specifics)
- Connects to like a display case (passive integration)
- Enables long duration load shifting
- Cloud connected IoT with cutting edge software

Benefits

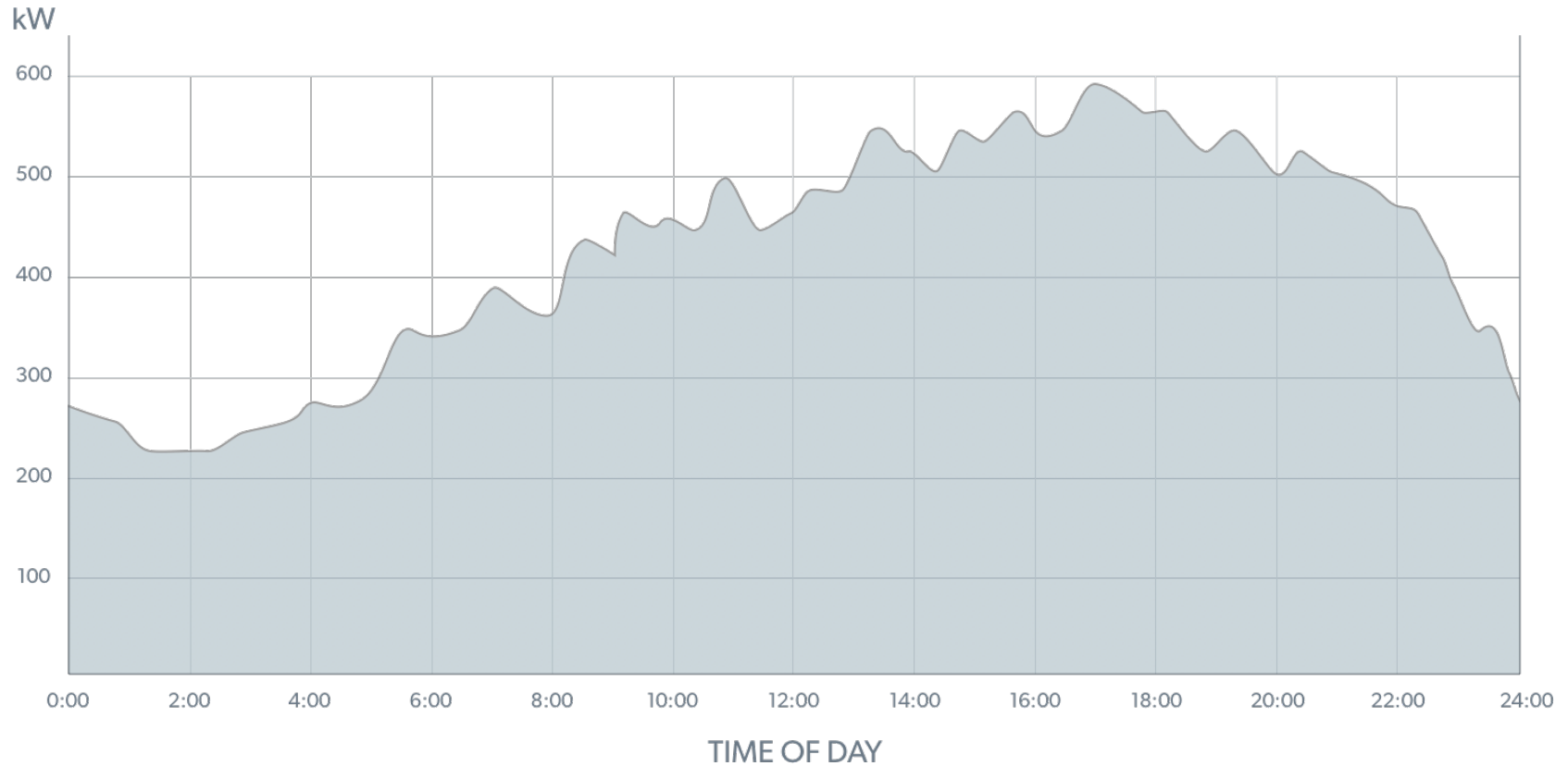
- Lower energy bills
- Backup cooling capacity
- Increased system visibility



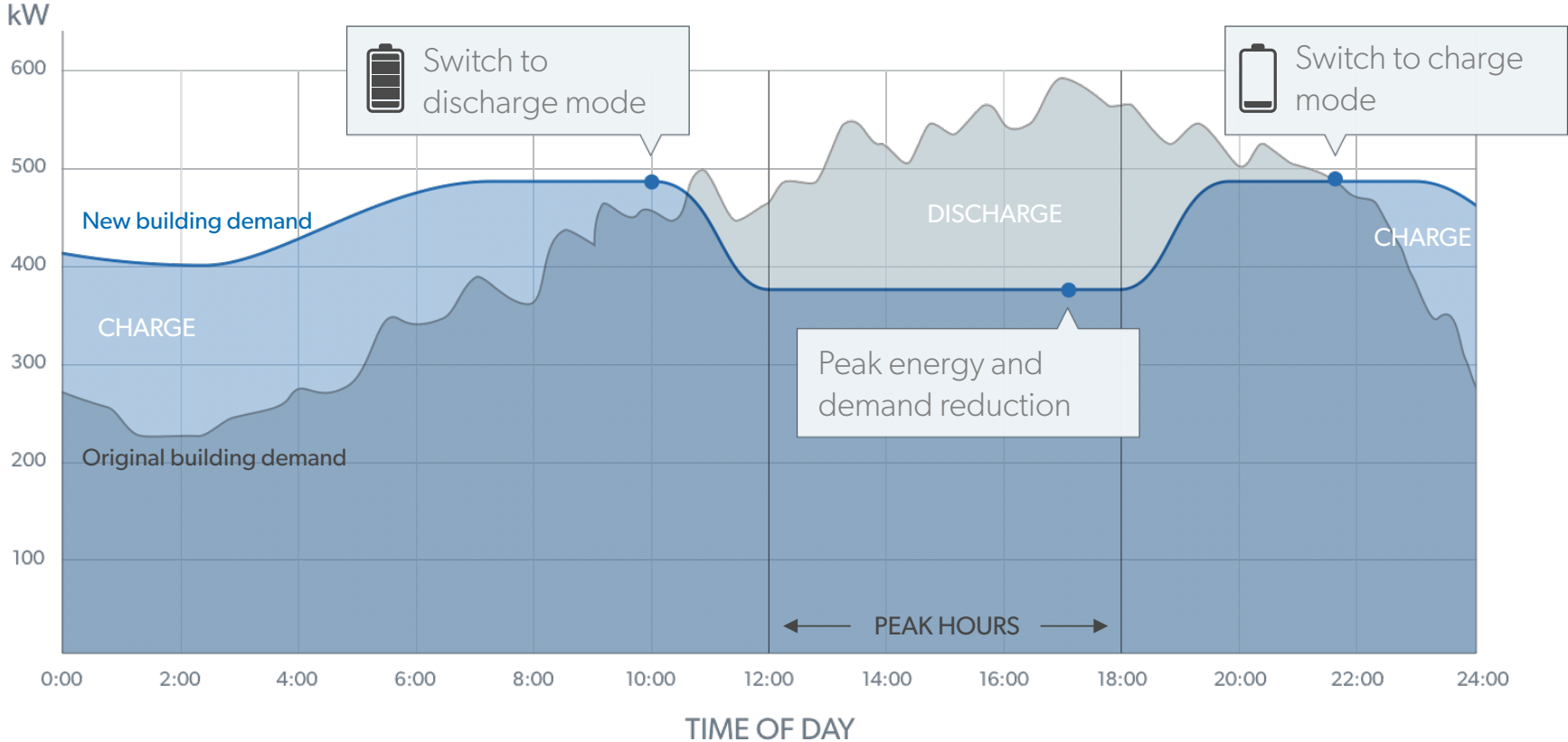
The most cost effective energy storage
solution for the cold chain



Typical supermarket summer power load

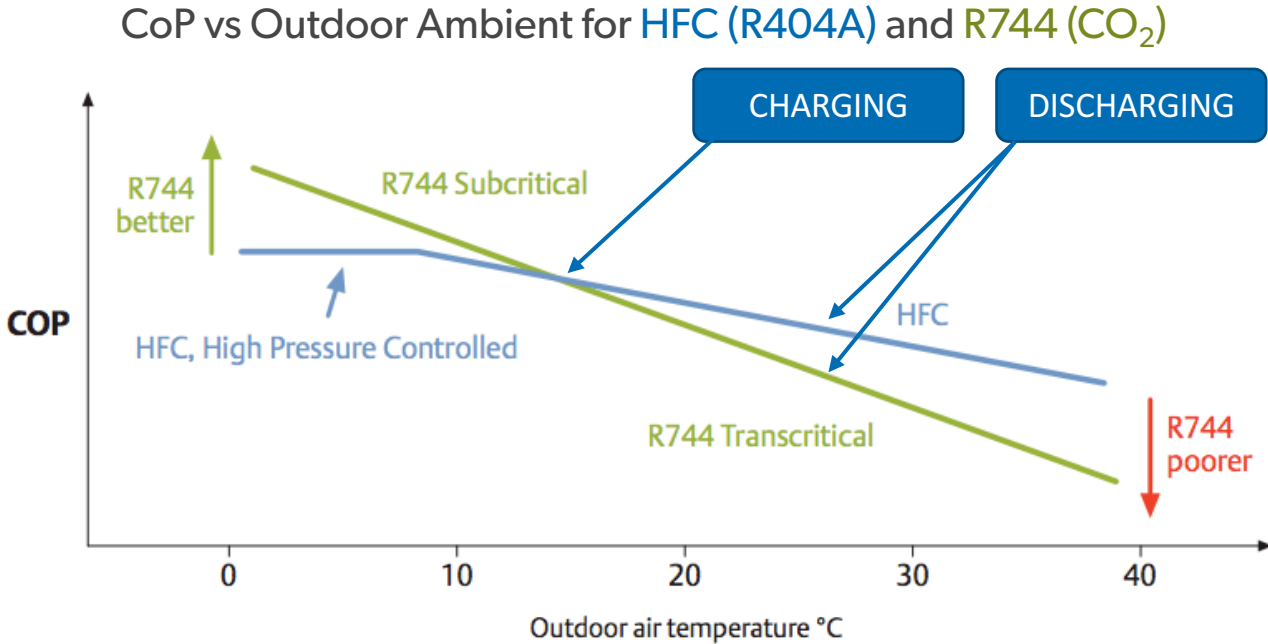


Charge & discharge cycles to lower utility bills



RB stores refrigeration at night, at a more efficient CoP

Beneficial COP arbitrage is amplified with CO₂ systems



Source: Emerson Climate

http://www.emersonclimate.com/europe/documents/resources/tge124_refrigerant_report_en_1009.pdf



Value 1: Energy bill management



Demand Charge Savings

- Demand charges represent ~60% of many utility bills
- We reduce demand charges by up to 40%

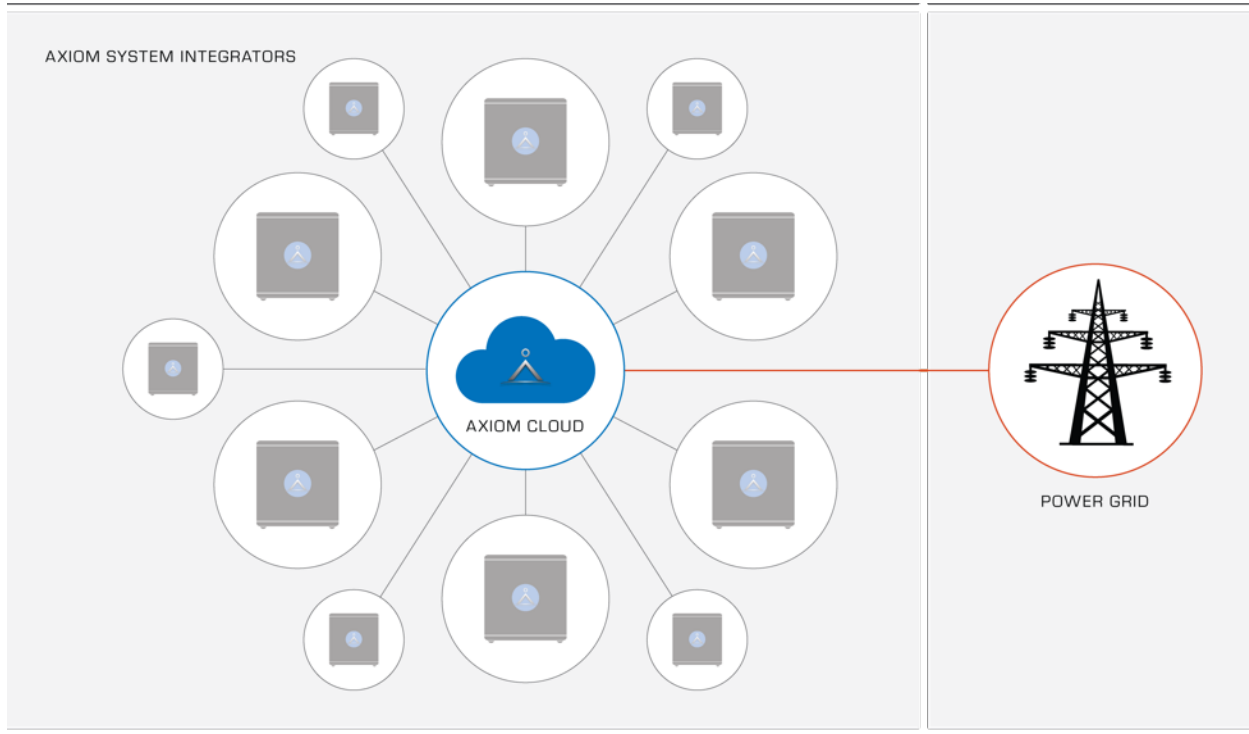


Time of Use Rate Savings

- We use more energy at night, when it costs the least
- And offset energy use during the day, when it's most expensive



Value 2: Grid Services



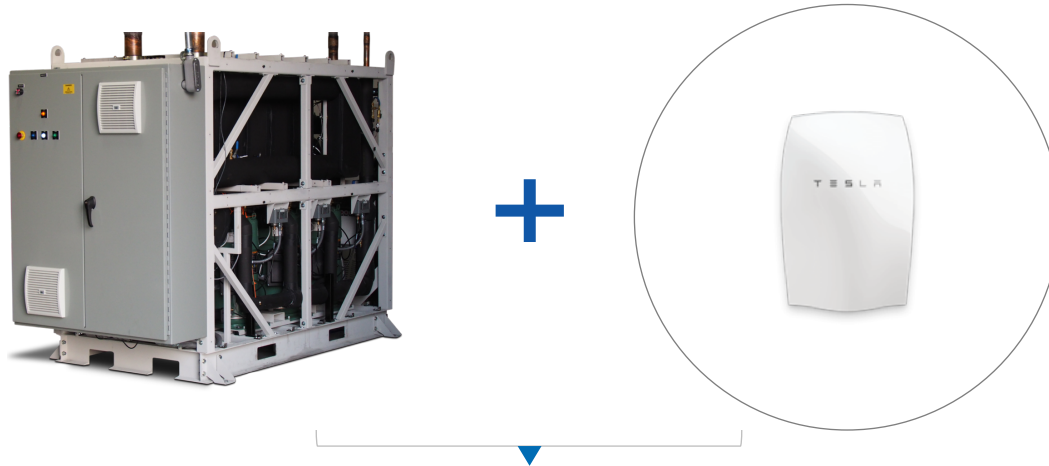
Virtual power plant:

- Aggregate thousands of sites
- Take advantage of utility incentive programs
- Unlocks additional revenue stream for host
- Improves grid operation and site resilience



Value 3: Backup cooling

One supermarket power outage can wipe out >\$300,000 worth of perishables



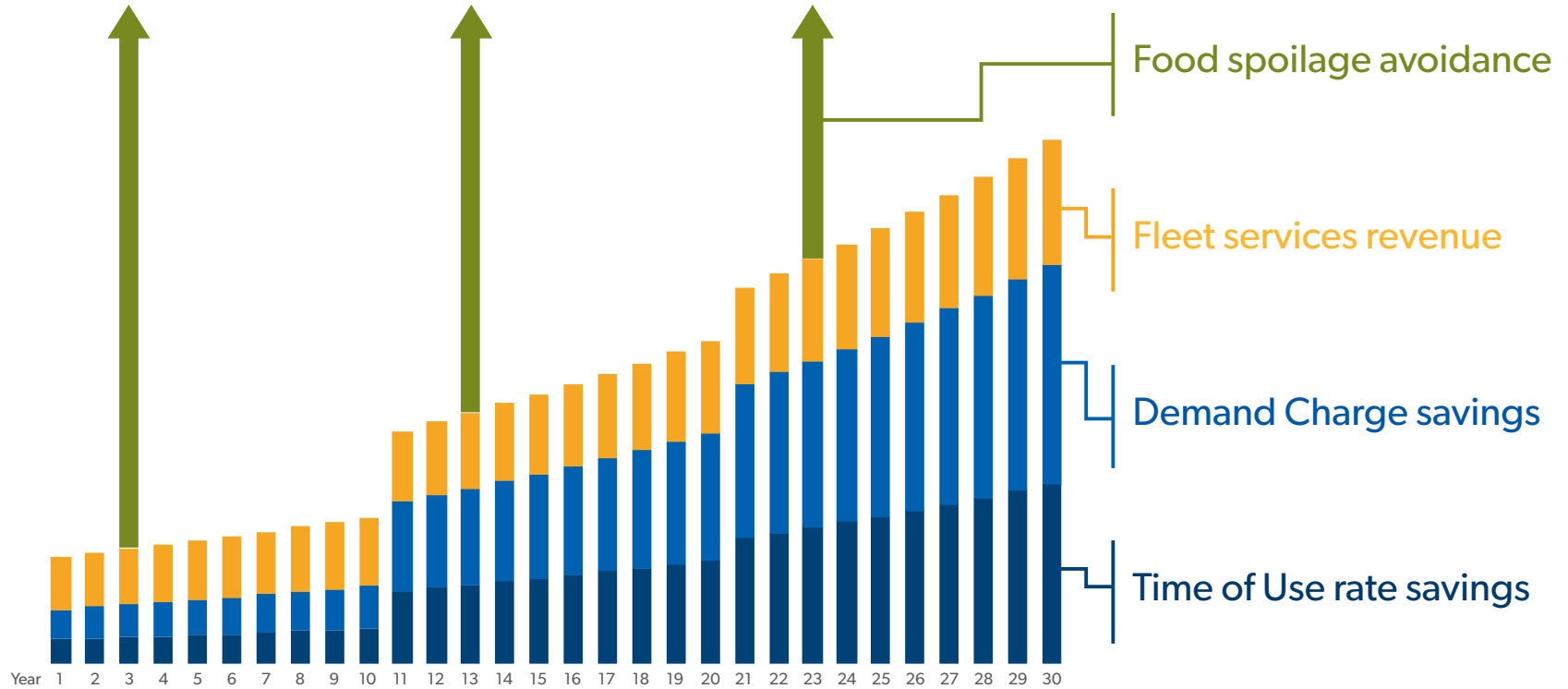
RB HYBRID SOLUTION

2-6 hours of backup cooling

plus additional peak shaving services



1 Refrigeration Battery, 30 years of store savings



Axiom's offer

SaaS

STORAGE AS A SERVICE

No CapEx required
100% off balance sheet

SAVE

MONEY STARTING DAY 1

Pay Axiom less than you save each yr
10 year contracts, renewable

ENJOY

CARE-FREE OPERATIONS

Axiom handles all install & operation
And assumes performance risk



Traction



Whole Foods, Los Altos

- Installed, successfully demonstrated ability to shift entire medium temp refrigeration system load to off peak hours



Walmart, Escondido

- Installed 2Q 2018





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THANK YOU



AXIOM EXERGY

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