

# Artificial Intelligence—Investing Beyond GPUs

Jim Hamel, CFA, Matt Kamm, CFA and Jason White, CFA | Growth Team



ARTISAN PARTNERS

For Institutional Investors Only—Not for Onward Distribution

# Artisan Partners Growth Team

Team approach leverages high degrees of experience and knowledge within a disciplined investment process

## Leadership

### Jim Hamel, CFA

Portfolio Manager  
Lead Portfolio Manager—  
Global Opportunities Fund  
27 Years Investment Experience

### Jason White, CFA

Portfolio Manager  
Lead Portfolio Manager—  
Global Discovery Fund  
24 Years Investment Experience

### Matt Kamm, CFA

Portfolio Manager  
Lead Portfolio Manager—  
Mid Cap Fund  
24 Years Investment Experience

### Craig Cepukenas, CFA

Portfolio Manager  
Co-Lead Portfolio Manager—  
Small Cap Fund  
35 Years Investment Experience

### Jay Warner, CFA

Portfolio Manager  
Co-Lead Portfolio Manager—  
Small Cap Fund  
22 Years Investment Experience

### Pratik Patel

Chief Operating Officer  
Talent  
Generalist  
23 Years

Portfolio leadership has been working together for 20 years

## Analysts

### Martin Jochmann

Associate Portfolio Manager  
Health Care  
23 Years

### Cindy Mu, CFA

Associate Portfolio Manager  
Consumer  
18 Years

### Aashish Rao

Associate Portfolio Manager  
Technology  
16 Years

### Alex Braid, CFA

Financials  
19 Years

### François Broquin, CFA

Industrials and Energy  
19 Years

### Roderick Brower

Head of ESG  
Internet, Media and Consumer  
25 Years

### Sally Fernandes

Technology  
5 Years

### Robin Johnson

Head of Stewardship  
18 Years

### Matt Lemenager, CFA

Technology  
11 Years

### Sridar Maya, CFA

Consumer  
13 Years

### Sarah Olijar, CFA

Generalist  
7 Years

### Ryan Tochihara

Health Care  
16 Years

### Angela Wu

Internet and Media  
18 Years

## Traders

### Jay Peters

32 Years

### Bryan Schultz

22 Years

## Coordinators

### Cristal Lieungh

29 Years

### Heather Dow

24 Years

### Kelly Kaminski

2 Years

## Client Service Team

### Chip Ridley, CFA

Managing Director  
Business Leader

### Ting Rattanaphasouk, CFA

Account Coordinator

### Floyd Dukes, CFA

Portfolio Specialist

### Lisa Sturm

Account Coordinator

### Cameron Griffin, CFA

Portfolio Specialist

### James Wilson, CFA

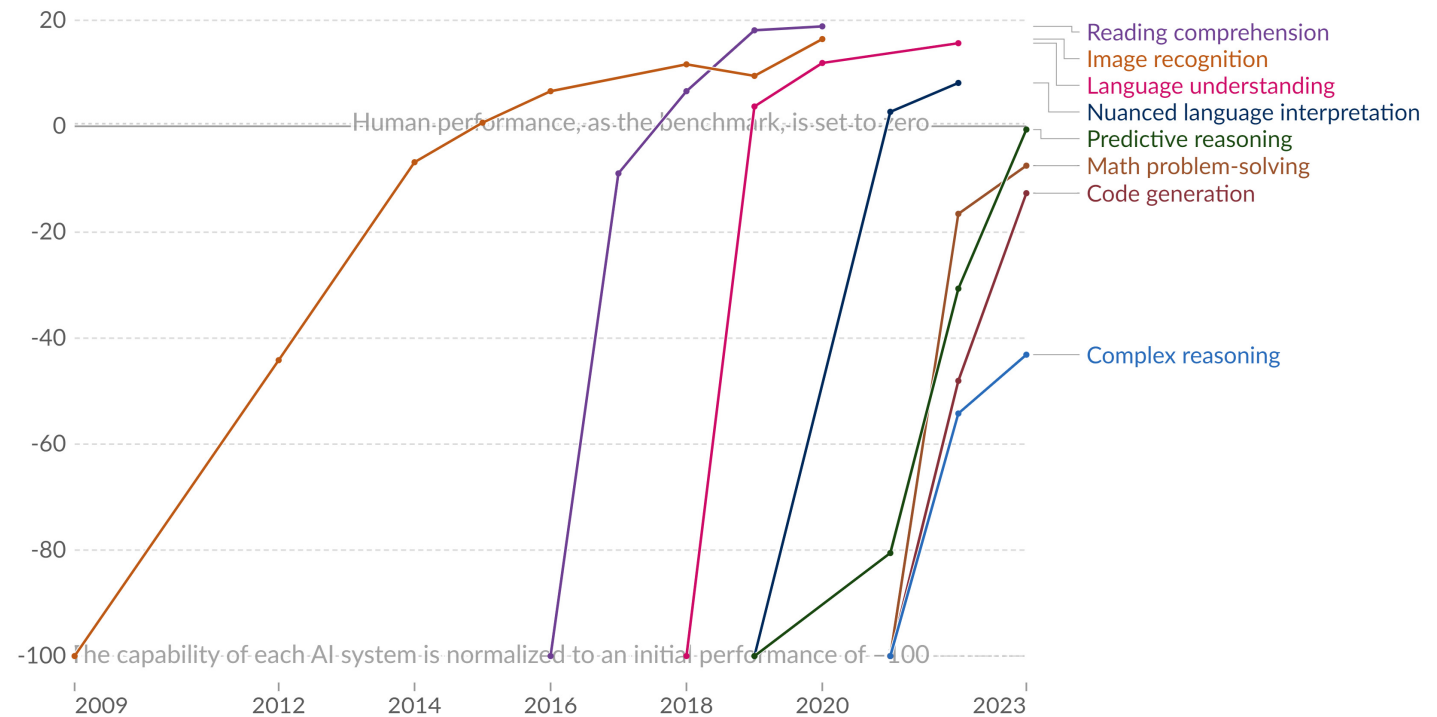
Investment Content Lead

Generative AI progress made on **predictive reasoning** is driving disruption and innovation that will drive opportunity and profit cycles.



## Test scores of AI systems on various capabilities relative to human performance

Within each domain, the initial performance of the AI is set to -100. Human performance is used as a baseline, set to zero. When the AI's performance crosses the zero line, it scored more points than humans.



Data source: Kiela et al. (2023)

OurWorldInData.org/artificial-intelligence | CC BY

Note: For each capability, the first year always shows a baseline of -100, even if better performance was recorded later that year.

## Prompt: Customer Service Request: Inquiry to Cancel Cable Subscription

2019

### GPT-2 Response:

---

Dear [Customer Name],

Thank you for contacting us. We are sorry to hear you want to cancel.

We appreciate your loyalty and understand your concerns.

Could we discuss some options to better meet your needs?

Thank you.

Best regards,

Customer Support Team

2024

### GPT-4 Turbo Response:

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Dear [Customer Name],

I hope this message finds you well. My name is [Your Name], and I am with the Customer Support Team at [Cable Company]. I understand that you are considering cancelling your cable subscription, and I'd like to assist you with that process.

First, I want to sincerely **thank you for being a loyal customer for the past 15 years**. We understand that the recent \$10 monthly price increase to offset local broadcast fees may have been a concern for you. Additionally, **we know that live sports are a key interest for you**, and some of the sports you enjoy are exclusively available through our service.

To address your concerns and enhance your viewing experience, **we would like to offer you the following incentives:**

- **\$10 Discount:** A \$10 discount on your monthly subscription fee for the next 12 months, effectively offsetting the recent price increase.
- **Premium Sports Package:** Complimentary access to our premium sports package, which includes a broader range of live sports and exclusive content, for the next 6 months. This will ensure you continue to enjoy the sports you love without missing out.

We hope that one of these options will enhance your experience and demonstrate our commitment to providing you with the best possible service.

Please let us know which option interests you, or if you have any other concerns, we are here to help.

Thank you once again for being a valued member of our community. We look forward to hearing from you soon.

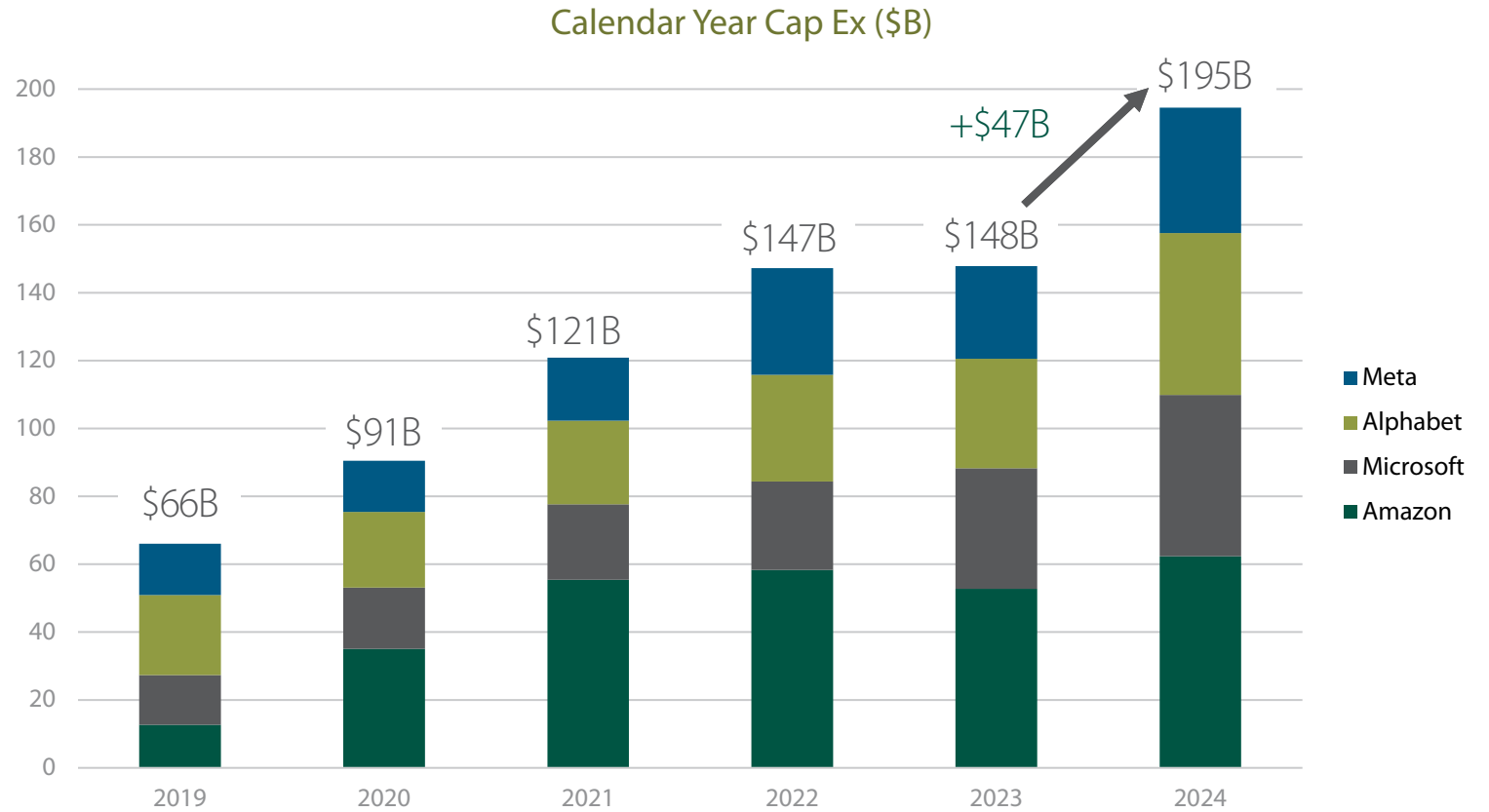
Warm regards,

[Cable Company]

# INVESTING BEYOND GPU<sub>s</sub>

## Enablers: Hardware

Looking at major cloud infrastructure spenders (Amazon, Microsoft, Alphabet and Meta), there is nearly \$200B of expected cap ex spend in 2024.



# Enablers: Hardware

Holding	Data Center Role	Market Cap	Global Opps	Global Discovery	Mid Cap	Small Cap
Taiwan Semiconductor	Manufacturing	\$706B	✓			
Advanced Micro Devices	GPU Provider	\$292B	✓	✓		
Synopsys	Design	\$87B			✓	
Arista Networks	Networking	\$91B	✓	✓	✓	
Astera Labs	Networking	\$11B				✓
Onto Innovation	Inspection	\$9B				✓
MACOM	Networking	\$7B		✓	✓	✓

# How are we thinking about AI-driven investment opportunities?

Industries that will be impacted are far-reaching. While most near-term value creation has accrued to hardware companies selling into the datacenter supply chain, we are doing a lot of work to understand which companies are poised to be second-order beneficiaries.

**Enablers: Hardware**

**Beneficiaries: Proprietary Data Providers**

**Enablers: Electrification, Power and Cooling**

**Beneficiaries: Business Model Breakthroughs**

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# Enablers: Electrification, Power and Cooling

Eaton Corp

**\$1.2T**  
in cumulative  
North America  
mega projects  
since January 2021

- 42 megaproject announcements in Q1 2024 totaling **\$130B+**
- **54%** of projects are related to federal government incentives (IRA, IIJA, CHIPS)
- Only **16%** of these projects have started construction—multi-year runway
- Megaprojects represented **15%** of total nonresidential construction starts in 2023

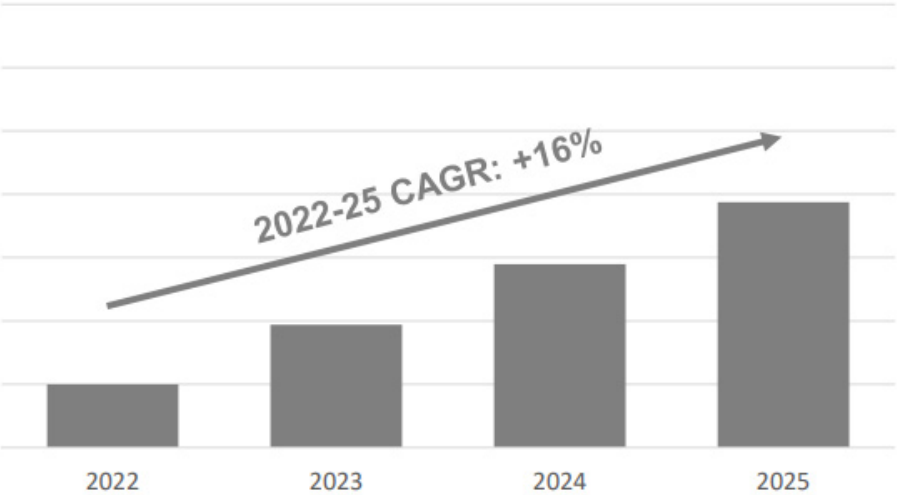


# Enablers: Electrification, Power and Cooling

## Prior View (3Q'23 Earnings)

Data Centers End Market – Indexed Growth

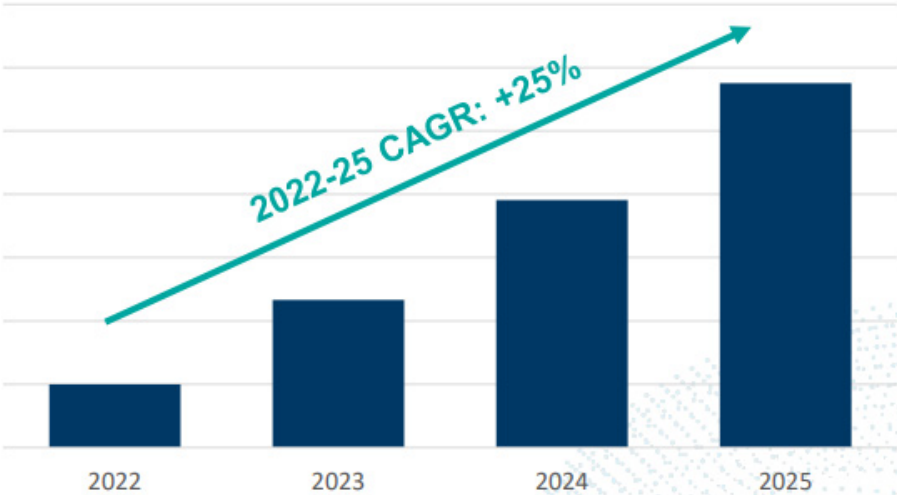
■ Global Product Addressable Market



## Current View

Data Centers End Market – Indexed Growth

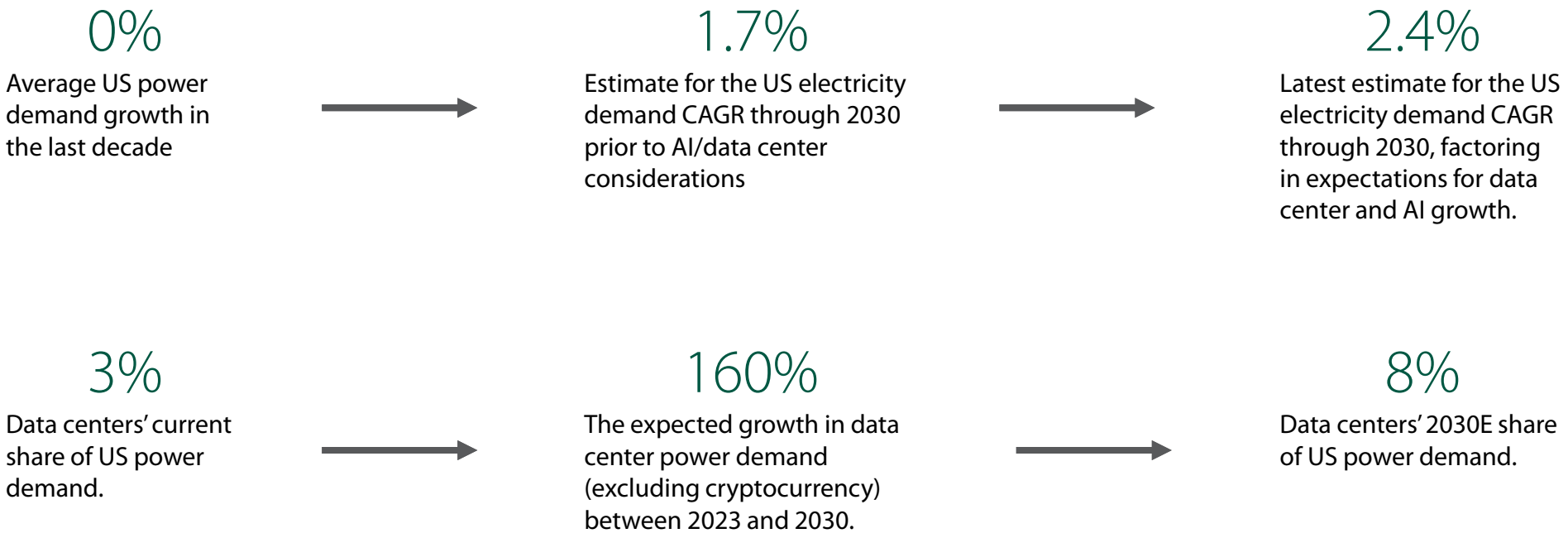
■ Global Product Addressable Market



Source: Eaton Corp. As of 30 Apr 2024. See notes and disclosures for holdings information.

# Enablers: Electrification, Power and Cooling

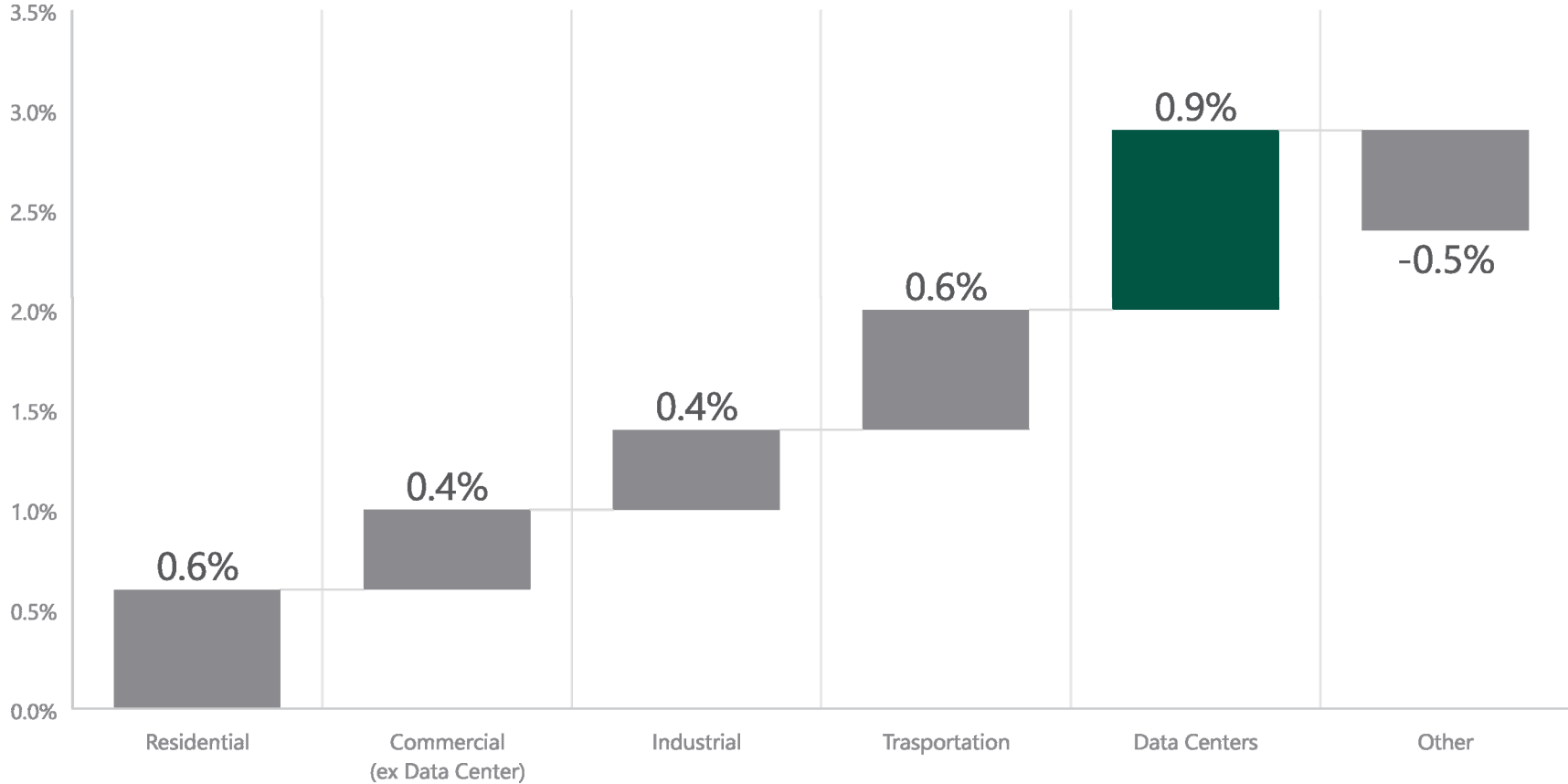
## The US Power Demand Surge in Numbers



Source: Goldman Sachs. "Generational Growth AI, Data centers and the coming US power demand surge. As of 30 Apr 2024.

# Enablers: Electrification, Power and Cooling

Composition of 2.4% US Power Demand CAGR, 2022-2030

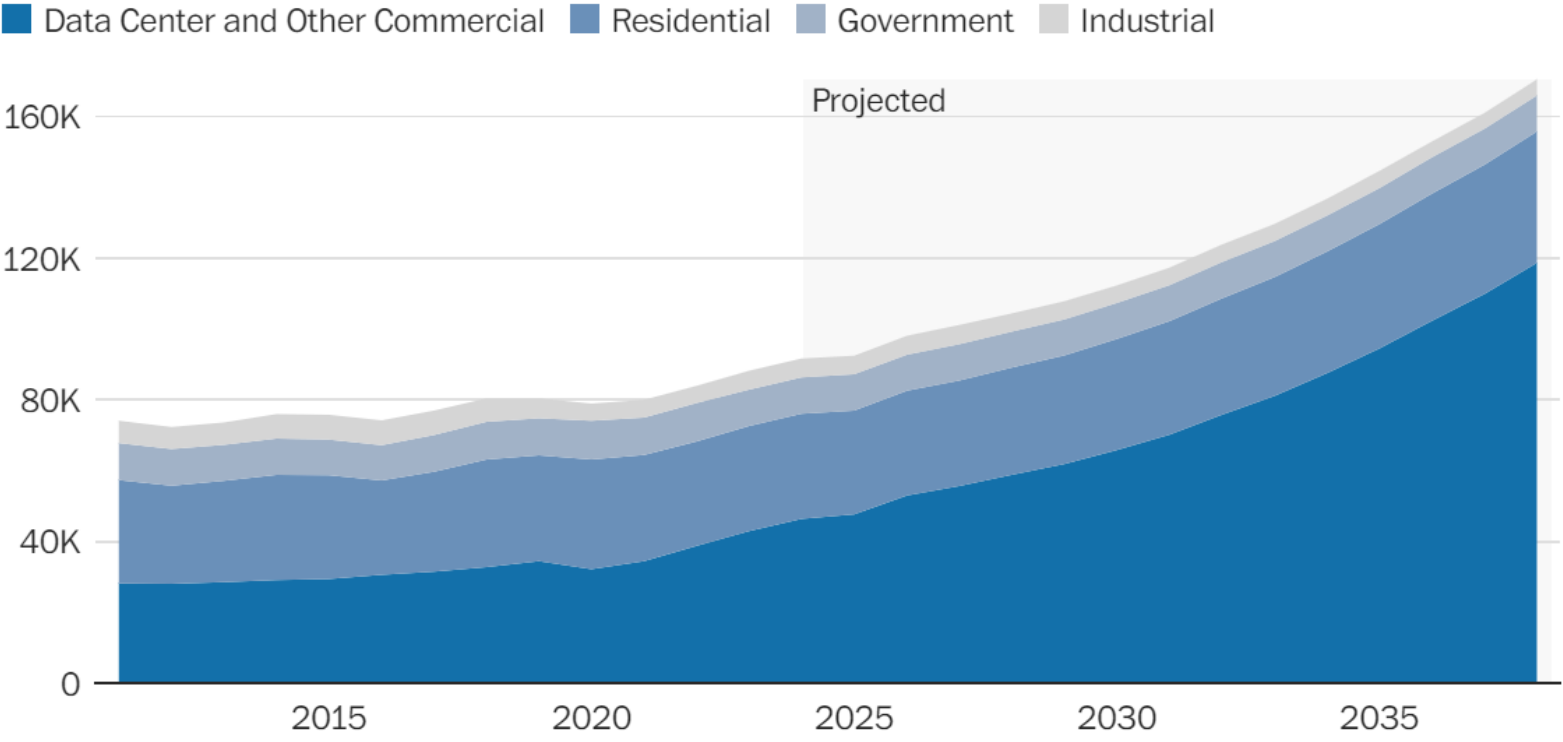


Data centers contribute 90bps to the overall 2.4% estimated US power demand CAGR from 2022-2030

Source: Goldman Sachs. "Generational Growth AI, Data centers and the coming US power demand surge. As of 30 Apr 2024.

# Enablers: Electrification, Power and Cooling

Dominion Energy customer demand in Virginia, in gigawatt hours

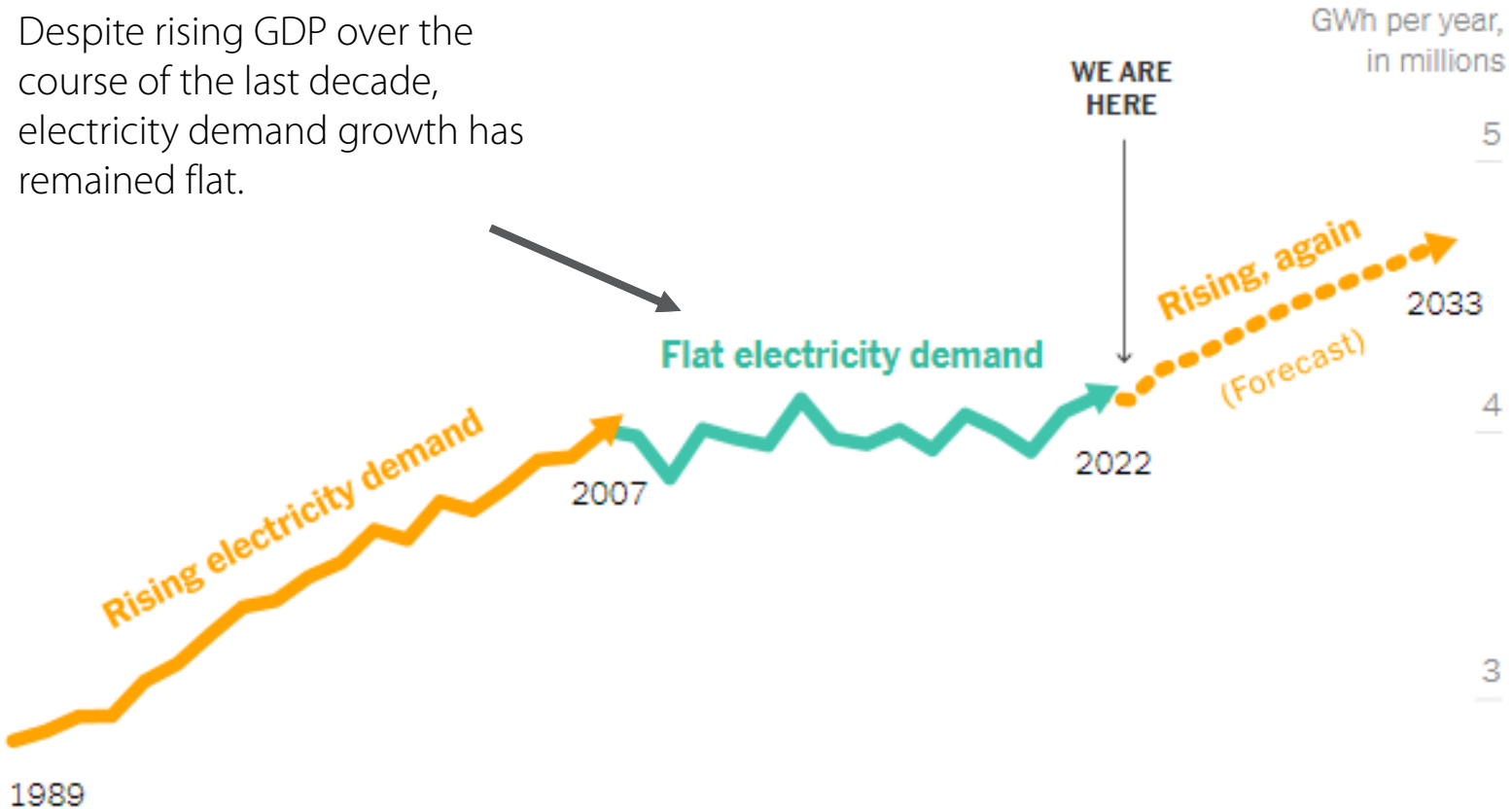


Source: Dominion Energy's Virginia Electric and Power Company Integrated Resource Plan

Source: Washington Post. "Amid explosive demand, America is running out of power". 7 Mar 2024.

# Enablers: Electrification, Power and Cooling

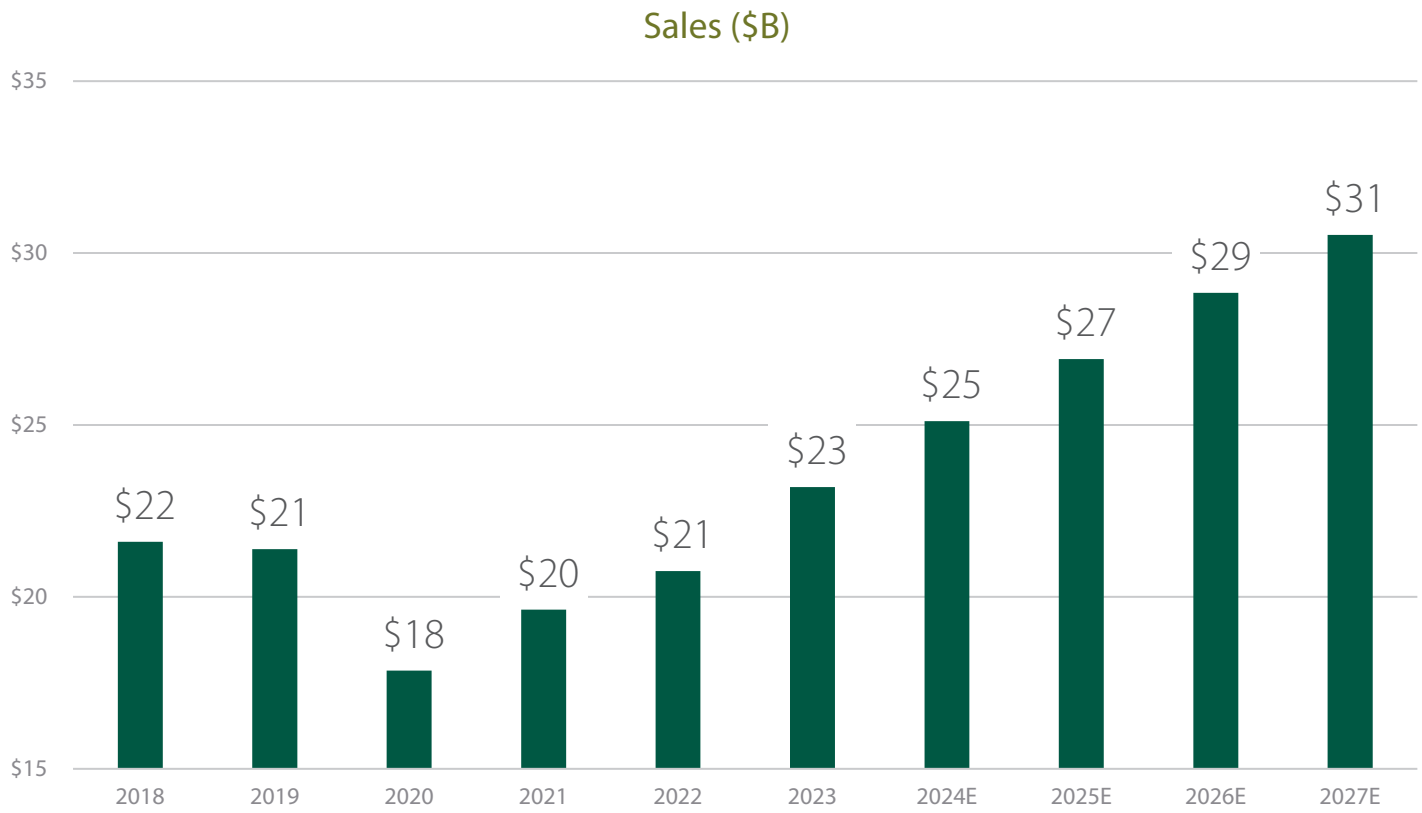
Despite rising GDP over the course of the last decade, electricity demand growth has remained flat.



Source: New York Times. "A New Surge in Power Use Is Threatening U.S. Climate Goals". 14 Mar 2024.

# Enablers: Electrification, Power and Cooling

## Eaton Corp Annual Sales



Source: Artisan/FactSet. As of 15 May 2024. See notes and disclosures for holdings information.

# Enablers: Electrification, Power and Cooling

Holding	Data Center Role	Market Cap	Global Opps	Global Discovery	Mid Cap	Small Cap
Eaton	Electrification	\$125	✓			
Quanta Services	Electrification	\$38B	✓	✓	✓	
Monolithic Power Systems	Power Management	\$33B		✓	✓	
Vertiv	Liquid Cooling	\$31B		✓	✓	
Hubbell	Electrification	\$22B		✓	✓	
SPX Technologies	Liquid Cooling	\$6B				✓
MYR Group	Electrification	\$3B				✓

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# Proprietary Data Providers

## London Stock Exchange

London Stock Exchange's data and analytics advantage is built on its breadth and depth of proprietary data serving an array of analysts, portfolio managers, investment bankers, sales and traders, wealth advisors and academics.





# Proprietary Data Providers

Holding	Country	Sector	Market Cap	Global Opps	Global Discovery	Mid Cap	Small Cap
S&P Global	United States	Financials	\$137B	✓			
RELX	United Kingdom	Industrials	\$81B	✓			
London Stock Exchange	United Kingdom	Financials	\$65B	✓	✓		
CoStar Group	United States	Real Estate	\$39B	✓		✓	
Verisk	United States	Industrials	\$34B			✓	
TradeWeb Markets	United States	Financials	\$22B		✓	✓	
MarketAxess	United States	Financials	\$8B		✓		✓
CCC Intelligent Solutions	United States	Information Technology	\$7B				✓

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# Business Model Breakthroughs

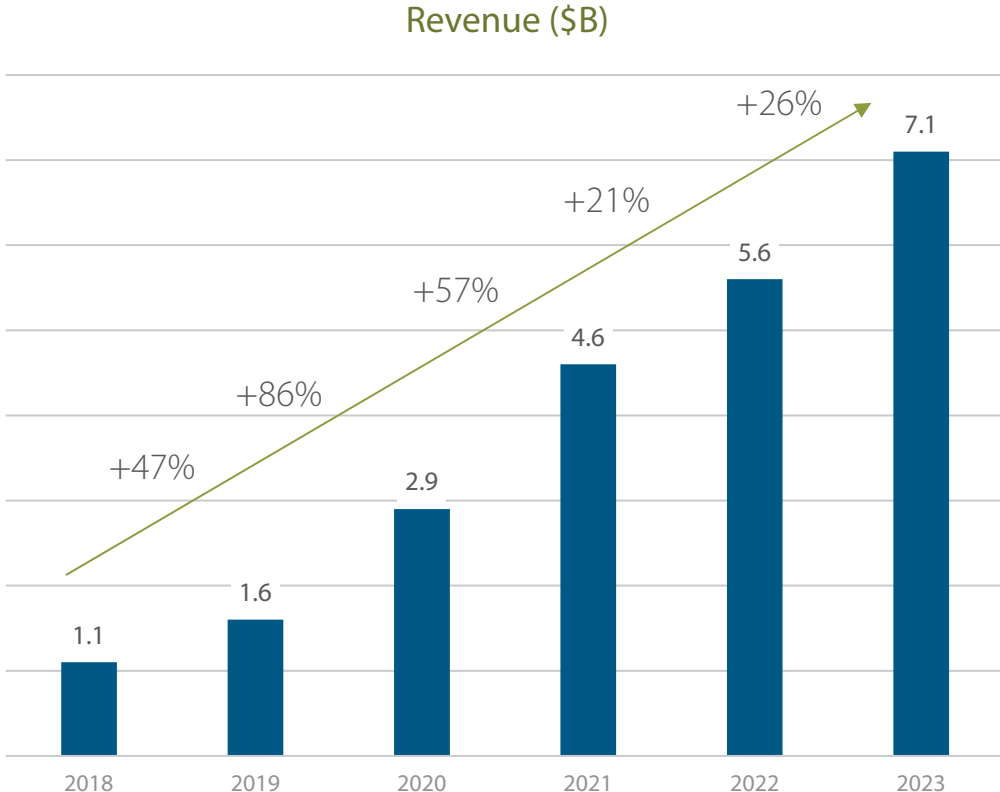
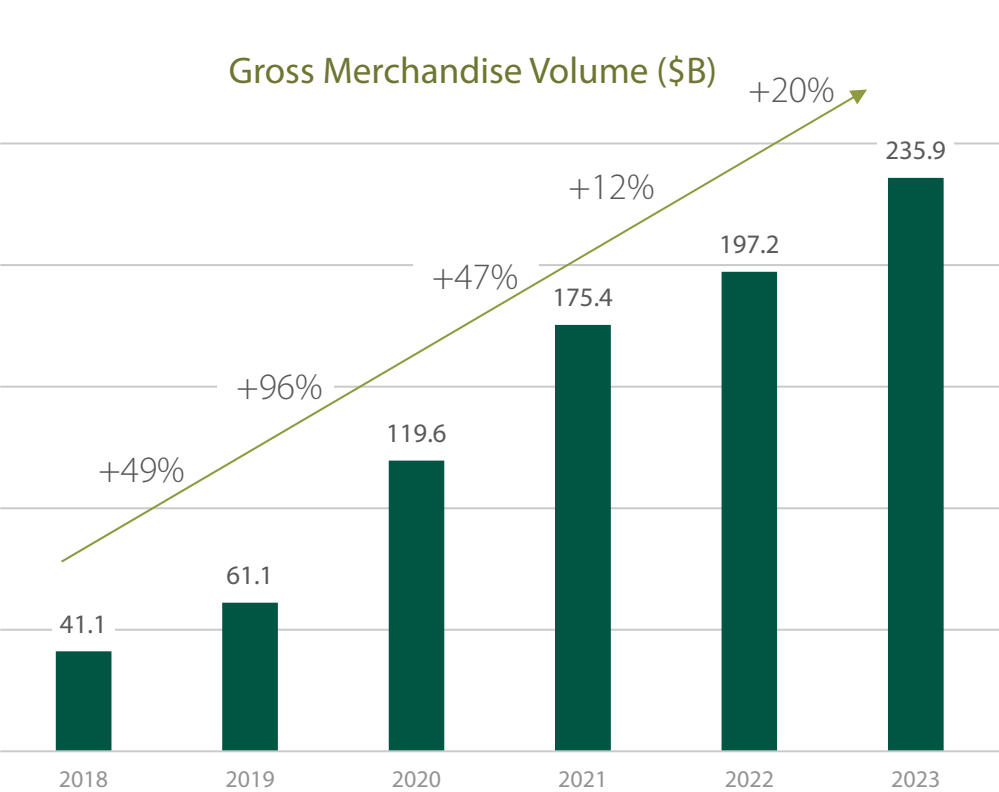
Shopify

Holding	Market Cap	Global Opps	Global Discovery	Mid Cap	Small Cap
Microsoft	\$3,127B	✓			
Amazon	\$1,873B	✓			
Netflix	\$263B	✓			
Shopify	\$99B	✓		✓	
HubSpot	\$32B		✓	✓	
GoDaddy	\$17B		✓	✓	
Gitlab	\$9B				✓
Duolingo	\$9B				✓

Source: Artisan Partners/FactSet. As of 31 Mar 2024. Discussion of current portfolio securities are not intended as a past or current recommendation to purchase or sell individual securities. See notes and disclosures for holdings information.

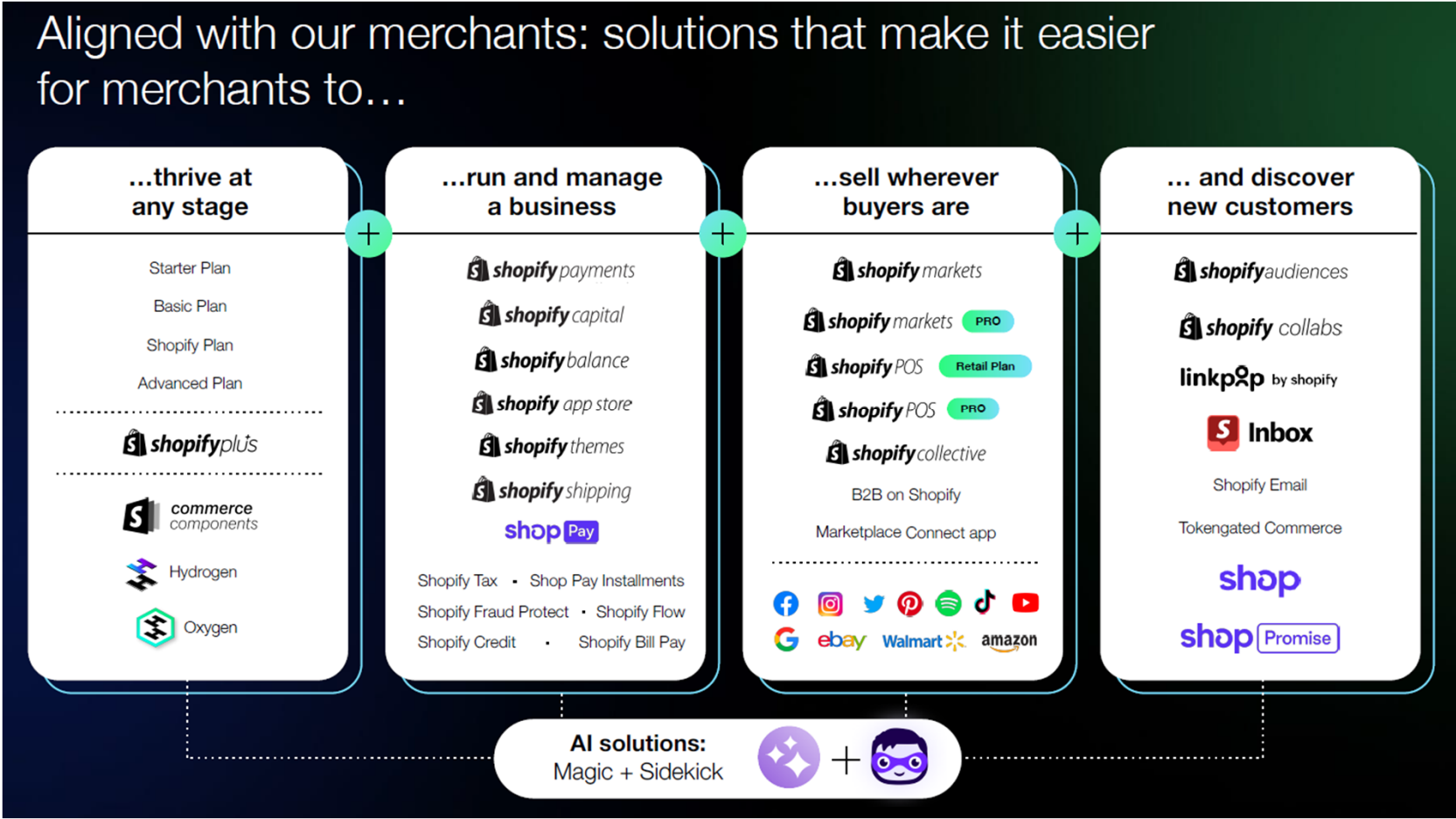
# Business Model Breakthroughs

Helping its merchants grow their business drives Shopify's business



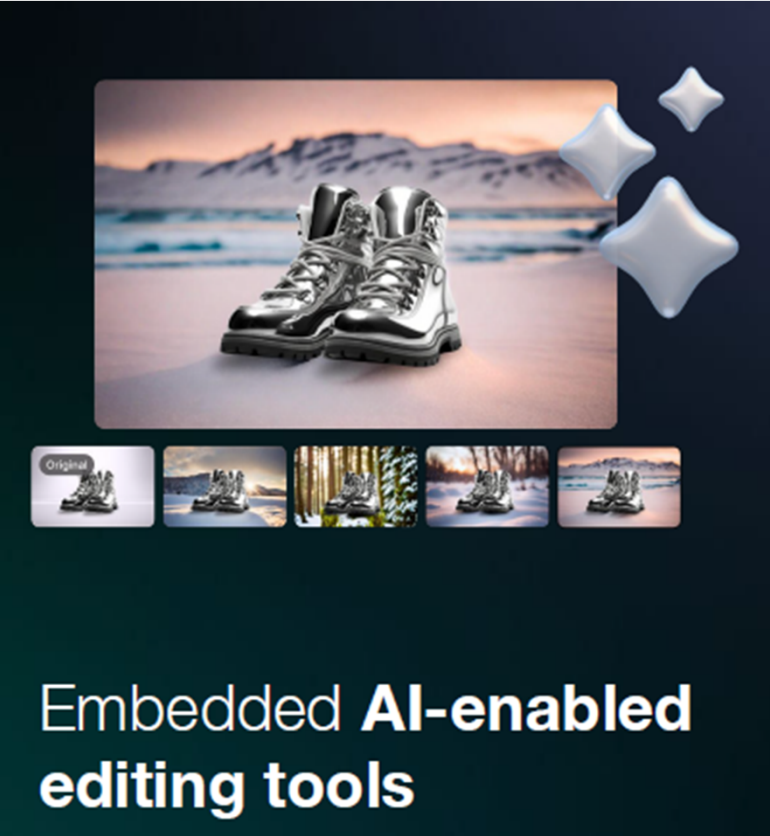
Source: Shopify 2023 Investor Presentation. See notes and disclosures for holdings information.

# Business Model Breakthroughs

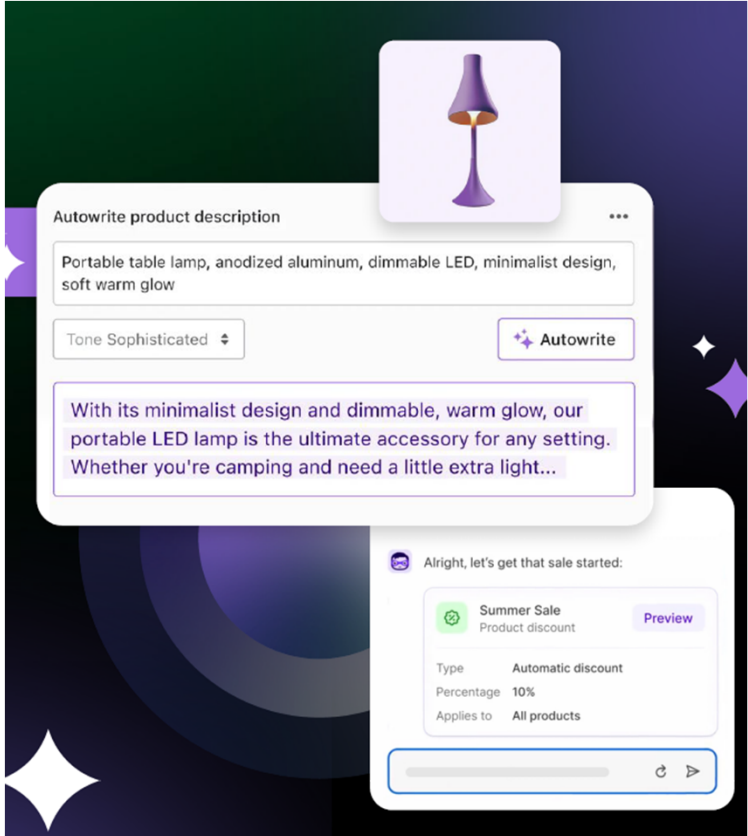


Source: Shopify 2023 Investor Presentation. See notes and disclosures for holdings information.

# Business Model Breakthroughs



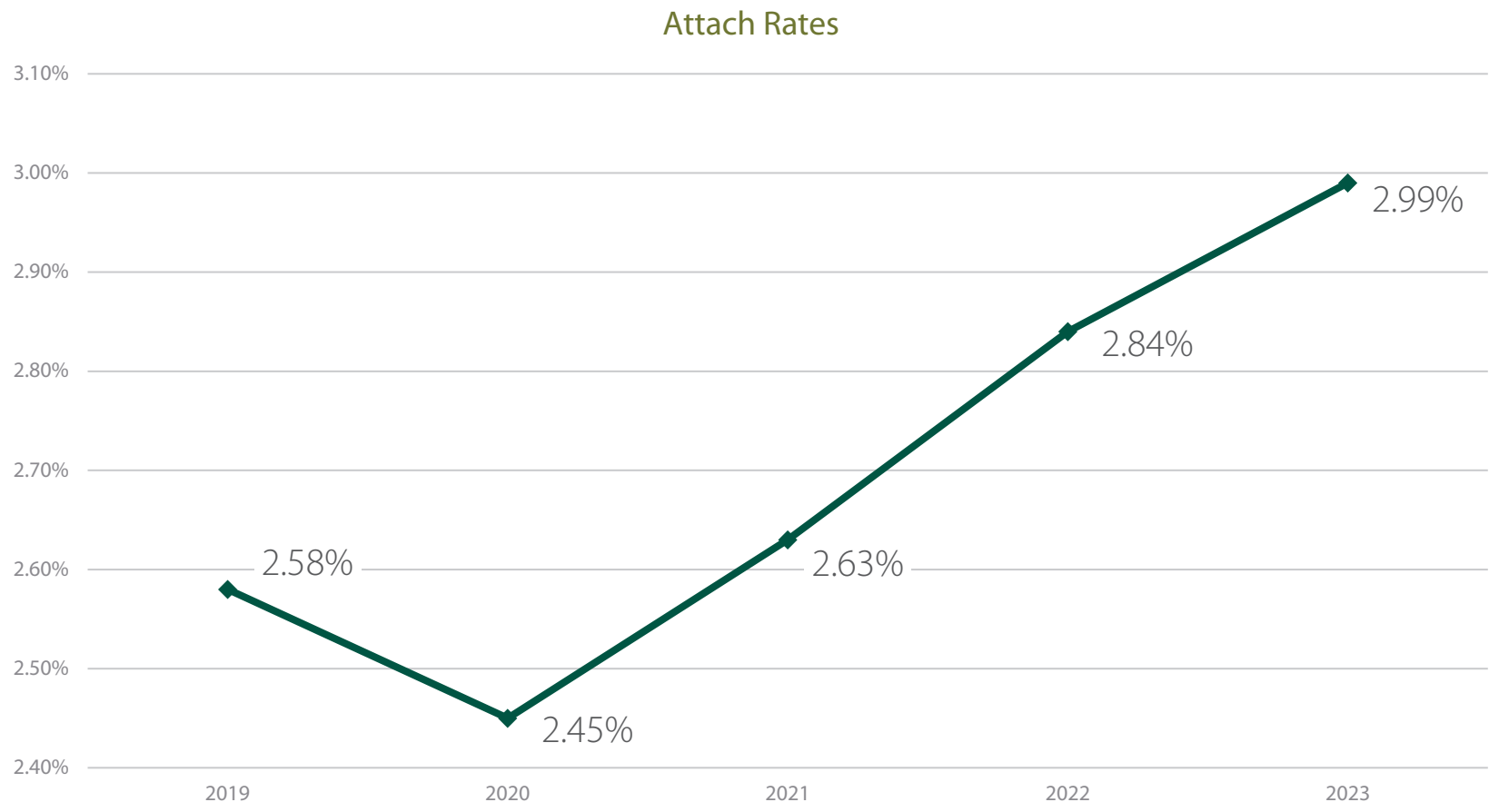
The screenshot shows a dark-themed interface for an AI-enabled image editing tool. At the top, there is a large image of a pair of silver boots on a beach at sunset. To the right of the image are three white, four-pointed starburst icons. Below the main image is a row of five smaller thumbnails, each showing the boots in a different background setting. The first thumbnail is labeled 'Original'. At the bottom of the interface, the text 'Embedded AI-enabled editing tools' is displayed in a large, white, sans-serif font.



The screenshot shows a dark-themed interface for an AI-generated product description tool. At the top, there is a purple lamp icon. Below it is a white box with the title 'Autowrite product description' and a three-dot menu icon. The main text area contains the following description: 'Portable table lamp, anodized aluminum, dimmable LED, minimalist design, soft warm glow'. Below the text is a dropdown menu set to 'Tone Sophisticated' and an 'Autowrite' button with a starburst icon. Below the button is a preview of the generated text: 'With its minimalist design and dimmable, warm glow, our portable LED lamp is the ultimate accessory for any setting. Whether you're camping and need a little extra light...'. At the bottom, there is a notification box with the text 'Alright, let's get that sale started:' and a 'Summer Sale' card. The card shows 'Product discount', 'Type: Automatic discount', 'Percentage: 10%', and 'Applies to: All products'. There is a 'Preview' button and a progress bar at the bottom of the notification.

# Business Model Breakthroughs

Shopify has been slow to monetize the value it creates for merchants



Source: Shopify 2023 Investor Presentation. Attach rate is Shopify's revenue as a percentage of its customers sales. See notes and disclosures for holdings information.

The background features a complex, abstract geometric pattern. The top half is dominated by dark blue and green triangular and polygonal shapes. A solid black horizontal band runs across the middle, containing the text. The bottom half continues the geometric theme with lighter blue, green, and yellow shapes, including a prominent circular arc on the right side.

Questions?

# Notes and Disclosures

This section of this presentation contains information important to a complete understanding of the material presented. Please review it carefully.

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