A Net Zero Roadmap for Sustainable IT

Kristin Moyer

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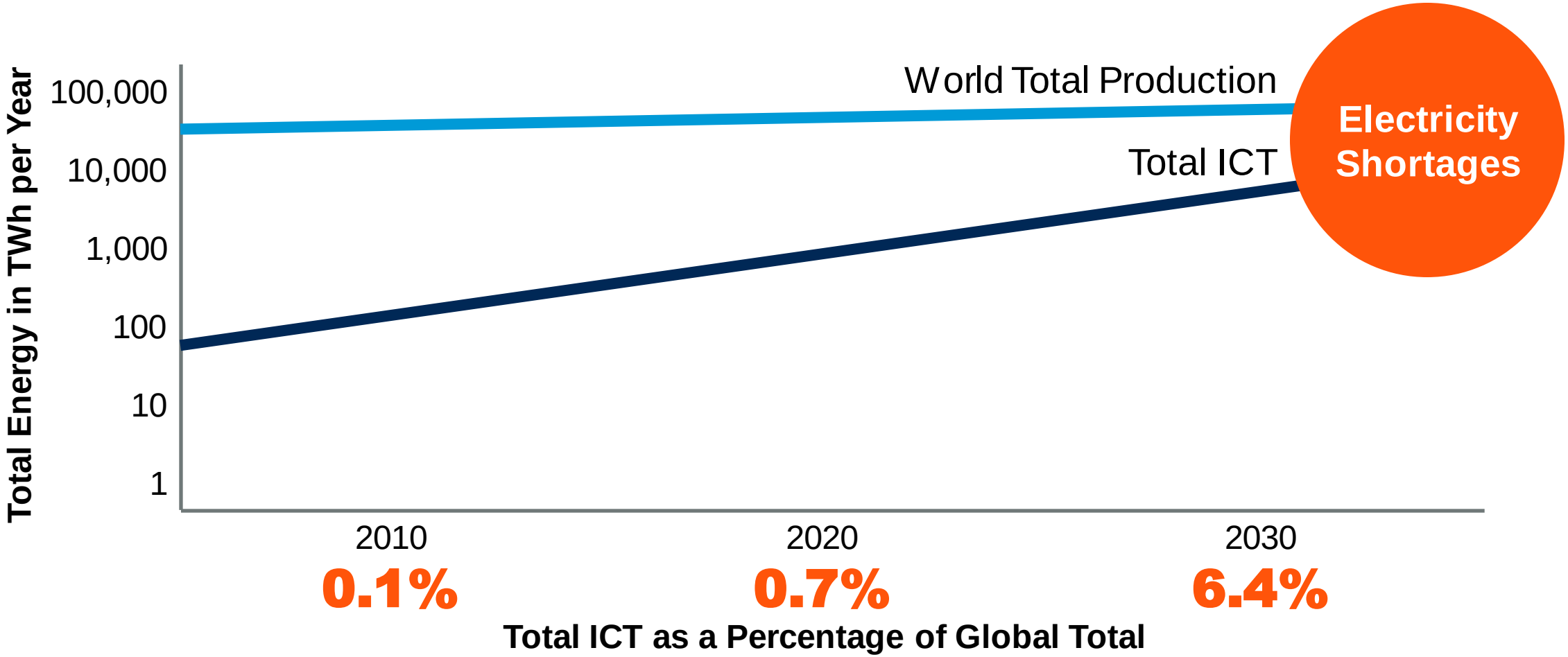
Tech-Related Energy Demand Is Unsustainable

World Generation Capacity vs. ICT Energy Requirements



Source: SRC's Decadal Plan Update, SRC; World Energy Outlook 2022, International Energy Agency

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By 2025, 75% of organizations will experience ongoing electricity shortages, accelerating the push for sustainable IT.

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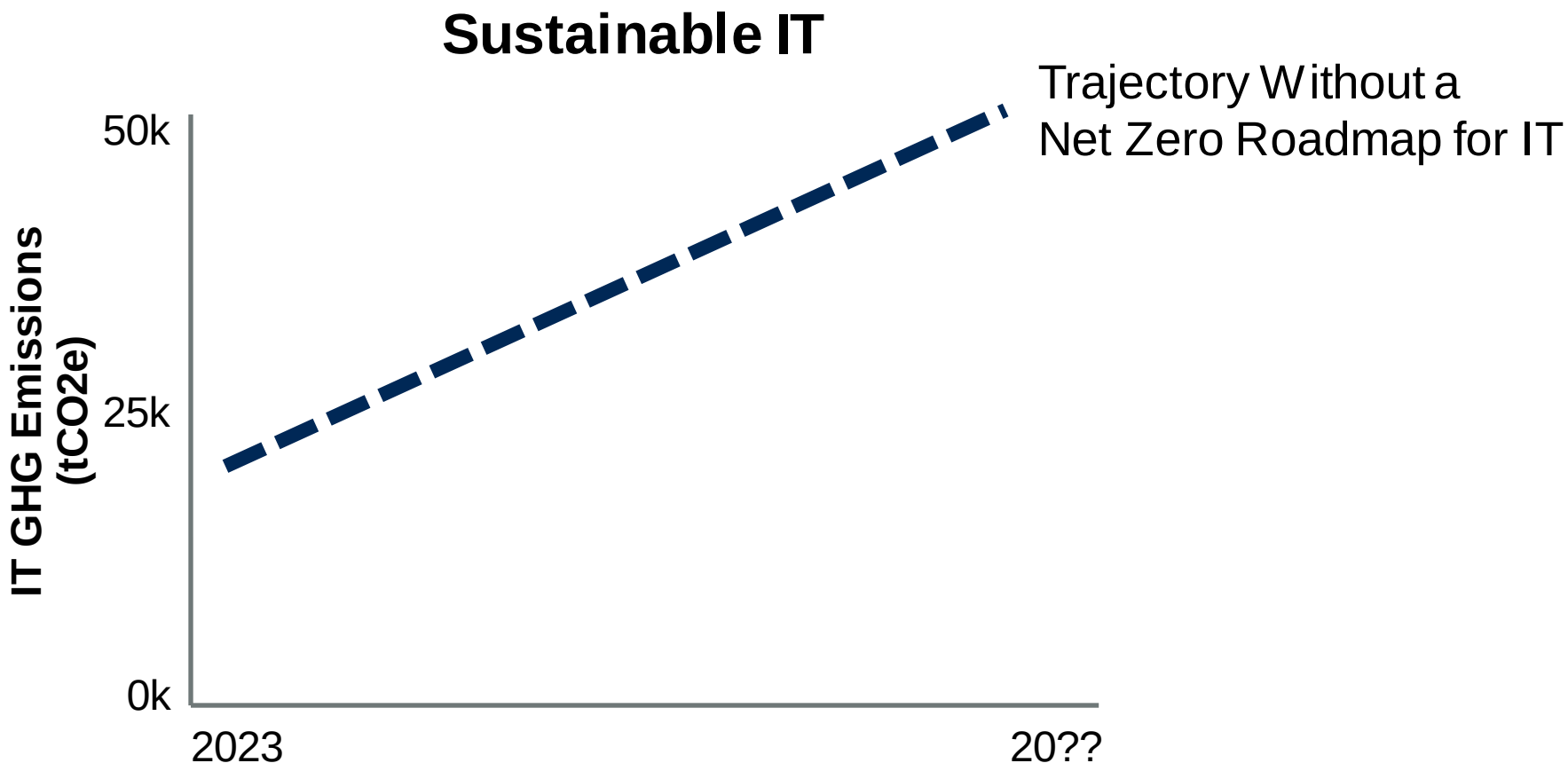
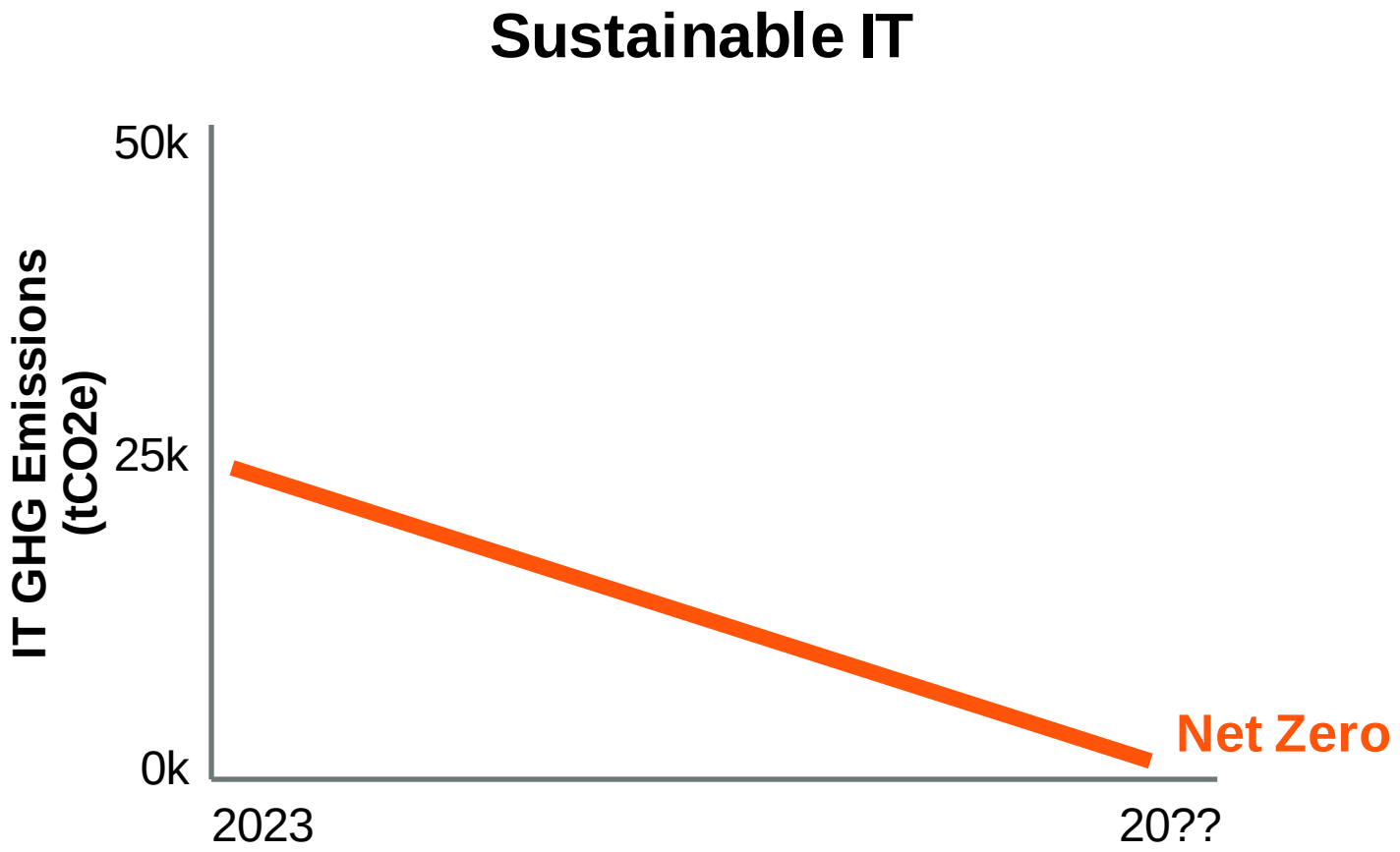
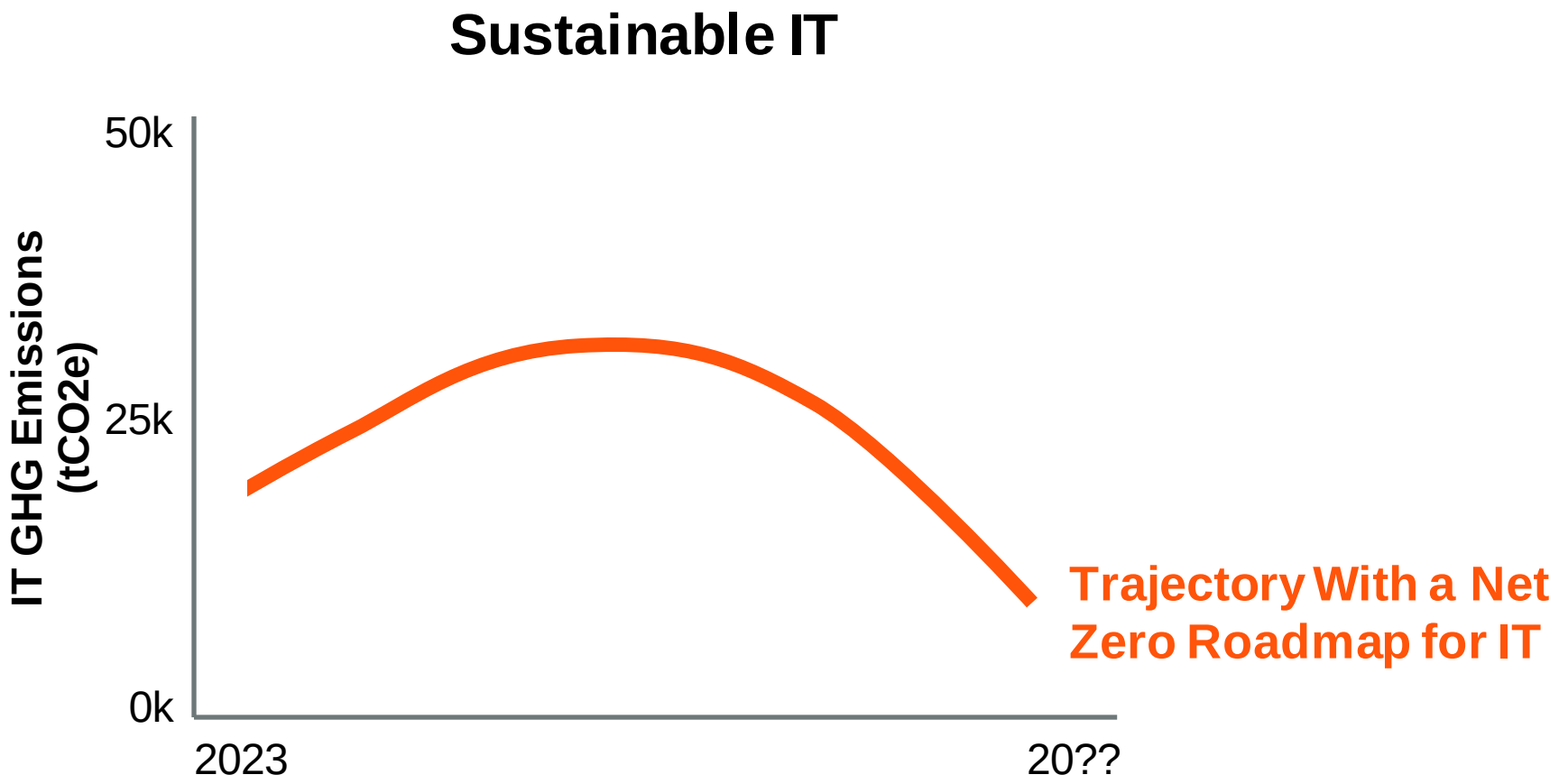
IT Is Currently Not Sustainable



This Is Not a Realistic Net Zero Roadmap for IT



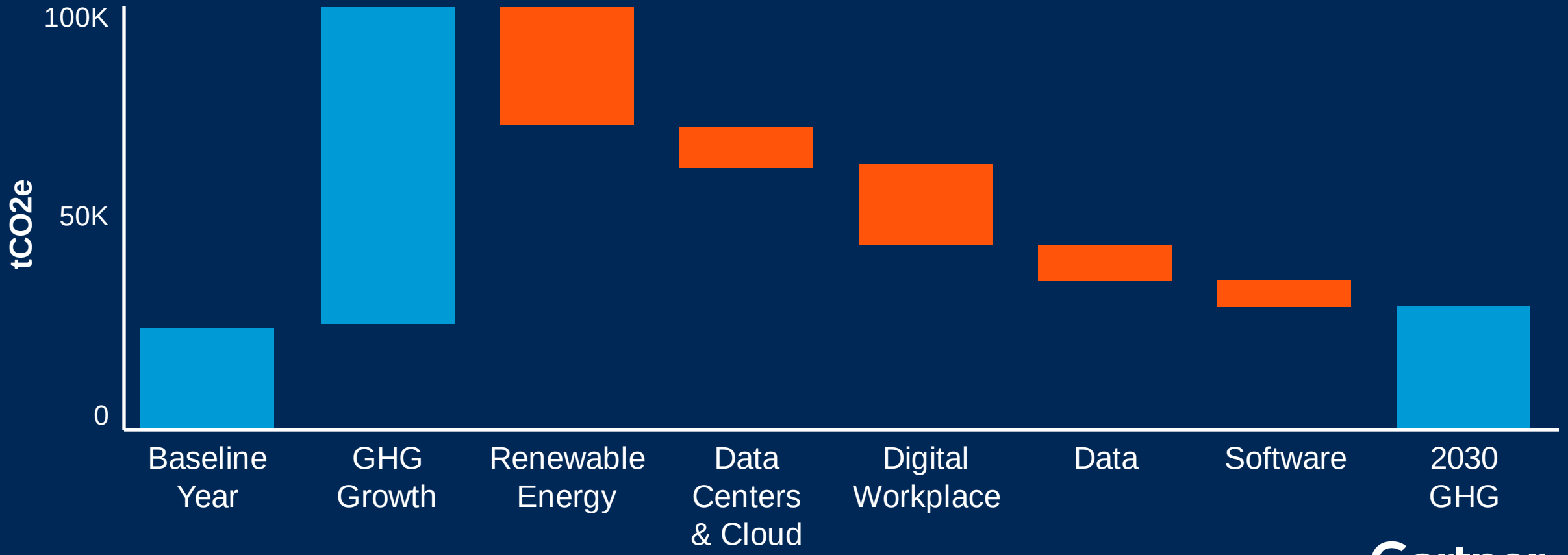
This Is a More Realistic Net Zero Roadmap for IT



CIO Action: Build a Net Zero Roadmap for Sustainable IT

Net Zero Roadmap for Sustainable IT (Illustrative)

Assumes 30% CAGR GHG Increase Through 2030



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Renewable Energy

Net Zero Roadmap for Sustainable IT (Illustrative)

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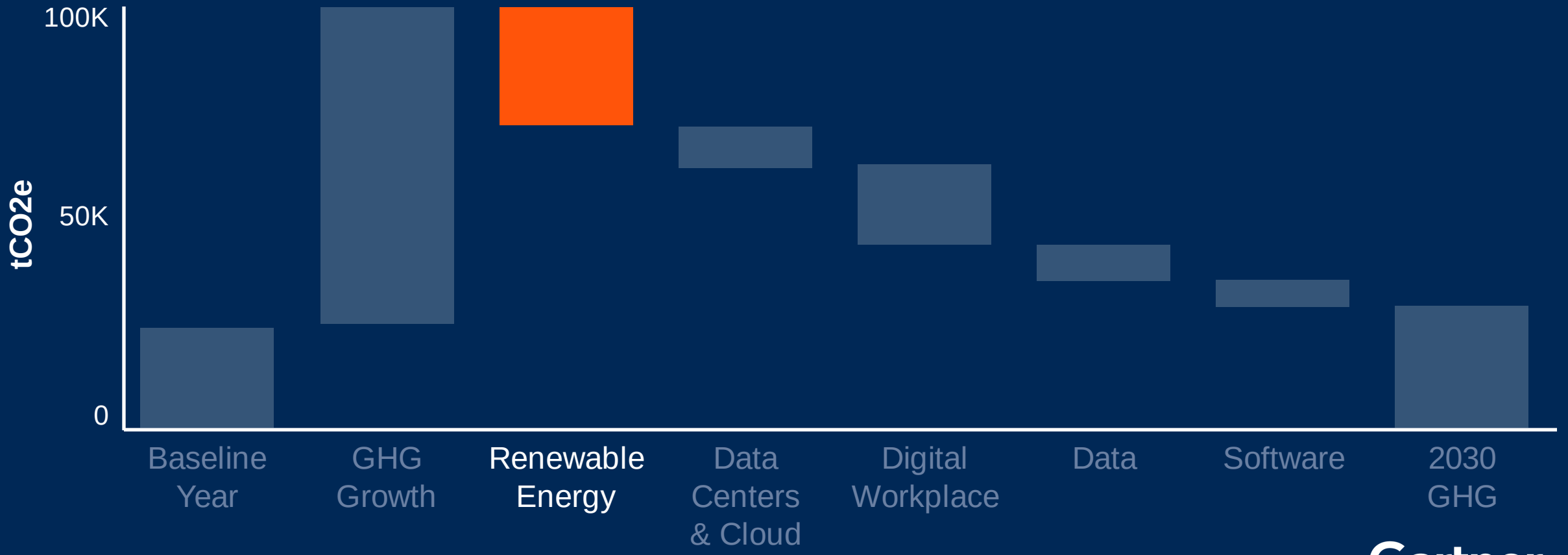

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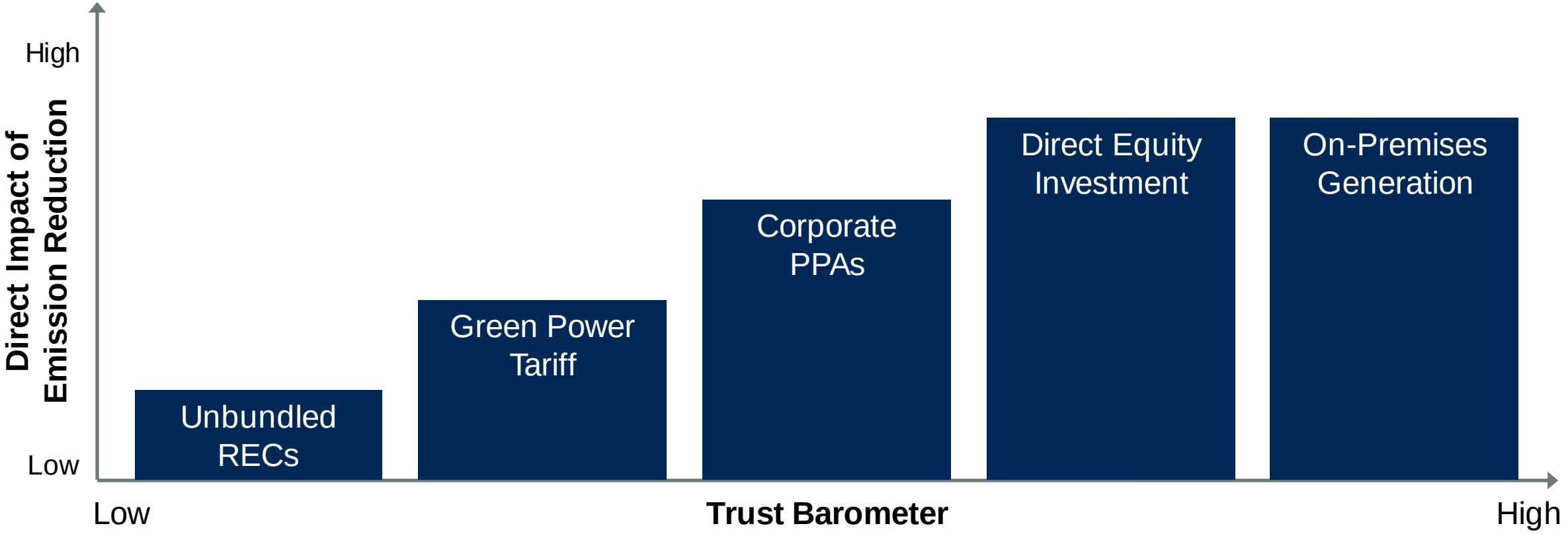
Create a Policy for IT-related Renewable Energy Procurement

Renewable Energy Sourcing Methods

Illustrative



Source: Gartner
Procurement complexity can include contractual structure, duration of contract, financial obligations, return on investment and reputational risk.

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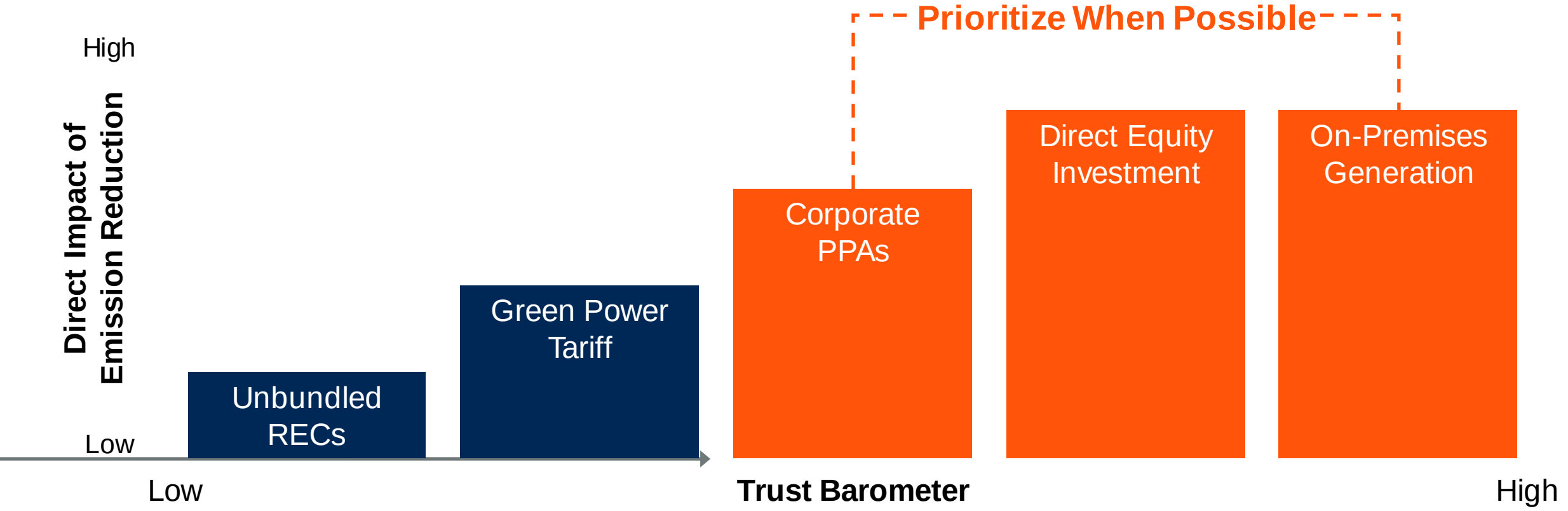

Source: Gartner
Procurement complexity can include contractual structure, duration of contract, financial obligations, return on investment and reputational risk.

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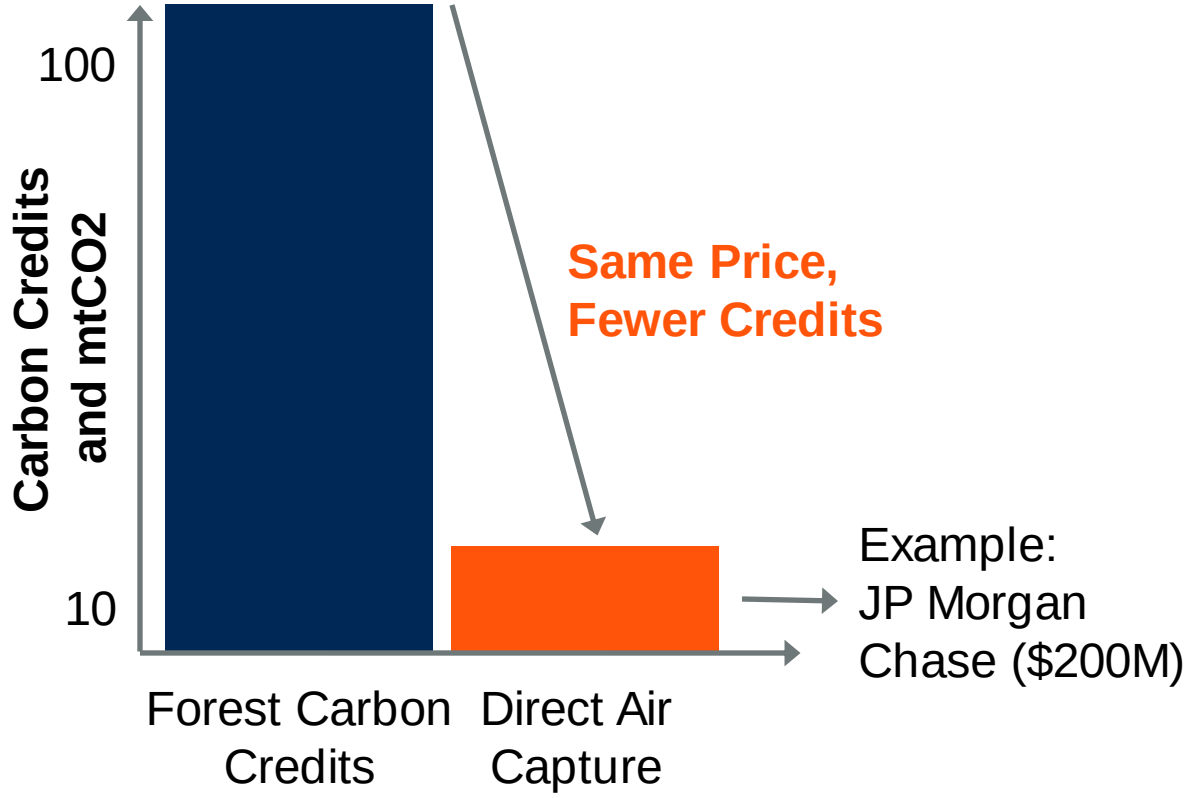
Use Carbon Offsets as a Last Resort

Verra

90% of Rainforest Offset Credits Are "Phantom Credits"

94% of Credits Had No Benefit to the Climate

Flight to Quality (and Higher Prices)



Source: Revealed: More Than 90% Of Rainforest Carbon Offsets By Biggest Certifier Are Worthless, Analysis Shows, The Guardian; A Spotlight on Shoddy Offsets #152, CTVC; JPMorgan Chase Seeks to Scale Investment in Emerging Carbon Removal Technologies, Announces Agreements Intended to Durably Remove and Store 800,000 Tons of Carbon, JPMorgan Chase

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Data Centers and Cloud

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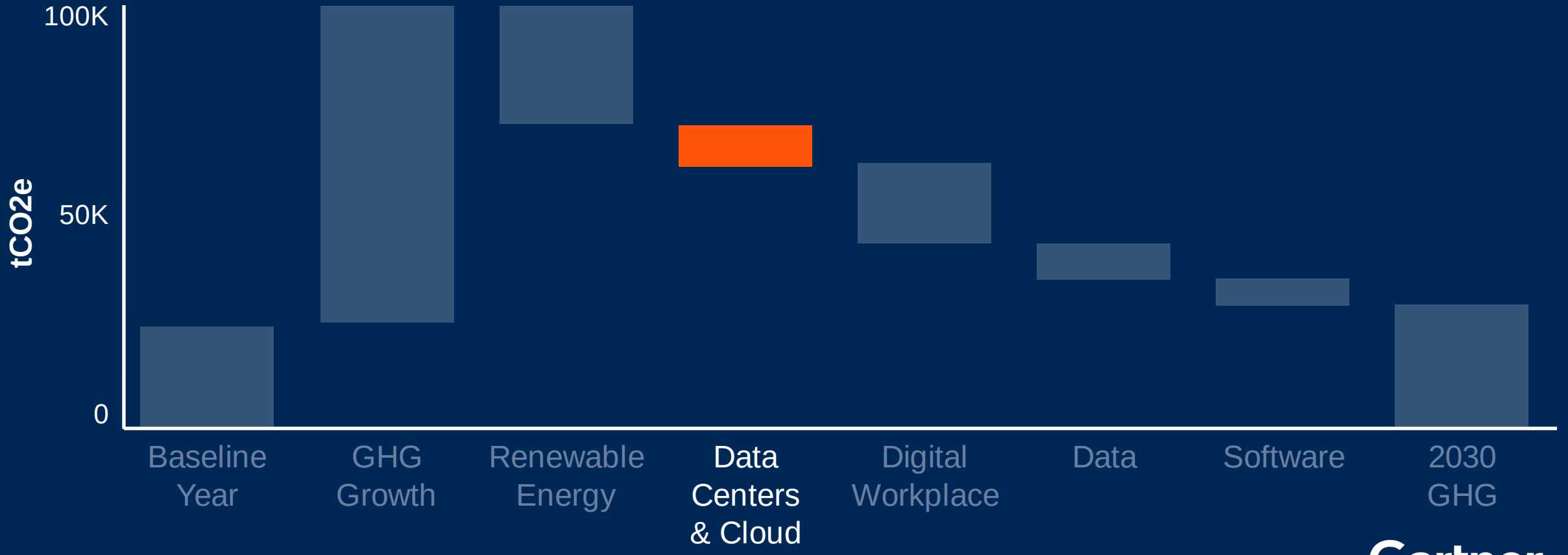

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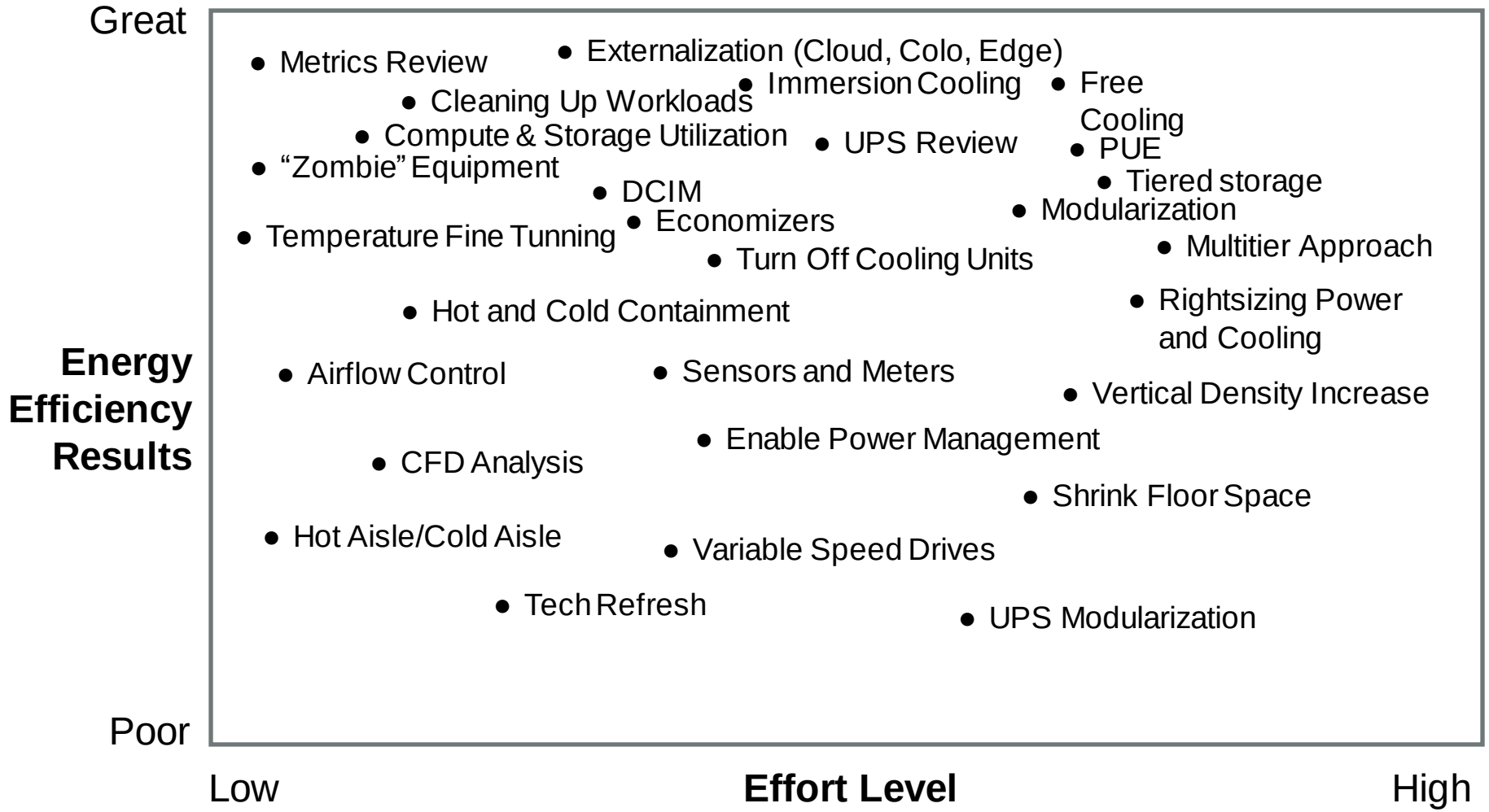
From Efficiency of Supply to Demand Management

Data Center Energy Efficiency Initiatives



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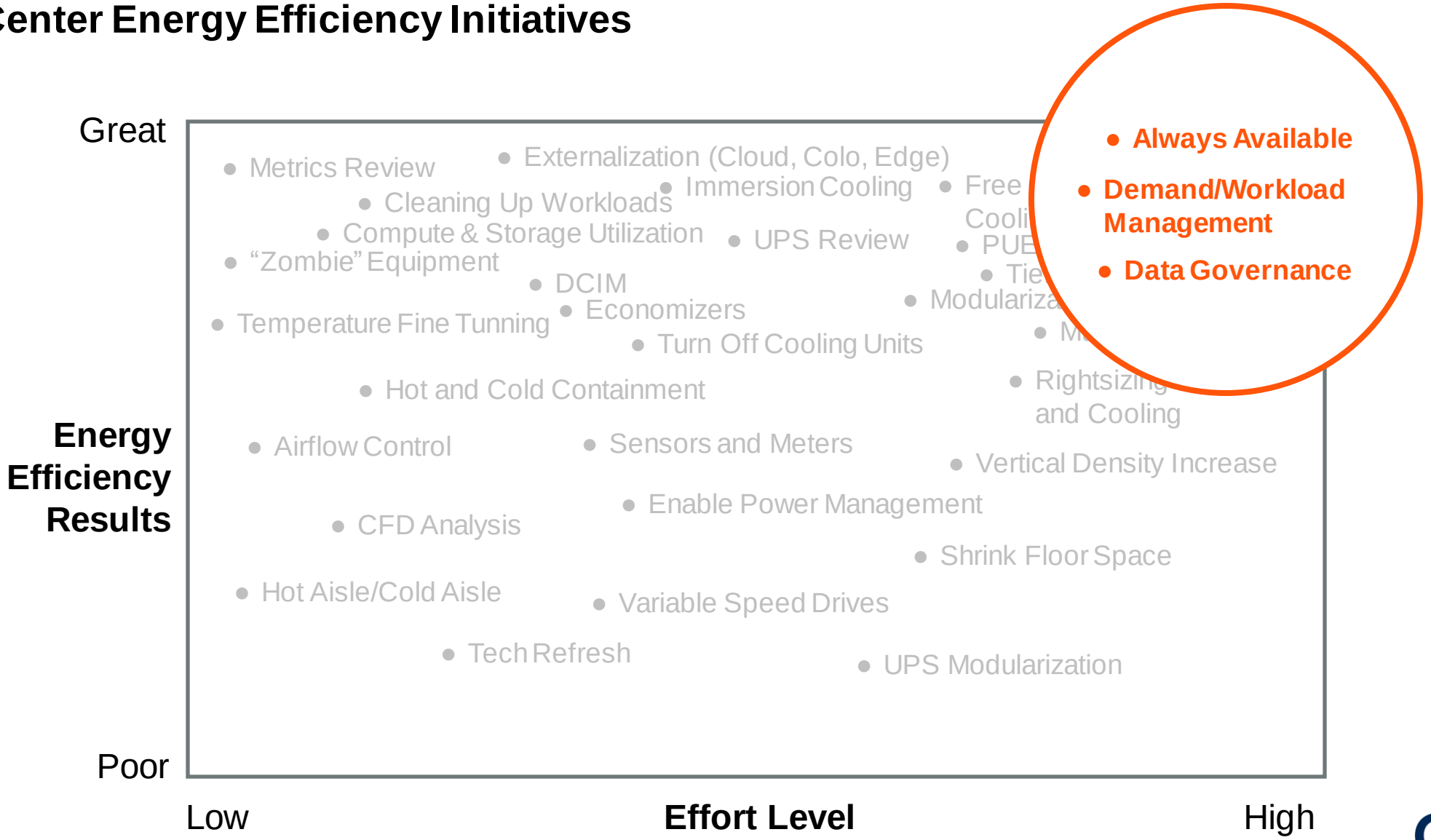

Move From “Always-On” to “Always-Available”

ABN·AMRO

Sustainability Rating – S

Enhancement to workload classification structure: CIA-S

Sustainability Rating (S)	Resource Dynamics Archetypes / Characteristics Applicable on Product, Workload and/or Business process level	Typical / background
0 Label A	**‘Always-off or default-off’** Resources scaling back to 0, when no workload present/needed. Resources dynamically (de)allocated when workload in use *	Excl. listener/orchestrator/backup(s) Compute scaling down to 0 Data scaling down to 0 *Driven by sessions/transactions/analytics/etc.
1 Label B	**‘Always-off or default-off’** Resources not scaling back to 0, when no workload present/needed. Resources dynamically (de)allocated when workload in use *	Excl. listener/orchestrator/backup(s) Compute scaling down to 0 Data not scaling down to 0 (persistent data, footprint remains)
2 Label C	**‘Partly-off’** - minimal 3 of 3: 1. No permanently allocated DTA resources 2. No permanently allocated DR resources 3. No permanent allocated Peak load resources	Resources typically reside in shared platform(s) Typical On demand provisioning
3 Label D	**‘Partly-off’** - minimal 2 of 3: 1. No permanently allocated DTA resources 2. No permanently allocated DR resources 3. No permanent allocated Peak load resources	Resources typically reside in shared platform(s) Typical On demand provisioning
4 Label E	**‘Partly-off’** - minimal 1 of 3: 1. No permanently allocated DTA resources 2. No permanently allocated DR resources 3. No permanent allocated Peak load resources	Resources typically reside in shared platform(s) Typical On demand provisioning
5 Label F	**‘Always-on or Default-on’** All workload resources permanently allocated and active. (incl. DR/Peakload/DTA**)	Resources (capabilities/capacities) are continuously allocated and active. ** DTA=Development, Test, Acceptance

WvdZee Febr. 2020

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Public cloud can reduce GHG by 70% to 90%.

Source: Quick Answer: How Green Are Public Cloud Providers? (G00777481)

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Take Responsibility for Cloud Sustainability

Vendor is responsible for making cloud sustainable.

Organization is responsible for using cloud sustainably.

- Host cloud powered by renewable energy.
- Use the cloud operating model (elasticity, turning off compute instances when possible).
- Track sustainability metrics with the same diligence paid to costs.

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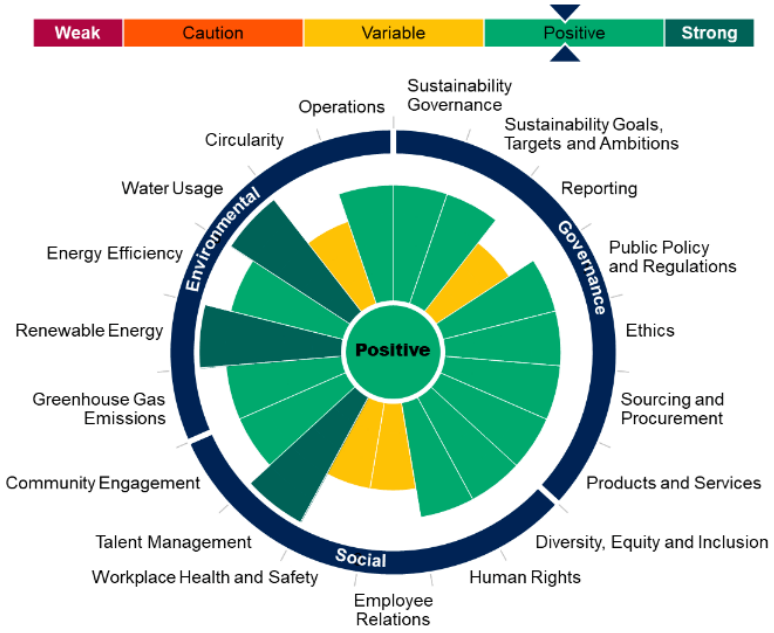
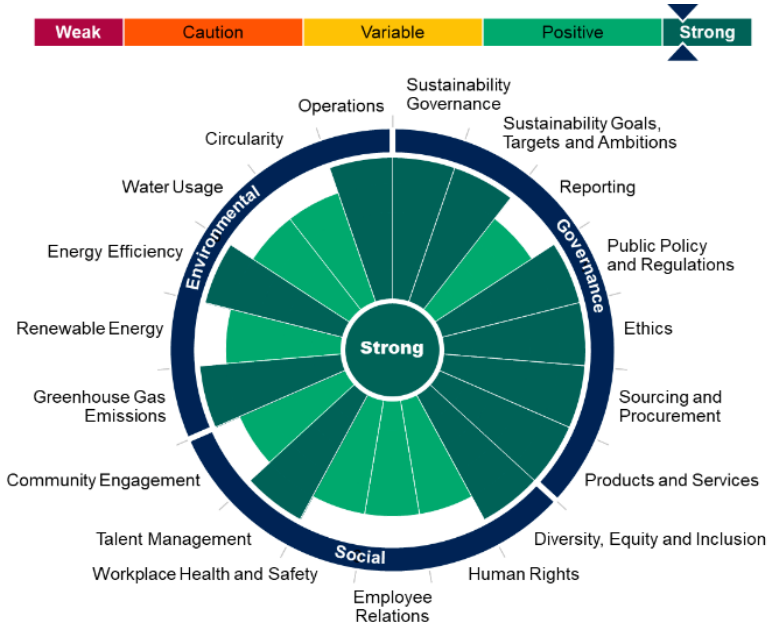
Assess Cloud Vendor Sustainability

Gartner Sustainability Assessment

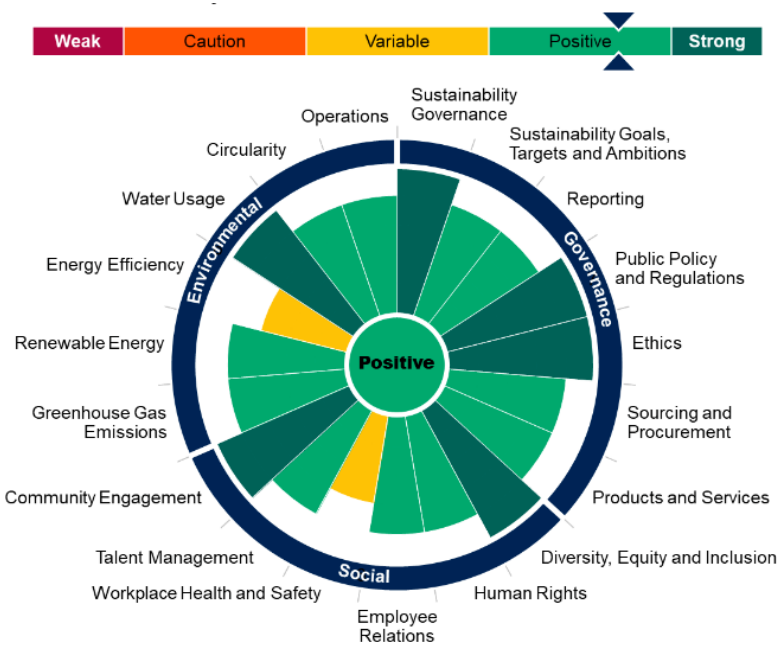
Amazon



Google



Microsoft



Source: Sustainability Assessment: Amazon (G00780305), Sustainability Assessment: Google (G00780808), Sustainability Assessment: Microsoft (G00780709)

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Digital Workplace

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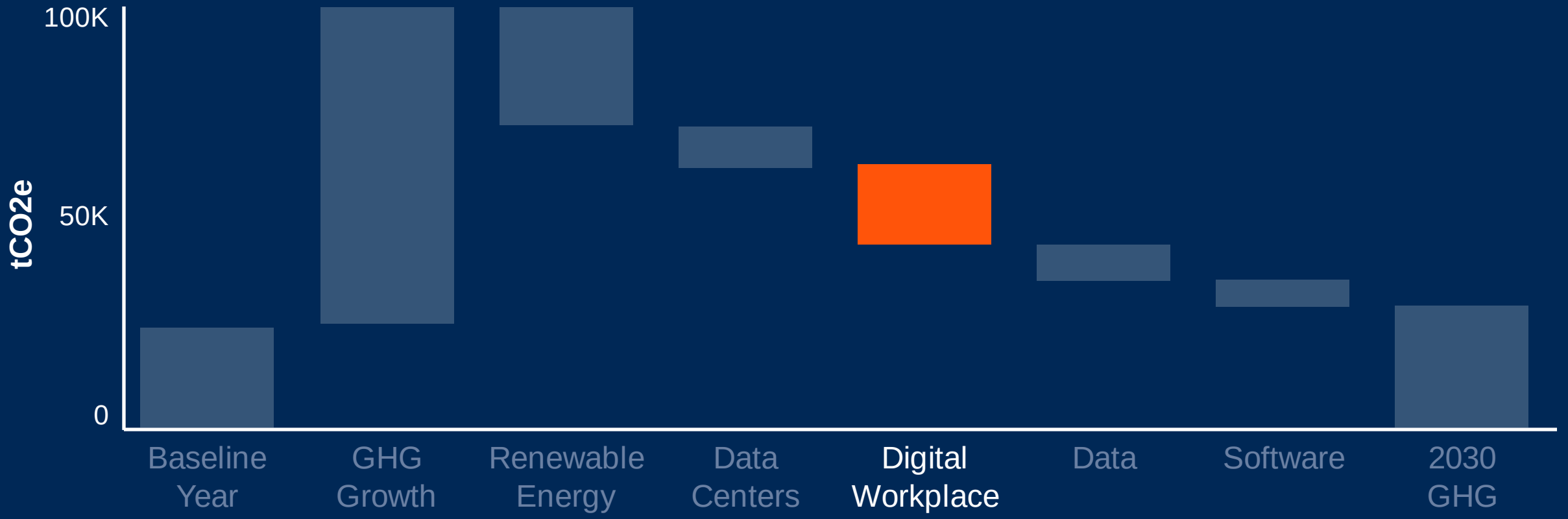

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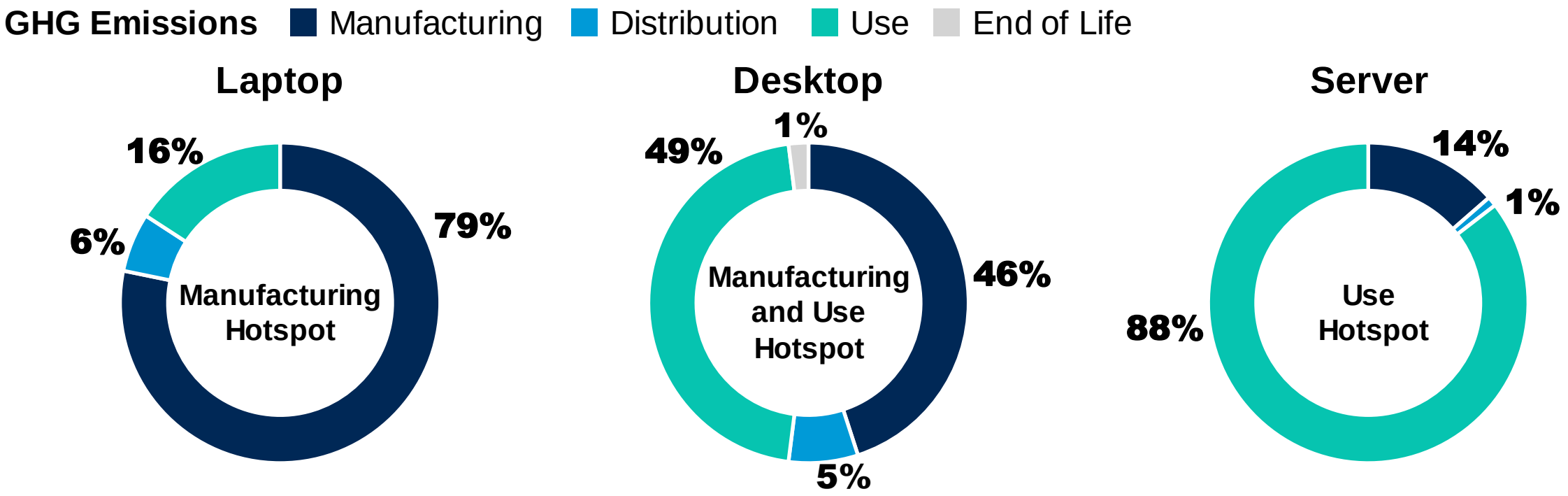
Tackle Your Digital Workplace Emissions Footprint



Avg. GHG Emissions:
316kg CO2e

Typical Life Span:
4 years

Avg. GHG Emissions:
605 kg CO2e

Typical Life Span:
4 years

Avg. GHG Emissions:
8,104 kg CO2e

Typical Life Span:
4 years

Educate Employees

Energy Ignorance

Digital Sobriety

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Nudge
Trigger
Gamify

Reminder: Shut Your Laptop Down at the End of the Day

Question of the Week on Employee Sustainability Impact

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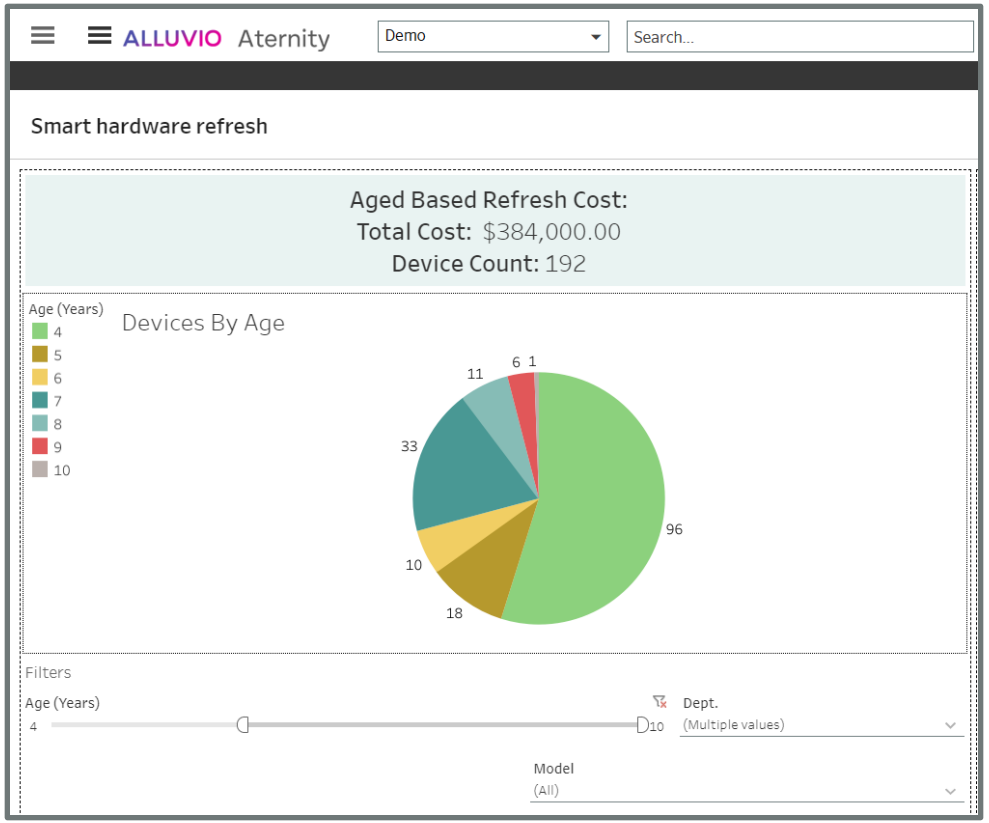
Use Two Strategies to Accelerate Digital Workplace Progress

Modularity

- Structure (Chassis)
- Memory
- Processors (CPU, GPU, NPU)
- Disk
- Motherboards
- Screen and keyboard
- Battery and Power

Analytics-Driven Refresh



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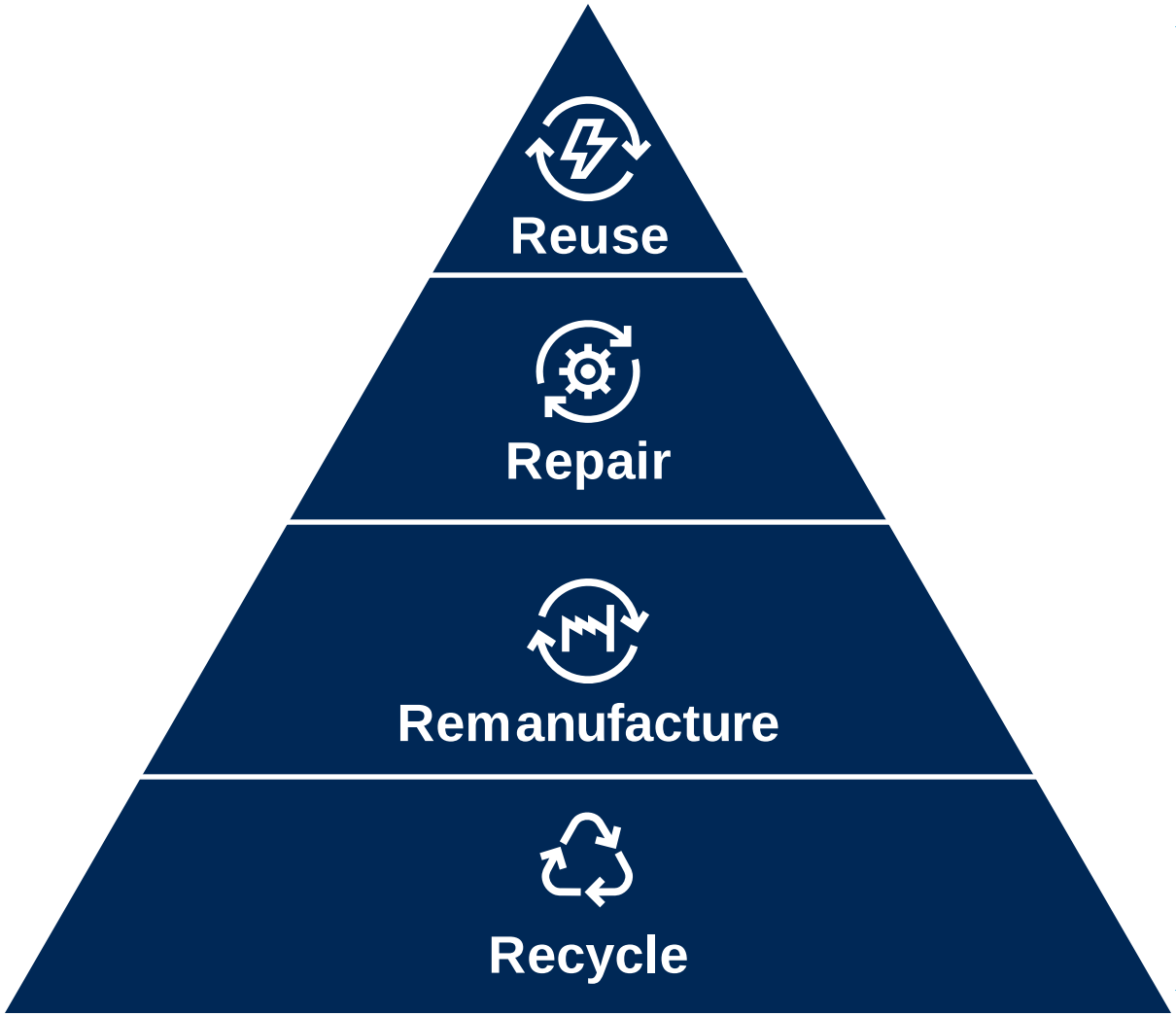
Drive Circular Economy Principles Into IT



Most preferred

Least preferred

- Use EPEAT and TCO certified ecolabels.
- Pressure vendors to increase the certified range.
- Get detailed data from your ITAD providers and agreed performance.
- Analyze the device as a service benefits.
- Start innovating with select vendors on BOMs and materials flows.

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Data

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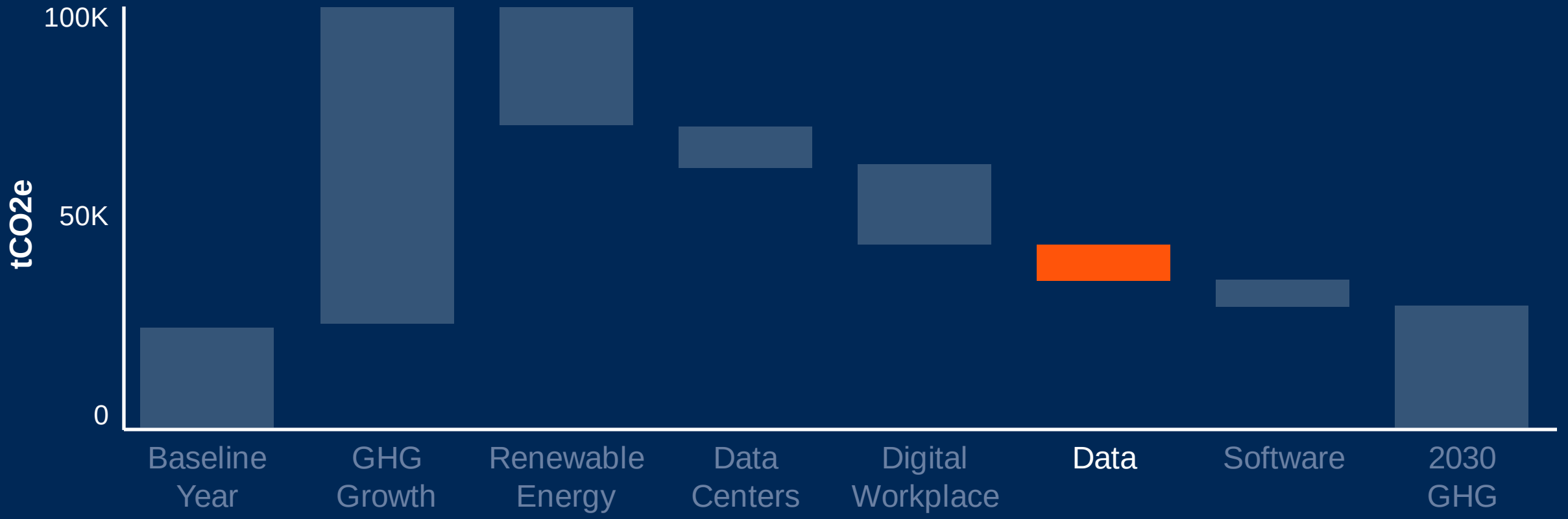

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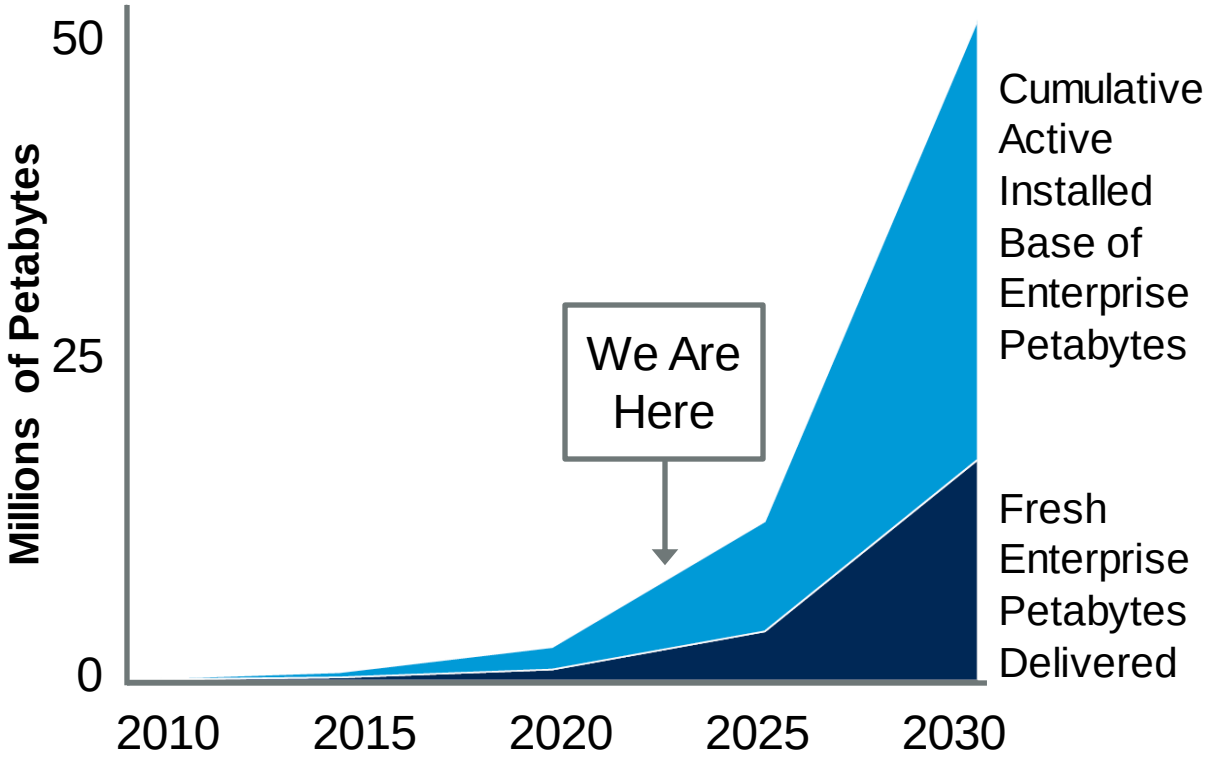
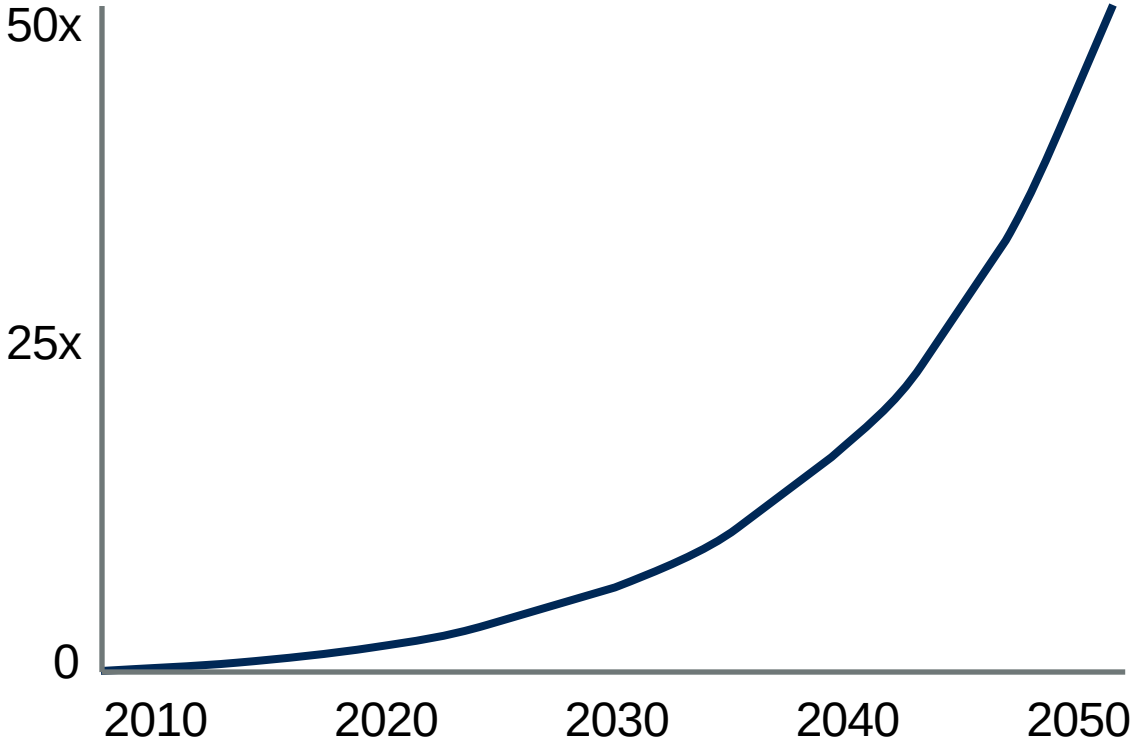
Data Is an Asset With Ongoing Costs

The Active Installed Base of Enterprise Petabytes, 2010-2030



Storage Power Consumption Relative to 2010



Source: Gartner

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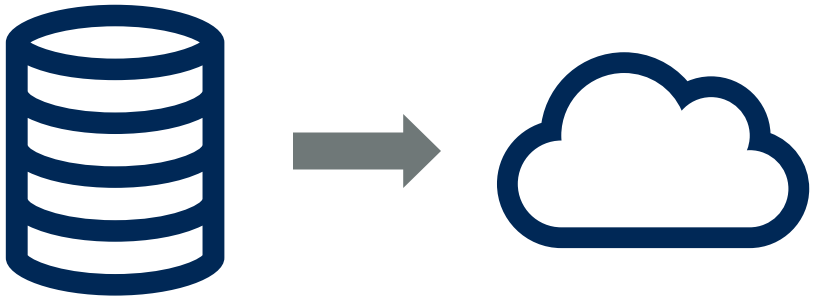
Drive Data Hygiene

Don't Rely on Cloud to Solve the Problem



Do Treat the Underlying Issues

- Don't Over (or Under) Deliver
- Avoid Unnecessary Duplication
- Optimize Data Movement
- Reduce Processing Cycles
- Host Data in Low Carbon Locations
- Leverage Passive Storage Media
- Index Data Appropriately

Source: Quick Answer: How Can CDAOs Reduce the Environmental Impact of Data? (G00786208)

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Software

Net Zero Roadmap for Sustainable IT (Illustrative)

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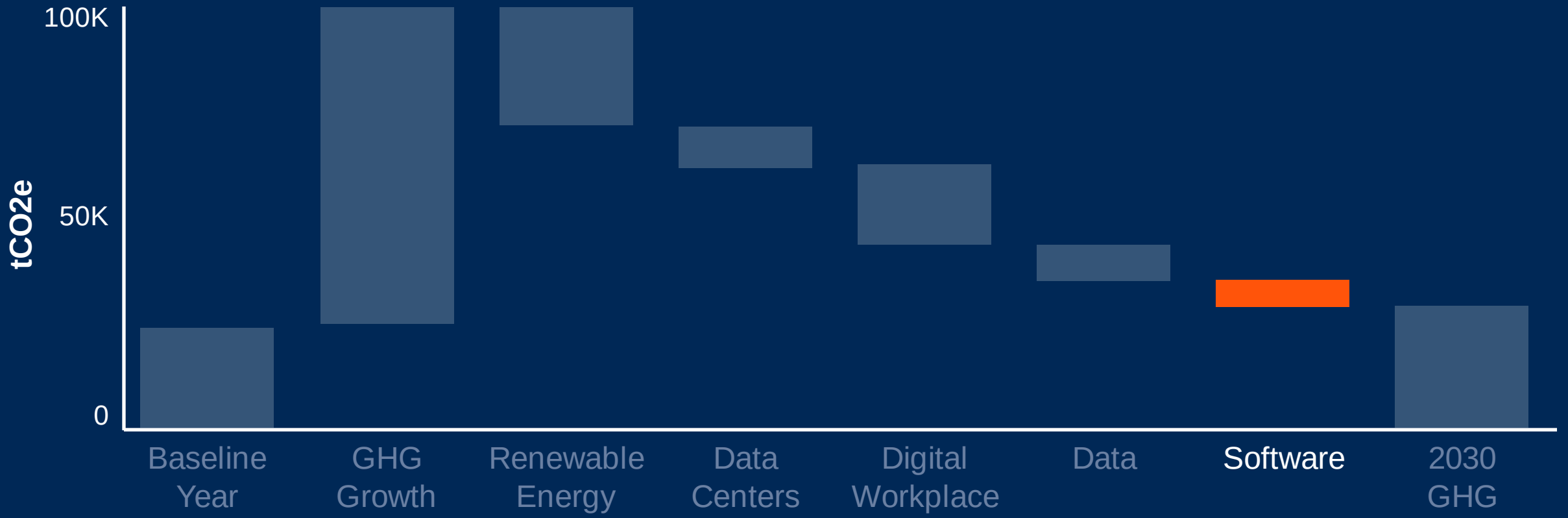

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Sustainable Software Is ...

Energy Efficient:

- Design
- UX
- Software and Algorithms
- Architecture and Networking

... and Adapts to New Contexts

Sustainable:

- Ecosystem Partners
- Cloud & Data Centers
- Energy Awareness

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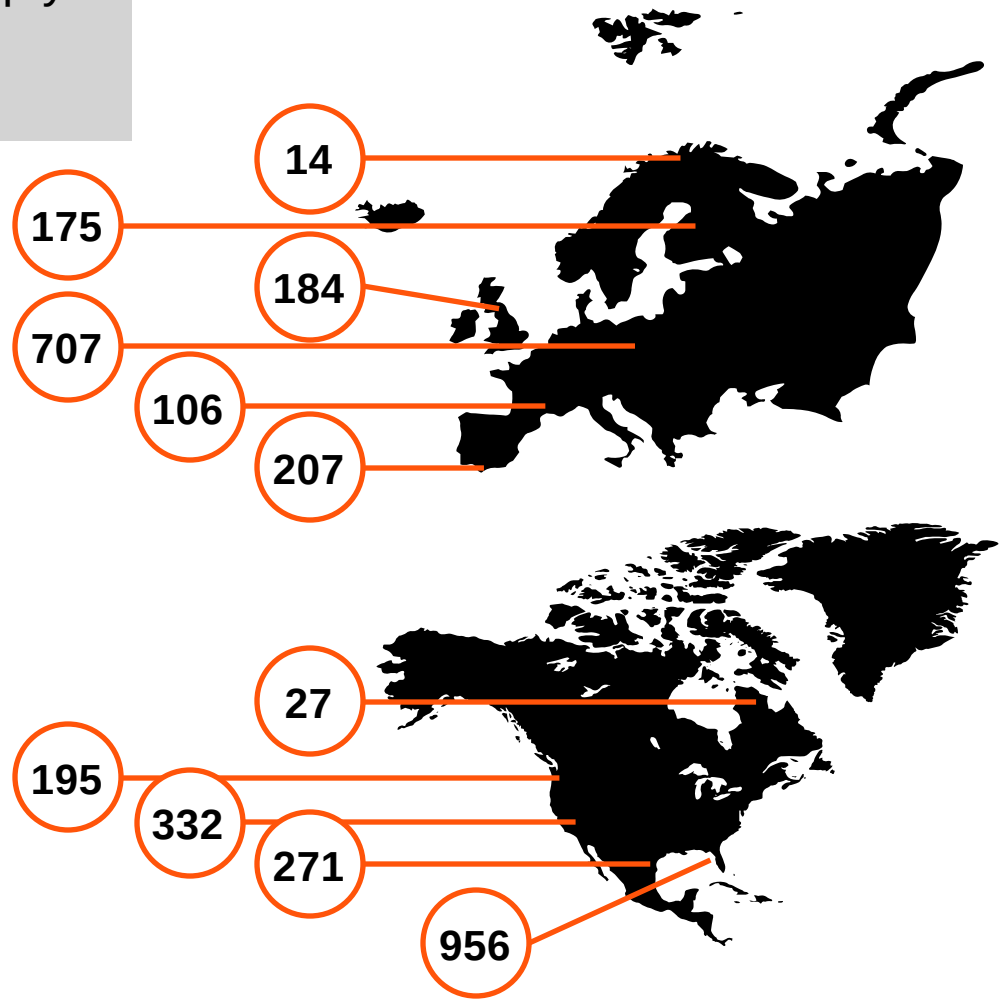
Run Software in the Right Place at the Right Time

Carbon intensity of electricity supply:
gm of CO2 per KwH,
13:10 GMT, 4 February 2023.



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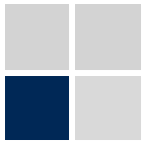
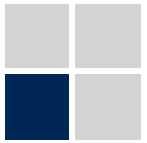
Don’t Separate Software and Hardware Actions

More Strategic

More Tactical

Revolutionise		Long term: New architectures, postsilicon chips, quantum, DNA storage, new processing paradigms.
Rearchitect		FPGA, GPU, ASIC, AI-optimised silicon extreme parallelism, optical computing.
Replace		Smaller silicon geometries, alternative processor architecture, better circularity, less embodied energy.
Extend		Prolong current H/W life or extend usage conditions.
Rationalise		Eliminate zombie hardware.

ASIC = application-specific integrated circuit; FPGA = field-programmable gate array; GPU = graphics processing unit

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Two More Parting Thoughts

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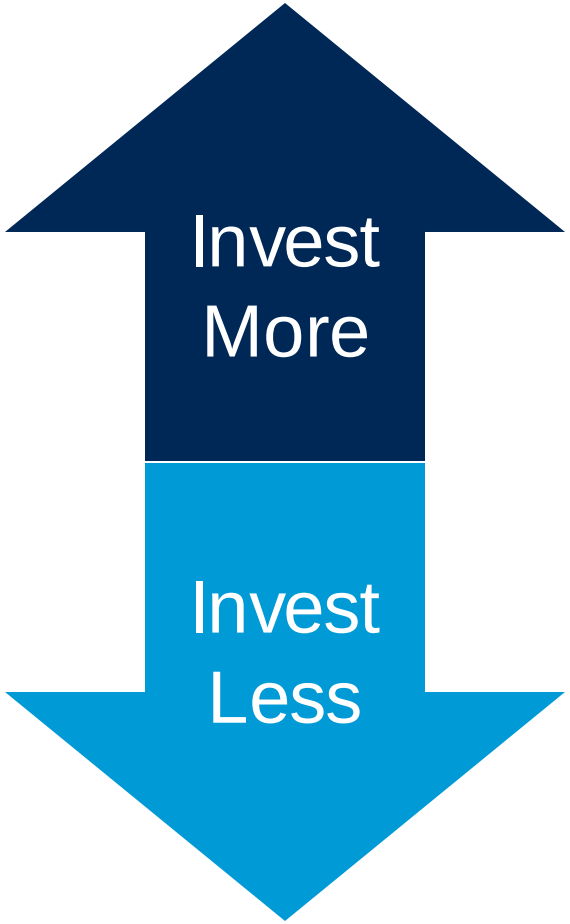
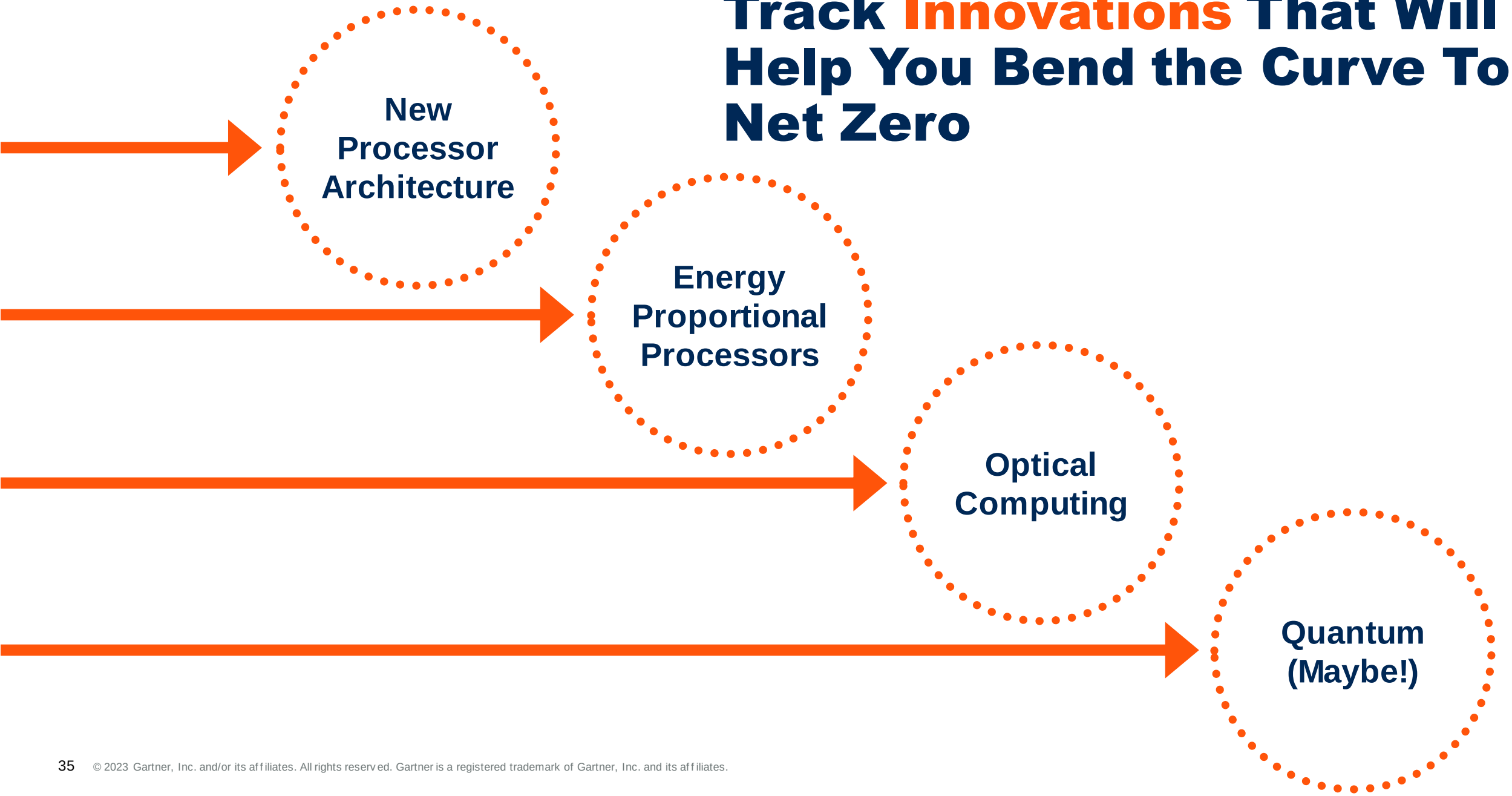
Determine the Right Level of Net Zero IT Investment



- Net zero goal has been set.
- IT intensity is high.

- The main objective is regulatory compliance.
- Sustainability is not a top business priority.

Track Innovations That Will Help You Bend the Curve To Net Zero



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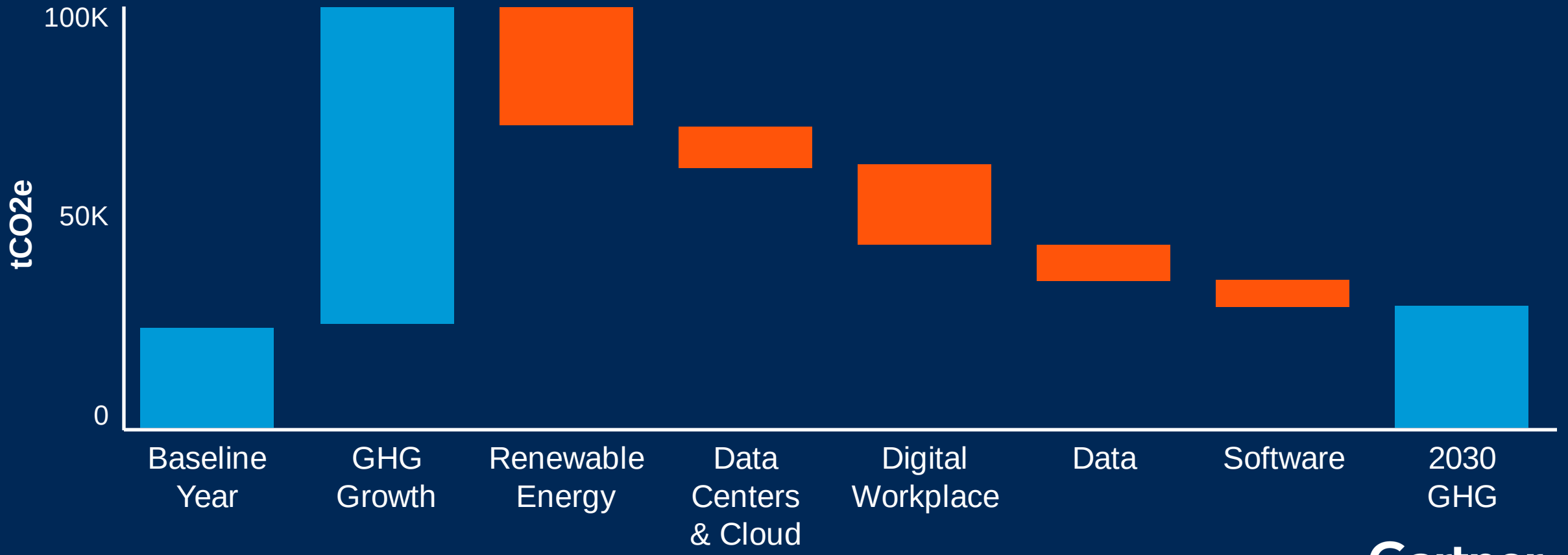

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Build a Net Zero Roadmap for Sustainable IT

Summary of Gartner Advice

Renewable Energy

- Create a policy for renewable energy.
- Use as few carbon offsets as possible.

Data Centers

- Shift from supply efficiency to demand management.
- Always-available (not always-on).
- Take responsibility for cloud sustainability.

Digital Workplace

- Educate employees.
- Leverage modularity and analytics-based refresh.
- Tackle Scope 3 emissions.
- Drive circular economy principles.

Data

- Share data GHG footprint.
- Stop overdelivering.
- Optimize data movement.
- Reduce processing cycles.
- Host in low carbon data locations.

Software

- Leverage sustainability by design.
- Use low carbon energy sources.
- Design sustainable UX.
- Run software in the right place at the right time.

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Recommendations

- Focus on extreme efficiency. Data center capacity and efficiency is already becoming a constraint.
- Drive the best renewable energy strategy for your enterprise and your most carbon-intensive suppliers.
- Optimize the demand placed on the data center(s).
  - Start the journey from always-on to always-available.
  - Innovate and collaborate on energy-efficient architectures and software.
- Extend the life of digital workplace assets and reduce device intensity.

Recommended Gartner Research

- **Unlock the Business Benefits of Sustainable IT Infrastructure**
  Autumn Stanish, Jonathan Forest and Bob Gill
- **Is Sustainable Software a Distraction or an Imperative?**
  Nick Jones
- **Sustainability Assessment: Amazon**
  Ed Anderson, Mike Dorosh and Michael Warrilow
- **Sustainability Assessment: Google**
  Ed Anderson, Sid Nag and Michael Warrilow
- **Sustainability Assessment: Microsoft**
  Ed Anderson, Brandon Medford and Michael Warrilow

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