When There's no Plan B: a Framework for Achieving Sustainability in Data Centers

Optional Subtitle

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Data centers **must** work towards sustainability…

C-level attention

99%

of large company CEOs agree that "sustainability issues are important to the future success of their businesses."

(Harvard Business Review)

Need for action

49%

of the world's annual GDP, equal to $39T, is now covered by nations, regions, and cities that are legislating for net-zero emissions.

(Energy and Climate Intelligence Unit (ECIU))

Investor expectations

75%

of investment executives agree that a company's sustainability performance is important when making investment decisions.

(MIT Sloan Management, Investing for a Sustainable Future)

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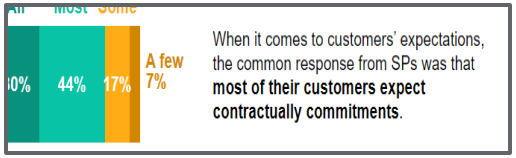
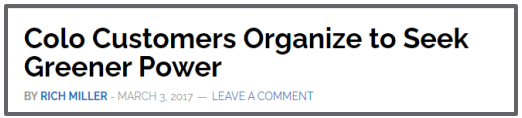
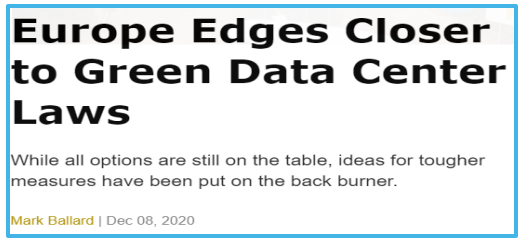
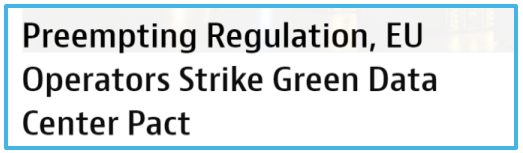
… or be left behind









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Industry leaders are already committed … but is that enough?

Microsoft

"By 2030, Microsoft will be carbon-negative, and by 2050, Microsoft will **remove** from the environment **all the carbon** the company has **emitted** either directly or by electrical consumption **since it was founded in 1975**."

facebook

"We are committed to reaching net-zero emissions **across our value chains in 2030.**"

"In our founding decade, Google became the first major company to be carbon neutral. In our second decade, we were the first company to achieve **100% renewable energy. By 2030, we aim to be the first major company to operate carbon-free**."

amazon

Co-founded the Climate Pledge with Global Optimism – **calls on big companies to be net-zero carbon by 2040** – a decade ahead of the Paris Accord's goal of 2050.

Apple's 2030 carbon-neutral pledge covers itself and suppliers – any company hoping to become a **supplier would have to commit to "be 100% renewable for their Apple production" within 10 years.**

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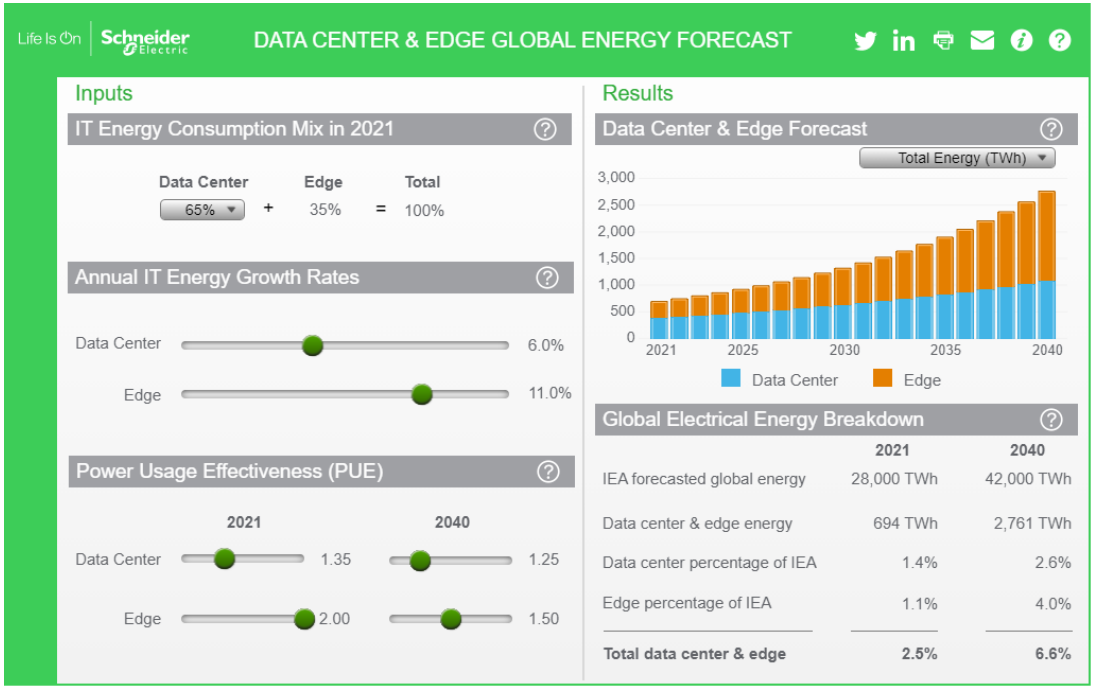
Even if we solve for data centers, we still have an issue.

Edge will soon pass data centers for energy consumption (TWh)



Source

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One source showed **52** buzz words describing sustainability!

Green
Net-zero emissions
Zero-carbon
Carbon neutral
Renewable energy
Ecofriendly
Environmentally friendly
Energy-efficient
Biodegradable
Compostable
Recyclable
Preservation
Remineralize

Embodied energy
Embedded carbon
Zero VOCs
Ethical goods/services
Fair trade
Clean
Organic
Non-toxic
Sustainable design
Natural
Greenhouse effect
Natural resources
Single-use

Biodiesel
Biomass
Biophilia
Byproduct
Carbon emissions
Carbon footprint
Carbon offsets
Circular economy
Climate change
Climate positive
Closed loop
Naked packaging
Vegan

Composting
Conservation
Deforestation
Eco-conscious
Ecological footprint
Environmental impact
Freecycle
Grey water
Greenhouse gas
Greenwashing
Zero waste
Reclaimed
Wish-cycling

Source

Fundamentally, sustainability is about protecting resources for future generations.

Water

Atmosphere

Our discussion today will be mainly focused on CO_2 and other GHG emissions.

Land/soil

Forest

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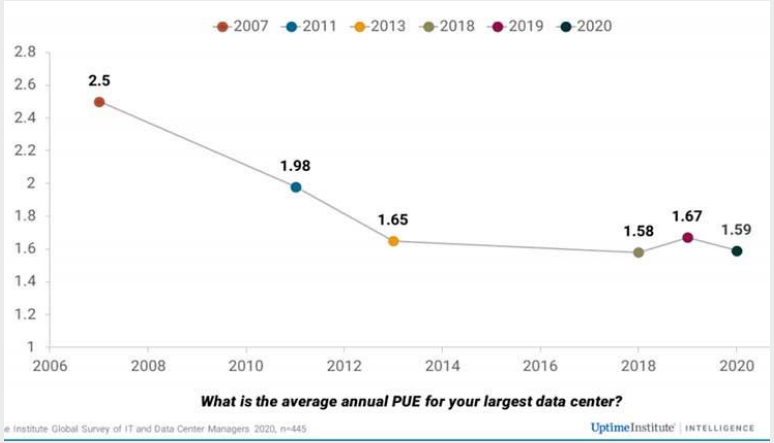
Data centers have largely been focused on electrical efficiency for the last 15 years …



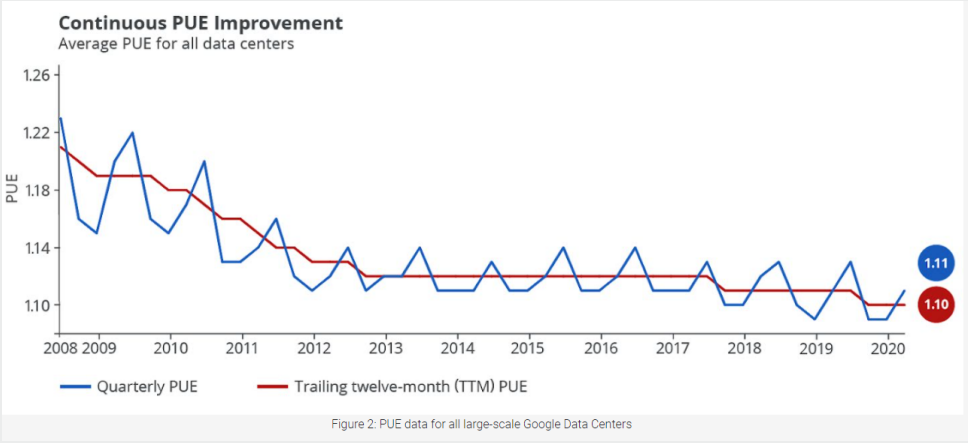


Figure 2: PUE data for all large-scale Google Data Centers

… Arguably, we're hitting diminishing returns.

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Efficiency is just one part of environmental sustainability.

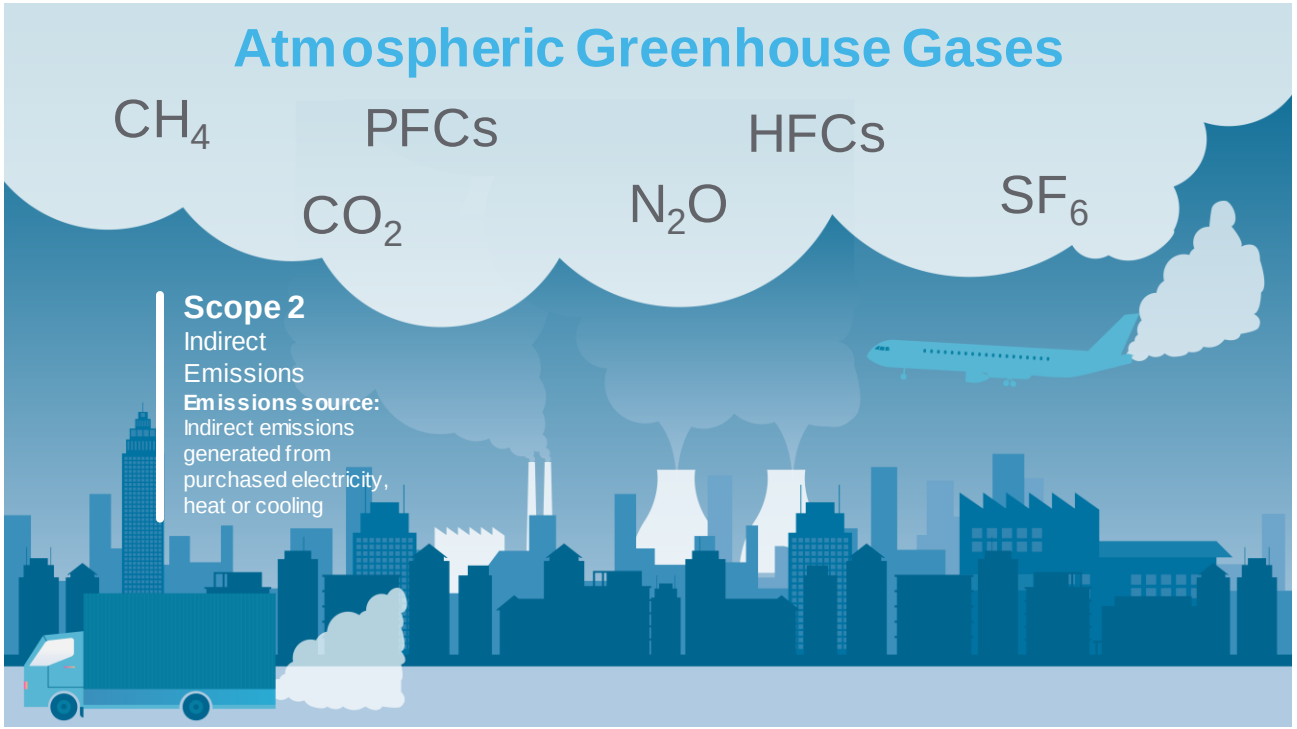
"'Greening' products by achieving more efficient use of energy and material inputs is important, but evidence suggests that greater efficiency alone will **not be sufficient** to significantly lessen the resource impacts of our collective consumption."

– USDN

"The majority of companies' environmental impact starts within their supply chains, which produce **more than 5x the emissions than their direct operations**."

– Digital Realty, 2020

The Greenhouse Gas Protocol defines 3 categories of GHG emissions.



Scope 1
Direct Emissions
Emissions source: All direct emissions within the operational control of an organization

Scope 3
Indirect Emissions
Emissions source: All other indirect emissions from sources such as business travel, waste management, and the value chain

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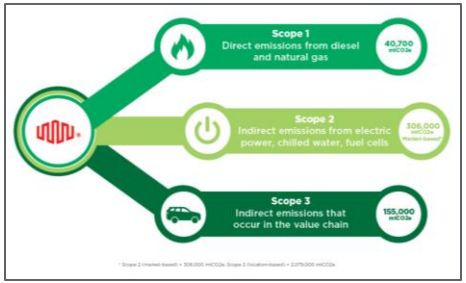
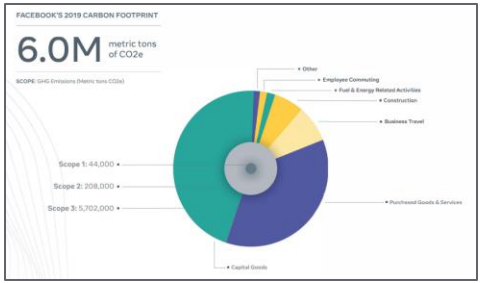
Good news … key players are publicly reporting.

Scope 1, 2, and 3 reporting

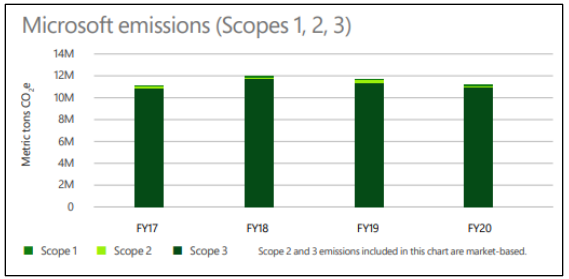
Equinix



Facebook



Microsoft



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Reporting frameworks are established, but standardized reporting in data centers is not.

Target setting

Reporting frameworks

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So, how do we tackle this?

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Schneider has been committed to sustainability for 15 years.

Ratings and indices

Awards

Commitments

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Schneider has been committed to sustainability for 15 years.

… and in 2021, Schneider Electric™ was named **the most sustainable company in the world … and we're not done yet!**

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SE philosophy includes 5 key drivers to comprehensive data center sustainability.

Set a bold, actionable strategy

- Establish a holistic, data-driven sustainability strategy to minimize direct and indirect environmental impacts (including scope 1, 2, & 3 emissions, biodiversity, raw materials, land, water) leveraging circular economy principles
- Set measurable targets to build concrete, actionable programs and establish transparent external reporting

Implement efficient data center designs

- Prioritize sustainability as a key parameter in your data center designs by designing for longevity and serviceability
- Develop efficient, repeatable, global data center designs that can be localized anywhere in the world
- Select innovative products that are eco-designed, environmentally compliant, and circular-ready

Drive efficiency in operations

- Leverage the power of data and analytics to drive operational efficiency, optimize system performance and longevity, and reduce OpEx
- Digitize aging infrastructure, adopt predictive maintenance practices, and utilize software tools to identify and manage inefficiencies across your data center infrastructure

Buy renewable energy

- Tackle your scope 2 emissions by decarbonizing your energy mix with a comprehensive renewable procurement strategy
- Meet your long-term goals through an evolving mix of procurement options that can include on-site solutions, off-site solutions, and EACs

Decarbonize supply chains

- Tackle your scope 3 emissions by establishing a comprehensive supply chain decarbonization program – inclusive of circular economy models, renewables, emerging technologies, and other scope 3 emission-reduction levers
- Identify the size of your supply chain carbon emissions, establish decarbonization programs and targets, and engage with partners who support those initiatives

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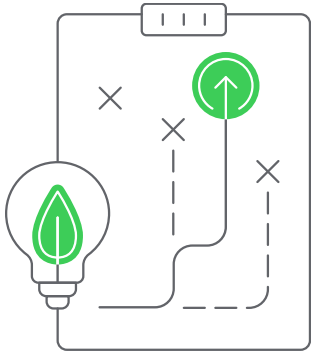
Set a bold, actionable strategy



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We see 3 common pitfalls preventing companies from reaching their climate goals.

Lack of corporate strategy with clear objectives and prioritized actions

Misalignment of internal expertise and siloed resources

Lack of business case to justify and fund projects

451 Research survey demonstrates the need for support in planning.

#1 **driver** of sustainability is **customer requirements**

97% of multi-tenant data center providers have customers that **require contractually binding efficiency and sustainability commitments**

but… Only **43%** of multi-tenant data center providers have a **comprehensive sustainability program**

451 Research
Now a Part of
S&P Global
Market Intelligence

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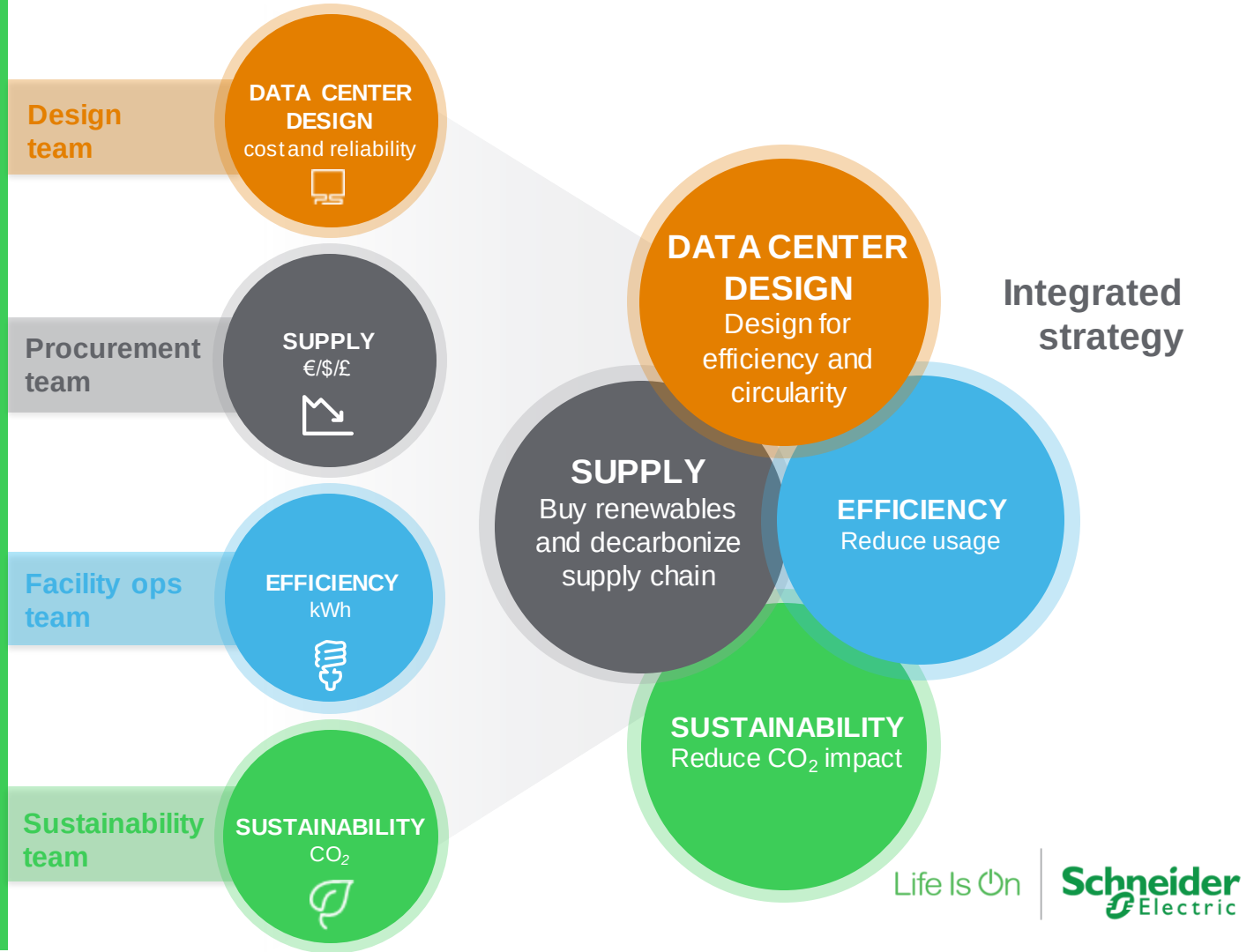
Organizational silos are preventing integrated efforts.



Making the business case requires …

Executive sponsorship to support customer/investor requirements

Placing an **internal value on carbon** (actual price, carbon cap)

This is why we launched Schneider Electric Climate Change Advisory Services

Define success

Align on vision and strategy

- Market intel and trends
- Status quo and peer review
- Stakeholder engagement
- Envision the journey

Deploy program

Implement to drive performance

- Energy procurement
- Efficiency program execution
- On- and off-site renewables, offsets
- Supply and value chain Initiatives

Set targets

Identify goals, prioritize actions

- Top-down/bottom-up analysis
- Program structure design
- Assess and communicate targets
- Carbon roadmap development

Sustain results

Measure, iterate, innovate

- Performance tracking and analytics
- Internal and external reporting
- Operational services
- Innovation at the edge

Trusted

125M+ mt of CO_2 managed annually

Leading

9GW+ advised renewable PPAs since 2014

Digital

800k+ connected points in EcoStruxure™ Resource Advisor

Global

2000+ experts in over 100 countries

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Sustainable

Meet the business needs responsibly, without compromising the future

- Carbon strategy consulting
- Renewable energy sourcing
- Resource-efficient designs
- Resource management
- Circular materials including batteries
- Carbon efficient supply chain consulting

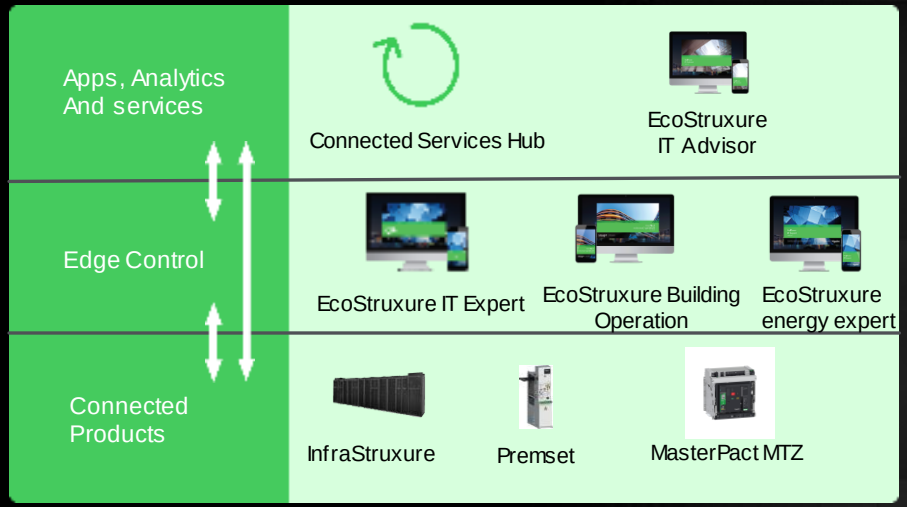
Customer Story

Green Mountain DC, Norway

EcoDataCenter

EcoStruxure™ Innovation At Every Level

for Data Centers



99% Energy Efficiency through Galaxy VX's ECOnversion Mode

1.15 PUE with reuse of heat waste

EER of **132** from CRAH units

"With the knowledge and technology on Schneider's end, and the ambition from ours, it's a good match for an efficient and green facility"

Mikael Svanfeldt, Chief Technology Officer, EcoDataCenter

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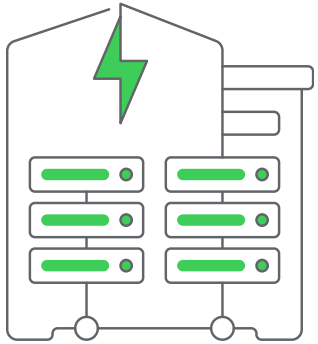
Implement efficient data center designs



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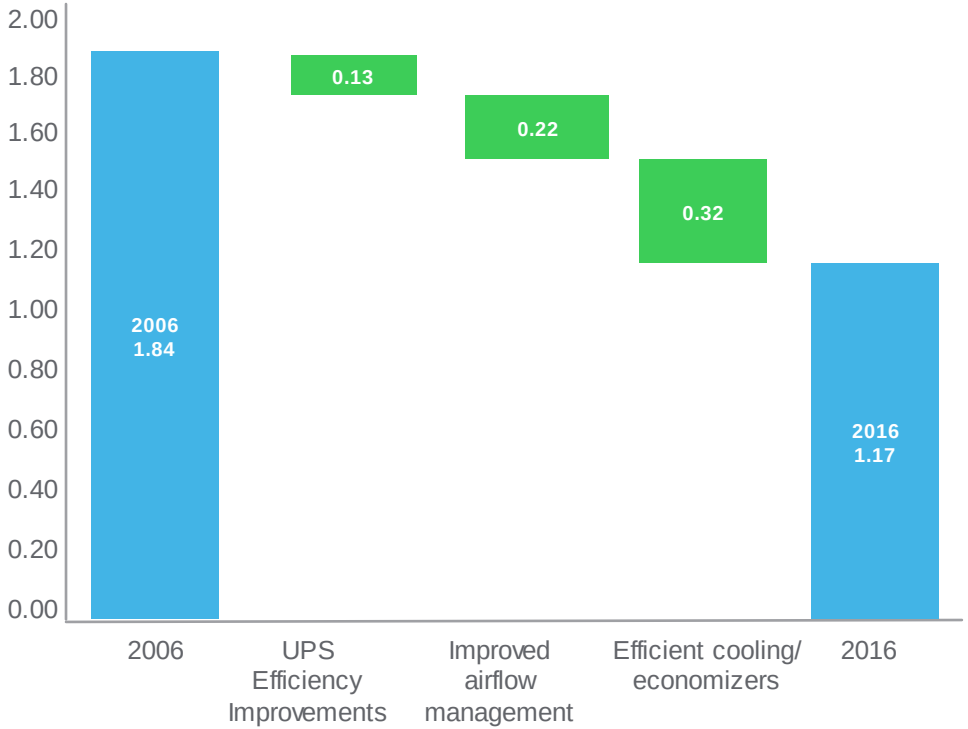
The basics have led to an 80% reduction in energy losses.



Source: Schneider Electric™ analysis, presented at DCD London, 2017

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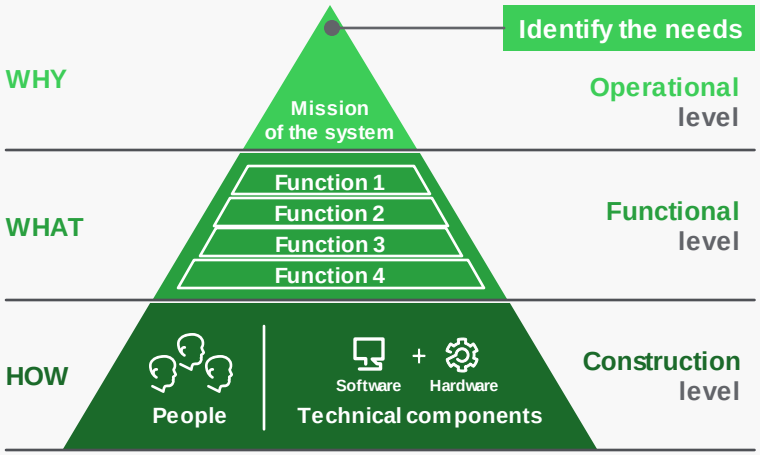
The basics have led to an 80% reduction in energy losses.

Solution-based design process



Our architectural approach

- Ensures that **sustainability objectives** are a key parameter in design without compromising business and solution performance
- Enhances **collaboration with key stakeholders** from design through execution
- Utilizes SE's **proven methodologies** and **experienced team** to manage the complex design process

Outcomes

- Reduce footprint with "right-sized" equipment
- Reduce complexity
- Maximize use and yield of solution (e.g., from 50% to 75%)
- Standardized design saves time, enables fast growth, and minimizes risk

Proof-points

Influenced **€2B** of infrastructure over the past 4 years

Savings from 2015 *reference design (103)* vs. 2020 *reference design (107)*: **30%** less CapEx — **20%** due to less equipment installed in a smaller **footprint,** but with equivalent power

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And we need to prioritize circular design.

Design for

Reduced size and weight

Serviceability

Second life

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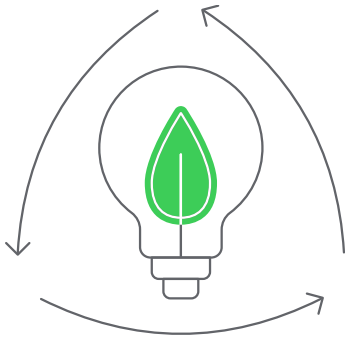
Buy renewable energy



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Why organizations source renewable energy

Environment

To reduce impact and climate risk, to meet stated environmental goals, to gain brand leadership, to substantiate claims and inform reporting

Stakeholder pressure

To respond to increasing stakeholder pressures via customers, investors, value-chain partners, C-suite executives, employees, competitors, and others

Economics

To leverage sourcing mechanisms to achieve environmental goals, while benefiting from tax advantages from incentives and subsidies

Reputation

To communicate sustainability progress, establish credibility, and enhance transparency with stakeholders

Three ways to address Scope 2 emissions

Energy attribute certificates (EACs)

- Also called Renewable Energy Credits (RECs) in the United States
- Underpin all renewable energy that is tracked and traded globally

On-site/distributed generation

- Install renewable energy sources on-premise, e.g., solar panels
- Site can directly consume clean energy generated, with associated EAC retirement
- Can connect to grid and may act as part of microgrid

Off-site generation

- Contract for renewable electricity direct from supplier
- Long-term power purchase agreements (PPAs) are most common
- Other options include green tariffs and tax equity investments
- PPAs may be direct/retail (i.e., local, in your grid) or virtual/financial

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Take a portfolio approach due to complex variables.

- Geographic availability
- Timing
- Scalability
- Economics
- Sustainability claims
- Commercial terms
- Risk profile

Recommended approach to Scope 2

1. Maximize energy efficiency
2. Maximize on-site generation
3. Pursue off-site PPAs
4. Purchase EACs/RECs for the short-term and/or balance
5. Explore additional clean tech to close footprint gaps (e.g., green tariffs, tax equity investments, microgrids)

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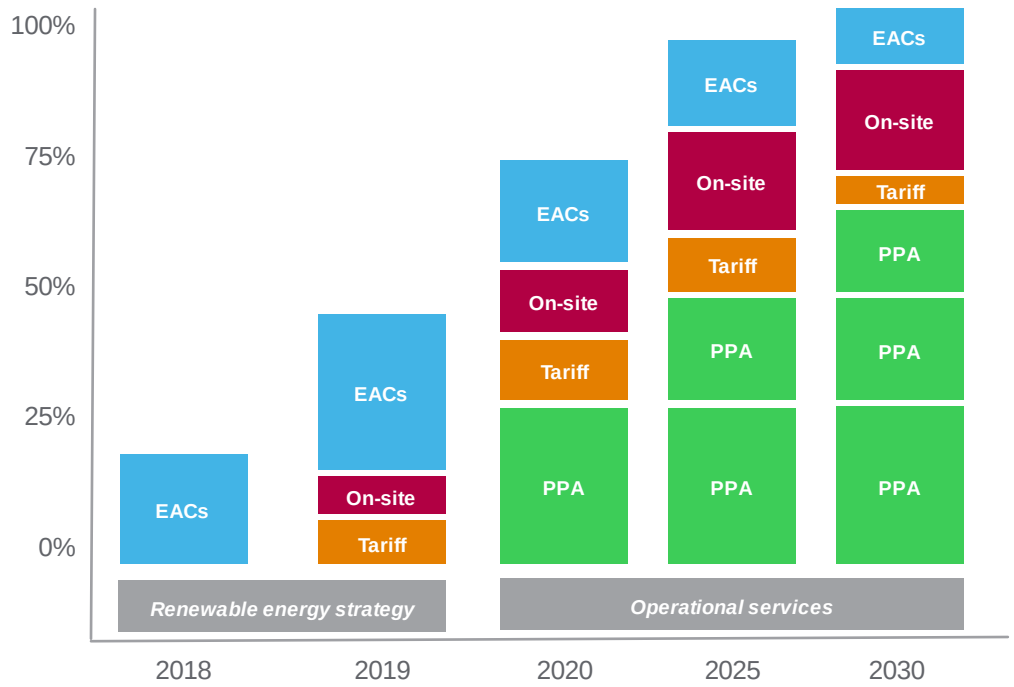
Example of how to achieve Scope 2 emissions goals over time



Generally speaking …

EACs:

- Allow renewable credit to be applied immediately
- Are a cost premium
- Are highly variable/traded as commodity

PPAs:

- Executing PPAs for new wind/solar projects must account for construction cycles
- Provide potential long-term financial benefits, in addition to Renewable Energy Credits

Key Takeaways

1. Organize and prioritize around data center sustainability; rely on experts to navigate this complex landscape.
2. Start with Scope 2 emissions, review your energy mix, and look to clean technologies to address your footprint.
3. Address the carbon impact of your supply chain.