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The Path to Sustainability and Carbon Neutrality in Data Center Infrastructure Management

IN THIS DOCUMENT YOU WILL:

- learn what sustainability initiatives are already taking place and what additional challenge needs to be solved (*1 minute read*)
- get a crash course on the emission scopes in the Greenhouse Gas Protocol (GHG) and understand why this knowledge is important to successfully decarbonize (*2 minute read*)
- gain insight into why it is economically beneficial to your organization to actively decarbonize and be able to demonstrate progress (*3 minute read*)
- see how a new add on to the FNT Command Platform leverages its documentation capabilities to facilitate analyzing the carbon emissions of your infrastructure landscape, track the progress of decarbonization efforts and remain compliant with corporate and governmental requirements (*2 minute read*)

Sustainability initiatives in data center operations – plus one more challenge you need to master (*1 minute read*)

Data center operators are heavily investing in reducing their carbon footprint. They've declared ambitious goals to reduce emissions by 50% by 2030 and achieve net-zero emissions between 2040-2050. In order to reach these targets, they are committing themselves to use 100% renewable energy to power their active infrastructure elements, taking measures to improve the energy efficiency of their equipment and operations, and reducing e-waste (old, end-of-life or discarded electrical and electronic equipment) by purchasing products

that have been designed to last longer and are easier to recycle or reuse.

What are some of the actions they are taking? Integrating renewable energy such as solar, wind, and geothermal power to reduce their reliance on fossil fuels is one example. Choosing locations for new data centers that have the ability to utilize natural environments for assistance with cooling or to share excess heat with short-haul district heating networks or nearby industrial

facilities is another. Radical new cubic building designs combined with new cooling approaches like liquid and free cooling, smart power management and operating equipment at higher operating temperatures within the allowed performance envelope is yet a further example. All contribute to the key objective of minimizing the carbon footprint.

Despite these actions, one additional associated challenge remains: correctly documenting and optimizing the eco-footprint of embodied emissions and emissions during the “use” phase of the IT equipment lifecycle. This is a major challenge that must be addressed. It’s an issue because the infrastructure landscape is not uniform and standardized. It is made up from a heterogeneous mix of assets and devices of different makes and models, from a multitude of manufacturers. In addition, location and

configuration are in a constant state of flux with devices being replaced, moved, substituted, etc. Keeping carbon footprint documentation up to date is a nightmare.

Solving this problem is important because it is an activity with remarkable opportunities to be seized and rewards to be gained. In order to understand this challenge better it’s helpful to have a closer look at:

- the relevant essence of the greenhouse gas (GHG) protocol
- the reasons for addressing the challenge and the benefits that can be realized
- concrete actions that will actually address and overcome it

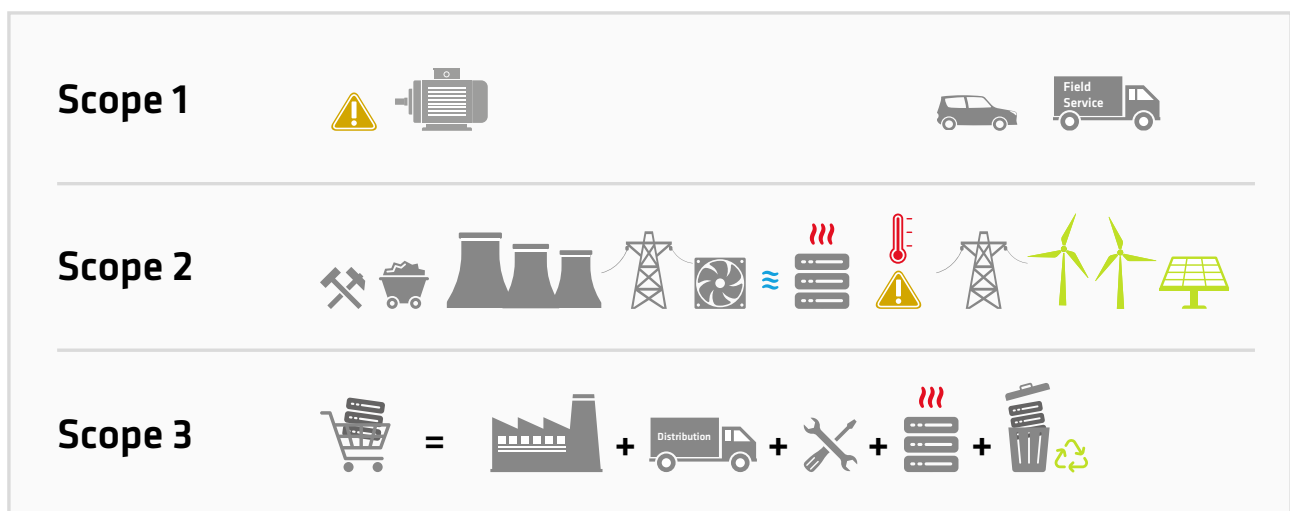
Basic knowledge: Emission reduction by optimization on every greenhouse gas (GHG) protocol scope level. (2 minute read)

The Paris Agreement of 2015 was a landmark international treaty on climate change. It was adopted by 196 signatories at the 21st Conference of the Parties (COP 21) of the United Nations Framework Convention on Climate Change, and it set one major long-term goal: limit the global temperature increase to less than 2 degrees Celsius, preferably to 1.5 degrees Celsius, as compared to pre-industrial levels. Together with the greenhouse gas (GHG) protocol of 1998 with its Corporate Carbon Footprint (CCF), it has led to further legislation that requires companies to decarbonize. “Reduce CO2 emissions!” has become the rallying cry of the signatories.

Not all emissions are the same. To distinguish between them the concept of “scopes” was developed. According to the leading GHG Protocol corporate standard, a company’s greenhouse gas emissions are classified into three scopes ranging from 1 to 3. Why is this important? The different scopes have different levels of severity and

different tracking and reporting requirements. Successful decarbonization hinges on efforts to reduce emissions across all three levels. It also requires the ability to document the relevant data, analyze it to establish a baseline, then show proof of progress and success.

Scope 1 covers direct GHG emissions from sources owned and controlled by a company, i. e. emissions from the combustion of fossil fuels in a diesel generator to produce electric power for a data center. Another such source is the operation of vehicles – also called truck rolls – to ferry personnel and equipment around to different sites. The level of direct influence is high for Scope 1 emissions. A company decides which generator it uses, how often and when, whether it is being operated under optimum conditions, etc. The same applies to the transport of people and material. Companies can optimize the routing as well as the planning of work orders executed per trip.



Scope 2 accounts for the GHG emissions induced by the generation of electricity consumed by a company. Even though these emissions physically occur at the facility where the electricity is generated so are therefore classified as indirect emissions, the company purchasing the energy can still execute significant influence on the actual amount of greenhouse gases being emitted. They choose the type of electricity they use. They can choose traditional electric energy generated by burning fossil fuels such as coal, oil or gas, or they can opt for renewable sources such as wind and solar. Beyond electricity type there is the degree of efficiency with which electric energy is being used. Is energy use optimized to reduce unnecessary waste? With IT and network infrastructure devices that means finding the best possible setup and avoiding hotspots by not exceeding the maximum cooling capacity of a rack through the intelligent distribution of heat-intense elements. Measures such as these influence how much of the purchased energy is actually needed to operate the landscape.

Scope 3 deals with embodied emissions. These are indirect emissions incorporated into a device or piece of equipment simply by it being manufactured, distributed and set up. Despite being indirect, there is nevertheless a significant amount of influence a company can exert. It can choose to purchase low-emission equipment for the IT, data center and telco network rather than high-emission equipment. The impact of these choices does in fact make a difference. And whatever choices the company makes, documenting these embodied emissions is relevant. This may initially seem like an unsurmountable challenge – how can a company realistically know what types of emission the equipment it uses gives off, or what amounts are embodied in a device? But the growing availability of Environmental Product Declarations (EPD) conforming to ISO norm 14025 ISO 14025:2011 (Environmental labels and declarations - Type III environmental declarations - Principles and procedures) that manufacturers are providing in ever growing numbers does provide extremely helpful data to overcome this challenge.

Aspects of relevancy: Why should you care? How will you benefit? (3 minute read)

Decarbonizing requires you to stay in control. Being in control means you know the current overall composition of the infrastructure in regard to environmentally harmful emissions across all scopes, have the ability to optimize the situation by making well-informed decisions, and actively manage the supply chain. These are all major levers that enable you to steer your organization to:

- **become truly and effectively greener,**
- **remain compliant with ever-tightening** ESG/CSR legislation,
- **retain access to** important **corporate refinancing sources,**
- **become eligible for tax exemption** programs,
- **reduce operations cost.**

Become effectively greener. We need an intact and healthy ecosystem in order to survive and prosper. The overwhelming majority of scientifically sound studies show that climate change and ecosystem degradation at current levels are, to a large extent, man-made. Further deterioration of the environment will lead to severe socio-economic consequences on a planetary scale. The only option is to massively reduce the impact of our economic activities on the planet.

Remain compliant. The generally acknowledged importance of becoming greener has led to legislative oversight and clear regulatory rules to force companies to act accordingly. In the United States, for example, California passed

an emissions disclosure law, the Senate Bill SB-253 Climate Corporate Data Accountability Act of the Californian Senate, published in October 2023, that requires companies to publicly disclose their scope 1, scope 2 and scope 3 greenhouse gas emissions in their fiscal year end reporting. Clear-cut deadlines for gathering relevant data and implementing reporting go into effect in 2025, meaning companies must act now to meet the aggressive timeline.

The European sustainability reporting standards initiative with the ungainly title of “Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014 and Directives 2004/109/EC, 2006/43/EC and 2013/34/EU as regards corporate sustainability reporting” is in essence requiring the same of European companies, with similar deadlines.

Retain access to corporate refinancing. Big investment funds such as BlackRock are an important source for corporate refinancing. Most have sustainability policies in place which play an increasingly important role in deciding whether or not to invest in an enterprise. Their published requirements call for companies that seek investment to have a clear sustainability strategy in place, show a strong commitment of the management team towards sustainability and have robust sustainability reporting in place in accordance with recognized standards such as the GHG protocol standard, the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB). Without compliance with these requirements, corporate refinancing for mergers and acquisitions and large-scale research and development projects are seriously at risk.

Become eligible for tax exemption programs. The governmental agencies that push towards stricter regulation and oversight are – in all fairness – offering incentives to help companies make the changes being imposed on them. Federal assistance programs in the US include the Renewable Energy Tax Production Incentive (PTC), the Investment Tax Credit (ITC) and the Energy Efficiency and Conservation Block Grant (EECBG). Further programs in the US include the Data Center Infrastructure Efficiency (DCIE) 360 program and the Green IT program.

Likewise in Europe there are incentives such as the Energy Efficiency Directive (EED), the Renewable Energy Directive (RED), the Renewable Energy Act (EEG) and the Energy Efficiency Act (EnEffG) which provide tax credits that data center and network infrastructure operators are eligible to under certain circumstances. Europe also provides loans, grants and funding to sustainability and energy efficiency projects and activities with the European Energy Efficiency Fund (EEF) and the European Commission's Sustainable Europe Investment Plan.

All programs and initiatives share common requirements, including:

- a demonstrated commitment to sustainability;
- meeting energy efficiency goals;
- being willing to undergo regular energy audits and sustainability assessments with documentation to show proof of progress.

Reduce operations cost. The use of IT and telecommunications equipment and devices with a smaller carbon footprint and that are designed for better sustainability contribute to reduced IT and network infrastructure operations cost in a number of ways:

- **Decreased energy consumption:** IT and telecommunications equipment and devices are typically the largest energy consumers in data centers and other network facilities. By using equipment and devices that are more energy-efficient, businesses can significantly reduce their energy costs.

- **Reduced cooling costs:** IT and telecommunications equipment and devices generate heat, which must be removed to prevent equipment damage from overheating. This cooling process can be expensive, especially in hot climates. By using equipment and devices that generate less heat, businesses can reduce their cooling costs.

- **Extended equipment lifespan:** Equipment and devices that are designed for better sustainability are typically more durable and have a longer lifespan. The idea of planned obsolescence is becoming a thing of the past. This means that businesses can avoid the cost of replacing equipment as often.

- **Reduced maintenance costs:** Equipment and devices that are designed for better sustainability are typically easier to maintain and require less repairs. This can help businesses to reduce their maintenance costs.

- **Reduced waste disposal costs:** IT and telecommunications equipment and devices contain a variety of hazardous materials, such as lead and mercury. When this equipment is disposed of, it must be handled and disposed of properly to avoid environmental contamination. By using equipment and devices that are designed for better sustainability, businesses can reduce the amount of waste that they generate and the cost of disposing of that waste.

How FNT can help you to successfully master the transformation to a greener infrastructure landscape (*2 minute read*)

The FNT Command Platform, with its powerful infrastructure inventory capabilities, has been augmented with the new FNT Sustainability Add-On that enables you to:

- **Document emissions:** Document the embodied emissions (CO2 plus the whole range of other eco impact factors like freshwater use, mineral resource depletion, acidification) as well as the CO2 emissions during the lifecycle phase use of every element in your IT, network and data center infrastructure – physical devices as well as every virtualized element.
- **Keep the documentation up-to-date:** Maintain current documentation with near-zero effort in a ever-changing infrastructure landscape where de-

vices are constantly added, removed, relocated and changed in their composition.

- **Gain trend insights and identify spots where additional measures are needed:** Compare and BI analyze the infrastructure setup in regard to CO2 in every dimension: zonal location (building, floor, room, cage, rack), manufacturer (with product lines/families, models), organizational unit responsible and device type. But that's not all – data can be sliced and diced by virtually any data dimension, out-of-the-box.

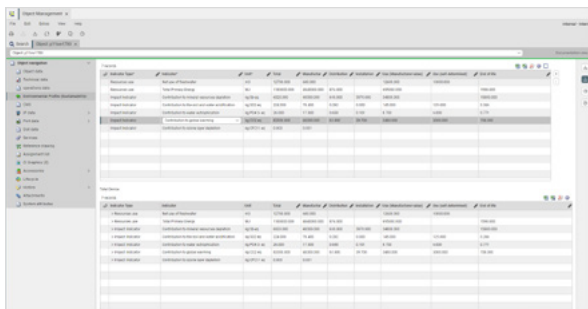
- **Track progress and prove success:** Prove that your decarbonization strategy and device and resource purchase policies are working – to internal stakeholders

as well as external auditors. Demonstrate the IT, network and data center are key contributors to helping your company meet its overall regulatory obligations and stay compliant.

- **Become effectively greener:** Avoid the controversy of “greenwashing” accusations. When you make it known that using your services means making a positive environmental impact, be sure it’s true – and be prepared to prove it if needed.

The FNT Sustainability Add-On features powerful new capabilities:

- **An ISO 14025 norm and Greenhouse Gas Protocol (GHG) compliant matrix data structure** to easily upload Type III Environmental Product Declaration (EPD) data that manufacturers of IT, network and data center equipment provide. This data is derived out of the Life Cycle Assessments (LCAs) following the ISO norm series 14040. FNT provides the ability to not only hold and document these manufacturer-provided values, but also to store and show individually determined CO2 emission values resulting out of measuring power consumption and calculating CO2 with your individual energy-mix.

A screenshot of a software interface displaying a large, multi-column data table. The table contains various numerical and categorical data points, likely representing environmental product declaration (EPD) data. The interface includes a sidebar with navigation options and a top header with search and filter controls.

ISO 14025 norm and Greenhouse Gas Protocol (GHG) compliant matrix data structure to easily upload Type III Environmental Product Declaration (EPD) data

- **A clever and powerful inheritance feature** that requires the environmental data to be uploaded only once for each device type. FNT propagates this data automatically to every instance of existing devices

and those that enter your landscape inventory when rolling out new infrastructure.

- **A user-friendly UI front-end dialog that makes it extremely easy to see the data** for each single asset and configuration element in your infrastructure. It simplifies extracting insights, drilling down into components (e. g. from a chassis of a switch to the network cards and their subcards) and making updates and adjustments when required.
- **An API to upload the CO2 values** and all other eco impact indicators in EPDs directly from external data sources with only minimal integration efforts.
- **A predefined FNT dashboard configuration** to kick-start the process of gaining insights with an out-of-the-box reporting approach. These dashboards support you in showing proof of progress even in challenging scenarios, such as when your infrastructure size grows, which causes a rise in total absolute CO2 emissions. While this may be unavoidable, you can still demonstrate the success of your policies by showing significantly reduced emissions per rack, per height unit, per server, per kilometer of cable operated.



Predefined FNT Analytics dashboard configuration for fast insights

Thank you for reading our expert paper about the tangible actions telecommunication service providers and network operators can take immediately to jump-start their journey towards achieving carbon neutral infrastructure management. For a broader discussion of sustainable infrastructure operations, we encourage you to read our white paper [**How to save money and improve corporate sustainability with effective infrastructure management.**](#)

At FNT Software, we understand the challenges that service providers face in managing their network in both an effective and environmentally friendly manner. We have the expertise and solutions to help. [**Contact us**](#) directly to learn more.

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