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Environmental Sustainability Management (ESM) Software for Colocation Data Centers

White Paper 54

Version 1

by Patrick Donovan

Executive summary

Environmental sustainability for data center service providers is a “top of mind” concern as tenants are demanding their suppliers to not only report on sustainability, but act in an environmentally responsible way. Pursuing sustainability will also better position these companies to comply with government regulations, attract investors, and retain employees. Software tools that report on efficiency, renewable energy supply, greenhouse gas (GHG) emissions, water conservation, waste recycling, and land & biodiversity are essential for visibility, target setting, and reporting. This paper will first make the case for why this type of software should be considered “the fourth pillar” of data center management for data center service providers and will go on to describe the essential functions and attributes of effective environmental sustainability management software.

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Introduction

For most data center colocation providers, failure is not an option. Some liken it to "maintaining an airplane while flying it". Complexity is much higher, and the pace of change is much greater than in most other types of facilities. Owning and operating multiple, geographically-dispersed data centers further complicates management and reporting. Because of this, data center operators rely on software management tools such as building management system (BMS), electrical power monitoring system (EPMS), and data center infrastructure management (DCIM) software applications. These "three pillars of data center management" serve to maintain business services and ensure the efficient deployment, operation, and maintenance of infrastructure and IT equipment. However, an increasing focus on environmental sustainability by data center service providers (and their tenants and investors) is leading to the emergence of a fourth pillar of data center management: environmental sustainability management (ESM; see Figure 1).

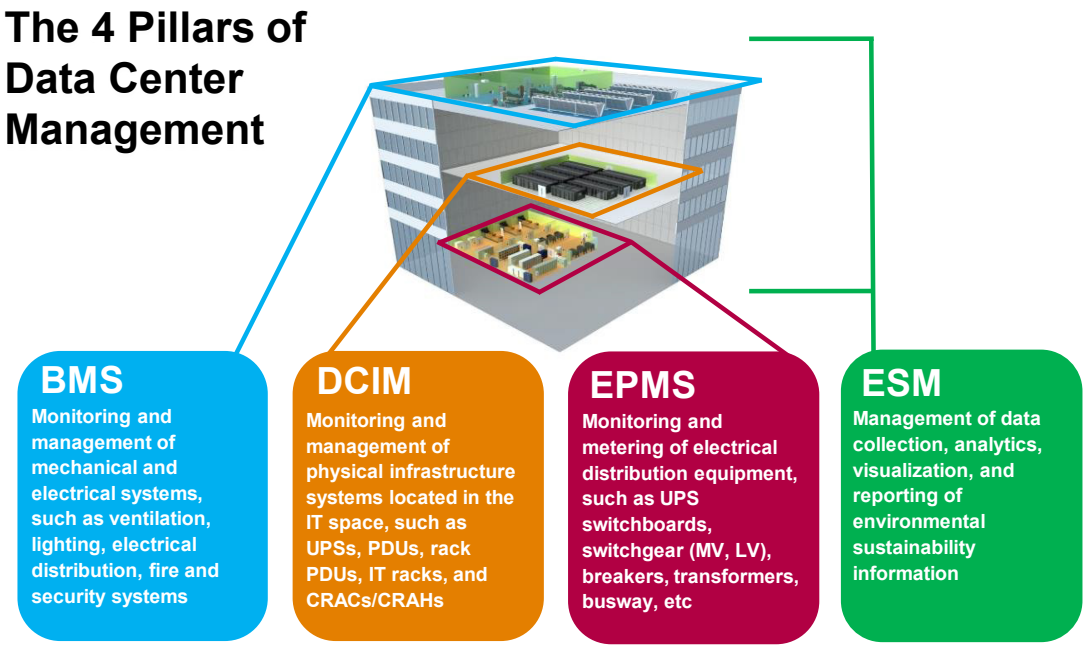

Figure 1

Due to 3 key drivers described below, environmental sustainability management (ESM), is becoming the "4th pillar of data center management" alongside BMS, DCIM, and EPMS. The circled areas indicate their area of primary focus.

Scientific predictions dramatically illustrate what is likely to happen if we do not quickly and adequately address the causes of human-driven climate change and resource depletion. These dire consequences have created unique business conditions that make environmental sustainability management software an imperative. This environment is characterized by complex energy markets, emissions trading schemes, evolving government environmental regulations, growing "environmental, social, governance" or ESG-driven investment power, and new customer demands that view progress on sustainability initiatives as a key performance metric. White Paper 64, "Why Data Centers Must Prioritize Environmental Sustainability: Four Key Drivers", goes into more detail on the forces driving data centers to focus on this challenge.

Years ago, the data center industry proactively developed the power usage effectiveness (PUE) metric which quickly became widely adopted and used to drive dramatic improvements in infrastructure energy efficiency. Today, more mature, large data center service provider organizations have adopted comprehensive enterprise sustainability management programs that go far beyond energy efficiency. These holistic programs involve corporate environmental goal-setting, detailed action plans, on-going data collection, and frequent detailed reporting of a wide variety of

sustainability-related metrics, typically as part of their overall corporate ESG reporting.

Environmental sustainability management software is a critical tool to use in these programs. Effective solutions ensure accurate, auditable, and transparent non-financial reporting of environmental sustainability data and metrics. Collecting the relevant data and reporting valid metrics can be a daunting task if the right software tools are not in place. The paper will first explain three key drivers for adopting these specific software tools to address this business challenge of sustainability reporting. Next, we discuss the essential functions of the software to help data center providers know what to focus on when evaluating various solutions available in the market today. And finally, we describe key attributes that you should look for when selecting a solution. These attributes are what will make one software solution more effective than another at providing the essential functions.

3 drivers for adoption

The complex business and energy environment that has arisen from the global need to address the climate has led to the emergence of three key drivers for implementing sustainability software tools. These pressures have made using simple tracking tools like spreadsheets or relying solely on existing data center management software tools (e.g., DCIM, BMS, EPMS) untenable.

Growth of mandatory sustainability reporting and compliance

Today, over 40 countries now require greenhouse gas (GHG) emissions reporting[1]. And this is expected to increase in the coming years. What began as a focus on only the largest polluters is quickly expanding to include smaller companies and organizations. Governments are increasingly forcing corporate transparency on environmental, social, and governance (ESG) performance through mandatory reporting. In the EU, for example, the Commission adopted a proposed Corporate Sustainability Reporting Directive which requires all listed companies, banks, insurance companies, and all those deemed by authorities as a "public-interest entity" to now report on ESG metrics and be subject to audits[2]. Government mandates typically mean penalties for non-compliance. So, this type of non-financial reporting requires a high degree of accuracy and must be defensible in case of audits or legal challenges. Software designed for reporting this type of information is, therefore, needed.

Market forces impelling accurate, auditable, and transparent non-financial reporting

Not only is the force of government at play, but customers and investors are also expecting ESG transparency and accurate reporting. The accelerated growth[3] of ESG funds in recent years is fueling the view that companies who prioritize ESG-related issues perform better. Data centers not only feel a societal responsibility to do no harm to the environment, they also act to reduce impact to protect their brand and reputation in the marketplace. As customers and tenants of data center providers focus on reducing their own climate impact, they are looking to their host data centers to also reduce the impact of these facilities. This is because data center providers' Scope 1 and 2 emissions are a significant source of their tenant's Scope 3 emissions.

[1] https://www.ul.com/news/mandatory-emissions-reporting-around-globe

[2] https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

[3] https://www.cnbc.com/2021/02/11/sustainable-investment-funds-more-than-doubled-in-2020-.html

Given these tenant and investor demands/expectations, the consequences of poor accounting and reporting can be severe. Corporate reputation, stock price, etc. can all be negatively impacted quickly if the market discovers errors or lack of reporting or transparency. Software tools designed to collect, report, and provide checksum features, should be used to reduce human error while making the data traceable and transparent.

Scope and organizational complexity

Corporate environmental sustainability is broad in scope. In this paper, we are fundamentally talking about minimizing GHG emissions and consumption of natural resources that occurs across the entire enterprise. This broad scope means there are a wide variety of stakeholders and influencers: design firms, engineering teams, corporate real estate, facilities management, IT management, energy procurement, CxOs, and, of course, corporate sustainability teams. The fact that sustainability crosses so many different roles, functions, and lifecycle phases means there is much more complexity to managing and reporting. A further complicating factor is that data center providers tend to have multiple sites that are geographically dispersed, sometimes globally.

This creates data collection and reporting challenges such as dealing with data variability. With data coming from different locations, departments, systems, and databases at different intervals with varying levels of availability and auditability, specialized reporting software is needed that can collect, clean, and normalize all this disparate information to create a "single source of the truth". Without a global, harmonized view of all the data, energy and sustainability measures tend to be managed and viewed on a site-by-site or region-by-region basis. Facility managers, for example, end up acting in isolation from their peers.

Another data collection and reporting challenge is the need for cooperation among the various stakeholders who tend to be siloed from each other. Effective environmental sustainability improvements require executive buy-in and leadership as well as collaboration between procurement/finance, facility/IT operations, and corporate sustainability officers/team (see Figure 2) to bring the necessary data together.

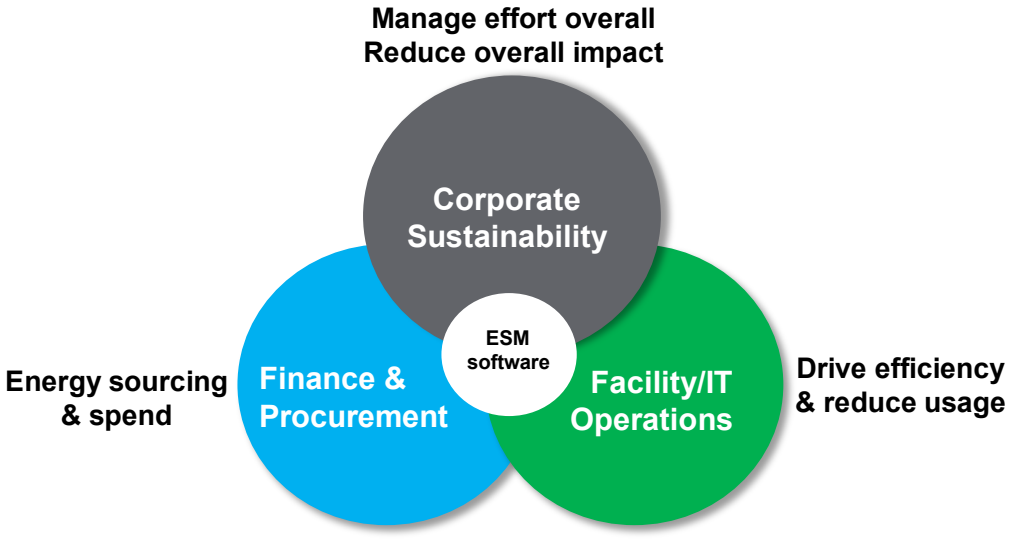

Figure 2

Effective environmental sustainability management (ESM) software can play a significant role to bring critical stakeholders together and align on program objectives

There is opportunity to combine and use the data and insights generated by each of the silos to drive more than just operational benefits. This data, combined with human expertise, can significantly enhance how companies approach sustainability. Stakeholders can define better emissions reduction strategies, set realistic

targets, and create an effective roadmap for future environmental sustainability improvements.

While we believe data is the foundation of an energy and sustainability strategy, effective sustainability software (described in detail in the next section) is needed to normalize, analyze, and present the data to make it useful and actionable. Also, without good useable data and the right tools, there is less cooperation, goals are often not aligned, and people remain in their silos. Environmental sustainability software tools can be the glue or conduit to bring organizations together and align on objectives.

Effective environmental sustainability management software should provide a global view of data in a way that facilitates energy and sustainability strategy development and enables energy sourcing and data center operations that are driven by the data presented through the software tool. Recent survey data[4], however, shows that 80% of C-level executives report their organization struggles with having coordinated planning (among the various silos) on sustainability measures. 59% reported a lack of a global view of the data with only 12% of collected data actually being used in any way. Further, while 85% of companies are actively trying to be "data-driven", only 37% claim to be successful.

In sum, increasing government-mandated reporting, market forces, and the scope and complexity data center providers face in monitoring and reporting on environmental sustainability, dictates that appropriate and dedicated sustainability software management tools should be used. Existing data center management tools like DCIM, BMS and EPMS will not suffice as they were not designed for this purpose. These tools certainly have a role, however, in supplying power and cooling infrastructure device energy data, for example, to the sustainability software for more granular tracking and reporting.

In the next section, we will explain the general capabilities of environmental sustainability management software and describe the key essential functions to focus on when evaluating different solutions in the market.

Essential functions

At a fundamental level, environmental sustainability management software is an enterprise-level data collection, analytics, and visualization platform. The ultimate aim of this software platform is to help:

- minimize energy and other natural resource consumption
- track and report environmental sustainability metrics

It achieves these by supporting data-driven decision making and driving actions by collecting and reporting enterprise-level, consolidated resource information. When well-implemented and maintained, this software brings benefits to both the provider and their tenants. Top level, mutual benefits include:

[4] https://perspectives.se.com/latest-perspectives/corporate-energy-sustainability-programs-research-report

https://perspectives.se.com/latest-perspectives/corporate-energy-sustainability-programs-research-report

https://www.forrester.com/The+Forrester+Wave+Big+Data+Hadoop+Solutions+Q1+2014/-/E-PRE6807)

http://newvantage.com/wp-content/uploads/2017/01/Big-Data-Executive-Survey-2017-Executive-Summary.pdf

- Accurate and auditable reporting of sustainability metrics for SLA, corporate, and/or regulatory compliance
- Transparency on Scope 1, 2 and 3 emissions
- Transparency on energy, waste, and other natural resource consumption
- Lower and less variable energy bills
- More competitive service offers and SLA performance

Fundamentally, these **benefits are enabled by the following essential functions** of the software platform:

1. Capturing relevant data
2. Combining, harmonizing, and validating data
3. Analyzing data
4. Providing a sound basis for strategic decision-making, action, and reporting

Figure 3 shows a high-level, simplified architectural diagram of an environmental sustainability management software platform to give a sense of how the system works. The arrows represent data flow. Users, in this example, would connect to the cloud to view dashboards and interact with the software platform.

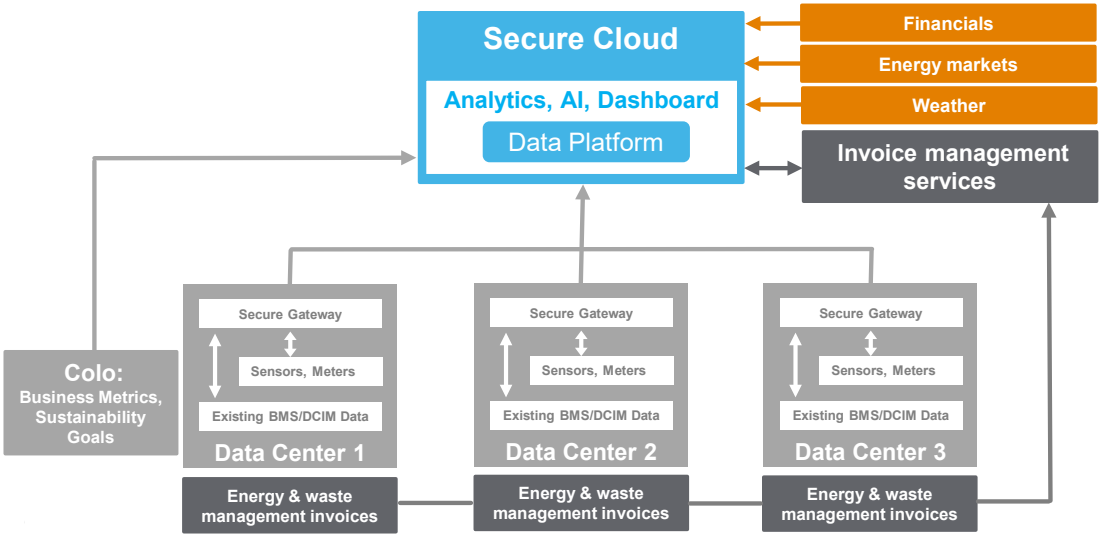

Figure 3

High-level, simplified architectural diagram of environmental sustainability management software platforms when applied to a portfolio of colocation data centers. The arrows represent data flow.

Function 1: Capturing relevant data

As with any software tool, its output is only as good as its data inputs (i.e., "garbage in, garbage out"). So, it is important for the tool to gather all necessary and relevant data to provide useful results. By useful, we mean results that enable you to take actions that drive progress on achieving energy cost savings and sustainability goals. These software tools tend to be capable of collecting a large number of different data streams from many different sources. Energy and sustainability data are collected in the following ways:

- Automatically from databases and libraries built-in to the software (e.g., emission factors)
- Via managed services (e.g., managed invoice services where vendor collects, validates, inputs invoice data on behalf of client)
- Automatically in real-time or in regular time intervals from site meters, sensors, and existing management systems using APIs

- Manually[5] by user (e.g., inputting data, one item at a time or in bulk)

In addition to built-in databases, typical data sources used in the software include:

- Energy, water, and waste disposal invoices
- Energy/power and water meters
- Existing data center management systems (e.g., BMS, DCIM, EPMS)
- User-supplied information regarding energy and sustainability goals & metrics
- Energy market, financial, and weather data

This data collection occurs on a site by site basis, typically. The software platform, however, will aggregate the individual site data into higher levels of organization, such as regionally or globally, to uncover and predict overall trends.

The number of data stream types handled and reported by these platforms can number well into the hundreds. As a user, you need to make sure the platform you choose collects, calculates, and reports on the specific data and metrics that are important to your business.

To simplify this for data center providers and enterprises with large data center and distributed IT holdings, Schneider Electric has recommended a list of 23 key metrics to focus on in your energy and environmental sustainability program. How many of these metrics might apply to you depends on your organization's level of maturity. Three levels of maturity are proposed: beginning, advanced, and leading. **Table 1** lists these 23 key metrics, grouped in 5 categories, and shows for each whether that metric is recommended or not for a given maturity level.

Schneider Electric White Paper 67, "Guide to Sustainability Metrics for Data Centers" explains these metrics in detail and defines the maturity levels. Ensure that the environmental sustainability management platform you choose can collect the data necessary to report on the key metrics that apply to you, ideally both for today as well as where you expect to be in the future from a sustainability program maturity perspective.

Historical, time interval, and real-time data collection

For most organizations, relying on data collection from past invoices (i.e., historical data) and/or metered data received in spaced out time intervals (i.e., hourly, daily, weekly, etc.) is sufficient to meet regulatory and corporate reporting requirements. However, as smart grid technologies, demand/response programs, grid services, and microgrids proliferate, there is a growing interest by some data center providers to react to changing energy market and carbon intensity conditions in real-time. They do this either by time-shifting loads to lower energy costs or by trying to match consumption with renewable energy generation in real-time to get closer to real net-zero emissions. Some environmental sustainability management software platforms can track marginal emissions or grid generation mix in real-time. This information could drive operational changes that lead to being able to report lower emissions and a greater use of renewables for those more advanced organizations capable of pursuing these emerging opportunities.

[5] Note, some vendors offer invoice management and data entry as a service to offload this task from the software user.

Table 1

23 recommended key metrics for reporting environmental sustainability, Source – Schneider Electric White Paper 67

Metric categories	Key metrics	Units	Recommendations		
			Beginning (11)	Advanced (18)	Leading (23)
Energy (5)	• Total energy consumption	kWh	✓	✓	✓
	• Power usage effectiveness (PUE)	Ratio	✓	✓	✓
	• Total renewable energy consumption	kWh	✓	✓	✓
	• Renewable energy factor (REF)	Ratio		✓	✓
	• Energy Reuse Factor (ERF)	Ratio			✓
GHG emissions (9)	• GHG emissions: (Scope 1)	$mtCO_2e$	✓	✓	✓
	• Location-based GHG emissions: (Scope 2)	$mtCO_2e$	✓	✓	✓
	• Market-based GHG emissions: (Scope 2)	$mtCO_2e$	✓	✓	✓
	• GHG emissions: (Scope 3)	$mtCO_2e$			✓
	• Location-based carbon intensity (Scope 1+ Scope 2)	$mtCO_2e/kWh$	✓	✓	✓
	• Market-based carbon intensity (Scope 1+ Scope 2)	$mtCO_2e/kWh$	✓	✓	✓
	• Carbon usage effectiveness (CUE)	$mtCO_2e/kWh$	✓	✓	✓
	• Total carbon offsets	$mtCO_2e$		✓	✓
	• Hour-by-hour supply and consumption matching	TBD			✓
Water (4)	• Total site water usage	m^3	✓	✓	✓
	• Total source energy water usage	m^3		✓	✓
	• Water usage effectiveness (WUE)	m^3/kWh	✓	✓	✓
	• Total water use in supply chain	m^3			✓
Waste (4)	• Total waste generated	tons		✓	✓
	• Waste landfilled	tons		✓	✓
	• Waste diverted	tons		✓	✓
	• Waste diversion rate	Ratio		✓	✓
Land & biodiversity (1)	• Mean species abundance (MSA)	MSA/km^2			✓

Function 2: Combining, harmonizing, and validating data

A critical and differentiating function of these software platforms is its ability to combine the collected data, validate its integrity, and harmonize or normalize it across its different locations, units of measure, time duration, and so on. This function avoids the problem of "garbage in, garbage out" and is represented by the "data platform" section of the "secure cloud" in Figure 3 above. The goal of the function is to provide a global, harmonized view of all of the data to create a "single source of the truth" for all stakeholders to rely on for planning and operations. Because data center providers are often globally or regionally distributed and use a variety of data sources, meters, databases and so on, the data platform must be capable of normalizing the data based on differences such as:

- units of measure
- time zones
- currencies
- languages
- polling intervals

Since most data centers will have a wide variety of equipment and meters from different brands, the software platform should be source agnostic in its data collection to utilize each data center facility's specific infrastructure, processes, etc. The software will then layer all this varied data on a common foundation of hierarchy, unit conversion factors, and attributes to add meaningful context (location, time, dependencies, etc.) to that data.

It is also important the software provide a means to validate data that is input into the platform, regardless of how or where the data came from. The aim is to prevent a gross or significant error from occurring due to user carelessness or device malfunction. This is done by running data validation tests that look for values that constitute being a significant outlier. By "gross" we are referring to data errors that are large enough to skew an analysis. Note, data validation test failure notifications are not the same as performance alerting where users may wish to be alerted when consumption or cost increases or decreases by a specific variance. When an outlier in the data is detected by the software (i.e., a failed validation test), it is good practice to require a user review to manually validate or approve the outlier data point as being good or bad. Figure 4 shows an example data validation test result.

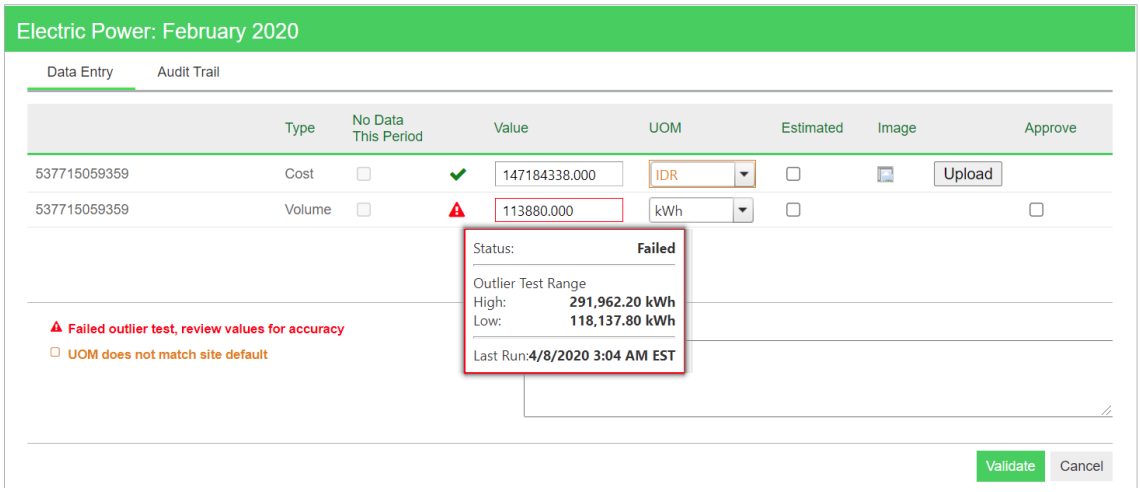

Figure 4

An example screenshot showing Schneider Electric's own instance of sustainability management software called, Resource Advisor, highlighting a failed data validation test that shows an energy number below the minimum accepted value and a unit of measure that does not match the default value for that particular site.

Function 3: Analyzing data

Once the data has been collected, normalized, and validated, the software platform will provide some level of "out-of-the-box" analysis and present the data using a series of dashboards. How well this function is performed is another key comparison point when evaluating these software platforms available in the market today. The more the software platform can provide context and insights around the data, as well as draw conclusions by understanding interdependencies between the myriad of different data streams, the more effective it will be in driving energy and sustainability program success. More than just providing a dashboard of collected information for use in reporting, these tools should offer data analytics to aid stakeholders in planning and day-to-day operations.

Some of the "out-of-the-box", built-in analytics to look for are as follows:

Trend analysis

This involves showing data rolled up by hour, day, week, month, or year. It is useful for showing trends in consumption (e.g., energy), demand (e.g., cooling demand), PUE, and temperature series data, for example. The analysis should enable the user to select or zoom in on shorter periods and to view all values.

Load profile analysis
This analysis shows metered energy load data and can be helpful for understanding trends below the daily level.

Comparison analysis
This analysis enables site to site or time period comparisons. Such benchmarking can make you aware of outliers that might lead to uncovering a problem that needs mitigation.

Calendar load analysis
This type of analysis shows metered data in a calendar view making it easy to spot unusual days that might be driving unusual behavior of data center cooling systems, for example.

Scatter-plot analysis
This type of analysis can uncover correlations between two sets of data, such as temperature and energy. Analysis will typically show a “best-fit” line. Comparison to historical data ranges is often available, as well.

Function 4: Providing a sound basis for strategic decision-making, action, and reporting

By collecting, normalizing, validating, analyzing, and presenting energy and sustainability-related data across the enterprise to all stakeholders, the software facilitates good operational decision making and provides a sound, auditable basis for reporting. These software platforms do not provide operational control of infrastructure equipment and their control systems, but rather provide information and insights upon which energy procurement, sustainability officers, and facility operators can act upon to do tasks more easily such as:

- benchmark performance and track progress toward sustainability goals (see Figure 5)
- report on carbon and enterprise sustainability data (energy, water, waste, supply chain, etc.; see Figure 6)
- minimize carbon emissions and use of energy & water
- improve energy demand/consumption forecasting & purchasing
- save money

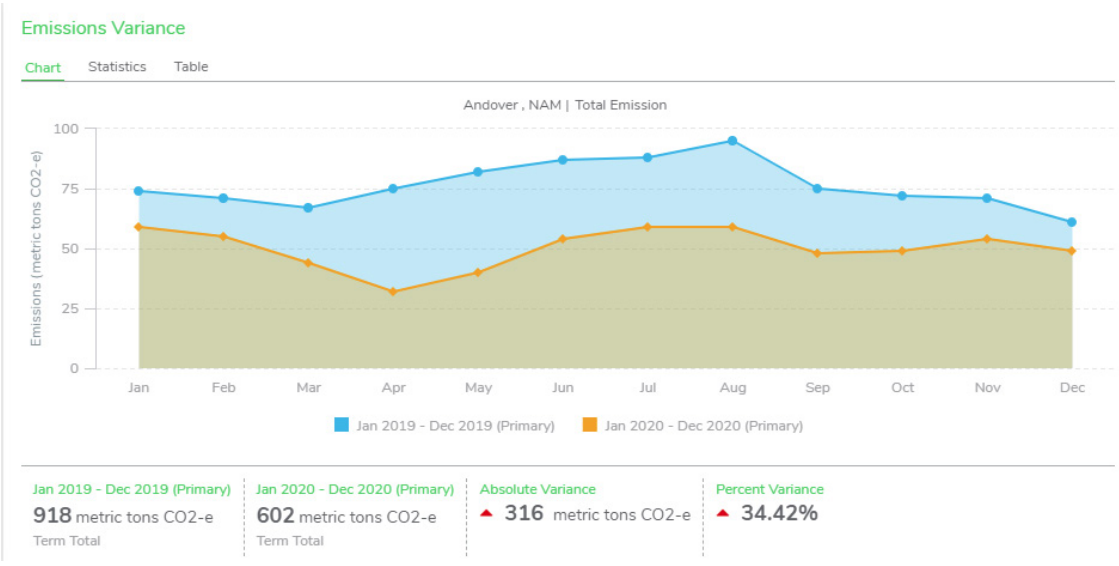

Figure 5

An example screenshot showing Schneider Electric’s own instance of sustainability management software called, Resource Advisor, that benchmarks carbon emissions year-over-year between 2020 and 2019 for a site in Andover, Massachusetts, USA.

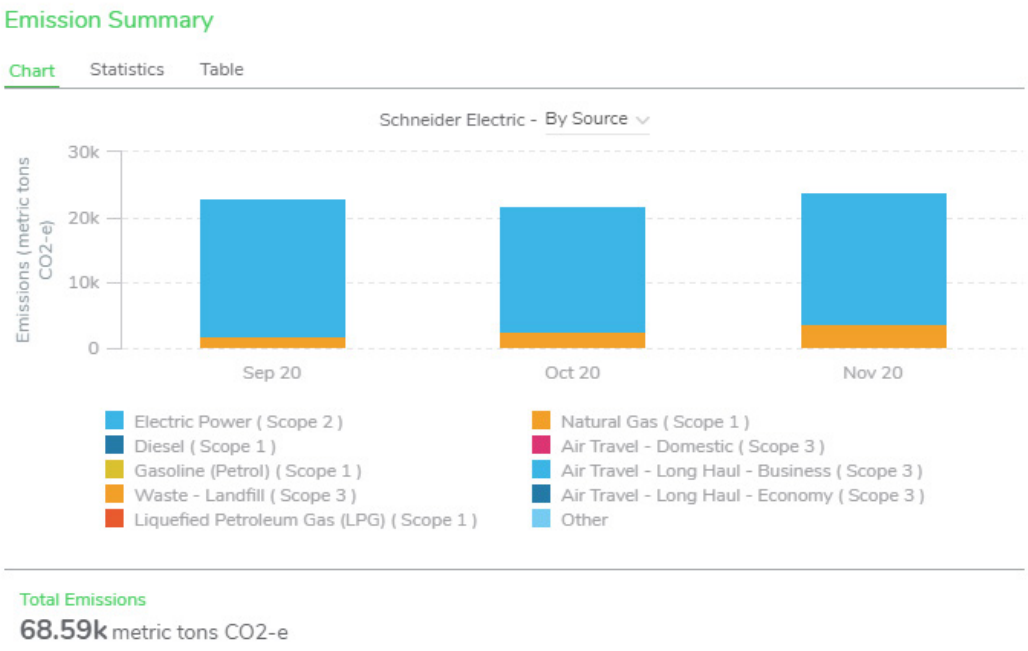

Figure 6

An example screenshot showing Schneider Electric's own instance of sustainability management software called, Resource Advisor, showing a 3 month report of GHG emissions by source type.

The following are four practical examples of how insights from the software can enable productive action.

Example insight 1 – With a complete enterprise-wide view of energy consumption, the software enables you to compare similar sites in real-time and historically.

Example insight 2 – Deviations from the norm (outliers) can make it possible to identify facility, equipment, and/or operational behavioral inefficiencies that could lead more proactively to actions that improve the situation, e.g., by upgrading equipment, changing operational control settings, etc.

Example insight 3 – The software makes it easy to compare utility invoice data with actual interval data from site meters to identify any irregularities between metered and billed consumption. Sharing this information with the utility company can lead to credits or refunds.

Example insight 4 – By utilizing sub-meter management that links energy meters in the IT space or data from DCIM to tenant spaces in the building, these software platforms can provide transparent, reproducible, and auditable tenant billing. It helps data center providers efficiently and equitably charge tenants for the actual energy costs they incur. This could be used to provide tenants with Scope 3 emissions data.

Essential attributes

Essential attributes are the characteristics of the software that make them more effective at providing the four essential functions described in the previous section. When evaluating different options available in the market, we recommend selecting a solution that embodies or is characterized by the following 5 essential attributes.

- Cloud-based
- Connects with vendor invoice management services
- Includes energy procurement & market functions and services
- Supports popular sustainability reporting frameworks
- Customization-friendly

Cloud-based

Given that this is a multi-site, enterprise-wide software tool, likely with diverse stakeholders and multiple users spread globally, a cloud-based architecture is a preferred approach versus a licensed-based, on premise solution. A cloud-based architecture is better at ensuring comprehensive global coverage, access anywhere, easy operation and maintenance. Cloud-based solutions tend to simplify and accelerate software procurement, setup, and on-going maintenance of the tool set. It is an effective way to give secure information access to all data sets across all sites in all regions while providing a means to summarize data and reports across the overall enterprise. A cloud-based architecture also enables the safe and secure collection of all relevant data in one centralized location. From there, it can be cleaned, validated, and potentially evaluated by artificial intelligence and paired with human expertise to extract better intelligence and insights. The cloud also makes it possible for the vendor to offer value-added services that make the use of the software easier and more valuable.

Connects with vendor invoice management services

In most cases, environmental sustainability management software relies on energy, water, and waste disposal invoices as the primary data source for tracking and reporting on sustainability-related metrics. It is critical, then, that all sites participate in inputting the data from their individual invoices into the software platform monthly. Given the importance of having complete and accurate invoice data for analysis and reporting, the software will usually track and report on "invoice participation" to warn users if data is missing.

Not all organizations will necessarily have the bandwidth to manage this important task for themselves. Some vendors offer a service to manage this for you. These invoice management services often go beyond just inputting data into the software platform, and will also include invoice validation services which track invoices that fail testing, provide summary information about potential issues, and show savings recovered as the result of identifying billing mistakes. In Schneider Electric's experience, the majority of clients rely on invoice management services.

Includes energy procurement & market functions and services

Energy procurement is a key component of any sustainability management program that this software should support. The key strategy for data center service providers to reduce their Scope 2 emissions is to purchase less carbon-intensive energy. At the same time, providers must work to keep energy costs low and hedge against market price fluctuations. Given the importance and impact that procurement can have on ESG program results, many of these types of software platforms offer related capabilities and vendor services including:

- program management of procurement activities
- access to energy and commodities market intelligence
- energy RFP management
- performance vs. budget tracking
- commodities risk reporting

Supports popular sustainability reporting frameworks

As ESG reporting has become financially important and increasingly mandatory, various sustainability reporting frameworks and standards have arisen around target setting, reporting, and for certifying (for energy use, for example). The

environmental sustainability management software you select should ideally automate reporting the necessary data into the framework you've chosen. A popular framework is the Global Real Estate Sustainability Benchmark, or GRESB. Their focus is on providing actionable and transparent ESG data to financial markets. GRESB collects, validates, scores and benchmarks ESG data to provide business intelligence, engagement tools, and regulatory reporting solutions for investors, asset managers, and the wider industry. This whole process is greatly simplified when the sustainability management software that can collect and report data in the GRESB format.

Easy to customize

Successful implementation and use of any enterprise-wide software platform depends on executive and stakeholder buy-in on its use. And success is more probable if the new software fits well with existing processes, tools, and systems. And since every organization varies on these points, it's important that the new software is easily customizable or adaptable to make it simpler to use and maintain and to make its outputs more relevant and simpler to understand for stakeholders. Otherwise, there's a greater risk of the tool not being maintained over time with good data and ultimately causing it to be abandoned.

Ideally, the software should be adaptable and customizable by the end user. However, for more complex adaptations and integrations, the vendor should offer a service to do the work. Key areas to have flexible customization for environmental sustainability management software include the following:

- Ability to pull in or share data to existing systems including infrastructure management systems (e.g., BMS, EPMS, DCIM), energy procurement systems, site power and water meters, weather data, and so on
- Support different languages, currencies, units of measure, stakeholders, and the KPIs/metrics they are concerned with, level of site granularity, and so on.
- Adjust alarm thresholds, notification policies, user rights

Conclusion

Driven by customers, investors, and governments, data center colocation companies will need to focus and report on efforts to reduce their environmental impact. The complexity of doing this in a way that is accurate, auditable, and transparent requires the use of environmental sustainability management software. When well implemented and maintained, these enterprise-level data collection, analytics, and visualization platforms enable data center providers to report on efficiency, renewable energy supply, greenhouse gas (GHG) emissions, water conservation, waste recycling, and much more. These tools are invaluable for providing enterprise-wide visibility, target setting, reporting, and giving transparency to clients.

When evaluating different solutions in the market, we believe decision makers should focus on the ability of the software to provide the 4 essential functions of:

1. capturing relevant data
2. combining, harmonizing, and validating data
3. analyzing data
4. facilitating decisions and providing a sound basis for strategic decision-making, action, and reporting

Environmental sustainability management software becomes the “4th pillar” of data center management alongside the equally essential BMS, EPMS and DCIM software management tools.

About the author

Patrick Donovan is a Senior Research Analyst for the Energy Management Research Center at Schneider Electric. He has over 25 years of experience developing and supporting critical power and cooling systems for Schneider Electric’s IT Business unit including several award-winning power protection, efficiency, and availability solutions. An author of numerous white papers, industry articles, and technology assessments, Patrick's research on data center physical infrastructure technologies and markets offers guidance and advice on best practices for planning, designing, and operation of data center facilities.

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