Position Paper

IT and Climate Change: How OpenText Solutions Support Carbon-Friendly ICT Strategies

Information and communication technology solutions must harness climate change goals for efficient energy consumption and greenhouse gas reduction.

OpenText drives sustainable business value across four areas:

1. **Moving to public clouds that use renewable energy and optimize resources.**
2. **Improving the efficiency of business processes to reduce energy consumption.**
3. **Improving management, computing and storage efficiencies to lower equipment and energy usage.**
4. **Prolonging equipment and software lifecycles, and improving production and recycling processes.**

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Executive Summary

Information and communication technology (ICT) solutions can help shape a more sustainable future. By enabling organizations to run and transform, ICT solutions bring the potential for industries to reduce energy consumption and mitigate climate change.

Operating sustainably and responsibly is becoming increasingly more important. A company's environmental, social, and governance (ESG) performance is often a critical factor in gaining market confidence—as too is the growing trend for organizations to transact with those who share the same approach to sustainable and responsible business.

At OpenText™, our aim is to make sustainable and responsible business part of the way we operate. While helping organizations navigate complex technological environments is at the heart of what we do, our software, services and solutions can also help address numerous challenges and deliver many business benefits—this includes enabling organizations to lower their energy impact and reduce their carbon footprint.

Reducing our impact on the planet is a shared responsibility. Collaboration between industry and government is key to shaping sustainable societies and accelerating the shift to a low-carbon economy. The Paris Agreement[1], a legally binding international treaty to address climate change, aims to limit global warming to 2°C. To achieve this, governments and business around the globe are investing in ways to reduce their carbon emissions and increase the adoption of renewable energy. Alongside increasing regulatory requirements, growing attention on ESG criteria is driving responsible and sustainable business as a competitive advantage.

As the business value of ICT increases, so too does energy consumption. Fueled by the growth of data, compute-intensive applications, the rise of the Internet of Things (IoT), and public cloud expansion—if the ICT sector were a country, it would rank third in terms of electricity consumption. Some analysts expect this to rise to an alarming 20 percent of the world's total electricity consumption by 2030.

This is the challenge: Can ICT reduce its carbon footprint and speed up digital transformation at the same time? Since renewable energy has limits, how can electricity consumption be reduced—and can ICT help reduce carbon footprint across industries?

Apart from simply buying renewable energy to power ICT installations, four ways ICT can contribute to carbon footprint reduction can be distinguished:

1. Move to a (public) cloud that uses renewable energy and adds various efficiencies, including resource usage and flexibility.
2. Make primary business processes more efficient to help reduce energy consumption.

3. Reduce the amount of energy used by ICT itself by improving management, computing, network and storage efficiencies, leading to less equipment use for the same amount of work.
4. Reduce the amount of energy used during the equipment and software lifecycle by prolonging lifecycles and improving production and recycling processes.

As one of the world's largest enterprise software providers, OpenText offers a comprehensive portfolio of solutions that can help organizations be more efficient in these four areas. We can help simplify cloud migrations and hybrid cloud management, provide actionable insights for better business decisions, streamline application development, make ICT environments more efficient, and help bridge old and new technologies to build upon what already works.

Several OpenText use cases illustrate the possibilities:

1. Assessing an ICT environment's unused and hardly used resources that can be identified and retired, leading to wins in both energy consumption and costs.
2. Consolidating and right sizing an ICT environment, in combination with the cloud, leads to a more efficient ICT architecture, reduces costs, and could significantly reduce energy consumption and environmental impact.
3. Analyzing structured and unstructured data produced by applications that has lost its value for the organization over time can free up storage capacity, further reducing energy needs.

Enhancing ICT efficiencies helps reduce carbon emissions while improving business processes. Run continuously in parallel to an organization's digital transformation approach, the goal is to find the right balance between sustainability and digital transformation. To achieve this, a deeper assessment is needed to build a business case and move forward to more carbon-friendly ICT strategies. OpenText offers a wide range of solutions that can be combined to enable this transformation.

TCFD and SASB

The Task Force on Climate-related Financial Disclosures[5], launched in December 2015. Founded by the Financial Stability Board[6] and G20 members, it promotes international financial stability by identifying the information for investors, lenders, and insurance underwriters to assess and price climate-related risks and opportunities.

The non-profit Value Reporting Foundation (VRF, formerly SASB), helps businesses and investors develop a common language about the financial impacts of sustainability.

Introduction

The Growth of ICT Usage in Times of Climate Change

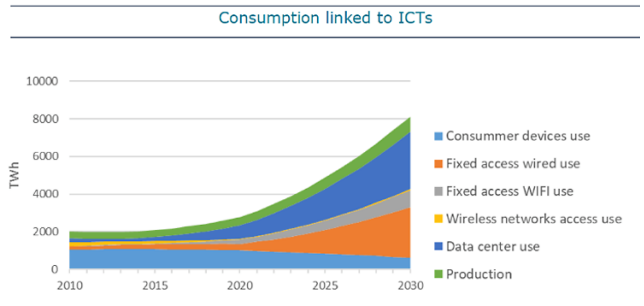
Climate change is one of the biggest challenges the human race has ever faced. In 2019, the European Union launched the European Green Deal[2] that sets Europe on a path to become the first climate-neutral society by 2050. And recently, the EU 2030 Climate Target Plan[3] was enforced—a plan to cut GHG emissions by at least 55 percent by 2030. On 14 July 2021, the EU unveiled its plan to reach its target in in a fair, cost effective and competitive way.

Standards, frameworks and regulations like the SASB Standards[4] and the TCFD[5] recommendations *(see panel at left)* are being adopted by more and more countries, putting pressure on companies to give more attention to ESG.

To align with the Paris Agreement targets, companies and industries are increasingly setting voluntary CO_2 reduction targets themselves. In February 2020, the telecommunications industry agreed on a science-based target[8] to reduce GHG emissions by 45 percent between 2020 and 2030. In Europe, a large group of data center operators have committed themselves[9] to the EU Green Deal. And the largest public cloud providers and many tech firms are rapidly moving to renewable energy sources as well.

Development of ICT solutions was prioritized to deal with growth, speed, transformation, and cost control. Addressing the climate challenge adds energy consumption and greenhouse gas (GHG) reduction to this priority list. The amount of energy consumed by ICT is only increasing with the exponential growth of data and data traffic, plus the rise of IoT, compute-intensive applications like blockchain, and public cloud growth. Currently, ICT accounts for five to nine percent of the world's total electricity consumption, resulting in about two percent of the world's GHG emissions. Some predictions expect it to rise to 20 percent by 2030 (source: Enerdata[10]).

While ICT can help improve energy efficiency in sectors like transportation, production, energy, and logistics, it is of course unacceptable if this leads to ICT driving increased energy usage.



Chapter 1

Carbon Footprint Reduction in ICT

While ICT can lead to more business efficiency, revenue growth, and accessible information—it can also lead to more ICT. In today's digital economy, business is based on ICT. Logistics, financial transactions, media and entertainment, to name a few industries, are powered by ICT—including traditional non-technology-oriented industries like farming—uses ICT[11] to maximize yield.

Compute-intensive applications like big data analysis or blockchain technology result in more power consumption, and an exploding amount of data is always online. How can we avoid the predicted 20 percent carbon footprint for ICT in 2030? (source: Enerdata[10]) Or is ICT able to reduce the carbon footprint in other sectors and compensate for its own growing energy needs?

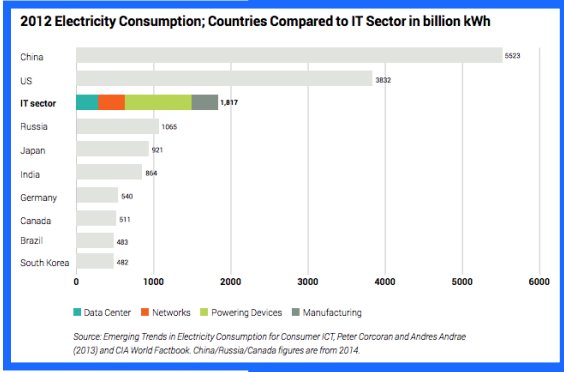
To reach the ambitious targets of the Paris Agreement, all energy consumption needs to move to renewable energy sources—wind, sun, water, and geothermal energy, or any source that does not release GHG. To power their ICT, organizations can choose to invest in renewable energy or turn to renewable energy providers.

Focusing on the most important carbon footprint reduction possibilities for ICT, we can categorize four solutions (other than simply purchasing renewable energy to power ICT installations):

1. Move to a (public) cloud that uses renewable energy.
2. Contribute to carbon footprint reduction in primary business processes.
3. Improve efficiencies and reduce the amount of energy used by of ICT itself.
4. Reduce the amount of energy used in the equipment and software supply chain and lifecycle.

Some Numbers on ICT Electricity Consumption

- 3rd largest electricity consumption if ICT were a country[12]
- 5% to 9% (1,200 to 2,160 TWh10) of yearly 23,398 TWh consumed in 2018[13]
- 6% to 9% increase yearly increase, rising to 20%, or 4,800 TWh
- 17% of total energy consumption worldwide is electricity[14]



1.1 Move to Renewable Energy

Many organizations choose to move applications and data to public cloud providers that use renewable energy sources. While moving to a sustainable public cloud reduces GHG emissions, it also shifts the carbon footprint responsibility to big tech enterprises like Microsoft, Google, and Amazon.

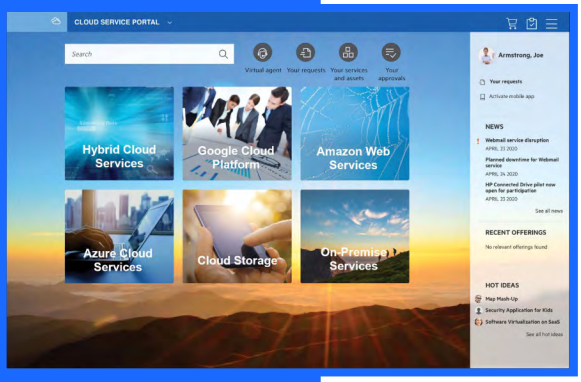
Moving to the cloud is often combined with improving other ICT efficiencies as well. For example, shifting to the pay-per-use concept of the public cloud, where systems are always optimized, means that less in-house hardware is needed and that it is no longer necessary to overprovision hardware for peak moments.

But efficiencies offered by the public cloud are relative. The endlessness of the cloud can lead to 'infobesity'—that is, storing more data than is needed. Without additional governance and policies, cloud usage can lead to a growing need for resources that in turn reduces the effect of other energy savings.

How OpenText Can Help

The non-profit Value Reporting Foundation (VRF, formerly SASB) uses the OpenText™ Hybrid Cloud Management X (HCMX) portal to help businesses and investors develop a common language about the financial impacts of sustainability.

- Integrates with public cloud services (AWS, Azure, GCP), private cloud, VM offerings, and traditional physical servers.
- A single, flexible design that automates the fulfillment of a large variety of requests.
- Comprehensive reporting filtered by accounts, products, tags, and business rules.



HCMX portal

Another question is whether there is enough renewable energy available for the many emerging public cloud data centers. Of all the electricity in the world, 27 percent comes from renewable sources. That is only 11 percent of all energy (source: REN21[14]). Hyperscale data center operators are leaders in corporate renewables procurement, often through power purchase agreements. The top four corporate users of renewables in 2019 were all ICT companies. In 2018, Google (10 TWh) and Apple (1.3 TWh) purchased or generated enough renewable electricity to match 100 percent of their data center energy consumption. Equinix consumed 5.2 TWh (92 percent renewables) while Facebook data centers consumed 3.2 TWh (75 percent renewables). Amazon and Microsoft sourced about half of the data center electricity from renewables. (source: International Energy Agency[15]).

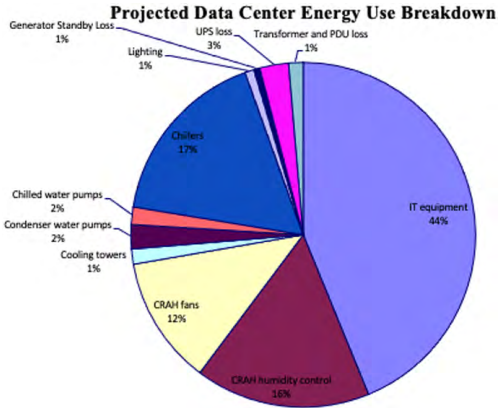
In 2021, a province in the Netherlands built a large windmill park[16]—partly financed with tax money and intended to help 370,000 homes shift to renewable energy. It then sold all of its capacity to a hyperscale Microsoft datacentre[17] planned in the countryside. How green is a green data center if it deprives other stakeholders, like citizens, of their renewable energy sources?

To overcome this dilemma, data center operators are looking for options to further increase energy efficiency. A Dutch start-up initiative (**blockheating.com**) can use 95 percent of the heat released from data centers to warm houses or greenhouses where vegetables are grown—also called "rest heat". Similar initiatives can be found in Sweden (**digiplex.com**) and Germany (**cloudandheat.com**), where rest heat is used to heat houses.

While the amount of renewable energy is rising fast, it is not evenly distributed across time and location. The digital industry is in a unique position to help with distribution by moving production to times and locations when and where there is a surplus of energy available. For example, moving big analysis jobs to the middle of the day for solar-driven data centers, or doing a development build or test in the middle of the night when wind is still being produced—but regular industries and homes are not consuming.

Data center operators are looking for ways to improve their power utilization effectiveness (PUE). This metric, used to determine the energy efficiency of a data center, is calculated by dividing the total amount of power entering a data center by power actually being used to run the computing infrastructure within it.

According to an energy breakdown from the U.S. Center of Expertise for Energy Efficiency in Data Centers[18] about 50 percent of all energy is being used to keep temperature and humidity under control. This would lead to a PUE of 2.0 or more. Improving this figure to 1.4 would reduce energy consumption by 30 percent.



To reduce GHG emissions by moving ICT resources to the public cloud, it is important to weigh all these aspects. Where does the renewable energy come from? What is done to reduce the amount of energy needed for power and cooling? Not only state-of-the-art hardware, but also smarter data center design and more effective cooling solutions, like relocating data center to colder climates, are needed to improve power usage effectiveness.

1.2 Contribute to Efficient Business Processes

Even though ICT is responsible for a small percentage of worldwide GHG emissions (about 2 percent of synthetic emissions), it is also one the fastest growing energy consumers. There is a growing perception that ICT can also substantially reduce the environmental impacts of other sectors by increasing its energy efficiency. Digital transformation may have the potential to decouple emissions and resource use from economic growth.

Potential ICT-induced energy efficiency is estimated to be several times larger than the overall energy consumption of ICT itself. The Climate Group calculates in the SMART 2020 report[19] that ICT could deliver 7.8 Gt CO_2-equivalent emission savings in 2020, which represents 15 percent of global GHG emissions. There is a broad uncertainty on the reliability of this data since ICT is embedded in complex systems, making it difficult to isolate its effect. But it can be concluded that the energy consumption of ICT is relatively small compared to the potential of ICT as an enabling technology. The net effect of ICT on climate change is clearly positive.

ICT can help all economic sectors become more energy efficient by optimizing existing processes or enabling entirely new, more energy efficient processes. These so-called smart solutions can contribute to carbon footprint reduction in various—if not all—sectors:

- **Energy:** Intelligent electricity grids with flexible, controlled power flows supported by advanced information technology will enable decentralized generation of energy and a high share in renewable energies in which consumers can become suppliers as well. All elements of the network (producers and consumers) should be able to exchange information to guarantee an optimized coordination to save energy, reduce cost, and increase reliability and transparency of the system. Since the energy sector is one of the largest emitters of GHG, it also can contribute to reduction. The Climate Group (2008) states in the Smart 2020 report that the power sector accounted for 24 percent of global emissions in 2002 and could be responsible for 14.25 Gt CO_2 equivalents in 2020. **The potential for ICT to reduce carbon emissions through smart grid technology in the year 2020 is estimated to be 2.03 Gt CO_2 equivalents.**

OpenText™ Windpark Manager

Nordex delivers more than 18 GW of sustainable energy worldwide, with offices in over 20 countries. Nordex SE needed a multi-vendor, end-to-end management solution that incorporates data from turbines, ICT components, and security information to increase efficiency and control, while reducing operational costs. OpenText materialized a new solution: OpenText Windpark Manager (WPM). This solution combines Operations Bridge, Network Node Manager, and Business Value Dashboard. It maps the turbine components and wind park infrastructure into service models and employs innovative, market leading correlation and automation. ICT components are discovered, monitored, and controlled, while the Business Value Dashboard provides real-time transparency for customers. By monitoring up to 4,500 turbines with a total of 10GW power output, it covers half of Nordex's installed wind parks, enabling meaningful insights for over 800 customers.

The Climate Corporation[11]

The Climate Corporation, a subsidiary of Bayer, aims to help all the world's farmers sustainably increase their productivity with digital tools. The Climate FieldView platform brings together field data collection, advanced agronomic modeling, and local weather monitoring into simple mobile and web software solutions. It gives farmers a deeper understanding of their fields so they can work to optimize yields, maximize efficiency, and reduce risk. OpenText™ Vertica acts as the data analytics and machine learning solution to help deliver these insights. (source: **www.vertica.com/wp-content/uploads/2020/04/eBook_Climate-Corporation.pdf**). In 2021, The Climate Corporation was awarded "Outstanding AI/ML Industry Project" by Computing.co.uk for the segment "Outstanding AI/ML Industry Project."

- **Logistics and transport:** Since transport is responsible for about 20 percent of European GHG emissions it is a crucial factor in the climate change debate. Apart from using less carbon intensive means of transportation, ICT can help optimize transportation organization and management with improvements like dynamic fleet management and route optimization. These result in a reduction in distance travelled, hence reducing the emission of GHG. According to The Climate Group (2008), the majority of logistics emissions come from transport and storage. **Optimizing logistics using ICT could result in a 16 percent reduction in transport emissions and a 27 percent reduction in storage emissions globally.**
- **Manufacturing:** According to The Climate Group (2008), industrial activity is one of the largest contributors to global emissions, responsible for 23 percent of total emissions in 2002 (9.2 Gt CO_2 equivalents). It uses nearly half of all global electrical power generated. A variety of technologies is available that could lead to energy demand reduction in industrial processes, including boiler operation, compressed air usage, heating and lighting, and electric motor efficiency. Measuring and control technologies together with the corresponding software in general are crucial for realizing potentials for saving resources. Better insights into production processes, the ability to produce-to-order, and optimization of (circular) supply chains leads to less stock, less production loss, and less energy use.
- **Office buildings:** Smart buildings use IoT devices—such as sensors and software with online connectivity—to monitor various building characteristics, analyze the data, and generate insights around usage patterns and trends that can help optimize the building's environment and operations. Interconnected technologies are used to make buildings more responsive, sustainable and productive. Using sensors for energy management can improve building efficiencies by doing things such as reducing temperature when an office is vacant, or by switching off lights as soon as employees leave a room.
- **Remote work:** As many have experienced during the COVID-19 pandemic, working from home leads to less use of office space, less traffic, and shorter meetings. At its peak, worldwide lockdowns resulted in 26 percent less CO_2 emission due to less air and car traffic[20]. Many other initiatives can have similar effects, such as online banking, remote healthcare, e-learning, and even ecommerce.
- **Sharing economy:** Sharing resources is easier with ICT. In many cities it is possible to share scooters, bicycles, and cars using an app. Often these vehicles are electric, with a low carbon footprint. The overall effect is a reduction in overall car and scooter usage.
- **Home:** Carbon footprint reduction can also start at home. The use of smart home solutions and modern electronic equipment that can be controlled remotely with an app. Apps can contribute to energy use reduction, while smart metering combined with intelligent power grids improve overall electricity use.

This shortlist could be longer—and as digital transformation continues, many new initiatives and solutions introduced will further improve business process efficiencies. After all, any ICT-based improvement in efficiency that leads to less unnecessary work, transportation, or anything activity that uses energy, will lead to less CO_2 being emitted.

How OpenText Can Help

OpenText solutions provide machine learning and artificial intelligence that produce the actionable insights, analysis of equipment usage, and process statistics that form the basis of improving process efficiency in ICT

OpenText™ Operations Bridge[22] collects sensor, IP, and ICT equipment data and presents them in a Business Value Board, to connect events directly to business processes.By leveraging common components (discovery, datalake, orchestration) it can reduce integration, storage, network and computing resources to deliver a complete integration for hybrid and on-premises environments.

OpenText™ application development and delivery portfolio[23] helps organizations build tools to automate and digitize their business processes. OpenText™ Vertica[24] analytics can help getting the right data insights. By working directly in the data warehouse, there is no need for moving or duplicating data, to reduce storage needs and network traffic.

With OpenText™ Robotic Process Automation[25] IT processes can be automated to make business workflows more efficient, while access to production data on the production floor can be provided by a tool as OpenText™ Reflection Mobile[26].

IoT Technology Will Save More Energy Than It Consumes

Transforma Insights and 6GWorld[21] report that IoT operations in 2030 will save more than eight times the energy they consume—a net savings of 230 billion cubic meters of water and elimination if one gigaton of CO_2 emissions.

The report also found that though manufacturing new IoT technologies will increase global electricity use by 34 TWh by 2030, they will reduce electricity consumption by more than 1.6 PWh—enough electricity to support more than 136.5 million homes' energy use for one year.

IoT technology will also result in an additional 53 TWh of fuel being used for distribution and deployment of solutions. However, IoT's net effect on fuel consumption will result in an annual 3.5 PWh reduction of hydrocarbon fuel.

1.3 Reduce the Amount of Energy Used by ICT Itself

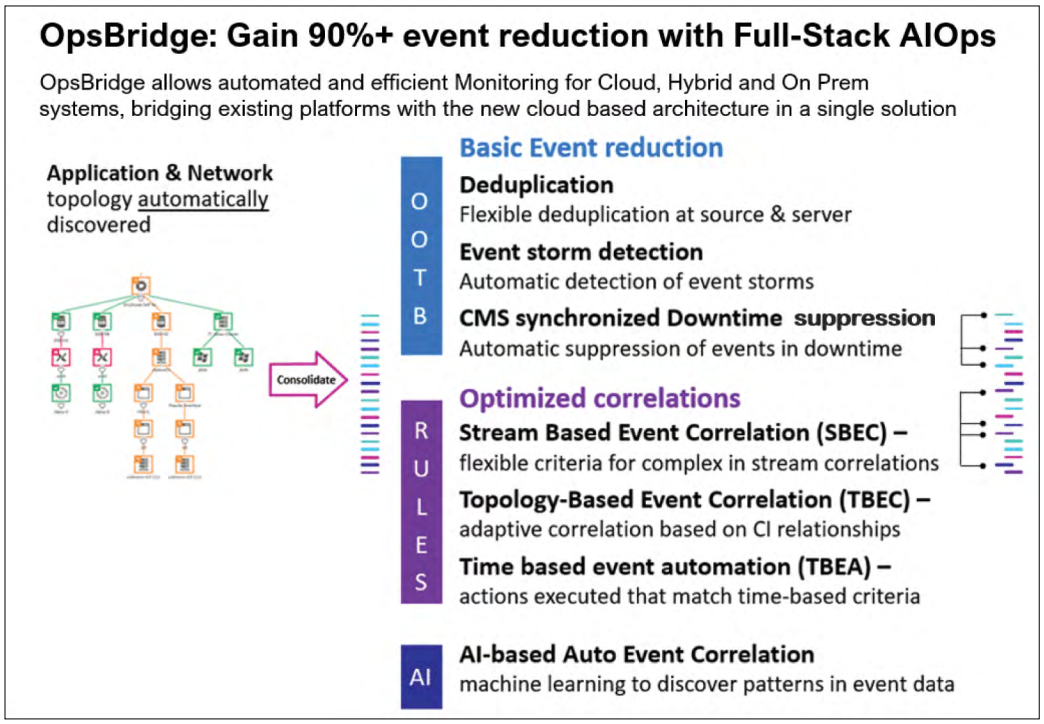
Migrating to the public cloud using renewable energy or optimizing business processes can help reduce energy consumption and contribute to reducing a company's carbon footprint. What about reducing energy consumption of in-house ICT and ICT equipment itself?

Companies that do not want to (or cannot) move to the public cloud can reduce their ICT power consumption in various ways. Obviously, migrating to new equipment that is more energy efficient leads to less power consumption, but replacing equipment might lead to more e-waste *(see 1.4)*. It is better to improve and optimize ICT so fewer resources are needed. Efficiency leads to less power consumption and lowers costs as a side effect.

Improving ICT efficiency:

- **Compute:** In many organizations, the growth of ICT has led to a patchwork of equipment that is not used efficiently. Consolidation, virtualization, right-sizing ICT, thin provisioning, and retiring unused resources can reduce the amount of equipment dramatically, thus reducing energy consumption.
- **Storage:** We can find even more efficiencies in data storage. Deduplication and compression of data, efficient back-up processes, moving unused data to offline media, or reducing the number of moving parts by migrating to flash storage can all contribute.
- **Network:** Minimizing transmission of unnecessary data over a network contributes to efficient networking. This includes incremental back-up over a network, but can be helped by compressing network traffic.
- **Software development:** Every new software release seems to consume more computing power and needs more memory. More efficient coding could lead to compute-efficient applications that are also energy-efficient. Moreover, during the development phase, many efficiencies can be accomplished by using smart testing tools to avoid double work or by incorporating security in the development phase.
- **Management:** Knowing your systems and knowing your data is a starting point for improving efficiencies. Assessing, monitoring, and analyzing computer performance and all other ICT processes provide useful insights. Classified data is needed for efficient storage. Smart management solutions that use machine learning and artificial intelligence eliminate time-consuming manual work and lead to less mistakes. In the end, efficient management leads to efficient use of ICT resources.
- **Security:** More and more resources are needed to keep systems secure and prevent threat actors from taking control over IT resources. Often organizations use many different solutions for different platforms. By consolidating security solutions, fewer resources are needed while security levels are improved.
- **Governance:** Governance can be more than securing access to data and complying with regulations. It can also be a starting point to reduce resource consumption by doing things like imposing policies that limit public cloud usage. The limitlessness of the cloud can easily lead to storing much more information than needed. Cloud governance can prevent that.

Reducing ICT power consumption is a combination of efficiencies—migration to new technologies and the (public) cloud. It's an ongoing process, parallel to digital transformation, that not only lowers energy consumption but also reduces costs.



1.4 Energy Use in the Equipment and Software Supply Chain and Lifecycle

Equipment lifecycle and supply chain are key considerations when reducing ICT's carbon footprint. Manufacturing and disposal of ICT devices and equipment may already account for more than 50 percent of its total energy use. Furthermore, ICT equipment is manufactured using rare materials including gold, lithium and palladium—often these materials are mined in locations where environmental regulations might not be stringent.

The disposal of retired ICT equipment leads to e-waste. Many of the materials used cannot be fully recycled because of the way they are used inside the equipment. While the most valuable materials can be recycled, the remaining items are often discarded, which can then cause pollution.

What can be done to prevent environmental risks in both the production and disposal of ICT equipment?

How OpenText Can Help

OpenText has built its reputation on bridging the old and the new. We help you leverage what already works. Our portfolio covers OpenText mainframe modernization[33] and integration of data for analysis and monitoring, to DevOps solutions[23] that bridge operations and application development. And our software development solutions make development and testing processes as efficient as possible, resulting in a true software factory[34] where all processes, tools, services, and data are integrated. We built this for ourselves, and can help other organizations build their own.

Mainframe Modernization

Historically, mainframes covered the core business applications in many organizations. In fact, 92% of ICT leaders consider these applications, mostly COBOL-based, as strategic to their business, even though they often lack a modern interface. OpenText™ Application Modernization enables access to mainframe data, binding the flexibility of web services architectures with the scalability and resilience of COBOL systems. Using RESTful APIs and web services interfaces, COBOL applications can be modernized using HTML5, Microsoft Windows Presentation Framework, or Win Forms technology. It is also possible to bridge COBOL data files and relational database management systems, enabling easy data integration with Microsoft Excel and other business reporting tools.

OpenText has established partnerships with Cloud Providers (AWS as an APN Advanced Technology Partner and Microsoft Azure), and recently helped U.S. Government offices run mainframe apps on MS Azure. Bridging the old and the new, government clients can reduce costs and extract maximum value from their existing core systems, instead of a risky rip-and-replace approach. At the same time, they benefit from Cloud elasticity and autoscaling capabilities, optimizing the end-to-end carbon emissions.

MANUFACTURER'S RESPONSIBILITY

Manufactures need to take responsibility for producing products that can be easily recycled and do not have hidden power consumption. Many manufacturers have trade-in programs in place, although that does not mean everything is recycled properly. Fortunately, more and more equipment manufacturers take responsibility and identify ways to contribute to a circular economy. Reusing all materials, using components that are easy to replace and finding new ways of ownership—like Ownership-as-a-Service—are steps to reduce e-waste and all its environmental effects, including reducing production carbon footprint in the supply chain. An example is HPE's asset upcycling services, which provides environmentally responsible upcycling or recycling of IT equipment.

PROLONGING THE LIFECYCLE OF A DEVICE

Replacing ICT equipment with state-of-the-art technology can lead to more efficiency and less power consumption. However, what happens to the systems that are retired? Depending on their age and manufacturer, they might become e-waste and mitigate the carbon footprint reduction of the new equipment.

To reduce new raw material extraction and minimize e-waste potential, there is the option to extend the lifecycle of the equipment while modernizing some parts. For example, a mainframe can be kept in use by modernizing access to its data. How we think about the lifecycle of a business product is often based on depreciation of investments. After three to five years, new equipment can be ordered simply because new budget is available—even if the old systems still perform. A small change in mind-set can reduce the amount of e-waste considerably.

WHAT ABOUT SOFTWARE?

Although software does not produce e-waste directly, the number of resources needed to develop software should not be underestimated, especially as development cycles tend to get shorter and faster. Efficient development, intelligent asset management, and smarter testing tools can lower resource numbers, reducing energy consumption in the process.

Reducing ICT energy consumption is about finding the right balance between (public) cloud migration, ICT efficiencies, and ICT's contribution to business process efficiency. While new equipment can help boost efficiency and reduce energy consumption, sometimes it is smarter to keep what already works. Assessing the ICT environment and building a business case based on various scenarios can help achieve the best decision for both business and environment.

Chapter 2

OpenText Use Cases That Enable Carbon Reduction

A variety of OpenText solutions can help organizations drive efficiencies and enable them to use their ICT equipment more effectively. In this chapter, three use cases are highlighted to show how OpenText solutions help reduce carbon footprint by (1) assessing an ICT environment and retiring zombie servers, (2) right-sizing an ICT environment in combination with the cloud, and (3) handling structured and unstructured data for storage efficiency.

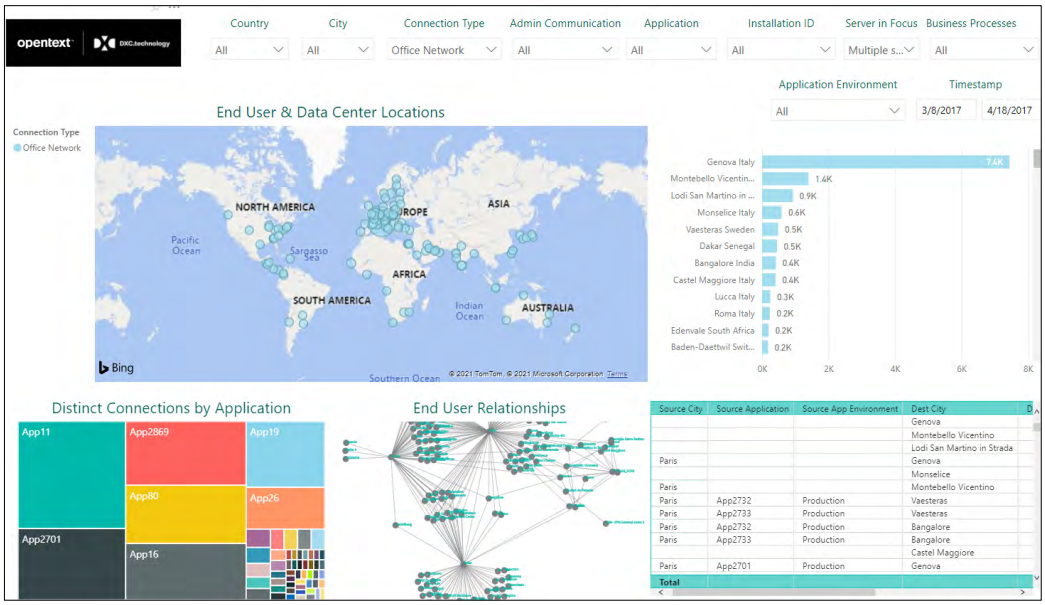
2.1 Identifying and Decommissioning Zombie Servers

According to some estimates, up to 30 percent of all servers in data centers are zombie servers—consuming energy, resources, and licenses, yet carrying out little useful work. Decommissioning these servers allows organizations to immediately reduce costs (hardware, software licenses) and energy. One of the advantages of our OpenText™ Smart Data Center Analytics[47] (SDCA) service is its capability to identify these servers.

Making any large-scale changes to the data center requires detailed knowledge of what exists there and how it is interconnected. Many projects rely on manual discovery, spreadsheets, and tribal knowledge to create maps that reflect the infrastructure topology. This approach is time-consuming, expensive, and error-prone given the size and complexity of today's data centers. The OpenText data-driven, intelligence-based approach to data center transformation projects does not treat it as a collection of infrastructure elements, but looks at it as a social network. Servers are considered as network members and network traffic as conversations they are having with their friends. The more servers talk to each other, the more friendly they are. All that is needed is information about who talks to whom, and how often.

Using network data that is already collected for operational needs, enhanced with configuration management system (CMS) data, these massive volumes of network traffic are converted into visual network graphs, dashboards and reports using a Big Data platform. From these reports, it is immediately clear which servers have hardly any IP traffic—zombie servers.

Recently, OpenText assessed the data center of a large company that had 725 servers in use. After completing the SDCA service, 217 were identified as zombie servers—without disrupting operations. By retiring and consolidating them, the organization saved US$650K annually, with a 400 percent service ROI after three months. Moreover, retiring 217 servers, each of which used somewhere between 350 and 800 Watts, more than 1 million kWH—1 GWh of energy was saved yearly. In this figure possible efficiencies in cooling aren't even taken into account.



Traffic analysis between Data Center and End user locations

2.2 Consolidating and Right-Sizing IT

As a software provider, OpenText consumes large quantities of ICT. To reduce our carbon footprint, we are undergoing a global consolidation project of our Product Service Delivery Centers (PSDCs) to create more efficient IT architectures, reduce costs, and reduce our environmental impact through lower energy consumption. The goal is to enhance operations and provide maximum flexibility to customers.

The PDSC is an internal service organization that delivers its services to the wider OpenText R&D community so that they can focus on their core competency of delivering superior software for their customers. Obviously, the PSDC uses OpenText technology wherever possible. This provided a perfect opportunity to deploy our own solutions such as OpenText™ PlateSpin Migrate[35], OpenText™ Project and Portfolio Management[36] (PPM), OpenText™ SMAX[37], OpenText™ Universal CMDB[27], and OpenText™ Operations Bridge (OpsBridge)[22]. PlateSpin Migrate reduced the risk of manual errors by automating the virtual server migration and accelerated the process greatly. Before migration, PlateSpin Migrate checked all servers and warned the team of any issues that might negatively affect migration, such as missing drivers.

Around 90 people worked on the project over a period of nine months. Project and Portfolio Management was used to manage resource assignment for the entire team, giving a real-time view of how many people were working on what part of the process. Monitoring is critical to the success of complex ICT processes, and the team relied on Operations Bridge and Service Management Automation X (SMAX) to provide 24x7 monitoring.

Universal configuration management database (CMDB) is embedded with Operations Bridge, and SMAX analyzed what and where equipment was deployed. This in-depth understanding enabled the migration to take place with the least disruption possible. It also ensured that any redundant equipment could be decommissioned immediately, supporting the green project objectives.

In the consolidation effort, 51 percent of equipment and associated workloads were relocated to other OpenText data centers, while the remaining equipment was decommissioned and disposed of sustainably. Energy consumption was reduced by 510 KW (4.5 GWh per year) and US$3 million was saved in annual rent and energy costs.

In parallel, several of our solutions now offer a cloud-hosted SaaS deployment option, in partnership with Amazon Web Services (AWS). Moving to the cloud reduces carbon emissions and streamlines critical infrastructure to enhance operations, improve flexibility, and give customers a better experience.

We also aim to increase the use of renewable energy where possible in the more than 90 OpenText sites across the world. OpenText continues to renew energy contracts with suppliers who provide higher ratios of renewable or cleaner energy, which is directly in line with our energy sourcing policy. Today, 40 percent of our energy comes from renewable sources globally, and our ambition is to reach 50 percent by the end of 2021.

But the overall challenge is to reduce absolute consumption, including green energy. The consolidation of the PDSC really makes a difference.

Right-Sizing Test Infrastructures

Realistic environments are needed for software testing, and organizations often have elaborate test infrastructures. By leveraging public cloud resources, it is possible to build a flexible cloud-based test environment that can cope with even the largest load tests, without the need for an internal test infrastructure.

- A large insurance company[38] used the cloud to build 35 virtual mainframe test environments using solutions like OpenText™ Enterprise Test Server[39], OpenText™ Enterprise Developer for z[40] and OpenText™ Enterprise sync[41].
- Educational publisher McGraw-Hill used OpenText™ LoadRunner Cloud[31] for efficient load testing in the cloud for up to 50,000 concurrent users.

As a result, both companies were able to speed up time-to-market, eliminate performance issues in an early stage, and increase overall development efficiency. Another solution to speed up testing without the need for a complex and dedicated infrastructure is OpenText™ Service Virtualization[42], that enables testing teams to create virtual services to test and quickly create realistic simulations.

2.3 Efficient Data Handling

Many organizations support applications, IT assets, and data that is no longer actively used. As in the case of unused IT assets and applications, data can pose unnecessary operational and business risk to the organization, and burden the environmental footprint. This data forces organizations to increase storage resources and network requirements, although existing capacity could accommodate all valuable data—with room to grow. It unnecessarily consumes compute resources for indexing and increases the amount of data that needs to be queried.

ROT AND MORE

OpenText provides solutions for governing the lifecycle of both structured and unstructured data in the organization. Our solutions such as OpenText™ File Analysis Suite[28], OpenText™ File Reporter[43] and OpenText™ Structured Data Manager[44] are able to discover and help manage what Gartner calls ROT data—data that is redundant, obsolete, and trivial . Moreover, they assist in handling MORE data—data that is misplaced, orphaned, risky, and exposed.

Misplaced files are ones that need to be moved to more secure locations on the network. Orphaned are those with an owner who has left the organization and are probably just taking up space and causing back-ups to take longer. Risky files are those that pose a risk to the organization simply by being stored—like financial files of a company targeted for a merger. And then there are exposed files that can be accessed by unauthorized users within the organization.

By managing ROT and MORE data, the organization can prevent increasing its storage footprint or even reduce it, with the environmental benefits that can follow.

DATA LAKES

In addition to data that doesn't add value to the business, there is data that is crucial to the organization but lingers in data lakes. Data lakes have evolved the last few years as valuable tools for gathering relevant information for business insights and applications. However, they pose a unique challenge as they combine large amounts of structured and unstructured data, and usually reside in highly distributed systems with inefficient access methods.

With Vertica[24] and Vertica SQL on Hadoop[45], OpenText offers Big Data analysis solutions that natively access both data lake and Hadoop data with breakthrough speeds, without requiring any data duplication. Using compression techniques on the hosted data, storage needs for the Big Data environment are reduced further. Less hardware resources are needed while customers experience an increase in performance.

HANDLING LOG DATA

Enterprise security relies on the capability to analyze and process vast amounts of log data from multiple sources. OpenText has developed OpenText™ ArcSight Logger[46], an efficient solution to consolidate and handle this data in a compressed manner to reduce the need for data storage and transportation. This turnkey product for collection has high-performance search, reporting, and alerting for all enterprise log data. It functions both as a standalone appliance for log management as well as a strong complement to other ArcSight product line deployments.

Chapter 3

Conclusions

There is no such thing as a one-size-fits-all solution to reduce ICT carbon footprint. Moving to renewable energy has its limits, and still leads to using resources of some sort. Carbon footprint reduction in ICT is a sum of efficiencies in ICT itself and ICT contributions to more efficient business processes. That makes it a journey that is specific for each organization, depending on its industry, its ICT maturity, and its digital transformation needs.

OpenText offers a comprehensive portfolio of solutions that can improve ICT efficiency in many ways, indirectly leading to fewer greenhouse gas emissions. From migrating to the public cloud to speeding up development cycles, from modernizing mainframe applications to providing actionable insights, OpenText helps organizations run and transform their ICT with a pragmatic, disciplined, customer-centric approach that allows customers to succeed in today's rapidly evolving marketplace.

Sarah Atkinson, director of ESG at OpenText, concludes: "We are committed to helping our customers address their carbon footprint and adopt carbon-friendly IT strategies, just like we're doing for ourselves. Our portfolio of leading-edge solutions is designed to help customers save costs, increase operational efficiencies, and operate more sustainably to support our planet."

This position paper highlights only a few carbon footprint reduction possibilities. To address the specific needs of an organization and to find the right balance between environment and digital transformation, a deeper assessment is needed to provide the right insights. At OpenText, we look forward to conducting such an assessment to help you move forward to more carbon-friendly ICT strategies.

Learn more: OpenText and our commitment to reducing our impact on the environment.

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