



Green tech initiatives: Best practices and breakthroughs

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AMAZING SPACE: WHY GREEN TECH IS GOOD FOR BUSINESS AND THE ENVIRONMENT

BY DAN PATTERSON

“Nature, science, and facts are non-partisan,” said Indian Creek Nature Center executive director John Myers. “Technology is an extension of nature. The two not only interoperate, tech and the environment complement each other.”

Science and technology are also good for business. The Indian Creek Nature Center (ICNC) is Iowa’s only private nonprofit nature center.



IMAGE: DAN PATTERSON

The organization's headquarters and [Amazing Space](#) "living building" is an [energy NetZero facility](#) nestled in a grove of oak trees on the edge of a sloping prairie dotted with both wildflowers and solar panels. The building is a 12,000-square-foot environmental education center, Myers explained, and is "under certification by the [International Living Future Institute](#) to become a Living Building.

This certification is far beyond

LEED standards and focuses on truly sustainable practices that restore, not degrade, the environment."

The nonprofit's mission is to promote sustainable development by encouraging environmental education and deploying best-in-class green technology. ICNC manages nearly 300 acres of land and hosts thousands of annual visitors. "We believe a balance is found," Myers said, when technology and nature are properly integrated. "We have adopted technologies that further engage [the community] and allow us to research ... weather stations, energy production and demand monitoring, and high-efficiency [storage] techniques."

The Nature Center's smart campus is powered by thousands of photovoltaic panels, a geothermal network, occupancy sensors, daylight monitors that regulate light output levels, and an electrical distribution that consists of 160 circuits throughout the building. "Each one of these circuits is connected to a web-connected gateway device that allows us to monitor electric usage in real time and view trend data," Myers said. "This information is output to a web dashboard we can view anytime and make quick decisions to maximize our energy efficiency."

Devising and constructing the living building was a community endeavor. My father, Rich Patterson, was Myers' predecessor, and along with business and community partners he made major investments in green technology in the 1980s and 1990s. We spent summers restoring natural wetlands that now filter the Nature Center's drinking water, and winters installing low-flow toilets. "Nature centers across the country are frequently supported by consumer investment and business partnerships," he told me during the Amazing Space launch in 2016.



IMAGE: DAN PATTERSON

“Smart companies understand the need for good environmental stewardship,” Myers said. “[The Nature Center] values energy efficiency for many reasons. Environmental protection is one reason. Because nonprofits operate with slim margins, we also have to be business leaders. By investing in technology early we can show, rather than tell, other businesses that [tech] innovation saves money and grows a path to the future.”

The Nature Center’s business partner Alliant Energy agrees. Alliant provides electric service to 530,000 customers and natural gas service to 235,000 customers in more than 700 communities in Minnesota and Iowa.

The Living Building is an experiment for both organizations to learn more about producing and storing renewable energy. “Solar energy is key in making the building sustainable and educational,”

said Doug Kopp, president of Alliant Energy’s Iowa branch in a [statement](#). “[The Amazing Space] will provide our customers with a new way to learn what it takes to become sustainable and how solar energy can help.”

The grid system solar array pumps out 105 kilowatts and combines 420 roof- and ground-mounted [integrated power panels](#).

“We chose [the grid system] for two reasons,” Myers said. “First, it allows us to partner with Alliant Energy, our local utility, to conduct research on how to best utilize solar across their territory. Second, we needed a reliable backup system. Battery technology is not currently cost-effective or sustainable because too many dangerous chemicals are still used in production, nor did we want a combustion-based backup generator on the property.”



IMAGE: INDIAN CREEK NATURE CENTER



IMAGE: DAN PATTERSON

Constructing the Amazing Space in a method cohesive with the environment was important to the Nature Center but also presented a big challenge, Myers said. “While it is inherent for [the ICNC] to respect the natural world, most building projects don’t look at the end-game of environmentally sustainable design. With a short-sighted viewpoint we could have limited our overall construction footprint by not building a large solar field in the middle of the prairie.”

The long-term deal, Myers said, will allow both Alliant and the Nature Center to make business decisions and share discoveries about optimal panel orientation, solar tracking systems, and methods of connecting solar panels to the grid. “In Iowa, tracking mount systems that follow the sun throughout the day may not create an increase in production substantial enough to justify their increased cost,” he said. “Iowa has lots of wide open

spaces with good sun throughout the entire day. Tracking systems may be more cost efficient in places such as Colorado, where sun is often blocked by mountains during certain times of the day.”

One of the biggest challenges with solar technology is energy storage. The research partnership also helps Alliant enhance and upgrade current electrical grid infrastructure and learn more about energy distribution. “The grid is antiquated,” Myers said. “Our business partnership with renewable energy helps provide incentive to upgrade a utility everyone uses, every day.”

When investing in technology, Myers said, “Businesses should [consider] when [technology] actually improves overall efficiency and is the responsible thing to do. Indian Creek Nature Center made a conscious decision to walk away from some of the cool [green] tech items such as a solar-thermal hot water system, in-floor radiant heating, and a gray water reclamation system because the financial payback wasn’t there.” Instead of investing in hip green tech, he said, companies and organizations should avoid trends and look for tech that simplifies business and enhances long-term ROI.

Walking through the restored prairie glistening with solar panels, Myers clearly has an appreciation for both technology and the environment. “Green tech is a good investment for any company,” he said. “But the end-game isn’t about making money. We invested in green tech because appreciating natural, wild places is a shared value. Science and education enhances everyone’s appreciation of nature. For us, investing in green tech is investing in a high quality of life for everyone.”



HOW TO USE IOT TO SAVE MONEY ON YOUR OFFICE BILLS

BY ALISON DENISCO RAYOME

The Internet of Things (IoT) has spread to office buildings around the world: 35% of companies said they are currently gathering or have plans to gather data on their building about lighting, HVAC, and system controls, according to [451 Research](#).

The number one priority for building-level IoT is optimizing operations (76%), including through preventive maintenance and reducing downtime, 451 Research found. The second priority is reducing risk (61%), through compliance or security, perhaps with security badges, video cameras, and field analytics.

The top IoT project in professional buildings is lighting, according to Christian Renaud, research director of the IoT practice at 451 Research. Companies looking to move to LED lights often come across smart lighting options, such as lights that turn on with motion detection or those that interact with an employee's phone so that when they enter their office, a certain light setting comes on, Renaud said.

HVAC, building management systems, and security access control IoT projects are also common in offices. Security might include location tracking for safety or offering company network access that differs depending on where you log in from, Renaud said.



Other projects depend largely on industry. For example, many grocery store chains have added IoT sensors to refrigerators, which are costly to keep running.

[Oxford Properties Group](#) installed smart meters in its office management platform at its commercial 480,000-square-foot property in Washington, DC, and discovered a small error that had compounded into a larger problem over time, according to property manager Rachel Sinaiko. Three cooling tower meters were being measured in gallons, but employees were reading them in cubic feet, distorting their costs. By fixing the verification system that's carried out on the back end, they immediately identified a \$30,000 savings.

Despite the potential for cost savings, “we’re in the very early stages of smart buildings,” said Mark Hung, research vice president at Gartner. “Companies are still exploring the right technology to employ, but also the right business model.

Again, consider smart lighting, Hung said. From a business model perspective, there are several ways to approach it: A company can invest in revamping its lighting infrastructure and recoup the costs in energy savings over a number of years. Or some vendors offer a pay-as-you-go model, wherein the vendor pays at least part of the cost of deploying the smart lighting solution and then gets a portion of the savings your company sees from that solution.

“People generally are not optimizing their energy expenditures,” Hung said. “There’s probably always ways to save, whether on lighting or heating or cooling—it’s just a matter of how much the reductions would be compared to the initial outlay. That’s the kind of spreadsheet work that organizations need to do to figure out the payoff.”

IOT FOR PRODUCTIVITY

Office IoT initiatives break down into two categories, according to Michele Pelino, a principal analyst at Forrester: building management (which includes HVAC and electricity) and office management (which includes conference room booking and temperature management).

“When you think about the office context in IoT, some projects are more related to the billing and the infrastructure itself, and being more efficient and using those resources more effectively within the building,”

Office IoT initiatives break down into two categories: building management (which includes HVAC and electricity) and office management (which includes conference room booking and temperature management).

Pelino said. "Then there are applications that are location kinds of services, and productivity-enhancing applications that will help employees be more efficient in their day-to-day jobs."

The starting point for most office environment IoT-enabled capabilities comes from the building structure, Pelino said. "There's a benefit that can be tangibly identified: 'If I save X amount of energy, that's going to account for X dollars. But over time, proactive companies are thinking about their building environments more strategically."

Some companies—especially those with multiple locations—are turning to IoT to differentiate the employee experience from their competitors, Pelino said.

For example, Deloitte's Amsterdam location is called the [Edge Building](#), which is an IoT-enabled space that allows employees to control lighting and temperature, among other things. "That has been a differentiator for, in this case, Deloitte, which says it's getting more people that want to work there," Pelino said. "They're using it as a differentiation for existing employees, but also for recruiting purposes to say this is a different, unique experience if you come here."

Most companies start with resource efficiency IoT projects, such as lighting and HVAC, Pelino said.

"Once the traditional thought process around cost efficiencies is used, the more proactive way of thinking about the value proposition of the building does come into play, and we're getting more questions in that area. Once you have that kind of infrastructure in place—like if you have smart lighting in your office building—you can add more sensors into that lighting infrastructure to then monitor things like location and where are people walking?"

TIPS FOR IT ADMINS

Companies that might be interested in adding in IoT to save on costs should examine their current bills in terms of lighting and HVAC and research what new systems cost and what efficiencies they bring.

"It's all about the ROI curve," Renaud said. "Some people want to do this because of the novelty, but when you talk to people who run these buildings or large commercial companies, they're looking at how they can get costs out of the bottom line. Ultimately that's what this does, because it gives them insight into the data of how their buildings are consuming energy and how that breaks down and allows them to implement policies across buildings."

Companies building a new office from the ground up have a larger chance to incorporate IoT-enabled smart capabilities, Pelino said. Incorporating these solutions into older buildings can be more complicated and costly.

Those interested in adding IoT capabilities to their building or office should first think through their current office environment and industry, in terms of how their building is used by employees and visitors, Pelino said.

“Make sure you have the right folks in the conversation early on. It’s not just about the facilities team. You have to have the technology team to help figure out how you’re going to implement these new kind of connected environments within the building and understand backend systems. You may need to have someone from the HR team or somebody who’s looking at the strategic value as we talk about this building environment to our potential employees as a differentiation factor.”

GOING GREEN: 10 WAYS TO MAKE YOUR OFFICE MORE ECO-FRIENDLY AND EFFICIENT

BY ALISON DENISCO RAYOME

Earth Day reminds us that there are always more ways for enterprises and employees to adopt environmentally friendly policies. Here are 10 things your company can do to go green.

1. START A SUSTAINABILITY TEAM FOR YOUR OFFICE

A sustainability team can both raise awareness and accomplish more, said Kris Osterwood, technical and policy director for the [Green Building Alliance](#). Projects for the team could include starting or enabling a more successful recycling program, and helping to inform purchasing decisions on energy-efficient appliances and green cleaning supplies.

A team like this can also educate staff through informational lunch-and-learn sessions with local departments of water and power or waste authority, said Andrew McCrea, senior associate, client experience at [Weber Shandwick](#).

“Employees engaging one another is more effective than memos from the top,” McCrea said. “This group can conduct monthly ‘inspections’ looking at the power/gas meters, amount of office supplies ordered, etc., and keep record to gauge positive or negative movement.”

2. CREATE MONTHLY GREEN CHALLENGES

Monthly team challenges can be a fun way of combining competition and going green, McCrea said. For example, you can challenge the office to go a month with no plastic eating utensils and reward those who stick with it by offering small prizes, such as coffee gift cards or snacks.



IMAGE: ISTOCK/IREN_KEY

3. TURN OFF ELECTRONICS, LIGHTING, AND HEAT EVERY EVENING

Instate a strict everything-off-at-night rule, Osterwood said.

At [Wooden Blinds Direct](#), “upon leaving the office, all of your equipment must be switched off at the main plug,” said content manager Amy Kilvington. “If someone forgets, they have to put some money in our Green Jar,” which gets donated to an environmental fund.

4. OPT FOR BETTER OFFICE PRODUCTS

There may not be room in your budget to buy exclusively sustainable products, but you can focus on certain areas that have a huge overall impact, such as more efficient electronics, said Kathy Gerwig, vice president of employee safety, health and wellness, and environmental stewardship officer at [Kaiser Permanente](#). In 2016, Kaiser Permanente purchased greener electronics that will ultimately avoid the disposal of 124 metric tons of hazardous waste, Gerwig said.

5. EMBRACE RENEWABLE ENERGY

Green power sources, including solar and wind energy, are more accessible than ever, with options including rooftop solar installations and large-scale wind farms. Organizations of any size can make this switch, Gerwig said.

If your business is located in a deregulated electricity state, one easy way to make your office greener is to shop for your electricity supplier and choose a green energy plan, said Kelly Bedrich, co-founder of [ElectricityPlans.com](#). Almost every electricity supplier offers green energy plans that are generated by renewable energy sources, primarily wind and solar, Bedrich said. These green electricity plans are priced competitively compared to traditional electricity plans powered by coal or natural gas.

6. LAY OFF THE THERMOSTAT

Workplaces are often over-air conditioned in the summer months, Osterwood said. Employees can inquire about increasing the set point to allow for a more comfortable workspace and to reduce energy use.

One large retail store lessened its impact on the environment by setting the AC to kick on at 75 degrees, instead of 74, according to Bridget Venne, energy and sustainability strategic advisor for [ENGIE Insight](#) (formerly Ecova). The store now consumes 30,000 fewer kilowatts and saves \$3,100 every year. “Smaller businesses might not notice such a dramatic change, but little adjustments done with intention build positive habits that make a difference over time,” Venne said.

7. GO PAPERLESS

The greenest paper is no paper at all, said Vince Digneo, sustainability strategist at [Adobe](#). Corrections, revisions, and updates on printed documents contribute to 90% of all office waste in the US, and the remaining 10% is taking up space in storage facilities, he said. “Keep things digital whenever possible,” Digneo said. “It’s as easy as keeping digital files on your computers and mobile devices, not file cabinets. Also, get in the habit of reviewing digital documents onscreen, rather than printing them out.”

According to a 2014 study conducted by Catalog Spree and PaperKarma, if the US alone cut its office paper use just 10% by moving to digital, it would reduce its greenhouse gas emissions by 1.45 million metric tons—the equivalent of taking 280,000 cars off the road for an entire year, Digneo said.

Other ways to go paperless include printing less in general and asking vendors to offer e-statements and invoices instead of paper statements. Setting up automated payments further reduces paperwork by eliminating the need for printed checks, said tech blogger Amy McGarity of [German Pearls](#).

“By using existing technologies to remove some of the paperwork burden of the accounts payables process, companies would find that they’ve both reduced their carbon footprint and improved the efficiency of their business.”

8. BRING A DESK PLANT

If possible, bring in a desk plant to improve indoor air quality and add a touch of nature to the office environment, Osterwood said.

“Plants produce more oxygen, offsetting any chemicals released into the air by new office furniture and making a cleaner, happier space for your people to work in,” said Rebecca Galloway, marketing director at information design studio [FFunction](#).



IMAGE: ISTOCK/ANIKASALSERIA

9. MAXIMIZE NATURAL LIGHT

The [World Green Building Council](#) reports that employees working near sunlit windows have a 15% higher production rate. “Natural light sets the body’s circadian rhythms, which control awakening, falling asleep, synthesizing vitamin D, and digestion,” said Jennifer Walton, principal of H. Hendy Associates. “Indoor light, however, is a major disruptor. If possible, move workstations to within 25 feet of peripheral walls with windows.”

Relying more on natural light when possible saves energy too, Digneo said. “Also consider installing a smart power strip at every workstation, replacing all lighting fixtures with LEDs, as well as incorporating sensors and timers for office lighting. You’ll reduce energy consumption and costs on things like utility bills.”

10. ENCOURAGE GREEN COMMUTING

Companies can encourage employees to lower commuting emissions by walking, biking, carpooling, or taking public transit to the office, and offering incentives to do so, Galloway [said](#).

[Creating work](#)-from-home policies can also reduce your company’s carbon footprint, Digneo said. The average American has a work commute of about 25 minutes each way, and flies about 17 hours per year. “Reduce employee travel whenever possible,” Digneo said. “There are a number of great web/video conferencing tools out there. It saves the company budget, but it also reduces Scope 3 emissions.”

CREATING SUSTAINABLE SMART CITIES: FIVE LESSONS FROM IOT LEADERS

BY TEENA MADDOX

Smart cities must be sustainable to survive. Sustainability is a key component of a truly smart city. If you add connectivity to a city without any connection to sustainability issues, you haven't really created a smart city.

To be innovative, a city needs to consider elements including renewable energy, smart grids, smart parking, and smart transportation. There must be a balance between economy, environment, and society to build a strong, resilient city that survives the test of time.

At IoT World 2017 in Santa Clara, CA, several leaders who are working within the smart city realm discussed sustainability and smart cities and shared details on some of their projects.

The panelists were:

- John Miri, chief administrative officer, Lower Colorado River Authority
- Deborah Acosta, chief innovation officer, City of San Leandro, CA
- Abhay Jain, CEO and co-founder, ActiveScaler, Inc.
- Ahsan Baig, Deputy CIO, City of Oakland, CA

The information they shared was highly relevant to smart cities and is useful for any city seeking to become more sustainable. Here is a summary of the top five takeaways.

1. START WITH THE INFRASTRUCTURE

Acosta said cities must start by improving their infrastructure. San Leandro, a city of 90,000 residents covering 15 square miles, entered the 1980s as a manufacturing powerhouse but lost jobs overseas throughout the decade. Manufacturing is still the city's lifeblood, as it is home to food giants such as [Ghiradelli](#) and [Coca-Cola](#), as well as tech company [OSIsoft](#). There was a risk that the companies would leave without the proper infrastructure in place, so in 2012, San Leandro installed a 20-mile fiber optic loop to provide the foundation for IoT.

In another move to stay relevant, the city embarked on a \$5.2 million project with [Climatec](#) for smart city technologies such as smart streetlights and street poles on a mesh Wi-Fi network. In addition, the city closed an RFP for a vendor to help it develop a smart city strategy last year.

Infrastructure, Acosta said, “is what cities do. Cities need to start with their infrastructure to make sure they’re ready to create alternative energy paths.”

The role of city officials, she said, is “making sure that their communities are prepared for this crazy scary new world we are entering. You have to create safe ways for them to be actually be able to engage. Not only by saving money, but we have to create a world where they are ‘prosumers,’ not just consumers. If we can create a world where energy is created by an individual and sold on the market, which we’re doing in California by creating the CCAs [Community Choice Aggregations]—competitors to our incumbent utilities—we believe we can accelerate that world.”

Jain said there are three essential components to the infrastructure of a city that can survive throughout the centuries, and that is being able to provide emergency services, essential services, and entertainment. “If you don’t create infrastructure for all these essentials, people cannot live in cities. It’s happened before. Cities have been abandoned for these reasons.”

Baig said that when the California economy tanked in 2008, the budgets for the cities were decimated in 2009 and 2010, particularly in IT. Meager funds were redirected to essential services. “The lesson I learned when it comes to IoT and making a city sustainable is you need to have capital, and you need to have resources, the people who are trained in the proper processes and tools,” he said. “It’s mission critical to have infrastructure to support making a city truly resilient and sustainable.”

2. RENEWABLE ENERGY IS ESSENTIAL IN A SUSTAINABLE CITY

Acosta said a flat “no” when asked if a sustainable city could exist without renewable energy. “The current way we generate electricity in the United States through hydropower, through nuclear energy, through burning coal, is not sustainable. With coal of course being the most dangerous of all of them. We have to go the path of renewable energy.”

“The current way we generate electricity in the United States through hydropower, through nuclear energy, through burning coal, is not sustainable. With coal of course being the most dangerous of all of them. We have to go the path of renewable energy.”

— Deborah Acosta

She said that not only is renewable energy clean, but it's an economical decision. In the book [Climate of Hope](#) by Carl Pope and Michael Bloomberg, she said the authors say that clean energy pays back a community. "Right now their estimate is there are six times more people employed in clean energies and sustainability than there are in oil, gas, and coal combined in this country. That's an astonishing figure. It's all about the money. It's all about the economics."

Baig said sustainability is a critical component for Oakland as well, and it's a major point in the mayor's budget. "In the City of Oakland we have the Port of Oakland, which is the fourth largest port in the country. We have about 70,000 jobs associated with the Port of Oakland." The port did \$49 billion in trade last year and it helps reduce the number of tractor-trailers on the roads when products are transported through the port.

3. IOT IS NECESSARY IN A SUSTAINABLE SMART CITY

Illegal dumping is a big problem in Oakland. The city has installed IoT devices for license plate recognition embedded within cameras to help with identifying hot spots for dumping. "Our target is to make sure we have a sustainable program with a policy so that we can take care of this whole illegal dumping issue," Baig said.

In San Leandro, IoT devices create data points to give the city information to enable better decisions about priorities. "We have to be able to prioritize first before we figure out how we can invest the return on investment. Our smart city lights will give a tremendous return on investment. The first few years we will be paying off our bond, but after that what can we invest in? We don't know. Remember, cities are coming out of the Dark Ages, especially after the economic downturn. We don't know what we don't know, so we have to figure out what that best ROI is for us and how we can invest it," Acosta said.

4. SMART GRIDS AND SMART METERING ARE A KEY WAY TO ADDRESS SUSTAINABILITY ISSUES

"Sustainability is an important part of a smart city. On our side, I think there are a few things we are doing that are part of the how-to effort. One is to be a good backend support for demand management. Smart meters and smart grids, all of these great devices are coming online, especially for the consumer," Miri said.

Connecting consumers with resources and enabling them to determine how much they're consuming and when they're consuming it, is one way to combat the energy problem. When people can see how much they're using and are given incentives to use it during low-demand hours, sustainability can be environmentally successful, as well as financially and socially successful so that it "just becomes the way we generate power," Miri said.

5. SOLVING TRANSPORTATION AND MOBILITY PROBLEMS IS CRITICAL

Acosta said transportation and mobility are critical to smart cities across the country. “Traffic is choking us. And it is compounded by applications like Waze, which actually directs traffic around the freeway jams and into your cities, causing an impact to your roads, which are very expensive to maintain.”

In California, all cities have call-to-action plans. Most California cities, including San Leandro, have a goal of reducing their carbon impact by 25% by 2020.

“For a city like San Leandro, the fiber optics of the infrastructure provides the basis that we need for the Internet of Things that is in turn going to allow us to solve some of these serious sustainability problems and to move toward zero net energy,” she said.

Miri said, “If you want to help us ... solve the public transportation problem and not just our buses, but how people move around through cities. If you want to solve a problem for the ages, give us connected, autonomous driving cars and a shared economy. Game over.”



THE ENVIRONMENTAL COST OF THE SMARTPHONE EXPLOSION

BY JASON PERLOW

Last December, Apple was caught with its pants down in what many have suspected all along: [that it is slowing down its older iPhones](#) right around the time a new model is released.

It doesn't appear that Apple is doing this to intentionally create planned obsolescence, but it will definitely be interpreted as such by the general populace.

[Lithium Polymer](#) batteries used in Apple's mobile devices are wear items, and their performance degrades with time. There is no alternative battery chemistry or other technology currently available at a reasonable cost factor that would prevent this from happening. The battery tech is what it is.

To provide a consistent battery experience over the lifetime of the device, Apple has inserted code in its iOS—which appears to have been present for well over a year—that slows the A-series SoC clock cycles when it detects battery performance degradation so that CPU speed is traded off for increased battery life.

With regular use, a LiPo battery should last two years. So if you buy an iPhone around the time of launch, within 18 months, you will start to experience slowness, especially if you've upgraded to newer and more demanding versions of the OS that need the full clock cycles of the device to perform adequately.

This raises a larger question—why not simply have a smartphone with a battery pack that can be replaced?

Certainly, we had these during the early days of Android phones as well as with BlackBerry and Windows Phone devices, and there are a few—but not many—Android devices on the market that still have field replaceable batteries, such as the [5th generation Moto G](#).

The simple answer is that iPhones (and virtually all the new Androids that have copied Apple's overall industrial design) are slim, sexy devices. They use glue and heat seals to put them together. You basically have to pry it apart with specialized tools and you have to be extremely experienced in servicing microelectronics not to destroy the thing in the process.

So swapping a battery out requires a skilled technician. [It's essentially impossible to repair](#).

In fact, most iPhone batteries in the store are never actually “swapped” or devices “repaired.” If your phone is under AppleCare, or if the company elects in or out of warranty to fix your phone at an Apple Store, in most cases, they simply replace your phone. It's happened to me a few times over the years.

Your old phone is sent back to a huge service center in Asia, where they recondition it with a new battery and it gets recirculated into the channel for resale.

Or if the components can't be reclaimed, the phone is recycled for its raw materials—or disposed of entirely.

Apple has been working on [installing robots in its partner stores](#) to do display replacements to avoid sending phones back to their spawning grounds.

That's only how Apple itself does things, which has some responsibility for its equipment if you turn it in to a retail store or your carrier store. There are millions of broken iPhones (and yes, Androids) that come through third-party channels that are simply just sent to the junk pile.

The amount of e-waste that is generated yearly by discarded smartphones and other electronic devices is utterly massive. And the piles just keep getting bigger.

iPhones (and Samsung Galaxy phones) are now made largely of glass, so they are extremely fragile and sensitive to drop damage. The glass can eventually be reclaimed, but not all of the components can be, nor are they cheap to fix because they are tightly integrated, such as the display, which on the newest models fuses the digitizer, the display matrix, and the glass into a single package.

I am a huge proponent of the [right of end users to repair and perform simple maintenance on their devices](#). So I feel it is unconscionable that device manufacturers have seen to it in recent years that there really are no authorized repair centers left either, so there is no third-party repair channel for many types of electronic devices.

They want you to send it back to them and repair it at an outrageous cost, or they want it to end up as junk so you buy a new one. More often than not, you're going to end up junking it.

With batteries being the primary wear item (USB-C on newer Androids have eliminated most of the durability issues with the horrid Micro-B charging connector) there is no reason why a smartphone, with proper considerations as to overall design and ability to tear down, can't last for three to five years.

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Yes, some extra bulk will almost certainly be added as a result of such changes. But we need to look past the basic aesthetics and more about how we as human beings play into the health of our planet and what kind of place we want to leave for our children and grandchildren.

Glass is a stupid material to make a smartphone out of. Sure, it looks great in promotional material, but in reality, if you don't put one of the newer iPhones in a case, you're pretty much going to destroy the thing on the first drop.

And on a \$1,000 iPhone X, you sure as heck don't want to do that. Get a case, dumbass.

We should really be making phones out of metal. I've been playing extensively with Huawei's latest inexpensive globally unlocked 4G smartphone, the [Honor 7X](#), which retails for \$200—and it is an incredibly durable as well as capable device for the money.

It has corner shock protection built into the metal casing and you can drop the thing from six feet onto solid concrete all day long, and pretty much the worst thing you are going to do is scratch the paint off.

Even if it falls flat on the front, you won't crack the Full HD+ screen because it has a slightly raised bezel. You'd have to take a direct hit to the front to crack the glass, which would be a rather unusual scenario.

I typically put cases on anything, but on that phone, you probably only need a thin skin to protect the paint. If you have a careless teenager who is notorious for wrecking devices, this is an ideal phone to give them—or make them earn.

There's no reason why this device can't last three to five years. But we know the battery will severely degrade long before that.

Unfortunately, this device is also put together with glue. So it is more likely to end up as a disposable. And if the trend is to drive the prices of smartphones down to where the Huawei 7X is, we're going to see a lot more people upgrade their devices every year. That's a lot more e-waste.

We really need to go back to devices that are screwed together so that the battery can be swapped by anyone with a micro tool set—not just a phone repair tech—or some type of old-school hatch that slides off to reveal a standardized removable 3000 mAh battery.

I realize of course this is likely going to create uglier phones. But let's look at the bigger picture—an ugly, unlivable planet is much, much worse. I have full confidence that the manufacturers can put their heads together and figure out how to build designs that are not just attractive but are also serviceable.

And yes, ultralight laptop and tablet OEMs, I'm talking to you. Yes you, Microsoft!

Maybe Apple won't do this, but certainly, I think a company like Huawei can—and so can the other Chinese and Taiwanese giants like ZTE, HTC, Oppo (OnePlus), and Xiaomi. And maybe Samsung should reconsider the stupidity of making phones out of glass as well.

LG seems to have the right idea with its super-sexy [all-metal, mil-spec V30](#). No swappable battery though. Sigh.

Yes, I know it's not easy to make a wireless charging phone with a metal casing. So let's look at high-impact polycarbonates for those or some type of case interface connection that allows the coils to be part of the secondary (sacrificial) plastic enclosure and still permit high-speed charging.

Put your heads together, OEMs, and figure it out.

I want us to stop treating our electronic possessions like disposable garbage, and I want the manufacturers to stop enabling us. No, you don't all have to copy Apple. I'm giving you permission to be environmentally conscious. That's way cooler than having a fruit logo.

10 WAYS SMART OFFICES ARE SAVING ENERGY AND LOWERING THEIR CARBON FOOTPRINT

BY TEENA MADDOX

As buildings become smarter and more connected, it's easier than ever for companies to reduce their carbon footprint.

Living greener is important to everyone, whether at home or work. There are many ways that smart offices can lower their carbon footprint and reduce their impact on the environment.

Some building owners opt for LEED certification, which stands for Leadership in Energy and Environmental Design. The certification system was devised by the [US Green Building Council](#) (USGBC), and there are rating levels ranging from Silver to Platinum, depending on a building's energy efficiency.

"LEED-certified buildings have 34 percent lower CO₂ emissions, consume 25 percent less energy and 11 percent less water, and have diverted more than 80 million tons of waste from landfills," said Alan Ni, director of vertical marketing for [Aruba](#), a Hewlett-Packard Enterprise company.

"LEED is the benchmark standard for energy-efficient buildings, so it's a good reference for the percentage saved over your average inefficient building," Ni added.

Aruba took steps to improve energy efficiency when it designed a new headquarters in Santa Clara, CA.

"When the building opened in January 2017, some of the key energy efficiency elements included smart lighting, efficient space management, asset tracking, and a large number of sensors all connected via Aruba's network infrastructure. Going forward, Aruba plans to integrate the network with the access control and other building management systems (BMSes), such as HVAC. This will allow the company to closely align energy utilization with building occupancy, outside temperature, degree of sunlight, time of day, and other factors," Ni said.

Cisco offers a range of cost-saving options for companies wanting to save on energy usage. [Cisco's digital building solution](#) focuses on making buildings smarter through optimized lighting, building automation, and IoT technology. Standalone building systems are converged into one IP platform through this foundation, said Anil Menon, global president of smart cities for Cisco.

If you want to make your company more energy efficient, here are 10 of the best ways to do it.

1. GET A CARBON FOOTPRINT MEASUREMENT

First, find out how big a carbon footprint your office is leaving behind. The University of California, Berkeley, [offers a quick calculator for businesses](#) that gives an estimate of how many tons of CO₂ per year your office creates. It's not all-inclusive, but it's a good starting point—and it provides a way to open the conversation among your co-workers.

2. USE IOT DEVICES AND SENSORS TO REDUCE ENERGY USAGE

Organizations are relying on connected IoT devices and sensors throughout their facilities to identify and enact steps that allow them to heighten their efficiencies and reduce their carbon footprint—all while increasing occupant comfort, Ni said.

“Use IoT and other sensing technologies to control lighting, the environment, and other energy-consuming systems, so that when space is unoccupied, energy is not expended,” Ni said. “For example, tie energy systems to your access control system, so when the last person ‘badges out,’ the building is set to empty state.”

3. DO AN ENERGY EFFICIENCY RETROFIT

“An energy efficiency retrofit of an office building has many specific actions. In most buildings, heating, venting, and air conditioning (HVAC) has the biggest carbon footprint and is thus the first place to start. Methods to address this include installing a new HVAC unit that is more efficient and uses less energy; adding insulation to the building to reduce the leaking of energy to the outside; adding sensors to better detect the occupancy and temperature of a room; and integrating the HVAC control with other aspects of the building—lighting, outside shades, and so on—to best optimize the total energy use of the building,” said Thomas Baker, principal with [Boston Consulting Group](#) (BCG).

4. INCORPORATE RENEWABLE ENERGY

Another way that companies can be more energy efficient is to utilize renewable energy, such as solar panels, and integrate them into overall power management. This can be done by using smarter software and building management systems to tie the use of renewable energy to building power demand, availability and price of external energy sources, and other factors to decrease overall consumption and up the percentage of renewable energy, Ni said.

AI-powered energy storage is a smart way to reduce energy costs and lower a carbon footprint at the same time, said Gabe Schwartz, marketing director at [Stem](#), which has an AI-driven software platform that gives companies greater grid flexibility in energy markets with a high demand.

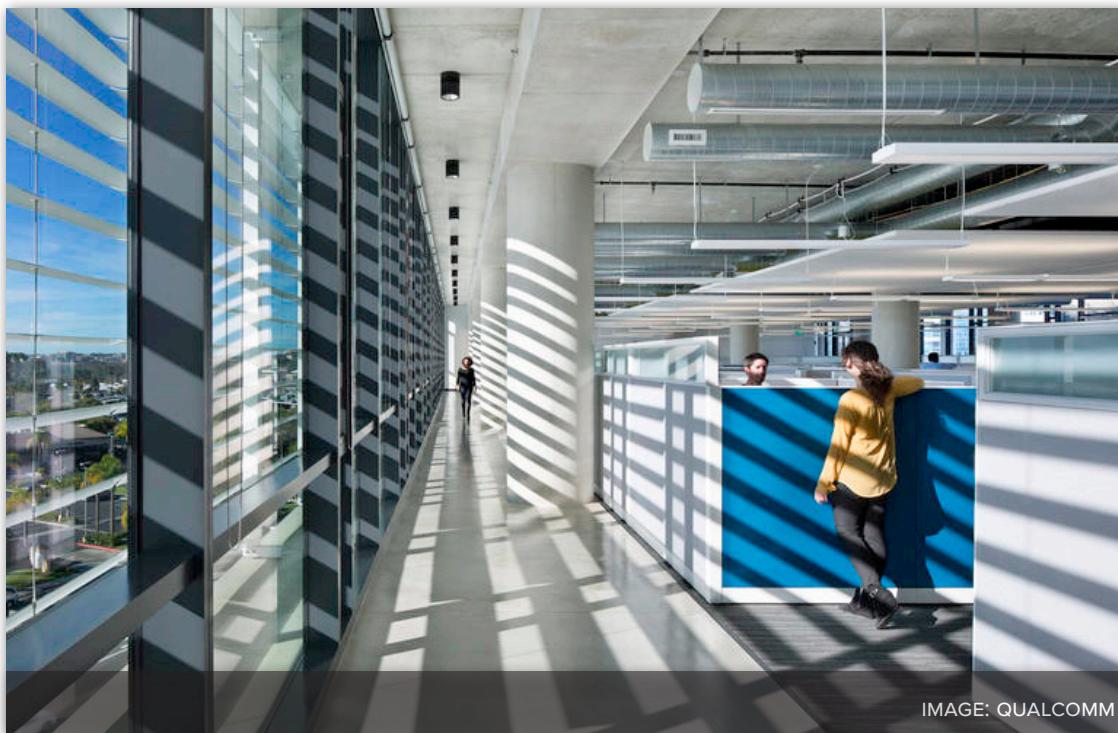
“With energy storage the carbon footprint story is all at the macro levels. It’s not like solar when you put it in a building and it just lowers the carbon footprint in that specific building. What it’s actually doing is lowering the carbon footprint of the whole electric grid,” Schwartz said.

5. MANAGE OFFICE SPACE

“Manage space more efficiently through the use of shared spaces and hot desking, so that the total square footage is used more efficiently and less space is needed per person. This can be done with space management software and sensors, such as smart furniture, combined with system integration, security, and other systems,” Ni said.

6. MAXIMIZE HEATING AND COOLING

One way to make the most of heating and cooling, Ni said, is to “recycle heat within facilities and maximize the efficiency of heating and cooling. For example, recycle water used to cool computer servers to provide hot water or use windows to absorb heat from the sun and recirculate it. Another example: Use cheap renewable electricity to make ice off hours and then chill air by blowing it over the ice, for air conditioning.”



7. RECYCLE EVERYTHING

Don't stop with recycling paper and plastic goods. Make sure that electronics are recycled as well. And instead of having one general bin or disposal area, try using clearly marked recycling bins in your office and consider adding a collection of bins for a certain number of employees in your office. In other words, if your employees are seated side by side or in groups of four, five, or six, consider placing three general recycling bins at each of these worker stations. This helps encourage positive recycling, making a big difference in terms of your company's overall carbon footprint, said Nate Masterson, marketing manager for [Maple Holistics](#).

8. REDUCE TRAVEL FOOTPRINT

Employees can carpool with co-workers to reduce the amount of solo travel it takes to get to the office. Providing employees with electric vehicle charging stations is another way to encourage a smaller carbon footprint. Offering bike storage for employees who opt to cycle to work and providing a locker room for showers and clothing changes is another way to help out cycling employees. Skullcandy offers bike storage for employees at its new headquarters in Park City, Utah, as previously reported in TechRepublic.

Another way to reduce environmental impact is to limit employee travel. With teleconferencing, it's easy to see co-workers and clients face-to-face without ever stepping on an airplane. Traveling less reduces costs and shrinks a company's carbon footprint.

Implementing flexible versus fixed offices for employees is another way of limiting travel, Baker said.

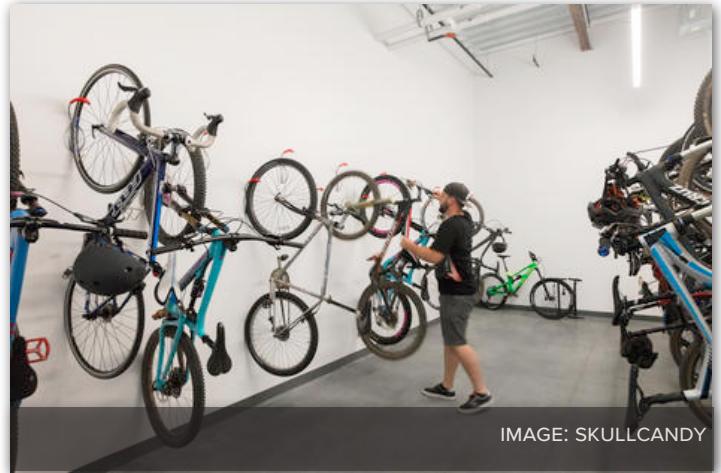


IMAGE: SKULLCANDY

9. EDUCATE EMPLOYEES

Everyone in the company needs to know about green initiatives for them to be effective. One way to get people involved is to set up goals and rewards for the departments that reduce their carbon footprint the most.

"The first step to ensuring that your office remains green or gets on track with regards to ethical eco-friendly practices is to educate your employees about their role in the issue," Masterson said. "No office functions alone and the whole point of having a successful business is based on your ability to function as a team. Once employees understand how much impact even the simplest of tasks may have in terms of protecting the environment (things like switching off computers at the end of the day or following simple recycling practices), they'll be more likely to cooperate."

10. KEEP TRACK OF ENERGY USAGE

Several companies can provide businesses with information about energy usage. One such company, [Verdigris](#), has a combination hardware/software solution that identifies and creates an “energy fingerprint” for every device in the building, helping property owners and managers identify waste and reduce energy consumption. Another company, [GridLion](#), is a startup in the energy efficiency space and it combines hardware, software, and strategy to support commercial buildings improve energy performance.

[Zen Ecosystems](#) offers an energy management system through its Zen HQ cloud platform to help companies control thermostats throughout their offices and manage energy costs, said CEO James McPhail.

WHAT IT ALL MEANS

Definite cost savings can result from being more energy efficient.

“The majority of energy efficiency and renewable energy procurement programs at offices end up reducing costs—in fact it’s the economic business case that is most often driving the adoption of many of these solutions,” Baker said. “We typically see energy efficiency solutions reduce an office’s energy use from between 10-30 percent. Especially in regions where a company is paying a high rate for electricity or other energy, this can have a short payback of a few years and an internal rate of return (IRR) of +15 percent. The same can be true for renewable energy procurement. Especially today, we have seen the cost for renewables drastically reduced in the last couple of years and become cost-competitive with traditional sources of energy.”

And the benefits of reducing a company’s carbon footprint go beyond financial savings.

“Beyond cost savings, upgrades to HVAC often provide a much higher level of comfort (and thus productivity) for the occupants—advanced sensors can detect hot or cold spots in a room and provide much more granular control. Finally, reducing a building’s carbon footprint can be leveraged for branding and marketing with customers and employees who often expect their workplace to be green,” Baker said.

Cisco uses its own smart building technology to create smarter offices for its own employees. Menon said Cisco saves millions of dollars each year in operating costs by utilizing space. “We optimize the savings for all of us and it allows us to give back to the employees a work space they enjoy working in. We have places where you can get together, we have open areas, we have lobbies, in some places we have areas where you can have small meetings together like around a billiards table, things of that kind. Employees connect, they talk to each other, they have a pleasant experience, they collaborate better together, they create better teamwork. So if we think about this in a holistic manner, it’s not only about financial efficiency saving, etc., Asset utilization is a big improvement, but improving productivity of employees and giving them a better experience really becomes the most important thing for us.”

THE FIVE GREENEST TECH COMPANIES IN 2018

BY JONATHAN GREIG

The environmental movement has shown no signs of slowing down nearly half way through 2018. In advance of Earth Day, [Apple announced](#) that it was going full clean energy, powering all of its offices, data centers, and stores with a variety of environmentally friendly power sources. Apple also wrangled some of its suppliers into committing to 100% clean energy.

Apple and other tech companies have gone to great lengths to project an awareness of the environmental impact of their business models. Many now release yearly environmental impact reports and one-up each other with admirable strides toward cleaner technology use.

But the reality, as a number of environmental organizations continue to point out, is that most of these companies are reliant on a business model that requires consumers to buy new phones, laptops, and tablets frequently. And that creates a lot of waste.

The problem has little to do with how we use a device and more to do with how we acquire it and get rid of it. There are more than [65 million metric tons](#) of e-waste worldwide now, yet 70-80% of the energy footprint of a device occurs during manufacturing, [according to Greenpeace](#).

The manufacturing of these devices, which occurs mostly in China and Southeast Asia using products [mined in dangerous conditions](#) across the globe, requires extensive waste and coal burning. Some companies are beginning to address this, with new recycling programs and energy-conscious supply chains. Here are the five greenest tech giants, as [ranked by Greenpeace](#).

1. APPLE

When it comes to going green, Apple has had a [very successful](#) year so far, after facing heavy criticism last fall following allegations that it may have [intentionally degraded](#) the batteries in its phones. Apple has been more transparent than many companies about its supply chain and the need to make it more energy conscious. It has invested more in recycling programs that can harness some of the materials needed for devices outside the mining process.

Its massive data centers are powered 100% by renewable energy, according to a [press release](#). And it has come out in support of the Paris Climate Agreement and worked to [root out child labor](#) issues amongst larger efforts to move to a closed-loop supply chain.

2. HP

HP is one of the few companies striving to do the opposite of most other tech companies. Oversaturated markets have forced some companies to make products that degrade quickly. According to Greenpeace, the average smartphone lasts only two years now, forcing users to buy new models with increasing frequency. But HP, along with Dell and a few others, has moved in the opposite direction, making products that do stand the test of time and are upgradeable.

HP set concrete goals on reducing emissions throughout its supply chain and actually published a list of materials it restricts during the manufacturing process. The company claims to have seen a 21% reduction in greenhouse gas intensity in its supply chain since 2010 and has been able to strong arm more than 90% of its suppliers into setting emissions targets.

In addition to its internal efforts, HP also backed the Paris Climate Agreement. According to its sustainability report in 2016, HP has worked hard to bring its consumption down to 900,000 tons of materials used in 2016 for products and packaging and 119,900 tons of equipment collected for recycling.

3. DELL

Dell is one of the only major tech companies that openly provides a detailed and extensive list of suppliers in addition to what kind of services were rendered for each deal. Like HP, it is bucking the trend and making devices that are lasting longer and easily upgradeable. When it comes to plastic use, it's on a closed-loop, so anything used is recycled and reused. It claims to reuse more than one-third of the plastic involved in its manufacturing process.

The firm heavily markets its refurbished devices and laptops, designing them specifically with repair in mind. Dell also sells spare parts widely and releases extensive manuals on how to repair its laptops and tablets. Due to a reliance on cobalt, it has worked with authorities to clear its suppliers of child labor. Transparency is one of Dell's major focuses, and it has worked to identify, contain, and limit the use of dangerous chemicals necessary for its devices.

4. MICROSOFT

Although it has been on the receiving end of criticism for the short lifespan of its devices, Microsoft has been public about its support for green initiatives, backing the Paris Climate Agreement and the Clean Power Plan. The company also supported environmental efforts in Japan.

The repairability of its devices ranges widely, but it has a robust offering of refurbished devices and do report some of the materials used in the manufacturing process. It has also been working to make its data centers

more environmentally conscious as it expands across the globe, as noted in a [blog post](#). The targets for emissions it has set are lower than Apple's, but it's one of few companies to set any goal at all.

Many of the company's products and suppliers [are listed in an effort to combat trafficking](#) or child labor within its supply chain.

5. LENOVO

Lenovo has worked hard to surpass its Chinese peers by presenting clear plans demonstrating how it will cut its emissions, which are growing steadily each year. It provides a detailed snapshot of its greenhouse gas emissions and carbon footprint, according to a [recent sustainability report](#).

Lenovo has also committed to ending its use of certain hazardous chemicals, and it recycles some of the plastic used in its manufacturing process, the report said. The company has worked to sell lines of refurbished devices, and it controls nearly 20% of the global laptop market.

As noted in the report, Lenovo made a commitment to cut greenhouse gas emissions in its own operations by 40% before the year 2020. When it comes to suppliers, it has forced most to set some emissions goals—but could do more.

HOW TO SAVE ENERGY IN YOUR DATA CENTER

BY EVAN KOBLENTZ

The most direct ways to reduce electrical use in your data center are straightforward: Virtualize multiple servers and storage into fewer racks, invest in newer cooling systems, or ask yourself if all that expensive cooling [is even necessary](#).

But what are some non-obvious things to do—and how do you measure the results?

“It’s a multidimensional topic,” said Mehdi Paryavi, chairman of International Data Center Authority, which is [a training company](#) in Rockville, MD. “One of the reasons most people don’t really build efficient data centers is that they don’t really look at it from all the possible angles.”

In many cases, organizations don’t focus on their actual needs.

“A lot of times data centers are over-built and over-designed versus your real requirements,” Paryavi said.

For example, even without virtualization, sometimes there are applications or storage on dedicated servers or in entire dedicated racks where it’s not needed. Sometimes that is done because of habit—everyone thinks their IT requirements are the most important ones—and other times it’s done due to uninformed business decisions without IT staff being told.

“People do tend to go overboard simply because they don’t have a clear vision of the future. It’s not the fault of the engineer, it’s the fault of the business,” Paryavi said.

And it’s not just computer hardware. People also misuse power systems, backup generators, and air cooling units, he said.

“Consolidation is a huge task that needs to be done. We see it all the time—people still go with 30-year-old cooling designs.” Sometimes the simplest advice is best: You should put the UPS as close as possible to the hardware it will power.

“One reason people can fool themselves or fool the industry is lack of education... There is a lot of marketing stuff out there that really doesn’t make sense to the actual technical world,” Paryavi said.

If the electric bill goes down and user morale remains high, you’re probably doing something right. One way to quantify it is with the international standard known as power usage effectiveness—that’s PUE in

industry-talk—and ISO/IEC 30134-2:2016 if three-letter acronyms bore you. PUE is the ratio of energy used to energy available. The closer the PUE to 1, the better. Most modern data centers have PUE of about 1.2-1.4, Paryavi said. “Anything below 1.5 is efficient.”

PUE began with two Hewlett-Packard engineers in 2005 and gradually gained traction. Now it’s largely influenced by a nonprofit organization called [The Green Grid](#), of which many top hardware companies are members. An amendment to the standard is shaping up that would expand PUE measurements to include related hardware that isn’t directly inside the data center, such as power units in adjacent rooms, officials from the PUE standards committee said.

The Green Grid offers other data center energy-saving methods beyond PUE, mostly in the form of [white papers](#). They include topics such as the second edition of the Standard Performance Evaluation Corp.’s Server Efficiency Rating Tool, which is [currently awaiting](#) its updated Energy Star endorsement.

Additional [advice is available directly from the Energy Star](#) agency. The government’s Lawrence Berkeley National Laboratory offers its own [data center energy training](#) and a [technical report](#).

MICROSOFT: THIS IS WHAT OUR REVAMPED SILICON VALLEY CAMPUS WILL LOOK LIKE BY 2020

BY LIAM TUNG



IMAGE: MICROSOFT

Microsoft's soon-to-be revamped Silicon Valley office will be designed to entirely remove its reliance on water from municipal sources, except for drinking water and sinks.

The Silicon Valley office renovation comes alongside Microsoft's [much larger overhaul of its Redmond headquarters](#) in Washington, which introduces new sports fields, walking tracks, and underground parking, and will have enough space for its current 47,000 employees plus 8,000 more.

Microsoft's 32-acre Silicon Valley campus in Mountain View is home to 2,000 employees who work on Outlook.com, PowerPoint, Xbox, and other products.

The renovation is expected to complete by December 2019 and modernizes a workspace of 643,000 square feet. The redevelopment adds 128,000 square feet to its existing 515,000-square-foot campus, which has been in Silicon Valley since 1981.

The Windows maker is [aiming for](#) "net zero non-potable water certification" to minimize the campus' impact on already strained water resources in California, which are mostly dependent on water from the Sierra Nevada. The campus will be designed so that only drinking fountains and sinks will use water from municipal sources.

"One hundred percent of the buildings' nondrinking water will come from rainfall or on-site recycled water. This will be a first in Silicon Valley and it shows a commitment to innovation and sustainability," [said](#) Pauline Souza, from WRNS Studio Architecture & Planning, the company that designed Microsoft's new campus.

As Microsoft revealed in [council plans in 2016](#), a big part of the project is also to introduce a massive green roof and move its acres of surface parking to beneath a soccer field.

The water objective is based on the idea of using non-potable water more than once. It involves harvesting rainwater and collecting storm water and waste water, which all gets processed at an onsite wastewater treatment plant for reuse.

The rainwater will be collected from roofs and solar panels for use on the landscape and in restrooms. All water from kitchens and restrooms will be treated for use in irrigation and toilets. Meanwhile, captured storm water will be used for the living roof, then treated by "rain gardens" that run into the nearby Stevens Creek area.

The plan will help reduce water consumption by five percent. This no doubt should help Microsoft minimize the impact of its new green spaces and the additional office space it's building. Microsoft said that it will build a four-acre roof that reintroduces native ecology and promotes species diversification in the area next to the Stevens Creek habitat.

Of course, it wouldn't be a Silicon Valley tech campus without modern comforts, such as a health-focused restaurant, athletic fields, and new fitness facilities. It will also have a new conference center, theater, and Microsoft Technology Center.

REPORT: TECH COMPANIES ARE USING GREEN STANDARDS TO GREENWASH PRODUCTS

BY ADRIAN KINGSLEY-HUGHES

Green standards are meant to lead the IT industry, but according to a blistering report commissioned by [Repair.org](#), electronics standards in the US have become too easy for manufacturers to meet, and firms are warping them into a tool that drives sales at the expense of the environment.

The [report](#) is authored by Mark Schaffer, a well-regarded electronics engineer and consultant with 20 years of experience designing and manufacturing sustainable electronics. He claims that tech companies are deliberately standing in the way of stronger green electronics standards in the US and are systematically blocking attempts to promote longer-lasting devices.

Green standards, the report claims, should be drawn up by a balanced group of volunteer stakeholders, including representatives from major electronics producers. But the report asserts that manufacturers now “occupy a large number of seats on the standards boards,” and “are abusing their position, diluting the standards to meet their existing products instead of designing leadership standards that encourage better products.”

The report points to the [EPEAT](#) (Electronic Product Environmental Assessment Tool—a registry that buyers can use to determine the effect a product has on the environment) UL 110 mobile phone standard:

“In late July of 2017, the first batch of phones were registered to EPEAT for the new UL 110 mobile phone standard. Of the 8 devices registered, 7 claimed EPEAT gold. LG claimed one silver product, while Samsung claimed a gold rating for Galaxy S8 line and Apple claimed gold ratings for the iPhone 7, 7 Plus, 6s, 6s Plus and SE. The gold-dense scoring line-up is troubling in a standard so new. A properly developed leadership standard should start off with devices just barely able to achieve the bronze level—as the initial computer standard did in 2006. The fact that two of the largest producers of mobile phones were immediately able to achieve gold designations for their existing products indicates that the leadership standard substantially reflects the status quo. It doesn’t lead—and the new criteria isn’t driving device design in a more sustainable direction.”

Another example in the report of EPEAT failure relates to Apple's 2012 MacBook Pro with Retina display:

"In 2012, Apple released the MacBook Pro with Retina Display. Historically, the MacBook Pro line had been modular, repairable, and upgradeable. The 2012 Retina MacBook Pro, however, shipped with a proprietary SSD, non-upgradeable RAM, and a glued-down lithium-ion battery—choices that limit the lifespan of the laptop and make it more difficult to recycle. Yet, the laptop was still able to garner an EPEAT 'Gold' rating, despite the standard's stipulation that devices be 'upgradeable with commonly available tools' and that batteries should be easy and safe to remove. When criticized for the Retina's inclusion on the registry, EPEAT said that its product verification committee had determined that products were upgradeable if they had an externally accessible port—which all laptops have. The committee also declined to define what 'easy and safe' meant for component removal. The move effectively gutted the modularity criteria in the standard—and the language re-interpretation made it much easier for products to achieve a 'Gold' rating."

The report's key findings are as follows:

- Manufacturers and other IT industry members—including chemical and plastics trade groups—hold so many positions on green electronics standards boards that they can resist leadership standards and instead approve criteria they can easily achieve.
- The cycle of innovation in tech radically outpaces the development cycle for electronics standards. For example, the current 1680.1 standard for computers includes design criteria that were written over a decade ago. Revising standards takes way too long.
- Manufacturers have consistently blocked meaningful criteria that would influence their product design, including any incentives to encourage design for repair or recycling.
- The current development process favors members from well-funded organizations. Participating in the standards development requires an investment of time and money—which often deters participants with fewer resources, such as nonprofit organizations, small businesses, and academic experts. Manufacturers drag out the development process, bleeding nonprofits of scarce resources.
- Regulatory bodies should balance the representation of standards boards to avoid a process that can be commandeered by manufacturers' representatives.

The report concludes by saying that green standards in the US “have become a complicated way for manufacturers to greenwash products that have a devastating environmental impact and pat themselves on the back for business as usual.”

“Electronics-makers can make products that are both cutting edge and long-lasting. Instead, they are pumping the market with disposable products that can’t be repaired and can’t easily be recycled,” says iFixit CEO Kyle Wiens. “Green standards in the US should promote better, longer-lasting products—but tech companies won’t let that happen. They’re short-changing consumers and the environment.”

GOING GREEN? HERE ARE THE EASIEST WAYS TO RECYCLE YOUR OLD TECH DEVICES

BY JONATHAN GRIEG

We all have a shoebox stashed away somewhere full of fraying cords and ancient hardware from a different era. As tech companies pump out newer, sleeker, and faster devices on a year-to-year basis, it's only natural for certain devices to lose their luster or fall into disrepair.

By 2020, Greenpeace estimates there will be 6 billion smartphone users, each replacing their phones every two years, on average. The waste from smartphones, as well as obsolete desktops and laptops, is already straining the environment in a number of ways.

E-waste is growing out of control, with the [United Nations finding in 2014](#) that more than 40 million metric tons of devices and parts found their way into landfills. It estimates a 21% increase in 2018. However, tech companies have started to step up to the challenge, expanding recycling programs and offering more refurbished devices for sale.

Amazon offers gift cards for any old devices that still work and provides clear directions for sending in any items that no longer function. It has an [easy-to-follow portal](#) that prints a UPS shipping label for you to quickly send your device back. Smartphones, tablets, Kindles, and games are accepted for return.

The company supports “the responsible disposal and recycling of electronics products” and has more than [30,000 collection sites](#) for rechargeable batteries, it says on its website. You can even recycle the boxes your Amazon purchases come in. Amazon also allows you to donate any other non-electronic items you may have by putting them in your used boxes and printing a free UPS label from its [Give Back Box](#) program. Donations go to your local participating charity.

Similarly, Apple has a [robust recycling](#) effort, dangling the prospect of Apple Gift Cards for any prospective refurbishers.

“No matter the model or condition, we can turn it into something good for you and good for the planet. And through April 30, we’ll make a donation to Conservation International for every device we receive—getting us even closer to leaving the world better than we found it,” Apple wrote on its website.

After only a few questions, users can figure out how much their old device is worth, or if its worth anything at all, and instantly get Apple Store credit or Apple Store Gift Cards. Apple claims to disassemble at least 200 iPhones an hour [using Daisy](#), a robot designed specifically for the recycling process. It has been eager to take on the recycling challenge and continue to push for more and more ways to reuse minerals and parts in old devices.

In an April [press release](#), CEO Tim Cook said that Apple would continue to push “the boundaries of what is possible with the materials in our products, the way we recycle them, our facilities and our work with suppliers to establish new creative and forward-looking sources of renewable energy because we know the future depends on it.”

Apple has lead the way in publicly condemning the environmentally costly lifecycle of most devices on the market, writing in its environmental responsibility report last year that it needed to move toward “a closed-loop supply chain, where products are built using only renewable resources or recycled material.”

Google has its own recycling program, offering both mail-in services and collection sites. Google products and other electronics can get you [something from the Google Store](#).



Sony established one of the first recycling programs for its televisions and electronics in 2007. In 2016, it collected [9,749 tons of used consumer electronics](#) and aims to have a collection center within 20 miles of 95% of the homes in North America.

As of March last year, Sony collected approximately 222,727 tons of electronic devices. You can contact it online with any questions about how and where to recycle any old devices or electronics. Although it doesn't offer payment or credit for any non-Sony devices, it does recycle everything for free and has a special program for rechargeable batteries.

Samsung, now the world's largest smartphone producer, organizes a number of recycling programs for its devices. It has collection sites across the US for devices, batteries, and printer toner but doesn't offer mail-in services. [Depending on the state](#), Samsung is required to recycle its devices at no cost to you. It doesn't say whether credit or gift cards are offered in exchange for old devices.

LG has programs similar to other tech giants, allowing mail-in recycling in the US at no cost. It also has drop-off sites where you can bring in anything from a TV to a smartphone. It is unclear from [its website](#) whether it offers any reward for products that still work.

Many charities and nonprofit organizations collect electronics and put them to good use as well. [Music & Memory](#) collects old iPods and mp3 players and refurbishes them for use in nursing homes. Other organizations offer home pickups of old electronics and devices you no longer need.

Before letting that shoebox overflow with old devices, cords, and batteries, check an organization's website to see if you can be rewarded for recycling.

FARMING FOR THE FUTURE: HOW ONE COMPANY USES BIG DATA TO MAXIMIZE YIELDS AND MINIMIZE IMPACT

BY BRANDON VIGLIAROLO

Agriculture makes up a huge part of land use in the United States—[somewhere around 50%](#), actually. That's a lot of land eating up a lot of resources, and if not stewarded properly, a lot of waste following behind the use of those resources.

[Foris.io](#) was created to counter this environmentally devastating possibility. Victoria Vegis, founder and president of Foris.io, was driven to action by the California drought. With too many resources being used, and not enough replenishing them, something had to be done.

Vegis homed in on a particular part of agriculture: soil conservation. “We’re dealing with soil issues worldwide that will—if not solved—drastically decrease our society’s ability to feed its population,” she said. Foris.io’s goal was clear: develop a way to collect data on soil to get the most benefit out of watering and fertilizing with minimal use.

THE IBM CONNECTION

Foris.io developed a soil sensor based around the popular Arduino platform, but it wasn’t enough to get truly valuable data. That’s where IBM Watson came in. Foris.io combines its Arduino-based hardware sensors with Watson machine learning, cognitive computing, and data analytics to form a completely proprietary system.

The systems Vegis and her team built are hosted on [Bluemix](#) (now called [IBM Cloud](#)), IBM’s data storage, processing, and analytics cloud. “IBM’s tools have enabled us to save both time and money on programming and development,” Vegis said. With the initial hurdle of developing machine learning systems and processing data already accomplished, Foris.io has been able to gather data instead of just planning for it.

According to Vegis, cognitive computing platforms like Watson allow them to “take concept to prototype in a shorter period of time, which we know will improve our chances of securing funding.” That doesn’t just apply to her and Foris.io—it’s a huge benefit for all tech innovators.

Foris.io developed a soil sensor based around the popular Arduino platform, but it wasn’t enough to get truly valuable data. That’s where IBM Watson came in.

HOW FORIS.IO WANTS TO CHANGE AGRICULTURE

With a probe installed, data gathering begins. The devices, capable of transmitting data several kilometers, measure moisture, pH level, salinity, temperature, and other factors, all of which are fed to Foris.io for analysis.

The data gained from soil sensors is combined with a variety of other environmental factors, such as weather, geographic location, crop yield statistics, and additional relevant data. Foris.io's motto, "Just enough • Just in time," reflects its goal for the data it gathers and analyzes: To provide farmers with real-time feedback that tells them how much to water and fertilize and precisely when to do it.

The global agricultural industry uses an estimated 70% of freshwater. Watering and fertilizing only as often and as much as needed eliminates excess water consumption, minimizes fertilizer runoff, prevents soil erosion, and curbs energy use.

In short, it's a win not only for farmers—it's a win for everyone.

"Agriculture is the last industry to embrace technology," Vegis said, "[yet] it is the industry that is most vital for our existence." With half the United States dedicated to growing crops, getting every farmer on board is going to be a battle for Vegis and Foris.io, but it's an important one: The future of our environment could depend on it.

IPHONE TERMINATOR: APPLE'S DAISY TEARDOWN ROBOT CAN RIP YOUR PHONE APART IN 18 SECS

BY LIAM TUNG



IMAGE: APPLE

Two years after unveiling [Liam, the robotic iPhone disassembler](#), Apple has developed a smaller, smarter, and more flexible successor called Daisy. Daisy can disassemble 200 iPhones per hour, or around one every 18 seconds, which is [six seconds slower than Liam's teardown time](#). However, the newer robot is capable of disassembling more iPhone models than its predecessor with high precision, according to Apple.

Daisy will be deployed first in the US and Europe to disassemble iPhone 5, iPhone 5s, iPhone SE, iPhone 6, iPhone 6 Plus, iPhone 6s, iPhone 6s Plus, iPhone 7, and iPhone 7 Plus devices destined for the graveyard through AppleCare or a new recycling program called [Apple GiveBack](#).

The teardown robot targets components constructed from high-value materials, such as the logic board, receiver, the iPhone's haptic engine, speakers, the enclosure, and rear camera. And Daisy can recover about 1kg of gold, 7.5kg of silver, and nearly two tons of aluminum from every 100,000 iPhones.

Apple will handle disassembly and then send components to recyclers to recover materials. Following extraction, Apple says the materials will be sent to secondary markets to minimize demand for mined resources.

Daisy is also designed to target components with rare-earth elements, such as neodymium, praseodymium, and dysprosium found in magnets, the haptics engine, and speakers.

Apple can recover 11kg of rare-earth elements from every 100,000 phones. Other materials extracted included tungsten, copper, palladium, tin, cobalt, and tantalum.

Apple revealed Daisy in its 2018 environmental responsibility progress [report](#). The company's overall carbon footprint in 2017 was 27.5 million metric tons of carbon dioxide, down from 29.5 million metric tons in 2016.

Just under 80 percent of greenhouse gasses is produced in manufacturing, 17 percent is generated through product usage, and the remainder is generated by product transportation, corporate facilities, and end-of-life products.

As Apple [previously announced](#), the beginning of 2018 marked its full transition to renewable energy, which powers all its data centers, retail stores, offices, and colocation facilities in 43 countries. Two-thirds of renewable energy bought by Apple comes from projects it created, including projects it owns and renewable energy contracts.

"Altogether, we reduced our energy footprint in fiscal year 2017 by 14.7 million kWh and 225,000 therms. Thanks to energy efficiency measures we've implemented since 2011, we are now cumulatively saving 70 million kWh of electricity and over 2.4 million therms of natural gas per year," Lisa Jackson, Apple's vice president of environment wrote.

Despite the iPhone maker's environmental achievements, Greenpeace senior analyst Gary Cook called on Apple to improve its repairability record. The company is one of many tech companies that are opposing [right-to-repair](#) proposals in several US states.

“Rather than another recycling robot, what is most needed from Apple is an indication that the company is embracing one of its greatest opportunities to reduce its environmental impact: repairable and upgradeable product design. This would keep its devices in use far longer, delaying the day when they’d need to be disassembled by Daisy,” he [said in a statement](#).

“Customers want to keep their devices longer, as evidenced by a three-to-four week wait for a battery replacement at Apple retail stores earlier this year, when Apple was compelled to dramatically reduce the replacement cost.”

Apple says in its report that it and authorized partners will repair services and parts for five years after the product is no longer manufactured.

UNSW LAUNCHES “WORLD’S FIRST” E-WASTE MICROFACTORY

BY JONATHAN CHADWICK

The University of New South Wales (UNSW) has launched what it calls the world’s first e-waste microfactory in an effort to reduce Australia’s electronic waste.

Following research at the university’s Centre for Sustainable Materials Research and Technology (SMaRT Centre), the microfactory has been launched as the first in a series under development at UNSW that can turn consumer waste such as discarded smartphones and laptops into reusable materials.

According to UNSW, the microfactory has the potential to reduce Australia’s vast amounts of e-waste causing environmental harm and offers an alternative to practices such as burning or burying e-waste.

“Our e-waste microfactory and another under development for other consumer waste types offer a cost-effective solution to one of the greatest environmental challenges of our age, while delivering new job opportunities to our cities but importantly to our rural and regional areas, too,” said UNSW professor Veena Sahajwalla.

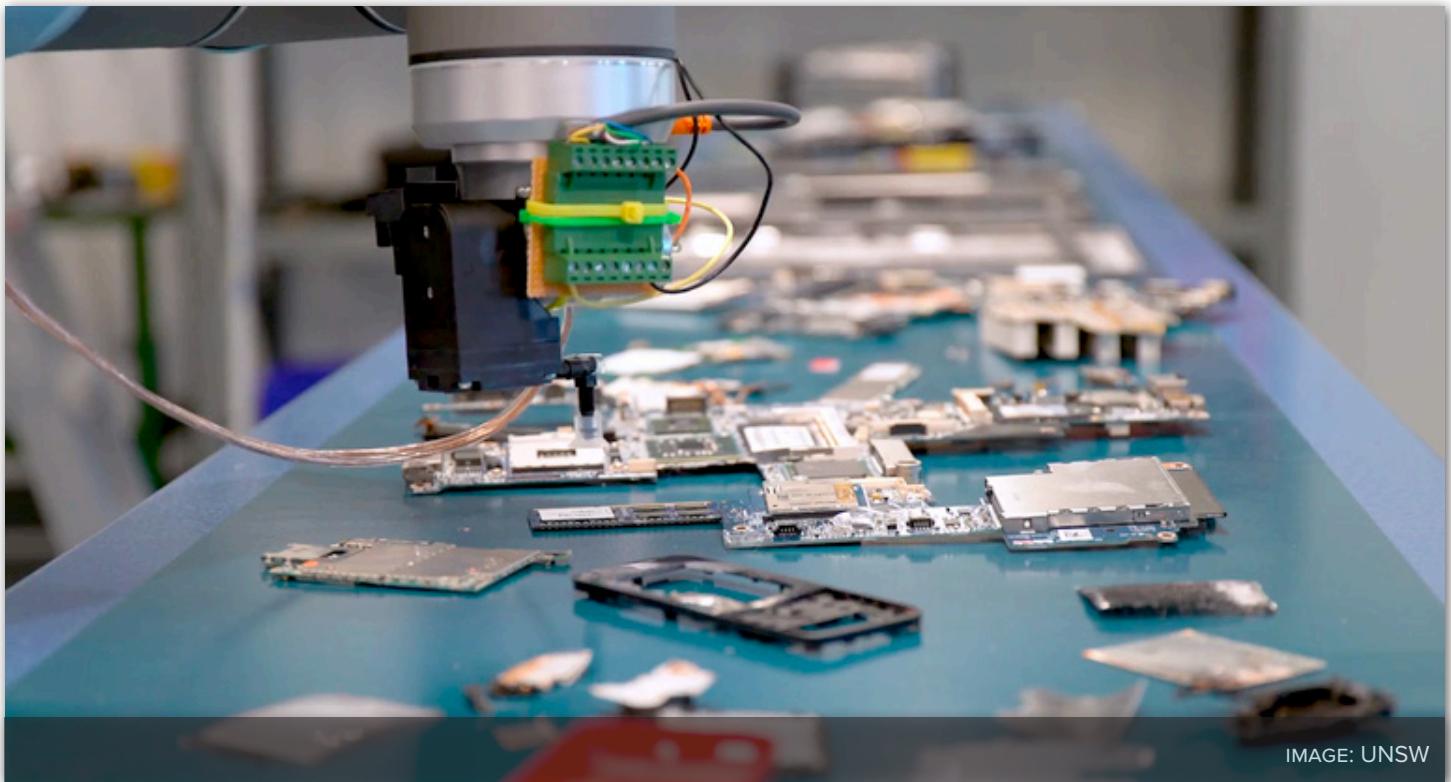


IMAGE: UNSW

“These microfactories can transform the manufacturing landscape, especially in remote locations where typically the logistics of having waste transported or processed are prohibitively expensive,” she added. “This is especially beneficial for the island markets and remote regions of the country.”

The microfactory is formed of separate modules through which waste materials are passed. Discarded devices, such as computers, phones, and printers, are broken down before being scanned by a robotic module for the identification of useful parts, which are then transformed into valuable materials using a controlled temperature process.

Computer circuit boards can be turned into valuable metal alloys, such as copper and tin, that can be used as metal components, the university said, while in another module, glass and plastic can be converted into micro-materials that can be used in industrial grade ceramics and plastic filaments for 3D printing.

UNSW’s aim is to create initiatives for industry to take up the technology and is already in partnership with recycler TES and mining manufacturer Moly-Cop.

According to a [United Nations University study](#), Oceania—the region comprising Melanesia, Micronesia, Polynesia, and Australasia—generated 0.9 million tonnes of e-waste as of 2014 and 15.2kg of e-waste per capita.

Asia generates the highest volume of e-waste and is the largest consumer of electrical and electronic equipment, the study said. Singapore and Hong Kong are among the biggest [dumpers of e-waste](#) in the East and Southeast Asian region, generating 21.7kg and 19.95kg, respectively, per capita.

Between 2010 and 2015, e-waste grew by 63 percent to 12.3 million tonnes, the study added.

GOOGLE SAYS ITS CLOUD IS GETTING GREENER

BY STEVE RANGER

Google is now buying enough renewable energy to match the power used in its data centres and offices. The [search-to-cloud-computing giant](#) said that last year its total purchase of energy from sources including wind and solar exceeded the amount of electricity used by its operations around the world.

For every kilowatt-hour of electricity the company used in its offices and data centres, Google purchased a kilowatt hour of renewable energy from a wind or solar farm that was built specifically for the company.

“This makes us the first public cloud, and company of our size, to have achieved this feat,” [said Urs Hözle](#), Google’s senior vice president of technical infrastructure.

He said the company now has contracts to purchase three gigawatts of output from renewable energy projects and is the largest corporate purchaser of renewable energy.

A BIG CHALLENGE

Powering cloud computing services in an environmentally friendly way is a big challenge as usage of cloud services grows. Thanks to all those data centres, tech companies are now among the biggest users of electricity. For example, Microsoft recently struck a deal with GE to buy all of the output from its new 37-megawatt wind farm in Ireland for the next 15 years to power its cloud data centres. Ireland said it expects data centres to account for [15 percent of total energy demand by 2026](#) across the country, up from less than two percent back in 2015.

Google has been working on this project for some time. It first announced plans to become [carbon neutral in 2007](#) by maximising efficiency and purchasing carbon offsets; since then, the company has been working on renewables. However, Hözle acknowledged that buying renewable energy is not the same as using renewable energy.

“It’s not yet possible to ‘power’ a company of our scale by 100 percent renewable energy. It’s true that for every kilowatt-hour of energy we consume, we add a matching kilowatt-hour of renewable energy to a power grid somewhere. But that renewable energy may be produced in a different place, or at a different time, from where we’re running our data centres and offices.”

Hözle said that Google’s target is to reach a point where renewables and other carbon-free energy sources “actually power our operations every hour of every day.”

THIS DATA CENTER'S EXCESS HEAT WILL HELP WARM THOUSANDS OF HOMES

STIG ØYVANN

Nordic data-center operator Digiplex and Stockholm Exergi, the Swedish capital's leading energy supplier, are going to be using excess heat from servers to warm the equivalent of 10,000 households.

The two companies say their large-scale heat reuse agreement is the world's first where an operational data center with indirect evaporative air-to-air heat exchangers is being retrofitted to transfer excess heat to a city's district heating grid.

Digiplex says that a progressive data center needs to explore every avenue to reduce its carbon footprint, with the world's data centers responsible for two percent of the world's annual CO₂ emissions and three percent of the world's power consumption.

"Every time we browse the internet, stream a TV series, or use the cloud, a process starts in a data center," said Digiplex CEO Gisle Eckhoff in a statement.

"If that data center is a power-hungry fossil fuel-fired one that releases excess heat into the atmosphere, we as individuals are contributing to climate change."

He added that digitalization needs to support improved sustainability, and using excess heat from Digiplex's Stockholm data center to heat thousands of households is an example of what can be achieved.

"This partnership with Stockholm Exergi is a big leap forward, one that could enable residents' digital activity to contribute to heating their own homes."

Close to 90 percent of all buildings in Stockholm are connected to the district heating network, making the Swedish capital one of only a few cities in the world where large-scale heat reuse from data centers is feasible.

The agreement also plays well into the city of Stockholm's ambitious plans for green operations, based on smarter use of technology.

Stockholm mayor Karin Wanngård said digitalization must go hand in hand with the development of environmental technology.

“Utilizing smart technological solutions to make the most of synergies between recovered data-center heat and the city’s heating needs is a part of the environmental objective to become fossil fuel-free by 2040,” Wanngård said.

“I’m determined to make Stockholm a major hub for sustainable data centers.”

Digiplex and Stockholm Exergi say their large-scale heat reuse agreement is a world’s first.



IMAGE: ÅKE ESON LINDMAN/DIGIPLEX

HOW TO GO GREEN WITH TECHNOLOGY ON EARTH DAY

BY TEENA MADDOX



IMAGE: BIOLITE

Earth Day is celebrated around the world on April 22. It's a day to stop and think about what we're doing that harms our planet and what we can do better.

With that in mind, TechRepublic has come up with interesting tech products that will make it a little easier to be green and eco-friendly. (For a complete rundown of 22 eco-friendly innovations, [check out this photo gallery](#).)

One of our favorite eco-aware companies, BioLite, has a range of cool items that are smart to use. A favorite around the world is [the HomeStove](#), which is used across India and east Africa and is now in limited

production worldwide for Earth Day. It uses 50% less wood than a traditional open fire and it provides external electricity to power a USB flexlight to illuminate the cooktop.

BioLite also makes an array of lights and lanterns, many that are solar powered and some that offer USB charging for mobile devices. Check out [the portable SunLight](#) that charges via the sun in seven hours and provides up to 50 hours of light. And there's also the [BaseLantern XL](#) that includes a power hub for charging devices. It's not solar-powered, but it has a 12,000 mAh rechargeable li-on battery and provides a lot of off-grid energy. If you use it with a low energy Bluetooth app, it unlocks features such as sleep timers, proximity activation, and real-time battery feedback.

[HELIO by Y Studios](#) is a solar-powered battery pack that doubles as an outdoor light source: It's an all-in-one solar lantern, flashlight, and power bank. And it looks pretty unique, too.

Energizer also offers rechargeable options, such as its [PowerKeep 36](#) 10,000 mAh power bank with a USB cable and a solar power system. Another option is the [PowerKeep Pro backpack](#) with integrated solar technology.

If you're trying to save a few trees, check out [Sony's Digital Paper](#). It's the perfect solution for anyone who takes copious notes for research or classwork.

And for those reducing water usage, there is the [Phyn Plus](#), which alerts homeowners or apartment dwellers when there is a leak. The [Lotik smart water sensor](#) also targets reducing water waste from unknown leaks. One in five NYC apartments has a leaky toilet, according to Pensa.

The [Skydrop smart irrigation system](#) from Amigo Energy controls your sprinklers with an app and allows easy control when your yard simply doesn't need more water.

The [Ecobee smart thermostat](#) from Amigo Energy connects to the Home IQ web portal to review energy usage and help reduce costs.

Whatever you choose, finding a way to reduce energy usage and doing something kind for the planet is easier when you use the latest technology.

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