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The Deloitte On Cloud Podcast

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Title:	**Cloud computing: Helping build a more sustainable future**
Description:	There's little doubt that sustainability has become a global imperative. In this Knowledge Short, David Linthicum discusses the vital role cloud computing can play in sustainability initiatives. He makes the case that cloud computing is more sustainable because resource use is optimized, and cloud providers typically employ green operations practices. He also talks about other ways organizations can practice sustainability in their everyday operations.
Duration:	**00:17:24**

David Linthicum:
Welcome to this Deloitte On Cloud podcast, Knowledge Short, exploring a specific topic related to cloud computing. This is a short tutorial talking about real-world concepts in the emerging world of cloud computing. I'm your host, David Linthicum, cloud computing subject matter expert, author, speaker, and managing director at Deloitte Consulting, and this is Sustainability.

So, obviously this is going to be talking about sustainability as related to cloud computing. This is a cloud computing podcast, by the way, and hopefully you're having a great summer and kind of enjoying some time off. We created these podcasts for a few reasons. Number one, people requested them. They

would like some knowledge shorts, and, so, instead of talking to a guest, just talking about a particular topic related to cloud computing, so you can learn more about cloud computing and enhance your ability to leverage the technology as a force multiplier and also understand where technology is going.

So, the use of cloud computing and sustainability has long been a thought process. Back in the day, say 2009, 2010, when cloud computing first started to inflect, I think a lot of the organizations, certainly the environmental organizations, saw that they were building many data centers that were supporting cloud computing, and a little disturbing to them because there were two data centers, and now there are four data centers, and doesn't look like any of the computing need has been increased. And the reality is that cloud computing providers were building ahead of the need, and so they're building data centers to anticipate the fact that many businesses are going to be moving from traditional data centers, data centers that they own, into cloud-based data centers.

So, a couple of things to remember there: That even though they're building ahead of the need, that's actually going to mean a more sustainable future because of the shareability of those resources. So, for instance, we're moving from an enterprise data center that's owned by a company, and most companies owned a data center. Either they were in the building or, in many instances, off in a place where lots of data centers exist such as Ashburn, Virginia, or Silicon Valley. And folks who live in those areas, you can drive around. There's hundreds of data centers around. And your ability to leverage cloud-based resources, which leverage multitenancy, which allows us to leverage those resources in a much more optimized way to share those resources.

So, for instance, say we're going from a single data center to a public cloud provider, and the single data center may have 100 different servers and 20 different storage devices. And you'll notice that all of those servers and all of those storage devices aren't near 100 percent utilization. They're at 3 to 5 percent typically. If you put a "perf mon," which is a performance monitor, on an older server, you notice that the majority of servers that are owned by enterprises are going to be way underutilized.

The reason that is, is because they bought ahead of their needs. In other words, they anticipated growth in their applications and certainly application usage, and data storage needs and capabilities. And, so, unlike cloud computing where you can—in an elastic way—allocate those resources and de-allocate them when they're not needed, you have to buy ahead of the need because it takes three to six months to buy a server get it bolted in the rack, get it hooked into the power, get it hooked into the network, train people on how it needs to be managed. All these things need to occur when it was kind of a DIY thing with your hardware and software.

So, the fact of the matter is the reality of an enterprise data center is we're paying a lot of money to power a particular piece of equipment that was only providing 5 percent of the benefit back to the enterprise. And we had to do that because it's off or on. Either the server's on and it's consuming power, or it's off, and it doesn't consume less power based on the—well, not much less power—based on the fact that you're utilizing or underutilizing it in different ways. Some servers, by the way, do increase their power consumption needs as they turn additional things on. That's another topic, but we can say, generally speaking, we have to power the thing and are powering a server that is not going to be 100 percent utilized, and, therefore, it's going to be a deficit in terms of sustainability because it's burning more power than it needs.

Now we take those applications and take those data sets and move them to a public cloud provider. And those public cloud providers leverage something called multitenancy, and that allows them to share resources as a tenant on the very similar hardware and software and storage systems. And, so, instead of doing 5 percent capacity utilized, we're at 95, and that's because we're allowing other companies and other entities that are a tenant on those cloud-based servers to make use of those resources.

We're able to allocate those resources in a much better way than we could in the past because we're optimizing those resources to make sure that we're leveraging as many servers as we need and leveraging only the power we need to power those servers for the capacity that's needed for the particular cloud provider. And since cloud providers have lots of scalability if they need additional capacity, they just turn on additional servers, and those servers are also going to be near 100 percent utilized because of the multitenant features.

And, so, the idea is that we're going from ten companies that are leveraging traditional business processing, application development storage, databases, things like that, and then moving those ten companies to a single cloud provider, and then for pretty much the same square footage and the same server footprint, we're going to provide the same processing. Therefore, we go from powering ten data centers, and the equipment within those data centers, to powering one data center, which is a cloud-based center which is able to host those ten companies, could be many more by the way, and therefore reduce the power impact because we're doing better at shareability. There we go.

Also, cloud providers have a tendency to be very green focused. If you look at many of the programs that they're doing today, they're leveraging renewables; they have wind farms, they have solar farms. They're operating their data centers in places where they know that the power source is, generally speaking, going to be clean. Could be nuclear, could be wind could be solar, but we're trying to avoid coal burning, or fossil fuel burning, power plants because those are really the CO_2 emitters out there, so, therefore, if we're burning more power, and we're burning more power in a much more efficient way and doing so within a cloud provider, we want to make sure that that power being burned is coming from a more sustainable source. You can't—and by the way, it's always going to be a mix of things. You can't have 100 percent wind power, 100 percent solar power, 100 percent nuclear power.

They're taking power off the grid, and that power's going to be supplied in different ways. In many instances, they have backup power, things like that. But it's a good idea, and the cloud providers do a good job of making their approach known and where the power is coming from, to check out where their power's coming from and what they're doing to be not only a cloud provider that provides shareability where you can do a lot more with a lot less, certainly from a power impact, but where are they actually getting that power from?

Next would be optimization issues, and we're hearing more about that these days. In the old days when we had lots of RAM and lots of storage systems, when we built systems, they weren't as optimized as they should be because there was not a lot of need to do it. We just threw hardware at the problem. And that got us in a bit of trouble in terms of optimization of those resources. So, for instance, the same application running on the same server may use 80 percent of that server's capacity and, therefore, have to be moved to a separate server. Therefore, it could be running on two servers because of the scalability that's needed for the particular application.

With some architecture changes just to that application, the ability to write that application in something that was a bit more optimized from a power consumption capability, believe it or not, you can write code that's optimized to burn less power—would only run at 10 percent capacity on one server. And

there was probably not a need to leverage additional servers in the future. Well, take that optimization and move it into the cloud, and therefore we're leveraging less resources in the cloud, therefore the cloud doesn't need to allocate as much compute and as much storage as we would if it was an under-optimized application.

And therefore, just by making some code changes and some architecture changes to a particular application or data storage system, things like that, we're able to burn less power. And, so, we have double savings. Number one, we're more optimized and more shareable in the cloud because it leverages a multitenant type of architecture, but we're also leveraging code that's much more efficient and burning the resources that are there.

So, the other thing to consider would be non-cloud platforms like managed service providers, co-location providers, and even owned data centers and doing some optimization around there as well. So, in many instances, we're able to move a lot of data sets, a lot of applications into the cloud, but not everything. And, so, we're going to have to maintain these environments where they are, in many instances, we have to have an enterprise data center, in other words, we're leasing a data center space from a particular data center provider, and there's a bunch of them out there to do it, or we're owning our own data center.

There may be a reason why they're doing it—security, compliance, things like that. But we also have co-location providers, which are really kind of data center real estate providers, which do provide you the ability to access a data center and set up your own servers where it's kind of DIY, you maintain it yourself. They're just giving you the space, they're giving you the power, they're giving you the network bandwidth to run your particular applications. In essence, you're doing what cloud providers do, but you're building it on somebody else's data center that they own.

And then finally, managed service providers, and that's basically someone who maintains their own server infrastructure, very much like a cloud provider, but they provide the management system for you. So, the good thing there is that, number one, they can allow cloud computing systems to participate, and they will manage that on your behalf, and many of them have moved to more sustainable processes and procedures and best practices these days where, they're not only able to manage your older applications that for one reason or another can't move in the cloud, and of course may be a huge power burn, but doing so on hardware and software and architectures in such a way where they minimize the amount of power that they're burning because that's in their best business interest.

The smaller the power bill, the more money they're able to make because it goes right to the bottom line, and better from a sustainability point of view because they're basically maintaining less power. So, there's options out there. Moving into the public cloud providers, and we know the big ones out there. Managed service providers, and there's dozens out there. People who can manage things on your behalf, which maintain a sustainable footprint and allow you to not have people around who have the skills to do the application optimization, to do the power optimization and things like that. You can always leverage co-lo providers, which are basically providing data center space like real estate.

Or, if there's still a need, you own your own data centers. When you own your own data centers, there's still a way to optimize the power. There's lots of best practices, technology, automation technology that are emerging these days that will allow you to burn less power, but also you can figure out different ways in which these data centers can be hosted.

So, also keep in mind that people are looking beyond just power savings as to what sustainability is. So, that looks at multiple things, and not only how much power they're burning as a company but who they're buying from and how sustainable those companies are, where their employees are located, whether they're using a lot of commute times, which has a huge carbon impact, and doing lots of things kind of beyond just getting a lower power bill and therefore more sustainability or have more sustainable practices.

So, what else can be done? Well, non-cloud issues, or maybe related to cloud, would be work at home programs. During the pandemic, we found that even when everybody was working from home, that productivity actually went up. And, also, there were no cars on the road. So, I live in Washington, DC, huge traffic problem here most of the time. There was no traffic for basically two years, and that has an impact on carbon. Getting people off the road, also don't have to buy as many cars. You can leverage public transportation because your transportation is only occurring maybe a couple of times a week, versus owning a vehicle.

There's all these opportunities not only to have a more sustainable use of resources, namely not forcing everybody to commute every day, but also allowing employees to live in places where they want to live, do what they want to do, have a closer relationship with their family—all the social impact coming with that—and burning less power. And I think the reality is, given the option, we don't want to get on airplanes, and we don't want to sit in our cars for five hours a day or three hours a day or whatever your commute is. It's longer than you actually think.

So, the ability to do things, leveraging technology as a force multiplier, video calling, cloud computing to allow people to work at home, different remote security systems, all these things have been kind of perfected over the last couple of years. They're options for you, and I know many companies are trying to call people back to work, but having work at home programs that are going to be a benefit for the company, a benefit for the employee, and really a benefit for the environment. So, you start looking at that. Not to force you in it, but it's something that should be considered as an option.

So, some of the ways companies remoting it would be low-interest loans on more sustainable vehicles, moving to electric cars. People who have an electric car know they're not cheap, so, therefore, the ability to provide some sort of a financial incentive to get them into an electric vehicle would be a good thing. Certainly, with gas prices now, that would be beneficial to your bottom line as well. It's not forcing people to move into electric cars but giving them the opportunity, if that is going to be a sustainable option for them, that's going to fit within the lifestyle, that's going to make them happy, we're going to subsidize part of that for you. And again, companies can look into that.

Also, low-interest loans for home-based renewables, wind and solar. And, so, in other words, we're not only providing them the ability to get into electric car, but also power that electric car and charging the electric car using solar panels on the top of your roof or wind power. That has come down in price a great deal in just the last five years where—I think it's $1.00 a kilowatt now. And, so, they have solar roofs and they have solar systems. There's certain local and state tax incentives for doing this. The technology's been pretty tested. Whether you do that through a battery that's maintained in your house, or you can even sell back to the grid.

So, in other words, leverage the power company as your battery. So, during the day, you're selling power back to the company, and at night when there's no sun, the power company could be providing power back to you but you're getting a net zero bill at the end of the month. And I know lots of folks out there who are able to pull that off. A little bit of an investment. You have to kind of look at the investment and the benefit tradeoff, but it's getting cheaper. It's going to be something that you should take a look at.

I urge you if you look at sustainability as something you're a business owner, you're working at a large business, look into these groups and make sure they're compatible with your culture, they're going to where you want to go, and also they're doing things that legitimately improving the way in which we're consuming resources, which is really what this is all about.

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