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PODCAST

ABB Decoded: Helping to solve the global water scarcity crisis

Two specialists from ABB discuss the global water scarcity crisis and what can be done to solve it.

Reiner Schoenrock: Hello and welcome to the new episode of ABB Decoded, the podcast that tries to press pause on your fast-moving life and shine a light on the technology and trends that are reshaping our world. I'm your host Reiner Schoenrock, and in this episode we will be discussing why addressing the global water scarcity crisis is more important than ever.

On World Water Day 2023, in March, the United Nations launched a water action agenda dubbed "Accelerating Change to solve the water and sanitation crisis". The United Nations says 2.2 billion people lack access to safely managed drinking water, while more than 4.2 billion people lack safely managed sanitation. A staggering 80% of wastewater flows back into the ecosystem without being treated or reused.

To further elaborate on that topic, I met with two colleagues of mine at ABB with Amina Hamidi and Marie Helene Westholm Knebel. Hello, Amina and Marie Helene. Nice to meet you.

Marie Helene Westholm Knebel: Nice meeting you as well.

RS: First, to better understand why I met with you to discuss the water topic, I would like to ask you for a quick introduction. In a nutshell, Amina, what do you do at ABB and how are you involved in improving the water crisis?

Amina Hamidi: Thank you for giving me the word. And before starting to introduce myself, I wanted to say that I'm very, very happy to be here with you today. Yeah, a bit about my background. I'm an electrical engineer. I did my Ph.D. a long time ago and started in ABB in 1998. I had different roles within ABB. I spent a big portion of my career in research and development activities, and I was even the chief technology officer of ABB Electrification.

Today I am leading the instrumentation business line within ABB where we offer instruments to measure different physical characteristics like pressure, temperature, flow for a variety of applications. And one of the focus areas, the focus applications for us in our business is the water where we have instruments that enable accurate measurements of water and where we are really proud to support that battle against the water scarcity around the world.

So, we offer technologies that help to make sure that not a drop of water is lost. And that also the processes that are treating the water, such as desalination, for example, which is the process where you treat seawater to make it into drinkable water, or even wastewater treatment, which is the topic we will discuss today. So, we are supporting these processes and we are really helping our customers making these processes much more efficient.

RS: Thank you, Amina. And what about you, Marie Helene, what do you do at ABB?

MK: Thanks, Reiner, for this opportunity to discuss such an important topic. So, I am a sustainability manager at Process automation, which means I'm supporting our divisions in PA with the implementation of the ABB Sustainability Strategy 2030. That means driving or helping driving operations internally and processes to cover and tackle all the topics that fall under sustainability, but also supporting our product managers to drive the solutions that will make a difference and a great impact externally at customers, but also towards society and community.

RS: Thank you, Marie Helene. And as we are talking right now, let's go back to March, where ABB marked the World Water Day with a report that focuses on how wastewater treatment can play a part in global water scarcity. Can you share some of the findings of the report with us?

MK: Sure. So, this research was commissioned by ABB to use an independent company development called Development Economics that is actually driving research projects, including water management. They have 20 years of research experience, market understanding. They can cover trends and they can really use data to actually tell the story. They actually this time use data that are from the United Nations themselves.

And from this, they could actually help us measure the impact that we can have as an organization to drive change in the water area and especially focus on wastewater. What they've notified as well is there is a clear need, of course, to tackle water scarcity. But wastewater itself is especially pivotal in this topic.

So beyond the need of water itself, we also need to tackle the concept of water quality. And of course, we need to accelerate the way we treat wastewater across the globe to actually allow reuse and reentry of this water into the water cycle. This is an untapped resource. This is something where there is great potential for improvement and this is where we can have an impact as an organization.

What the research has showed is that global wastewater treatment capacity needs to actually be increased annually by almost 8.6 billion cubic meters to actually have the impact that the United Nations are willing to have through the United Nations development

goals. So they use economic modeling as well into process to understand what is the investment that we need across the globe, what the authorities and utilities organization, it's actually drive to make sure that we can actually meet those ambitious goals.

So, in this research, beyond the data on water management, what they actually identified through economic modeling is actually that 469 treatment facilities will be required to be developed and further expanded per year if we actually want to meet the United Nations development goal on water scarcity. If you want to have it, you know, in terms of volume, an equivalent, that would be the equivalent of 3.4 million Olympic swimming pools each year that we would have to actually manage.

RS: Thank you, Marie Helene. Those are very impressive numbers. Now, how is the wastewater linked to the entire topic?

MK: So of course there is the water scarcity crisis. This is the critical thing that we need to address across the globe. This is something which is linked to peace, sustainable development, community development, health. These are really, really hot topics. However, wastewater plays a huge role as well for the issue of water pollution itself. So nearly half of the wastewater that is coming out from household, from companies, you know, from the toilets, the sinks, all the drains, the kitchens, it goes back into nature with harmful substances and is actually being used in some locations, for example, agriculture. So it will have an impact on what is processed and eventually on human health. So, if we reduce the amount of untreated wastewater that is going back into nature through our technologies, through regulation, then we will have a stronger impact on the environment, everything that is going back into the rivers or the oceans. It will solve a lot of crises from the health perspective of local communities that don't have a choice, but using those resources and it will have an impact on our planet obviously, and how our biodiversity is thriving. So there, and this is something where, I mean, I can really develop further on the technologies, using all the solutions we have to manage the plants themselves from an optimization and energy efficiency perspective, this is critical. But then also working on the water quality itself is even more important.

RS: So then let's quickly talk about technology, Amina. Because it seems that treatment of wastewater can offer a solution to the water crisis, but yet still today, much of it remains untapped. Is the technology available to optimize wastewater treatment so that it can play an important role in the battle against water scarcity?

AH: And the answer is yes. We do have the technologies to optimize wastewater treatment so that it can play that role that we want it to play against water scarcity. So wastewater can be treated and reused for various applications. It can be reused for irrigation, as you mentioned, for industrial uses and even as drinking water. However, of course, the level of treatment which is required will depend on the intended use of the treated wastewater.

There are various wastewater treatment technologies available today, such as, you know, biological treatment, chemical treatment, but also membrane filtration. And these technologies can be optimized. They can also be combined to create efficient and effective treatment systems that can produce really high-quality treated wastewater. And in addition to all that, there are advancements in water sensor technology and artificial intelligence that can help the optimization of the wastewater treatment systems. The

technologies can monitor the quality of the wastewater in real time and adjust the treatment process accordingly to make it more efficient.

RS: So, let me just switch to another topic, which is related to this, and that's the energy efficiency. A little-known fact is that treating wastewater is very energy intensive. With this industry consuming up to 3% of the world's total energy output and contributing to over 1.5% of global greenhouse gas emissions. With a growing population and industry demanding more water, it is critical that we enable more wastewater treatment using less power.

Is this something ABB can help with? Marie Helene?

MK: Yes, that's a positive news, of course, is that through our offering, we can really have a difference as well in the way we optimize those plants. So of course, we see an increase, obviously of emissions if we increase the capacities and a number of those plants. So how can we actually tackle this issue? We have our solutions, of course, in ABB in terms of electrification, automation, digitalization, everything that can make a difference in terms of how those plants operate will actually have a positive impact on reducing the emissions linked to those operations.

There is another research that actually ABB has launched, which is the energy transition equation, and we address this as well through data and modeling to understand what is really the connection again between those operations themselves, how important they are and how energy intensive they are and really the technical aspects that we can drive to really reduce the impact.

And so what we analyze is that by applying a package of automation and digital solutions, we can really achieve fantastic things. So, for example, the wastewater sites that we have calculated that can reduce carbon emissions by up to 2000 tons per year. So if you cover the amount of wastewater treatment plant that exist across the globe, and if we consider that we need to increase even this capacity to tackle the objectives, then we could save each year around 100 million tonnes of CO_2.

And of course, it's a massive opportunity from a market perspective, from an offering perspective to develop new capacities, develop new operations, apply the technologies that we have in different contexts and deliver, of course, cleaner water to the environment. So here the benefits are obvious.

RS: Great, Marie Helene. So then let's quickly discuss the improvement of the water infrastructure. Can we make the infrastructure live a little bit longer and by making it more efficient? Because this is also important for sustainability point of view. Marie Helene?

MK: Yes, that's correct. And it's extremely important to make sure that those plants work effectively, efficiently, and as long as possible to deliver and operate to the communities. So they're beyond the emissions. Of course, we need to make sure that they remain resilient across the years. And this is where, again, our solutions can help optimize the assets. So beyond energy efficiency, of course, you have all the control tools that we can use to make sure that we can monitor how they function, we can identify issues in the operations, we can correct them, obviously.

And as part of the objectives of the United Nations, we are not only promoting the access to clean water, we are also looking into promoting climate resilient wastewater infrastructure. So, we need to take into account as well the climate change impacts that we will have across the globe. So, beyond the water scarcity itself, which is an environmental mechanism, we have also to make sure that the plants themselves keep on functioning irrespective of the climatic consequences.

So there again, having access to those information on how the plants operate and how we can optimize those operations, this is critical. And of course, obviously this has also a very strong impact on how much things will cost.

RS: Thank you, Marie Helene. Well, Amina, I guess it's up for you now to explain a little bit further the technology ABB can bring to the table. Can you give us an example of how ABB technologies can help in wastewater treatment?

AH: Yes. ABB has a number of technologies that can play really an essential role in wastewater treatment processes. You know, we provide the basic accurate and reliable data that helps the operators optimize the process and improve that efficiency. If you take a wastewater treatment plant, for example, today, it has hundreds of measurement points all along the process and they are using different measuring principles. There are sensors that detect changes in the environment or in a given source and they are looking at chemical compositions, for example, of gases. If you think about the biogas that is released during wastewater treatment, for example, or they can also look at the compositions of the liquids, other sensors are using the physical characteristics measuring them. Such as temperature, pressure and flow.

So if I take really a few examples, and there are really many, a few examples about where our technologies are used. One such example is chemical dosing. ABB has flow meters, ProcessMaster and WaterMaster. They are used to measure the flow of the wastewater and provide this accurate flow measurement data for chemical dosing. So this will enable the dosing pumps to add precise amounts of chemicals to the wastewater to facilitate the treatment process.

By doing that, the result is really an improved treatment efficiency but also reduced chemical usage, which is very important and lowers operating costs, of course. Another example I can give here is the ABB PH sensors. They are used to measure the PH of the wastewater, which is a very important parameter in wastewater treatment processes. So PH measurements can be used to determine the appropriate dosage of chemicals required to treat the wastewater, but also to ensure that the treated water that you get out of it has the right PH and meets the required quality standards. So really a number of examples where we play an essential role with ABB technology.

RS: Thank you, Amina. All the podcasts we did so far, and no matter what topic we were talking about, we came to the term of digitalization. So, Amina and Marie Helene, we talk, for example, when we talk about water, also about smart water. What digital technology is required for water treatment plants to work efficiently? Let me ask Amina, as the technology guru here to explain further what digitalization means for water treatment?

AH: Yeah, we often use the term of smart water, and there are indeed a number of digital technologies that can be used for water industry in general and also for water treatment

plants. I can just mention a few of them, like, you know, process automation, which involves the use of digital systems to monitor and control the plant operations in real-time to help the overall efficiency.

But also I really like to speak about our smart instruments. So, we have that wide range of smart instruments that can be used to monitor the variety of operational parameters such as water quality, flow rate, pressure and so on. And those are really the initial elements that are collecting the data that will be used then in the digital systems to optimize the operations.

And then we can look at other digital technologies like predictive maintenance that is involving the use of the smart instruments and real-time condition monitoring, which is really helping customers to keep a close eye on critical applications and identify potential issues before they occur. So you are always checking the health of your equipment. And by doing that, of course, you can schedule maintenance activities in advance and you minimize the downtime.

And this is, of course, again, reducing waste, increasing efficiency in your operation. And then, of course, the very famous cloud computing. It can be used to store and analyze large amounts of data that we collect from the plants with our sensors and smart instruments. And by accessing this data from anywhere, the plant operators can make these informed decisions about their plant operation, optimize efficiency without even the need to be physically there, present, at the measurement points.

So in summary, to make a water treatment plant to work efficiently in the context of what we call smart water, a combination of digital technologies is required. And then these technologies are there. There are a number of them. They can help optimize plant operations, reduce downtime, as I said, and also improve overall efficiency.

RS: Thank you, Amina. So ,the technology is available and as you just said the technology can help the customers. But how can ABB help its customers to make use of data and create value for all of us?
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AH: Yeah, I think the topic of value creation for customer is a very important topic and close to my heart also. You know, when you put yourself in the shoes of the customer, what is important for them? What is important for that water operator. One, there are three dimensions I would like to mention. One is the compliance to regulation, which is very, very important in the water industry. The other one is, of course, and they are linked, is the clean environment, as Marie Helene was mentioning, and also the safe water for consumption. And then the third element is the efficient operations. So, ABB digital technologies, they support those three dimensions. And as I mentioned before, as a foundation layer, we provide the state-of-the-art accurate instrumentation, hardware, software and connectivity, which are often really the fundamental digital assets of our customers.

So those instruments create data around the clock to carefully monitor critical process values. Those data will enable customers to make informed decisions about how to manage the wastewater treatment plants. Then compliance to regulations is critical, as I said, and ABB's instruments can measure the levels of chemicals, for example, and contaminants in the water, and by monitoring such parameters, water treatment plants can ensure that they are always within the regulatory limits and provide safe water for its

intended use. Instrumentation can also help with the monitoring of wastewater discharges, into the nature, you know, by measuring the levels of pollutants in the wastewater. So, this supports, of course, to ensure a clean environment. And then when we speak about the plant efficiency, our smart instruments contain a lot of diagnostics capabilities that can help operators improve their productivity while also reducing the downtime.

So, one example is our verification tool, which is a software solution that connects with the instruments to generate health reports, similar to maybe your fitness tracker. When you get reports about your heartbeats, about your counts of steps. So we have that for our instruments. And just to give you an example of the use of such health reports, for example, the electromagnetic flow meters that are used in wastewater applications can suffer from coating buildup on the insides of the pipe surface, which over time can cause the measurement device to fail. So, by using our verification software, the maintenance staff can easily check if there is a build-up happening and forming, and then they can even estimate when the device has to be removed and cleaned before any failure happens.

RS: Thank you, Amina. So, I understand the technology is available. The support for the customers is available to make the best use of it. Marie Helene, what can you tell us about the extent of how the operational data is already being used today?

MK: It's actually very interesting to know that, you know, there is a strong support for data when we look into sustainability itself. Last year, ABB launched a survey which is called "The Billions of Better Decisions". It's an entire campaign where we actually approached 700 decision makers across different industries on the globe, and 96% of them agreed that data is actually essential to achieve sustainability goals.

So, all the points that Amina mentioned in terms of operational management, data quality and usage is a no brainer. The problem here, what we know from estimates that only 20% of all the data that is collected from those plants, from those operations, only 20% is actually used for a purpose. And from this, we see, of course, a massive room for improvement, because if you contextualize the data you get, which means you try to understand and solve the problems with this, then you have fantastic improvement opportunities there.

So, we have the usual motto that says, you know, what's going to be measured cannot be improved. Obviously, we have the tools to actually make those improvements real. We can use the technology we have in terms of analyzing the data itself and really identify what makes sense to our customers, to the assets and eventually, of course, to the communities.

RS: Thank you. Marie Helene and Amina, how can we make this impact of the technology we just were discussing tangible? Do you have examples out of your broad customer field where we put those technology already in play?

AH: Maybe I can start I wanted to mention maybe one example, which is quite nice to see. It's about our collaboration with the New Zealand water utilities provider Wellington Water. They manage the water infrastructure for six New Zealand councils and the infrastructure that is huge. It includes 105 water pump stations, 248 wastewater pump stations and approximately 148 reservoirs and 27 storm water pump stations at various sites. So really,

really a big network. Ultimately, again, to come back to what Marie Helene was saying, you cannot manage or improve what you cannot measure. So, ABB's technologies are used for that purpose and give Wellington water the ability to measure, also to store data and track the water flow passing through the pipes in real time so that they can really optimize it.

So, also with our intelligent measurement technology, the flow devices such as WaterMaster, which I mentioned before, and the digital solutions as our verification, we are helping them to achieve a more resilient and future ready water and wastewater structure, which is also helping them save energy for up to 10% and ensure that not a drop of water is wasted.

So that's really a very, very nice project we have with them. And recently this has been recognized. So, we have been shortlisted for a Global Water Award in the Smart Water Project of the Year category, and the winner will be announced on May 9th.

RS: Exciting time ahead. Looking forward to May 9th.

AH: Yes, we as well.

RS: And Marie Helene, do you also have to share an example?

MK: Yes. I mean, from my side, of course, every kind of success story that has a positive impact towards the environment or communities is really dear to my heart. Everything we're doing at ABB in the water topic, whether it's about cleaning the water itself, optimizing the plant's desalination, for example, can have a positive impact. So we are all over the world supporting all those activities and we have a lot of examples related to wastewater management, for example in the US.

And one is in Nashville, for example, where in 2023 all the operations will be finalized to make sure that the city itself has stronger and cleaner waste management processes and of course reducing then the environmental impact.

RS: Thank you. I guess we come to my last question here, and we were talking a lot about customers, but what does ABB do on its own facilities in terms of water treatment? From a sustainability perspective, does ABB walk the talk?

MK: Of course we walk the talk, Reiner. This is non-negotiable. As an organization like ABB, we need to address the water usage within our own operations and across the globe. So what we're doing is monitoring each of our sites, the water consumption and how we actually use the water itself. We report it in our own system and you can get all the information in our ABB sustainability report. The data itself is reviewed and validated by auditors each year. We assess not only the consumption but also the quality of water to make sure that there is no discharge of harmful substances back in the systems. And of course, this is part of our entire sustainability strategy at ABB, to ensure we manage resources sustainably.

RS: Thank you. Thank you, Amina and Marie Helene, for all your insights and compelling examples. Now we all better understand what is at stake, how important it is to tackle the water and sanitation crisis and how the water and wastewater industry can become more

sustainable and efficient. All this is well aligned with ABB's purpose. For us, sustainability is both the right thing to do and a business opportunity.

We lead by example, by embedding sustainability in everything we do. Our solutions reduce harmful emissions and preserve natural resources. We champion ethical and humane behavior to contribute to better lives for people around the globe. And if you, dear listeners, did enjoy this episode of ABB Decoded, why not like, share or subscribe, wherever you get your podcasts. Until next time.

Goodbye.