NINA MOINI: PFAS, also known as forever chemicals, were once thought of as impossible to remove from the environment. They're still seen as difficult and expensive to remove from wastewater, a common place for the PFAS to be found. A pilot project in St. Cloud tested a technology to do just that, and researchers found that the process they used destroyed more than 99% of the PFAS they tested.

Luke Langner is the public services director for the city of St. Cloud. Thanks for being here, Luke.

LUKE LANGNER: Thank you for having me.

NINA MOINI: And Andy McCabe, we're happy to have you as well, an environmental engineer with Barr Engineering. Welcome to the show, Andy.

ANDY MCCABE: Thanks so much.

NINA MOINI: Andy, I'd love to start with you. Could you just remind our listeners what PFAS are and why you would want to remove it from wastewater specifically?

ANDY MCCABE: Yeah, good question. So PFAS are a group of thousands of chemicals that have been used in lots of different products, some consumer, some not. And we find them all over the place in the environment, and there are a few of them that have been linked with health concerns. And really once they're in the environment, they linger around for a long time. There's really not a great natural pathway that we of right now that destroys PFAS or gets rid of it once it's in the environment, and so that's the concern is that it's-- once it's in the environment, we know there's lots of them there and they don't naturally go away on their own.

NINA MOINI: And, Luke, I understand when it comes to St. Cloud, that St. Cloud already has a relatively low levels of PFAS in the wastewater there. But why is it important for the city to participate anyway in this pilot project, in this research?

LUKE LANGNER: Yeah, that's correct. So we-- it's-- we have a low number currently in our wastewater, but as Andy alluded to and with the growing concerns around it, there has been regulation discussing how we're going to handle this going forward. And with the city being on the leading edge of a lot of things-- the city of St. Cloud's wastewater treatment facilities are known nationwide for being on the leading edge of processes and different things-- we want to be in the leading edge of this as well and to make sure that we are providing safe river water and applying biosolids safely to the fields that we are able to apply to.

NINA MOINI: Yeah. And, Andy, can you talk a little bit more in simple terms what the technology you were using was actually doing to the wastewater in this process?

ANDY MCCABE: Absolutely. And just to be clear, the technology that we were looking at was on the biosolids. So biosolids are a byproduct that we get from wastewater treatment, and that's the material that Luke was talking about that ends up getting land applied once it's been treated.

And our technology that we were looking at is called supercritical water oxidation. We simplify it to the acronym SCWO, S-C-W-O, and it's-- in the simplest of terms, it's a pressure cooker. So it raises the temperature and raises the pressure on the biosolids, and once you're in this-- it's called the supercritical phase of water-- you get really interesting chemistry to happen. And the most pertinent for us is an oxidation. So we're able to actually in this state degrade PFAS.

NINA MOINI: Yeah. And to see, Andy, that you were able to destroy more than 99% of the PFAS you tested, that seems like a shocking number. That sounds really great. What does it tell you about the potential of this technology?

ANDY MCCABE: Yeah, that's right. So the technology in it, there's lots of technologies out there that can do a really good job at destroying PFAS. And so this is one of those where it's a good demonstration. We have the ability to if we've got these media, these waste streams that have PFAS associated with them, we've got technologies out there that we can apply to actually destroy and manage them where it makes sense to do so.

NINA MOINI: And also, Andy, one of the things I understand that's also interesting about the process is that it doesn't just destroy PFAS, it also produces energy in a way. Can you tell us about how that works?

ANDY MCCABE: Yeah, exactly. So what's interesting is the biosolids themselves have a high organic carbon content, and when you put that through the supercritical water oxidation process, it's what we call technical term exothermic. And so it releases heat. And that heat can be captured and then used for useful things, and the most useful in our case is capturing that heat and then heating the biosolids before they go into the process. But in a full-scale system, you'd hope that there is excess heat that you're able to capture and then potentially use elsewhere in your facility.

NINA MOINI: I wonder, Andy, if you could give us an idea for how accessible this type of technology would be for most communities because we've seen PFAS in the headlines for years in different communities in different areas across the state, depending on what type of activity has been going on in that area, man-made activity and that type of thing. Is this the future or is it too expensive of a process or is the infrastructure there for more cities to be able to do this kind of work?

ANDY MCCABE: Yeah, really good question. And I don't think this is a unique story for this technology. But where we are with PFAS destruction technologies is they are expensive, and it's one of those things that it's market driven. And once we have a few early adopters of the technology and some of these vendors that are developing it, I think costs from that standpoint will come down quite rapidly.

I think where we are right now is-- and I think you are alluding to this-- scale is the issue. We can do a good job at this pilot scale and probably somewhere on the order of maybe 10 times bigger than what we were doing. But for large municipalities, we're still probably a few years off before this technology is accessible to very large communities. So I think from the standpoint where we are right now, public funding, grant funding, I think that's where things like this can happen, and that's where you do see it happening. There are some communities in the US that are exploring actually installing this type of technology.

NINA MOINI: Luke, would you add anything to that from the city perspective? Is this something that you're hearing a lot of communities trying to plan for in the future? And do you feel like it's a feasible thing to be planning for?

LUKE LANGNER: I think that a lot of cities around the state, the country are looking and trying to plan for what potentially might come from and through regulation and keeping the eyes open on what kind of processes are out there, what pilots are out there, what potentially they could bring into their facility that would work at their locations. Size wise is a concern as well, so trying to fit these new processes within an existing treatment facility footprint can be challenging as well. So I think taking all of that into account and trying to look into the future is what a lot of municipalities are doing.

NINA MOINI: Which is why it's helpful to have this pilot.

LUKE LANGNER: Absolutely.

NINA MOINI: Thank you both so much for your time and breaking some of this down for us. We really appreciate it.

ANDY MCCABE: Thank you for having us.

NINA MOINI: That was Luke Langner, public services director with the city of St. Cloud, and Andy McCabe, an environmental engineer with Barr Engineering based in Minnesota.