

Sustainability-first innovation: **mastering level measurement**

Featuring new radar transmitters—Sitrans LR500 series

Picture a processing plant where the technologies used to boost quality control, energy savings, and environmental compliance are themselves leaders in sustainability. Where the radar level measurement device installed on that vessel was built recognizing the crucial intersection between technological innovation and ecological well-being.

If that instrument is one of Siemens' new Sitrans LR500 series radar transmitters, this picture has now become a reality. But how are sustainable practices and materials shaping the industry's measurement intelligence? We dive into this and more with Siemens' Tim Little, Chief Product Owner, and Jenny Schaack, Business Line Owner for Sensing Technologies.

In 25 words or less, what's so important about incorporating sustainability into the design of industrial sensors?

Tim: Building sustainable industrial sensors means we continue to support customers in the push for a greener future, helping reduce plants' overall impact on the environment.

Jenny: And if I can add another few words to that, I'd say this also fosters responsible innovation, creating a win-win for both businesses and climate change.



Sitrans LR500 series are 80 GHz radar level transmitters for continuous monitoring of liquids, slurries, and solids in storage and process vessels.

SITRANS LR500 series

Level up your Sustainability – over 50% reduction in CO2

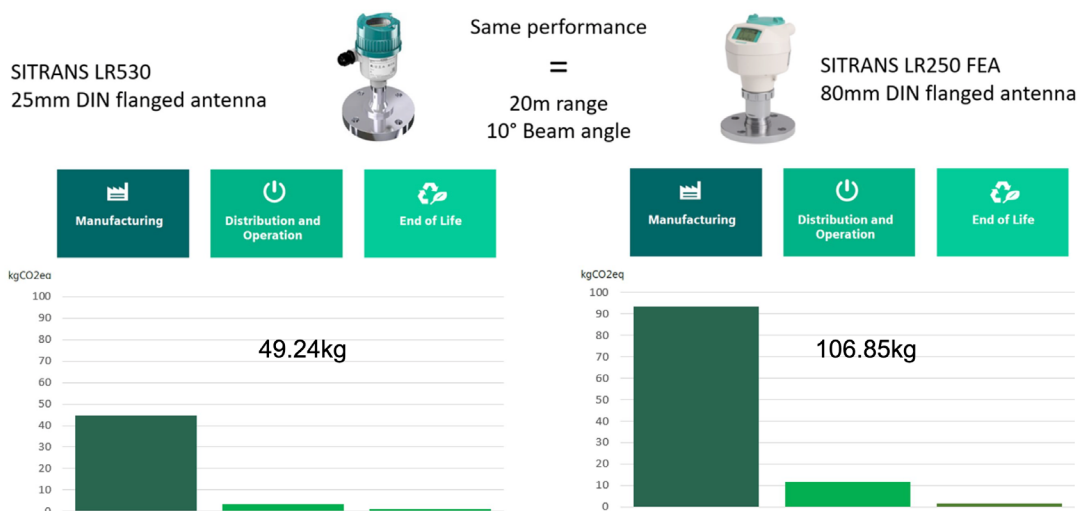


Figure 1: With significant reductions throughout the entire lifecycle, Sitrans 500 series radar transmitters can deliver more than 50% reduction in carbon dioxide-equivalent emissions.

What does this look like in practice? How does a radar level instrument improve its sustainability rating?

Tim: I've seen a long history of radar measurement devices over my career, from large four-wire, six-gigahertz technology with 200-millimeter diameter horn antennas—drawing several watts of energy. But with advancements in the technology going into the devices, modern instruments are much smaller in size and loop powered—with over 10 times less power consumption and significantly higher performance.

An older transmitter with an 80-millimeter antenna, for example, has a footprint of 107 kilograms of carbon dioxide-equivalent emissions (kg CO₂e)—whereas the new Sitrans LR500 has more than cut this in half, to 49 kg CO₂e (see Figure 1).

Jenny: All of this is grounded in lean principles, which help minimize waste from the very beginning of manufacturing. From working closely with supply partners to minimize the packaging on

parts coming into our factory, to using less packaging for finished products leaving the factory—and even using LED lighting in the factory—the whole manufacturing process contributes to these reductions.

Siemens instruments are shipped to customers around the world, so how do these practices continue once the product has left your factory?

Jenny: Our logistics teams do their best to consolidate shipments, which can really add up over the course of a year. Not only that, but we're using fewer raw materials in the manufacturing process—and this reduction in weight means the carbon footprint to transport that device is also smaller. Again, this might seem small for each shipment, but over the course of months and years—less weight means fewer carbon emissions. And with multiple manufacturing sites, we're able to use local vendors for raw materials, improving the efficiency of material flow as well as lead time.

Tim: I'll mention also that the technology on the inside of these devices means transmitters with truly intelligent electronic components that help drive sustainability. The Sitrans LR500 series is packed with customer-first features like Bluetooth app interface, cybersecurity features, as well as increased memory for faster communication and advanced diagnostics that allow predictive and preventative maintenance.

How else is Siemens tackling the carbon footprint of its sensors?

Jenny: Siemens is committed to the development and production of environmentally sound and sustainably produced equipment. So not only are we reducing the resources needed to ship the devices, but we're also lessening the impact of the device once it reaches its end-of-life stage.

Tim: That's right—the Sitrans LR500 series are built using a modular design, so instruments can be broken down and metals and plastics separated. Overall, the devices are up to 72% recyclable. Recycled metals can then be shredded, melted down, reformed, and reused—all of which uses one-eighth the energy of mining new iron ore.ⁱ

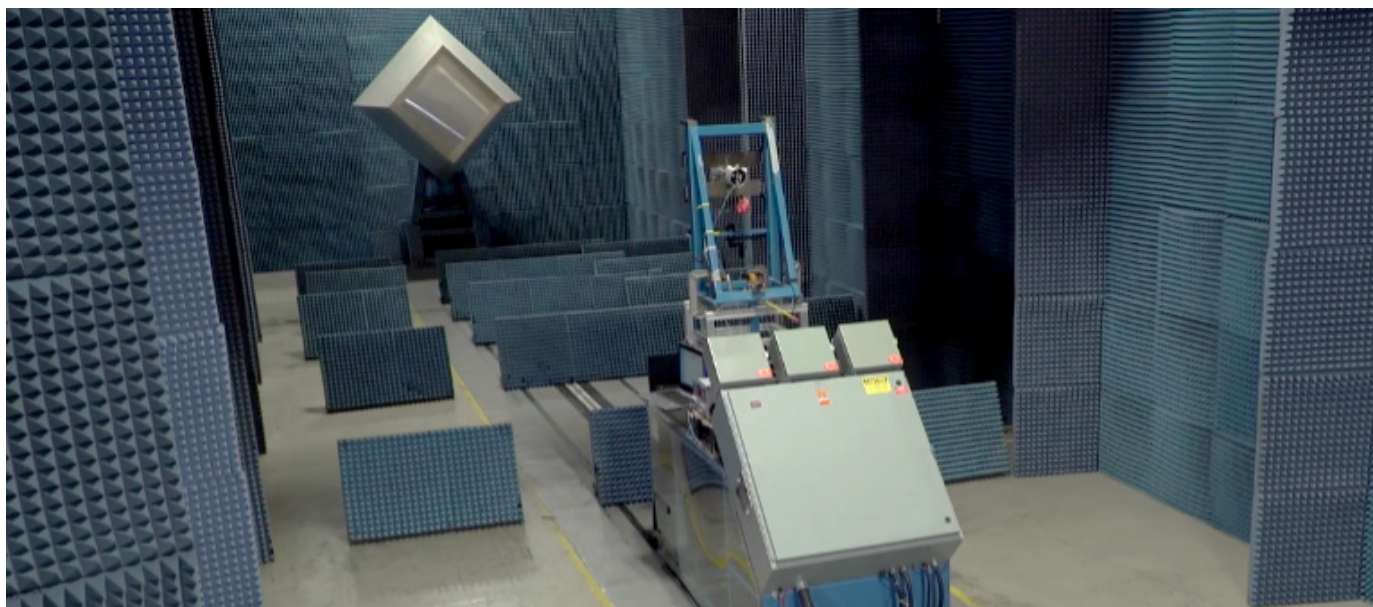
All these key environmental performance indicators are included in the instrument's environmental product declaration certification (EPD), capturing the impact of the device over its entire lifecycle. The EPD's can be downloaded from SIOS portal to support our customers creating their environmental impact documentation.

Are customers demanding this kind of transparency from instrumentation companies?

Jenny: You bet they are! Companies have their own sustainability targets to hit, from the sensors they choose in their plants to raw material usage and environmental reporting. But the second two depend on the first—without intelligent measurement and monitoring, tracking and reporting on material usage and energy consumption is a challenge.

Sitran LR500 is Siemens' most accurate and repeatable radar transmitter ever, with demonstrated one-millimeter accuracy under reference conditions. The benefits of higher accuracy? Measurement trust and improved inventory management—so companies can keep lower inventory levels, thereby lowering cost, as well as prevent risk of overfill or running out of stock—

With hundreds of product verification tests, Sitrans LR500 passed ingress protection, accuracy verification, environmental temperature cycles, shock and vibration, system compatibility, electromagnetic compatibility, radio compliance, and more.





Pick-by-light manufacturing and custom-testing ensures each device is assembled perfectly and will perform as expected.

not to mention improved quality of batch processes.

Tim: And we're seeing this in the field. We've added a feature to Sitrans LR500 called "Near Range Suppression." Useful on those very dirty applications with heavy buildup, the device automatically learns the noise signal near the antenna and suppresses it out. This will prevent nuisance faulty high-level readings and reduce or even eliminate cleaning cycles.

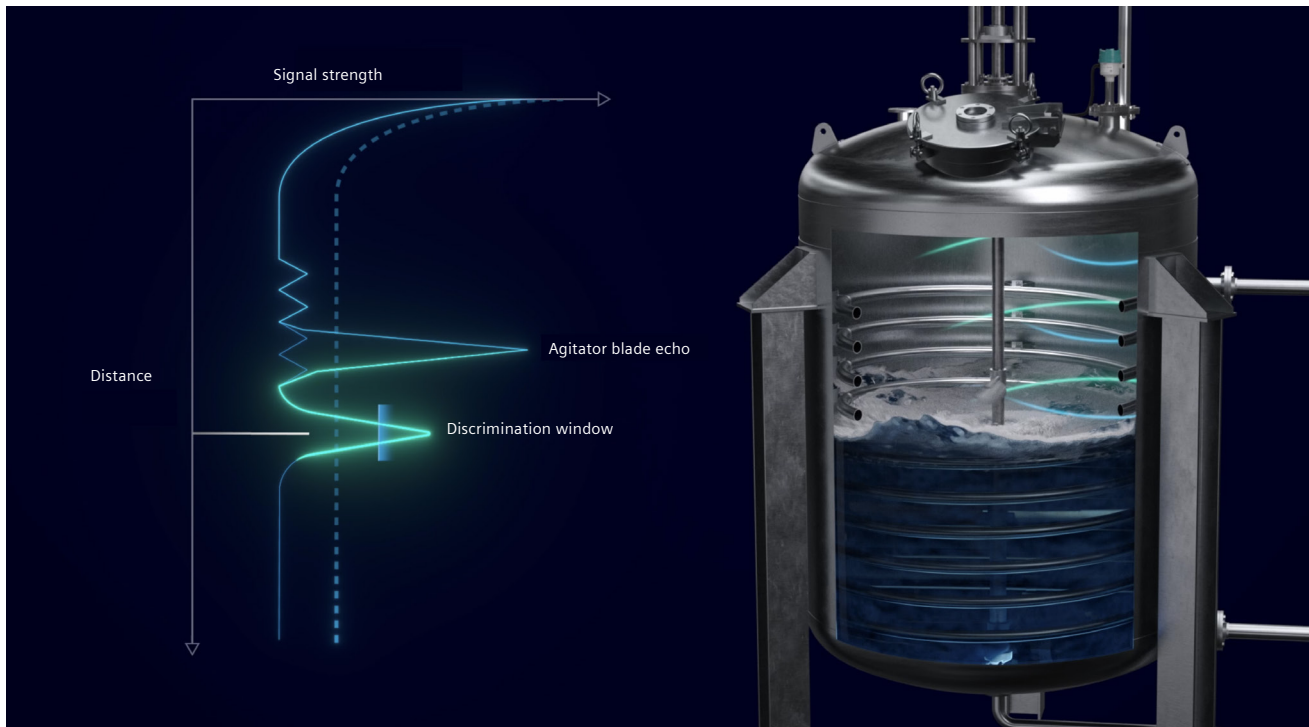
Over time—or during a batch—a transmitter's signal strength can go down. Customers can set a limit monitor threshold, doing predictive maintenance on the device when the signal reaches that point, rather than waiting for the sensor to fail completely.

We have a customer whose fermentation process creates wet foam on the surface of a vessel. If certain process variables are not perfect, the foam density can change, thereby causing a lower radar signal strength. However, the customer can create a set point to alert operators of an inferior-quality batch, so they can adjust the product before quality is compromised. This helps reduce wasted batches as well as the materials and energy that go into them.

Energy savings are critical to reaching sustainability targets. In addition to reducing product waste, how can intelligent sensors help decrease energy consumption?

Tim: It all starts with data. Here's an example: in a solids application where materials stick to the transmitter's antenna, we often recommend using the air purge option. But instead of constantly blowing air every few minutes, for example, we can use data insights to only turn on the air purge when it's needed. Plant air and compressor maintenance are expensive, not to mention the carbon footprint of all that energy!

With Sitrans LR500's 100,000 points of diagnostic data, customers can analyze signal quality changes and then create an air purge set point—saving a lot of energy compared to blowing air when it's not needed. These capabilities give customers the



Process Intelligence in action: the smart agitator discriminator window feature ensures that the material echo is selected, even when the agitator blade echo is temporarily in view.

transparency to learn from their process and optimize as they go.

Jenny: And we can't forget transparency when it comes to ensuring customers have robust devices to prevent cyberattacks. The development of our devices follows the IEC62443-4-2 standard, which defines more than 120 cybersecurity requirements for industrial products. Our products implement all appropriate requirements relevant for the operational environment.

Bringing it all together—sustainably

From end-of-life considerations to intelligent diagnostics, what makes up a level measurement instrument is critical to industry's sustainability journey.

As the world continues to decarbonize and reduce consumption in all areas, improvements to the tools industries use each and every day will help lead the way to a greener future. Because it #makesense for Siemens and our customers.



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