



Microbiology and
climate change:
**Building a sustainable
future together**

The time for action is now

The world is at a climate change tipping point. We have less than a decade to reduce our impact on the environment, and avoid irreversible damage that will decimate ecosystems and result in continuous crises.

“Going green” can feel like an uphill struggle for microbiology, which, by its very nature, uses huge quantities of water, energy, and single-use plastics. But as the scientific community demonstrated during the COVID-19 pandemic, nothing is out of reach if we all work together.

As a leading voice in the sector, Thermo Fisher Scientific believe we have a responsibility and an opportunity to make a difference. And while we have already made huge strides in developing more environmentally sustainable products, practices, and services, there is still much more to be done.

Innovation comes in all shapes and sizes, and moving fresh ideas and game-changing solutions from the drawing board to routine laboratory use takes collaboration.

Here, we make the case for change and ask you to work with us to secure a sustainable future for microbiology.

Why it matters

Scientists have been warning about the dangers of climate change for decades. Articles citing the possible impact of increased CO₂ in the atmosphere first started appearing as early as the 1970s.

More recently, the debate has moved into the mainstream, as have issues such as plastic waste in our oceans, pushing the issue to the top of the political agenda.

The shift has been driven by the considerable evolution in

climate change science, which informed the conclusion of the 2018 Intergovernmental Panel on Climate Change: that we have until 2030 to reduce emissions or face irreversible damage that will destroy ecosystems and leave millions of people in poverty.

The evidence is all around us. We are already witnessing an increase in severe weather events around the world, from floods and droughts to uncontrollable wildfires.

There is no time to lose. The time for action is now.

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We all need to take more responsibility for considering the environmental impact of the tests we perform, the suppliers we use, and the way we dispose of our waste.

Respondent, Thermo Fisher Scientific Voice of the Customer survey, 2021

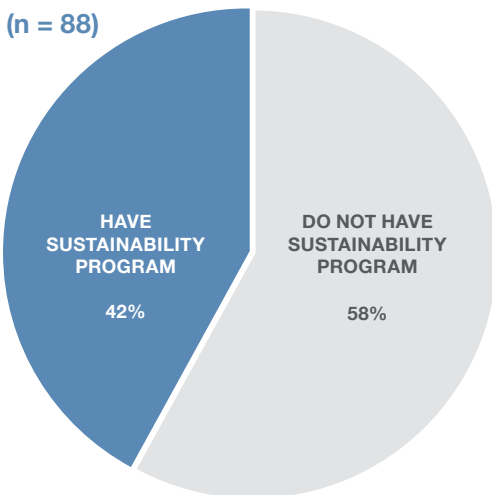
Microbiology: Resource hungry but ripe for change

It is no secret that laboratories are behind the curve in terms of environmental sustainability. Earlier this year, Thermo Fisher Scientific surveyed 50 healthcare and 38 food lab personnel in the UK and USA and found just 42% of sites had a sustainability plan in place.

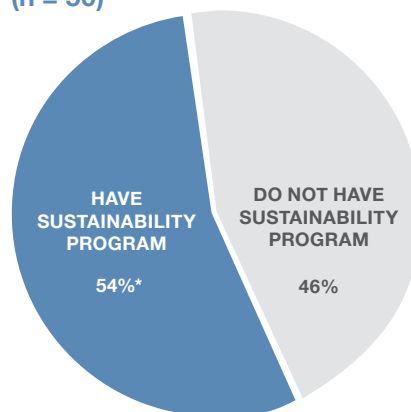


Prevalence of sustainability programs in labs

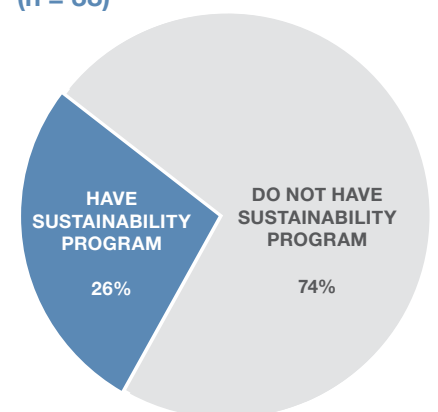
OVERALL
(n = 88)



HEALTHCARE
(n = 50)



FOOD
(n = 38)

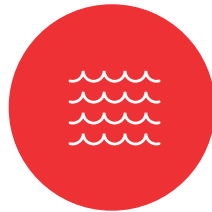


*Statistically significantly higher ($p \leq .05$) than corresponding profession.

Microbiology laboratories consume large quantities of water, single-use plastics, and energy-intensive equipment.



Labs use **10x more energy** than offices ¹



Labs use **4x more water** than offices ¹



Labs generate **5.5 million metric tons of plastic waste** a year ¹



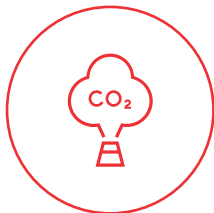
Diverting just 2% of lab plastics from landfill would be equivalent to **saving 100 million metric tons of CO₂** ¹



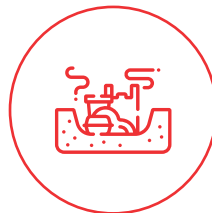
One -80° (ultra-low temperature: ULT) freezer can **consume as much energy as a house in a day** ²



Clinical laboratories use between **three to six times more energy** per unit surface area than a typical commercial building ³



Laboratories, with their instruments, HVAC systems, lights and computers, contribute to CO₂ emissions by consuming electricity, water, and gas.



They also produce a staggering amount of waste. Thousands of plastic petri dishes, bottles and vials, pipettes and pipette tips will pass through a typical facility - from supplier to landfill - every week.



Biomedical and agricultural laboratories alone are responsible for:

5.5 million metric tons of plastic waste each year; equates to the weight of 67 cruise liners, or 83% of all the plastic recycled worldwide in 2012. ⁴

In many cases, clinical laboratories place emphasis on time to results and patient experience, rather than the environmental impact of the work. But the two are not mutually exclusive.

Microbiology laboratories are extremely busy, high-pressurised environments and the throughput of consumables is high.

Our Voice of the Customer survey found high levels of packaging waste. Cardboard boxes with plastic bags, and cardboard boxes with cardboard/paper dividers were the most common type of packaging for plated culture media.

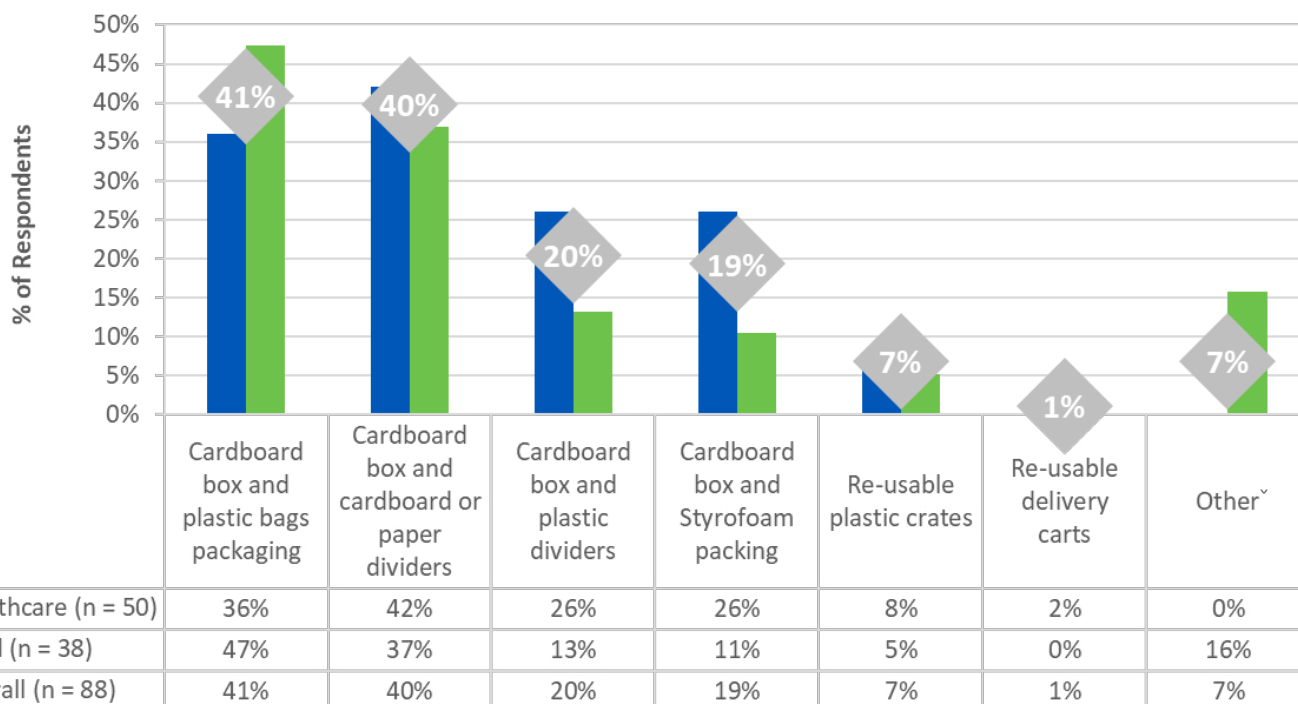
Just 7% of respondents received deliveries in reusable plastic crates, and 1% in re-usable delivery carts.



It might be difficult to believe that clinical labs can achieve sustainable operations, given their high throughput and need for sterility. But in fact, much can be done to limit labs' environmental impact.

Allison Paradise, CEO, My Green Lab
Reference

Packaging types used for plated culture media



Note: No statistically significant differences ($p \leq .05$) based on profession.

[✓]Other: Empty dishes come in cardboard box with paper dividers, High density polythene (HDPE), I don't know, N/A, Plastic bags in cardboard box, We don't buy plated culture media.



A steering committee has been set up by (my) organization to direct sustainability. Initiatives include measures to reduce center-wide costs by amalgamating redundant sectors.

Respondent, Thermo Fisher Scientific Voice of the Customer survey, 2021



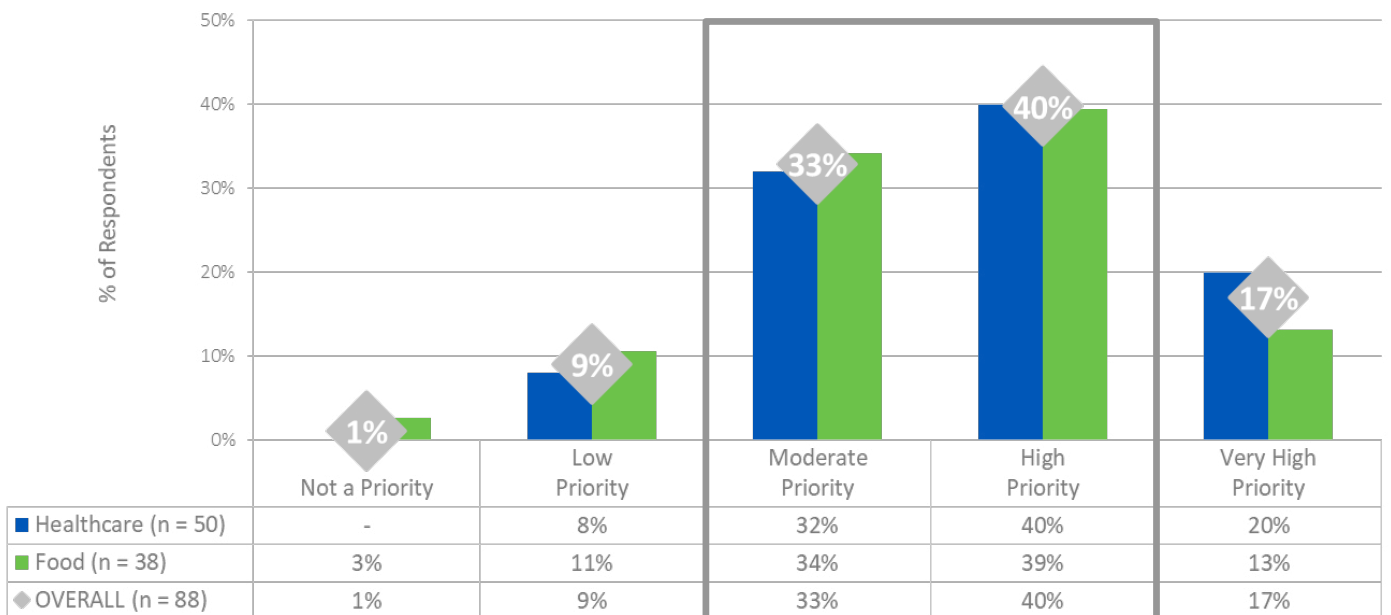
Priority level of sustainability in lab operations

Incorporating sustainability into operations, products used and waste management was a moderate to high priority for three quarters (73%) of respondents' labs overall.

And they expect the same from their suppliers. Overall, 40% of the laboratory professionals we surveyed said

sustainability was “very” or “extremely” impactful on the purchase decisions.

At Thermo Fisher, we understand this and are doing everything we can to help our customers achieve their sustainability goals (see page 10)

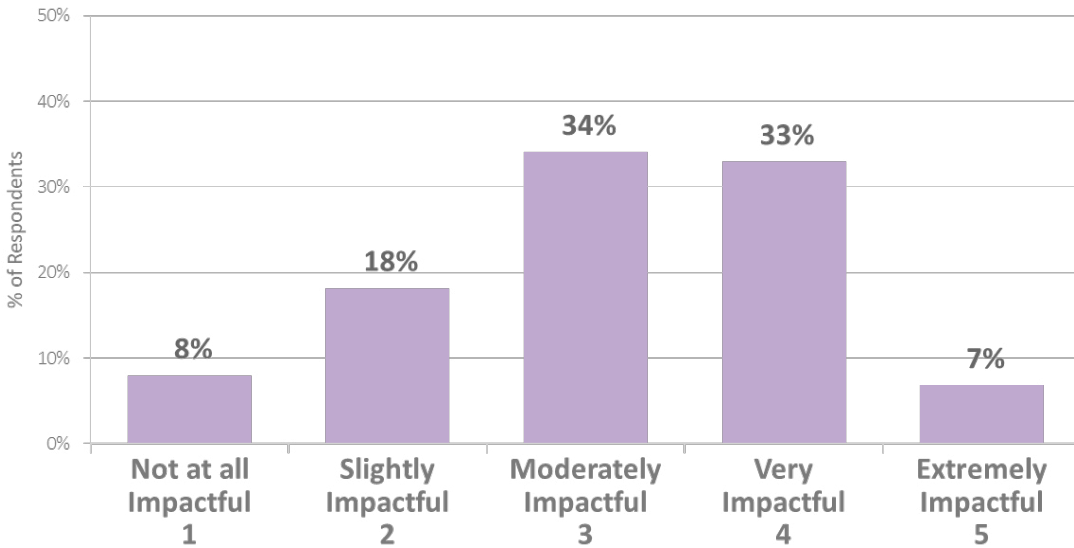


Note: No statistically significantly differences (p<=.05) based on profession

Impact of sustainability on current purchase decision

% distribution & mean rating

In our survey, 40% of all respondents said that sustainability was currently “very” or “extremely” impactful on lab product purchase decisions. We also found that sustainability had a bigger impact on purchase decisions among those in the healthcare industry than those in the food and beverage testing industries.



OVERALL (n = 88)

*Statistically significantly higher (p<.05) than corresponding profession.



(In my organization), every researcher is tasked with considering 1) have you minimized the use, 2) have you appropriately categorized the waste, 3) have you appropriately segregated the waste, 4) are you selecting the best item for the job.

Respondent, Thermo Fisher Scientific Voice of the Customer survey, 2021



Industry-wide shift

As scientists and individuals, microbiologists are all actively looking for ways to reduce environmental impact - because we all want to make a difference.

In recent years, the Green Lab movement, with its emphasis on energy management and expanding reuse and recycle initiatives, has been gaining momentum. And in 2018, the Lab Innovations trade show cemented the trend, by focusing on sustainability in the laboratory.

While there is still much to be done, the direction of travel is clear. The respondents to our Voice of the Customer survey almost unanimously agreed that the focus on sustainable laboratories would continue to grow. And the majority expected many current products and processes to become “greener” in the next three years.



Our current sustainability polices include ensuring processes are in place to operate going forward without impacting the environment... and ensuring we can continue to reduce our footprint.

Respondent, Thermo Fisher Scientific Voice of the Customer survey, 2021

Growth of Focus on Sustainability in Lab Setting % of respondents

Respondents agreed that the focus on environmental sustainability in the lab, based on the impact of products, processes, tests, and waste, will continue to grow.



OVERALL

(n = 88)

BELIEVE FOCUS ON
SUSTAINABILITY
WILL CONTINUE
TO GROW

98%

HEALTHCARE

(n = 50)

BELIEVE FOCUS ON
SUSTAINABILITY
WILL CONTINUE
TO GROW

96%

FOOD

(n = 38)

BELIEVE FOCUS ON
SUSTAINABILITY
WILL CONTINUE
TO GROW

100%

Note: No statistically significant differences ($p \leq .05$) based on profession.



We are committed to maintaining sustainable growth strategies for business, people, environment, society and governance.

*Respondent, Thermo Fisher Scientific
Voice of the Customer survey, 2021*



Thermo Fisher Scientific's approach

At Thermo Fisher Scientific, our mission is to enable our customers to make the world healthier, cleaner, and safe. It is a mission that inspires our 90,000-plus colleagues around the world to do their best – for our customers and our society – every single day.

As our world becomes more complex and interconnected, a holistic approach to operating our business becomes increasingly important.

We know that our stakeholders, whether they are customers, colleagues, communities, or shareholders, want to be associated with a company that delivers outstanding performance responsibly.

In 2019, we joined the United Nations Global Compact, demonstrating our commitment to upholding their guiding principles around business sustainability. Because operating with integrity and acting responsibly is both the right thing to do, and makes us a better partner.

We pride ourselves on providing innovative solutions that help our customers meet their sustainability goals, while also working to reduce our own environmental impact.

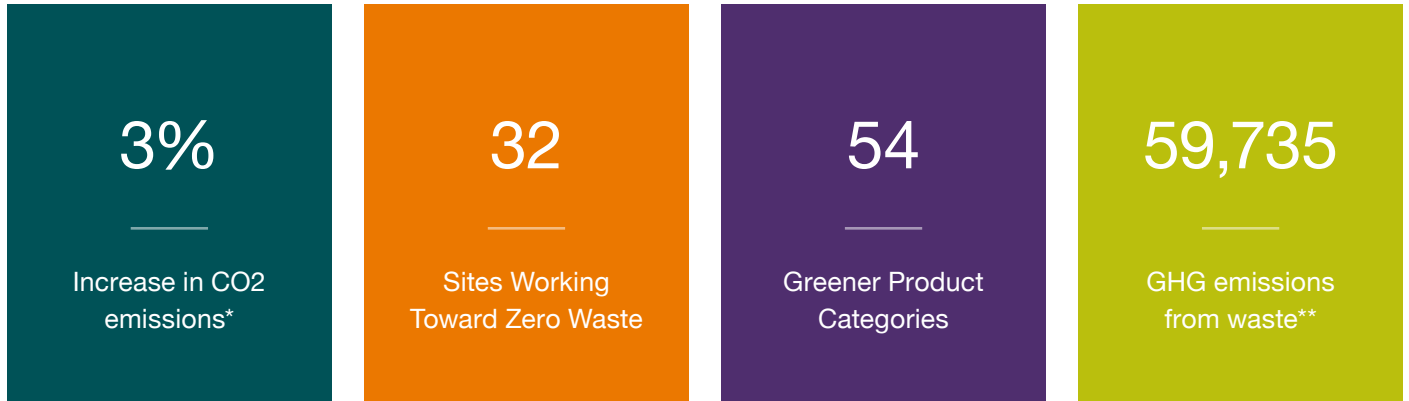


New Greenhouse Gas Goal:

In 2021, Thermo Fisher announced its commitment to achieve net-zero carbon emissions by 2050. This supports the global goals of the Paris Climate Agreement and the United Nations' Race To Zero campaign and will further advance the company's current strategy to mitigate its impact on the environment. ⁵

Corporate Sustainability Targets

Four metrics tracked at corporate level, plus highlights of sustainability solutions



*In 2020, we observed an increase in Scope 1 and Scope 2 emissions due to the growth of our business as we responded to COVID-19. However, while corporate revenue grew 26%, our CO₂ emissions increased by just 3% when compared to the previous year.

** In MTCO₂e





What does a sustainable laboratory look like?

There are lots of things laboratories can do to be more sustainable. The first step is looking at current processes and resource use to see where emissions and waste could be reduced.

It's a journey that starts at the most basic level of using tricks and tips to cut energy use, all the way up to redesigning processes and even facilities with "green" in mind.



A sustainable laboratory seeks to minimize the impact of products, processes, tests, and waste on the environment.

Top tips for a greener lab

- Use reusable glass flasks instead of plastic falcons
- Use bagged falcons instead of polystyrene racked falcons
- Re-use plastic bottles where possible
- Seek out more environmentally friendly products and consumables, e.g. they do not need a cold chain, come with less packaging, or are recyclable or reusable
- To reduce the impact of cold storage:
 - raise temperatures where possible,
 - choose more energy efficient equipment when replacing
 - maximize freezer space by improving inventory management
- Implement energy management strategies, such as turning off equipment when not in use
- Take a green chemistry approach by questioning protocols and always using the safest and most sustainable products

Use supplies with sustainable production processes. When items are not recyclable, laboratories can still make greener purchasing decisions by opting for those with the most sustainable manufacturing processes.

How can we help?

Thermo Fisher Scientific is committed to designing our products with the environment in mind. By incorporating principles of green chemistry and green engineering into our product design, we are minimizing chemical hazards, increasing reaction efficiency, and minimizing waste.

Our greener product alternatives can:

- minimize the use of hazardous chemicals
- reduce cut waste
- reduce material consumption
- increase energy efficiency

Not only does this help our customers be more sustainable, but it also improves safety and reduces costs.

Look for the leaf



To make it easy to find our greener product alternatives, we have added a green leaf symbol to product search results and product pages

Recognize the mark

We are also part of the ACT (accountability, consistency, and transparency) eco-label program, created by non-profit organization, My Green Lab.

Products with the mark have been independently assessed and given an environmental impact score based on its manufacturing practices, energy and water use, and end-of-life disposal.

Think of it as an eco-nutrition label for lab products.



How we are helping to reduce waste: Tailored Delivery Solution

The Thermo Scientific™ Tailored Delivery Solution (TDS) takes culture media deliveries out of cardboard boxes. Instead, we package them on scannable crates or trolleys and deliver them directly to our customers' storerooms.

“Each cage has the barcodes from all batches within it taped to the outside. We can scan the stock directly into our logistics system and check the incoming goods very easily,” said Cornelia Quandt, Laboratory Mönchengladbach Medical Care Center’s Quality Manager.

Not only has TDS slashed the laboratory’s cardboard waste, but it has also saved around 30 man-hours per week*.

“To unpack the quantities that are currently coming in with the cages, we would need to have at least two people – incoming goods checking, unpacking, storing in fridges, then distribution to the floor,” said Quandt.



TDS has benefited our business in many ways. We’ve saved about 50 manhours a week from de-trashing and moving stock, it’s streamlined our material flow, and we now generate less trash.

*Nick Serafino
National Director of Supply
Management, Quest Diagnostics.*

**Your Tailored
Delivery Solution**
for Thermo Scientific
Microbiology
Culture Media



How we are helping to reduce plastic waste

Culture media biplates

We are doing everything we can to reduce plastic waste. This includes the introduction of biplates, which reduce reliance on single-use plastic, without compromising on quality and safety.

One example of this approach is the Thermo Scientific™ Oxoid™ Columbia CNA Agar/Thermo Scientific™ Brilliance™ GBS Agar Biplate which helps reduce reliance on single-use plastic, without compromising on quality and safety.

Optimized to support the growth of Group B Streptococci (GBS), Brilliance GBS Agar is highly selective with superior, reliable performance. By combining it with Columbia CNA Agar, laboratories can also identify Gram-positive organisms, achieving a more complete clinical picture from a single sample on a single plate.

Shelley Bray, automation lead at The South West London Pathology partnership said: “We went with the biplate because it’s a more selective media for GBS and other Gram-positive organisms.

“In addition, instead of having two plates, a CNA plate and a Group B strep plate, we now have one. We are producing half the waste, and only need half the storage.”

SmartPlate design

Our automation-friendly SmartPlate design for Thermo Scientific™ Remel™ prepared culture media have a lightweight design that lowers the overall amount of plastic required.

In fact, they contain between 9% and 20% less plastic than previous plates, and around 8% less than the leading competitor.



In addition, instead of having two plates, a CNA plate and a Group B strep plate, we now have one. We are producing half the waste, and only need half the storage.

*Shelley Bray, Automation Lead,
The South West London Pathology partnership*

More efficient testing with biplates



References

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- ⁴ Urbina, M., Watts, A., et al. Labs should cut plastic waste too. (2015).
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- ⁵ Thermo Fisher Scientific Commits to Achieve Net-Zero Carbon Emissions by 2050
<https://thermofisher.mediaroom.com/2021-07-27-Thermo-Fisher-Scientific-Commits-to-Achieve-Net-Zero-Carbon-Emissions-by-2050>

What's next?

The science is clear. We are at a climate change tipping point, and there is no time to waste.

For our part, Thermo Fisher pledges to keep working with you to design new and innovative ways to reduce our sector's impact on the environment, without ever compromising on safety and quality.

Microbiology has set out on the road to sustainability. And while there is still some way to go, there's no denying what we, as a sector, can achieve when we work together. Because climate change affects us all, and the solution will only come from collaboration.

For more information on improving sustainability in the microbiology lab visit thermofisher.com/sustainablemicro

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