# vet

January 2024

Veterinary Emerging Topics (VET)™ Report

# Sustainability in veterinary medicine

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# Introduction

Climate change is posing an unprecedented threat to the health of pets, people, and the planet. Enterprises and organizations across all sectors are taking steps to operate more sustainably—and this sentiment extends to the veterinary community. As a profession, we are eager to learn how to promote environmental sustainability within clinical practice and, yet, for many of us, taking action in this space is a novel step.

In this year's Veterinary Emerging Topics (VET)™ Report, Banfield Pet Hospital® and the North American Veterinary Community (NAVC) have partnered to advise veterinary professionals and staff interested in taking action to support a healthy planet.

Banfield and NAVC's inaugural VET Report was in 2017. These reports combine the power of data with open, solution-based dialogue to address various challenges in veterinary medicine. By sharing new insights into veterinary care, we aim to ultimately enhance patient outcomes and the veterinary profession. Over the years, the series has highlighted antimicrobial usage, arthritis, obesity, medical quality and quality improvement methodology, and big data. We are honored to explore what we see as another critical topic of our time: sustainability in veterinary medicine.

Sustainability can be defined as meeting the needs of the present without compromising the ability of future generations to meet their needs.[1] Broadly speaking, improving sustainability in veterinary medicine entails adopting environmentally conscious practices and policies that minimize, or ideally eliminate, the negative ecological impacts of the services we provide. This report focuses on specific components of the environmental footprint of veterinary medicine and emphasizes strategies that can be implemented at the practice level to reduce their impacts. This includes:

1. Reducing greenhouse gas emissions
2. Limiting material waste and diverting waste from landfills, and
3. Using antimicrobial medications judiciously to preserve their efficacy now and in the future

By starting with these initial steps, veterinary clinics can begin their own journeys to help to reduce waste, limit their impact on the planet, and help to create a healthy environment for all.

Banfield is part of the Mars Veterinary Health family of businesses and sustainability is core to our culture. Recently, Mars announced its Net Zero Roadmap, an action plan for achieving Net Zero greenhouse gas emissions by 2050, including a new target to cut emissions in half by 2030 across its full value chain. Throughout the VET Report, we have used information from our broader ecosystem within Mars Veterinary Health to pull the latest insights and recommended practices on sustainability within our profession. At Banfield, we are at the beginning of our sustainability journey. Included in this report are insights we have learned as we researched methods for reducing greenhouse gas emissions and waste. This report is meant to be an amalgamation of insights gathered. Every veterinary practice is different. Within our hospitals, we are taking steps to reduce our impact on the planet that best aligns with our practice and our mission, and we encourage you to do the same.

In the coming years, much work must be done across industries to decrease our impact on the planet. As veterinary professionals, we have a unique responsibility to pets and people to rethink how we run our practices. We believe that working towards a more sustainable veterinary profession is essential to ensuring a healthy future for pets and people—goals that Banfield and NAVC share. NAVC strives to enable veterinary healthcare teams to thrive, and Banfield is guided by its purpose: A BETTER WORLD FOR PETS. Through this report, we hope to provide our community with knowledge and tools to make veterinary practice more sustainable. An ongoing commitment to sustainability will ensure that veterinary medicine can continue to meet the needs of pets and people for many generations to come.

Respectfully,

Alea Harrison, DVM
Chief Medical Officer
Banfield Pet Hospital

Chief Veterinary Officer
North American Veterinary Community

# Where are we now? The current state of climate change

Climate change is defined as a change in the Earth's temperature and the resulting impacts of sea level rise, changes in precipitation patterns, increased extreme weather events, and more climate variability. It is caused by an increase in greenhouse gas (GHG) emissions coming from across our society, including industry, transportation, energy production, and agriculture.

We started to see an increase in global GHG emissions during the Industrial Revolution in the 1850s. To date, the planet has warmed by around 1.1 degrees Celsius, with more than half of the carbon in our atmosphere being added in the past three decades.[2] The results of climate change are very visible—with increases in forest fires, flooding, storms, and droughts on a global scale. These extreme weather events are made more severe by climate change.[3]

The scientific community has aligned around a recommendation that we must limit temperature rise to 1.5 degrees C to avoid the most severe impacts of climate change. To reach this goal, the United Nations has put forth a recommendation based on science to reduce GHG emissions by 45% by 2030 and reach net zero by 2050.[4] These are ambitious targets, but targets that are necessary to avoid the worst of climate change. To reach these, we need individuals across all industries to lean into this work to make changes, including re-examining GHG emissions and waste.

## Climate change and the veterinary profession

Climate change intersects with our profession in several ways. First, there are the effects of climate change on pets including poor air quality, new and expanding patterns of infectious diseases, hotter weather, and others.[5] These conditions are not new to us as veterinary professionals but are instead exacerbated by climate change. The second intersection between climate change and veterinary medicine is, however, a new concept to many of us: the impact of our profession on the planet.

Ultimately, as public health professionals, our remit stretches beyond pet care. The Veterinarian's Oath mentions the promotion of public health, and the health of our environment is key. In addition to providing services that address the impact of climate change on pets, we must take an active role in mitigating climate change itself.[6] Some believe, as we do, that reducing our impact on the planet is within the scope of veterinary practice,[4] and it is our responsibility to take action to address factors that contribute to climate change.[2, 7] While the environmental footprint of veterinary medicine may be smaller than other professions, veterinary practices, like all professions, share the responsibility of minimizing environmental impacts and operating more sustainably.

Let's take a closer look at our profession's current impact on the planet and how we can reduce this impact.

# Greenhouse gas emissions

GHG emissions from veterinary practices come from a range of sources, including supplies, energy use, travel, and anesthetic gases. We will explore each of these categories.

## Supplies

The most significant source of GHG emissions comes from the medical supplies veterinary clinics purchase and use every day. These emissions are generated during the manufacturing, shipping, and disposal of supplies. Given how many supplies a veterinary clinic uses, the impact adds up. Preventing and avoiding the use of products when not necessary is the first step to reducing GHG emissions and waste. Of course, supplies are necessary in veterinary medicine, but there are ways we can reduce our emissions in this category. When possible, select suppliers who demonstrate a commitment to sustainability. A good place to start is to consider selecting suppliers and supplies with the following attributes:

- Reduce packaging and product materials.
- Increase recycled content and recyclability of packaging and products.
- Use reusable products where possible.
- Develop product take-back options where relevant.
- Remove hazardous materials and chemicals of concern from products.
- Harness renewable electricity to manufacture products.
- Use electric vehicles to transport shipments.
- Have set a science based GHG emissions reduction target.

If you have a relationship with a supplier, talk to them about your perspective on the need for more sustainable options. By having these conversations, we can support a positive change within the profession's infrastructure. Many veterinary suppliers are beginning this work and are supportive of lowering GHG emissions within their products.

### How to get started

- Use supplies only as needed and consider if any reductions can be made.
- Evaluate suppliers, prioritizing those who are taking steps to reduce emissions.
- If you have a relationship with a supplier, talk to them to generate awareness and inspire change.

## Energy use

Reducing energy consumption is crucial for minimizing a veterinary practice's emissions and often this step can save money as well. Energy-efficient measures, such as using LED lighting, upgrading equipment when necessary to be more energy-efficient, optimizing heating and cooling, and turning lights and equipment off, not only lower operational costs but can reduce your practice's impact on the planet.

In most cases, these changes are behavioral. For example, you can put a sticker next to light switches to encourage hospital staff to turn off lights or include turning off appropriate equipment at night as part of your end-of-day operating checklist.

Some of these changes will cost money but will pay off long term. For example, replacing lightbulbs when needed with LED lighting will reduce your energy bills, as will upgrading equipment to be energy efficient. For these upgrades, wait until items need to be replaced to maximize emission reductions.

You can also look at larger infrastructure upgrades, such as installing solar panels or electric vehicle chargers. If solar panels are cost-prohibitive, call your power company to see if you can switch your service to a renewable source.

### How to get started

- Explore behavior changes such as turning off lights and non-essential equipment when not in use.
- Replace lights and equipment when needed with energy-efficient alternatives.
- Contact your local power company to see if your hospital can switch to renewable power.
- Consider infrastructure upgrades such as solar panels.

## Travel

Travel—whether commuting or business travel—has a big impact on the planet. Travel is also necessary in our field. However, there are ways to reduce your travel and associated emissions. First, review your current travel and consider whether your travel is essential. Second, evaluate how your practice can reduce emissions related to commuting and business travel.

### *Commuting*

Impacting the commutes of hospital staff can be difficult as this is a very personal choice and the infrastructure for public transit varies greatly across the U.S. Have an open conversation about the barriers staff face for more sustainable commuting options. There could be an opportunity for a staff carpool, an incentive for using public transit, or your practice could implement a bike-sharing program.

### *Business travel*

Many of us travel for continuing education. When considering which learning event to attend, look for conferences that are committed to sustainability and consider location. Ground transportation generally has a lower carbon footprint than air so, when possible, travel by car, train, or public transit. If you need to fly, look for direct flights and fly coach, packing only what you need.

### How to get started

- Critically assess travel needs. Consider options and whether your travel is essential.
- Have an open conversation with hospital staff to gauge interest in sustainable forms of commuting, as well as ways to support them.
- Consider the planet when traveling for CE. Prioritize hybrid events, conferences with a demonstrated commitment to sustainability, local events, or events with direct flights.

## Anesthetic gas

Anesthetic gases are some of the most potent GHGs and therefore present an opportunity to make reductions by making changes to what gases we use and how we use them. As a veterinary professional, you may be able to reduce your carbon footprint by 3.5 tons per year by reducing the fresh gas flows by approximately 25% dependent on the gas.[7,8] For comparison, 3.5 tons is approximately equal to the emissions generated from driving a gasoline-powered passenger vehicle from Alaska to Argentina.[9] There are resources available to provide training on the most responsible ways to reduce fresh gas flow.

To reduce your GHG emissions from anesthesia, consider switching to lower-impact gas or reducing fresh gas flows.

**Physical characteristics of anesthetic gases in the atmosphere**[10]

| Agent | $GWP_{100}$ | Atmospheric lifetime (years) | Mac in dogs (%) |
|---|---|---|---|
| Isoflurane | 510 | 3.2 | 1.3 |
| Sevoflurane | 130 | 1.1 | 2.3 |
| Nitrous oxide | 265 | 110 | ~235 |
| Carbon dioxide | 1 | 74 | n/a |

$GWP_{100}$: global warming potential over 100 years; MAC: minimum alveolar concentration

*Anesthetic gases vary in their impact on the planet. Nitrous oxide is the most harmful long term, with it being 265 times stronger in terms of warming potential than carbon dioxide (for comparison) and lasting 110 years. Sevoflurane has the lowest warming potential and has a lifetime of 1.1 years.*

You can also compare the financial cost and GHG emissions of inhalation anesthesia using anesthetic calculators. The Association of Anesthetists of Great Britain and Ireland have a calculator for human medicine that looks specifically at anesthesia gases, including sevoflurane. This is a great resource to look at volumes of gas and resulting environmental impact. This calculator should be regarded as a resource and is not intended to replace the expertise of a veterinary professional evaluating the unique considerations of the pet they are treating.

Another way to reduce the GHG emissions of anesthesia is by using lower flow techniques to reduce fresh gas flows (FGF). Appropriate FGF rates vary and should account for the patient's metabolic oxygen consumption and ensure that the volume of gas in the reservoir or rebreathing bag is sufficient for the patient to aspire. MVH practice Linnaeus Group has developed helpful resources for the profession for lower flow anesthesia, which can be accessed here. Consult an anesthetic specialist before making changes to clinical protocols that you are unfamiliar with.

### How to get started

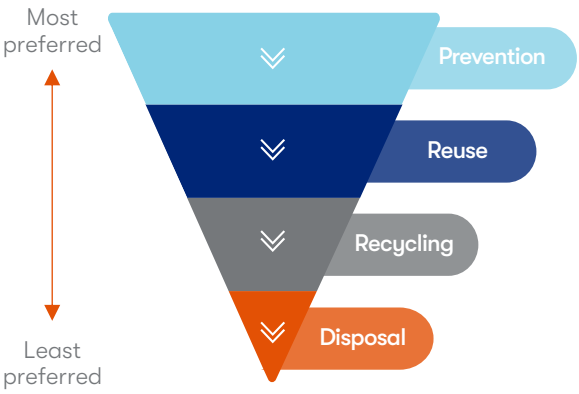
- Use of sevoflurane over other gases.
- Evaluate anesthetic protocols to consider the use of lower flow techniques.

# Material waste

Waste in a veterinary hospital is generated from medical supplies, medications, cleaning products and paper towels, pet food, supply packaging, staff consumables, medical record-keeping, communications, and more. Once generated in veterinary hospitals, waste is typically sent to a landfill or incinerated. Most forms of waste, regardless of the treatment and destination, can impact the health of the environment, pets and animals, and people. Therefore, reducing waste in pet hospitals is a priority for decreasing the environmental impacts of veterinary medicine. There is a great opportunity to reduce waste through several approaches without impacting the services provided at a hospital.

To guide planning on waste reduction, a hierarchy is used to show the sequence of approaches to take in veterinary hospitals. Let's spotlight how to bring these to life.

**Approaches to waste reduction in veterinary hospitals**




## Preventing material waste

Preventing waste can seem like a challenging task, but you can make a difference by picking some easy first steps and slowly transitioning your processes.

Hospital teams can reduce their use of disposable items by replacing bottled water with water distillers, swapping single-use cutlery and kitchen items with reusable ones, and assembling or selecting surgical or exam kits that contain only the needed items. Using electronic rather than paper-based systems for record-keeping and communication can decrease paper waste. Also, consider when supplies are truly needed for a given task or exam.

Another way to reduce material waste is to go further upstream and select suppliers who commit to reducing packaging waste and improving the reusability and recyclability of their products. See previous section titled "Supplies" for best practices regarding this process.

## Reuse

Some medical equipment can be reused including sharps containers, certain textiles (such as gowns), incontinence pads, kennel mats, warming blankets, and scrub caps.[11] Reusable options reduce greenhouse gas emissions by 66% for textiles and 84% for approved anesthetic equipment compared to disposable options,[12] and reusable gowns reduce waste by 84%.[13]

## Recycle

Over the past few years, there has been some debate about the benefits of recycling. While it is true that some recycled materials end up in landfills, recycling is ultimately beneficial to the planet. At a national level, recycling plays a crucial role in reducing the consumption of raw materials, creating the supply of recycled material to make new products, conserving energy, and decreasing pollution associated with extracting and processing new resources.

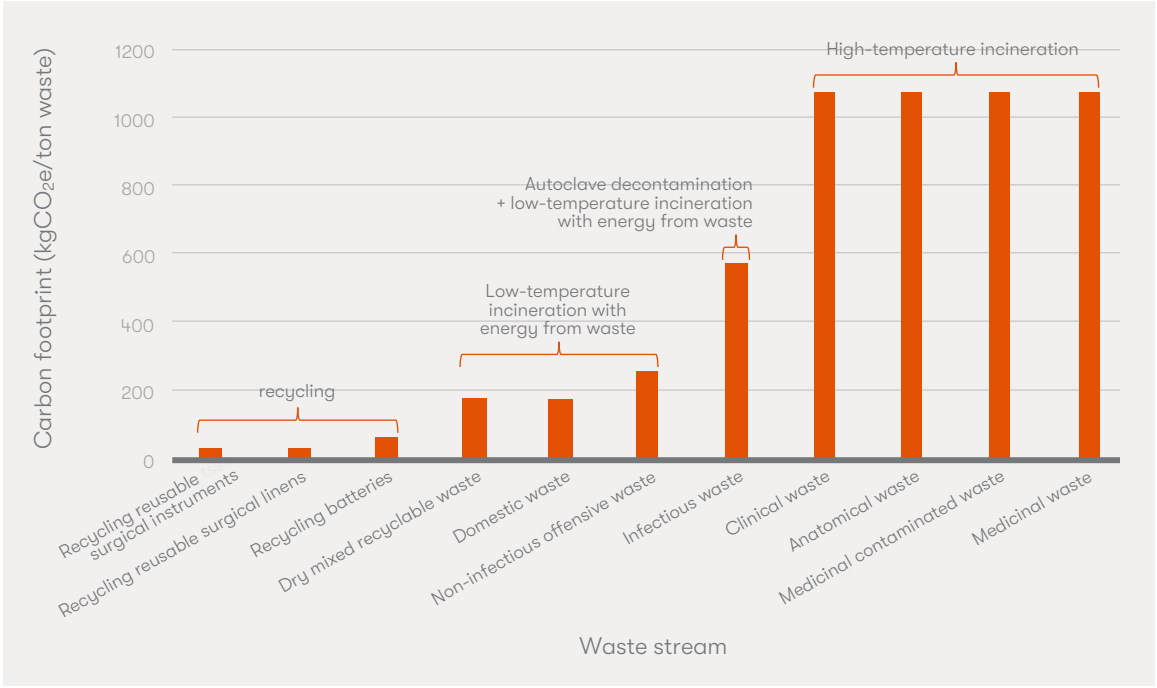
Recycling food waste, also known as composting, is an important form of recycling. When food scraps are sent to landfills, methane gas is produced, which is a greenhouse gas that is approximately 28 times as potent as carbon dioxide as it relates to trapping heat in the atmosphere.[14] By composting food scraps (and reducing food waste in the first place), we can greatly reduce GHG emissions from landfills.[15]

When establishing or improving recycling in your hospital, be sure to reach out to your local provider to understand recycling opportunities and make sure you have the right signage to guide staff to separate waste into the right bins. There could be a way for you to increase the types of items you recycle at your hospital. In addition, print off signage for your colleagues to understand what items are recyclable, how, and where. You can also offer staff a quick training during a morning huddle to make recycling easier.

## Disposal

Disposal is the least preferred option, and it's important to understand why. How we dispose of waste greatly changes its GHG emissions footprint. By prioritizing recycling where possible, we can greatly reduce the GHG emissions of hospital waste. Here you can see how these different disposals emit different amounts of greenhouse gases. While there is not any industry-wide data specific to the impact of waste in veterinary medicine, we can look to a report conducted in the UK that analyzed emissions from waste within a human hospital.

### Greenhouse gas emitted by different disposal methods[16]




### How to get started

- Identify and eliminate unnecessary use of materials. Look for quick wins to get started—substituting reusable gowns for single-use, disposable gowns, for example.
- Switch to reusable versions of non-medical products, such as dishware and cutlery in kitchens.
- Replace paper-based systems with digital ones.
- Use water filtration systems in place of bottled water.
- Install recycling bins in easy-to-access places and label them with instructions for sorting materials. Contact your local provider of recycling services for local regulations and recycling opportunities.
- Educate colleagues about waste reduction opportunities and proper waste sorting.

# Pharmaceutical stewardship

Pharmaceutical usage is a significant portion of the day-to-day work in a veterinary hospital. Responsible stewardship of these medications can play an important role in building a more sustainable future. From sourcing of raw materials, manufacturing, distribution, storage, and eventual prescription, there is an environmental footprint of pharmaceutical usage. In support of our sustainability efforts, Mars Veterinary Health is building a program around responsible pharmaceutical stewardship (RPS). While this program will eventually encompass pharmaceuticals such as anti-parasitics, analgesics, and topical medications, we are starting this work with a focus on antimicrobials.

# Antimicrobial stewardship

Antimicrobial agents are indispensable in treating infectious diseases in humans and pets, but their use can present some drawbacks concerning sustainability. As mentioned earlier, supplies in a veterinary practice produce GHG emissions, and this includes the manufacturing and transport of antimicrobials. Transportation of temperature-sensitive agents is particularly demanding, especially as global average ambient temperatures continue to rise. The industrial sector, to which pharmaceutical manufacturing belongs, accounts for about 23% of GHG emissions in the U.S., making it the third largest contributor.[17]

## Antimicrobial resistance

Perhaps the biggest sustainability concern posed by these drugs is antimicrobial resistance (AMR), defined as the continuing emergence of microorganisms that are resistant to one or more antimicrobial drugs. The World Health Organization has declared AMR one of the top 10 global public health threats.[18] AMR is responsible for roughly 700,000 human deaths per year worldwide and by 2050 is expected to kill more people than cancer.[19] Long-term, widespread, or suboptimal use of antimicrobial drugs can give rise to AMR, jeopardizing outcomes of infectious diseases in both human and veterinary patients.

The Access to Medicine Foundation recently issued recommendations for drug manufacturers to follow to limit the risk of AMR.[20] Prescribers and users of antimicrobial agents in both human and veterinary healthcare must also manage antimicrobial agents responsibly.

## Opportunities to improve stewardship

A foundational component of antimicrobial stewardship is surveillance of antimicrobial use. We need to understand how antimicrobials are used so that we can evaluate current practices, identify intervention and education opportunities, monitor changes over time, and assess the impact of antimicrobial use on AMR. However, it is often difficult to obtain accurate, timely, and detailed information on antimicrobial use. Data on purchasing antimicrobials is one of the more readily available sources of information on antimicrobial use.

# Case study

## Antimicrobial resistance in veterinary medicine

Banfield recently studied antimicrobial use in 818,150 canine and feline dental procedures at primary care practices in the U.S. in 2020 in partnership with UC Davis School of Veterinary Medicine.[21] Local or systemic antimicrobials were used in 16.4% of procedures in dogs and 14% of procedures in cats. Increasing age, tooth extraction, and periodontal disease were associated with an increased likelihood of antimicrobial administration. Clindamycin, amoxicillin-clavulanate, and amoxicillin were most commonly used in both dogs and cats. Drugs classified by the European Medicines Agency (EMA) as "highest priority critically important antibiotics" were used in 26.5% of treated dogs and 52% of treated cats.

Our results suggest that even when applying broad indications for prophylactic antimicrobial use, current practices in the veterinary field may be able to be optimized. By characterizing the use of antimicrobials in dental procedures at primary care practices, we hope to influence best practices and inform interventions to optimize patient care and promote antimicrobial stewardship during such procedures.

### Current barriers to antimicrobial stewardship

Veterinary teams have a critical role in antimicrobial stewardship but face several barriers to developing and implementing stewardship efforts. These include:

- Lack of comprehensive (companion animal) data.
- State of label and off-label usage of antimicrobial drugs.
- Limitations/restrictions on diagnostic testing that could influence prescribing practices.
- Hospital capacity and staffing constraints.
- Owner expectations and understanding of antimicrobial stewardship.
- Legislation targeted at antimicrobial usage in companion animals.
- Limited new antibiotic options.

## Successful stewardship programs

Despite these barriers, antimicrobial stewardship efforts can succeed. One study compared the effects of three different types of stewardship intervention (education only, intermediate, or intensive) on antimicrobial prescribing practices at primary care companion animal clinics in Australia. Overall antimicrobial prescribing for dogs and cats declined by 50% after the intervention period, and the drop was greater for the intensive intervention than for education alone.[22] Another study evaluated the effectiveness of a multi-faceted stewardship intervention at 44 Dutch companion animal hospitals and the daily dose of antimicrobials prescribed was 15% lower after the intervention than it was before.[23] In both cases, interventions effectively changed prescribing practices and reduced antibiotic usage.

### How to get started

- Assess your team's current knowledge of antimicrobial stewardship and the impacts of antimicrobial resistance.
- Investigate your current antibiotic usage.
- Review current published guidelines for best practices.*
- Identify hospital-level opportunities for change:
  - Primary indications for antibiotic usage.
  - Perioperative antimicrobial usage.
  - Improving alignment with current recommendations.
- Identify client-facing opportunities:
  - Install signage in visible public locations.
  - Education about antimicrobial stewardship and the importance of administering antimicrobials as prescribed.
  - Tear-off pad instead of a prescription indicating when antimicrobials are not required.*[24]


*For example: Last year, Banfield compared current diagnostic and prescription practices for urinary tract infections at our network of hospitals with newly issued recommendations from the International Society for Companion Animal Infectious Diseases (ISCAID).[25] We identified opportunities to reduce antimicrobial usage by raising awareness of the ISCAID guidelines and best practices.[26]*

# Taking the first step

To have the best chance of mitigating the effects of climate change, we need everyone to lean into this work. When facing a global issue like climate change, it can feel discouraging to take small steps. However, by starting the journey and focusing on incremental changes, you can make a meaningful difference over time—and the time to start is now.

We encourage you to join us in the push to make veterinary medicine more sustainable. Use the resources included in this report to identify opportunities and plan sustainability initiatives at your practice. Consult our 2022 VET Report for guidance on implementing changes using a quality improvement framework.[27] We all share the responsibility of providing veterinary care that is sustainable and protects the health of pets, people, and our planet.

## An ongoing commitment to sustainability

### *Banfield Pet Hospital*

Improving the sustainability of our operations is a long-term goal for Banfield and the Mars Veterinary Health family of companies. We are integrating sustainability into the heart of our business as part of the Mars Sustainable in a Generation Plan.[28] We have launched focused efforts to shrink our footprint including limiting material waste, reducing emissions, and managing antimicrobials responsibly, as described in this report, among many other projects. We will apply the model to evaluate the changes we make, as part of our dedication to continuous quality improvement.[29,27] We expect to include some of our learnings and preliminary outcomes in a future report.

### *North American veterinary community*

As hosts of the largest gathering of global leaders in veterinary medicine, the NAVC is dedicated to improving event sustainability and reducing our carbon footprint. It is important to us that our events are environmentally sustainable and socially impactful. Some of our efforts include reusing show site materials, switching to recycled and recyclable materials, and replacing printed materials with digital assets. At VMX 2024, we will launch a Sustainability HUB to encourage our attendees and exhibitors to adopt sustainable practices with us including waste sorting stations, increased recycling opportunities, using refillable water bottles and reducing food waste; as well as energy smart, and travel smarter programs to further shrink our carbon footprint. With careful planning, conscious efforts, and a great deal of time, our exhibitors, event partners, and hosts are supporting our sustainability mission. Our trade show, exhibit, and event partner, Freeman has a commitment to net zero carbon by 2050 and is helping exhibitors implement sustainable offerings while at VMX. Our VMX host location, the Orange County Convention Center has demonstrated industry and community leadership by pioneering pathways for large venues to achieve continuously improving levels of sustainability stewardship. For more information and updates on our commitment to sustainability please visit here.

# References and resources


1. United Nations (1983) Report of the World Commission on Environment and Development, Our Common Future (The Brundtland Report) https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html

2. United Nations Intergovernmental Panel on Climate Change (2023), AR6 Synthesis Report, Climate Change https://www.ipcc.ch/report/sixth-assessment-report-cycle/

3. NASA Extreme Weather and Climate Change https://climate.nasa.gov/extreme-weather/

4. United Nations Climate Change Net Zero Coalition (2023) https://www.un.org/en/climatechange/net-zero-coalition

5. Companion Animal Parasite Council (2023) https://capcvet.org/

6. Kiran D, Sander ME, Duncan C (2022) Empowering veterinarians to be planetary health stewards through policy and practice. Frontiers in Veterinary Science 9, fvets.2022.775411.

7. Wynes, S., Nicholas, K.A. (2017) The climate mitigation gap: education and government recommendations miss the most effective individual actions Environ. Res. Lett. 12

8. Pierce, J.M.T. (2015) The Anaesthetic impact calculator; Royal College of Anaesthetists. https://www.rcoa.ac.uk/about-college/strategy-vision/environment-sustainability/anaesthetic-impact-calculator

9. United States Environmental Protection Agency Greenhouse Gas Equivalent Calculator https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results

10. Vet Record Reducing the environmental impacts of veterinary anaesthesia https://bvajournals.onlinelibrary.wiley.com/doi/10.1002/vetr.1147

11. Fr.elis.com (2022) Elis conducts a Life Cycle Assessment (LCA) study on reusable scrub suits. https://fr.elis.com/en/elis-life-cycle-assessment-study-reusable-scrub-suits

12. Overcash M (2012) A comparison of reusable and disposable perioperative textiles: sustainability state-of-the-art. Anesthesia and Analgesia 114, 1055-1066.

13. Vozzola E, Overcash M, Griffing E (2020) An environmental analysis of reusable and disposable surgical gowns. AORN Journal 111, 315-325.

14. United States Environmental Protection Agency , Global Methane Initiative https://www.epa.gov/gmi/importance-methane

15. United States Environmental Protection Agency, Sustainable Management of Food https://www.epa.gov/sustainable-management-food/composting#benefits

16. Science Direct The carbon footprint of waste streams in a UK hospital https://www.sciencedirect.com/science/article/abs/pii/S0959652620354925

17. United Stated Environmental Protection Agency Sources of Greenhouse Gas Emissions https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions

18. World Health Organization Antimicrobial resistance fact sheet https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance

19. Rahman MM, Tumpa MAA, Zehravi M, et al (2022) An overview of antimicrobial stewardship optimization: the use of antibiotics in humans and animals to prevent resistance. Antibiotics 11, 667.

20. Access to Medicine Foundation (2023) Methods matter: What steps are companies taking to help curb AMR by manufacturing responsibly? https://accesstomedicinefoundation.org/medialibrary/atmf_responsible-manufacturing_amr-report.pdf

21. Soltero-Rivera M, Weese SJ, Battersby I, et al (submitted) Antimicrobial use practices in canine and feline dental procedures performed in primary care practices in the US. PLoS One.

22. Hardefeldt LY, Hur B, Richards S, et al (2022) Antimicrobial stewardship in companion animal practice: an implementation trial in 135 general practice veterinary clinics. JAC - Antimicrobial Resistance 4, dlac015.

23. Hopman NEM, Portengen L, Hulscher MEJL, et al (2019) Implementation and evaluation of an antimicrobial stewardship programme in companion animal clinics: A stepped wedge design intervention study. PLoS One 14, e0225124.

24. BSAVA Responsible antibacterial use in the veterinary community https://www.bsava.com/resources/veterinary-resources/protect-me/

25. Weese JS, Blondeau J, Boothe D, et al (2019) International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. Veterinary Journal 247, 8-25.

27. Banfield Pet Hospital Making better use of antimicrobials when treating pets' urinary tract infections https://www.banfieldexchange.com/News/Urinary-tract

27. Banfield Pet Hospital Veterinary Emerging Topics Report 2022 https://www.banfieldexchange.com/VET-Report

28. Mars Sustainability Plan https://www.mars.com/sustainability-plan

29. Agency for Healthcare Research and Quality Plan-Do-Study-Act (PDSA) Directions and Examples https://www.ahrq.gov/health-literacy/improve/precautions/tool2b.html

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**We cannot do this work alone,** which is why we are committed to sharing our journey and our resources so others can join us in this work. Below is a checklist of steps you can take in your practice today to make a difference.

## Supplies

**How to get started**

- ☐ Use supplies only as needed and consider if any reductions can be made.
- ☐ Order supplies efficiently.
- ☐ Evaluate suppliers, prioritizing those who are taking steps to reduce emissions.
- ☐ Have conversations with colleagues and suppliers to generate awareness and inspire change.

## Energy use

**How to get started**

- ☐ Explore behavior changes such as turning off lights and non-essential equipment when not in use.
- ☐ Replace lights and equipment when needed with energy-efficient alternatives.
- ☐ Contact your local power company to see if your hospital can switch to renewable power.
- ☐ Consider infrastructure upgrades such as solar panels.

## Travel

**How to get started**

- ☐ Have an open conversation with hospital staff to guage interest in sustainable forms of commuting, as well as ways to support them.
- ☐ Consider the planet when traveling for CE. Prioritize hybrid events, conferences with a demonstrated commitment to sustainability, local events, or events with direct flights.

## Anesthetic gas

**How to get started**

- ☐ Use of sevoflurane over other gases.
- ☐ Evaluate anesthetic protocols to consider the use of lower flow techniques where possible.

## Material waste

**How to get started**

- ☐ Identify and eliminate unnecessary use of materials. Look for quick wins to get started—substituting reusable gowns for single-use, disposable gowns, for example.
- ☐ Switch to reusable versions of non-medical products, such as dishware and cutlery in kitchens.
- ☐ Replace paper-based systems with digital ones.
- ☐ Use water filtration systems in place of bottled water.
- ☐ Install recycling bins in easy-to-access places and label them with instructions for sorting materials. Contact your local provider of recycling services for regulations and recycling opportunities.
- ☐ Educate colleagues about waste reduction opportunities and proper waste sorting.

## Pharmaceutical stewardship

**How to get started**

- ☐ Assess your team's current knowledge of antimicrobial stewardship and the impacts of antimicrobial resistance.
- ☐ Investigate your current antibiotic usage.
- ☐ Review current published guidelines for best practices.
- ☐ Identify hospital-level opportunities for change:
  - ☐ Primary indications for antibiotic usage.
  - ☐ Perioperative antimicrobial usage.
  - ☐ Improving alignment with current recommendations.
- ☐ Identify client-facing opportunities:
  - ☐ Install signage in visible public locations.
  - ☐ Education about antimicrobial stewardship and the importance of administering antimicrobials as prescribed.
  - ☐ Tear-off pad instead of a prescription indicating when antimicrobials are not required.

Commit to a step you can take immediately to **reduce your impact on the planet** Together, we can create a more sustainable profession.

## Next week, I commit to this action:

_____

_____

_____

_____

bsustainable

Scan to learn more about steps you can take to be more sustainable in our latest Veterinary Emerging Topics (VET)™ Report.