

Introduction

- Climate change has resulted in over two-million deaths over the last 50 years.
- The healthcare sector contributes to 5% of greenhouse gas emissions.
- Inhalational anesthetic gases and the extensive use of disposable medical materials and equipment are major contributors to healthcare’s carbon footprint.
- Single use anesthesia circuits made largely of plastic are the US. standard.
- Several countries, particularly in the European Union and Australia, have transitioned predominantly to reusable, multi-use anesthesia circuits.
- Based on new data regarding safety, reusable airway circuits were approved by the FDA for use in the United States

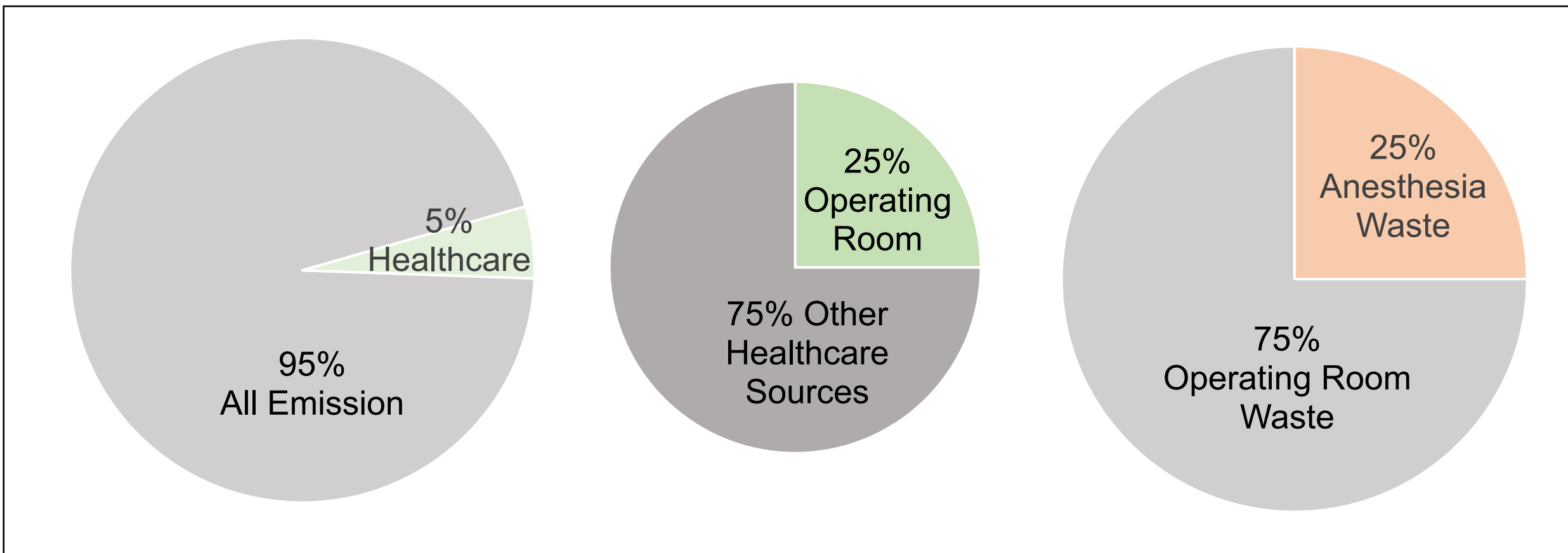
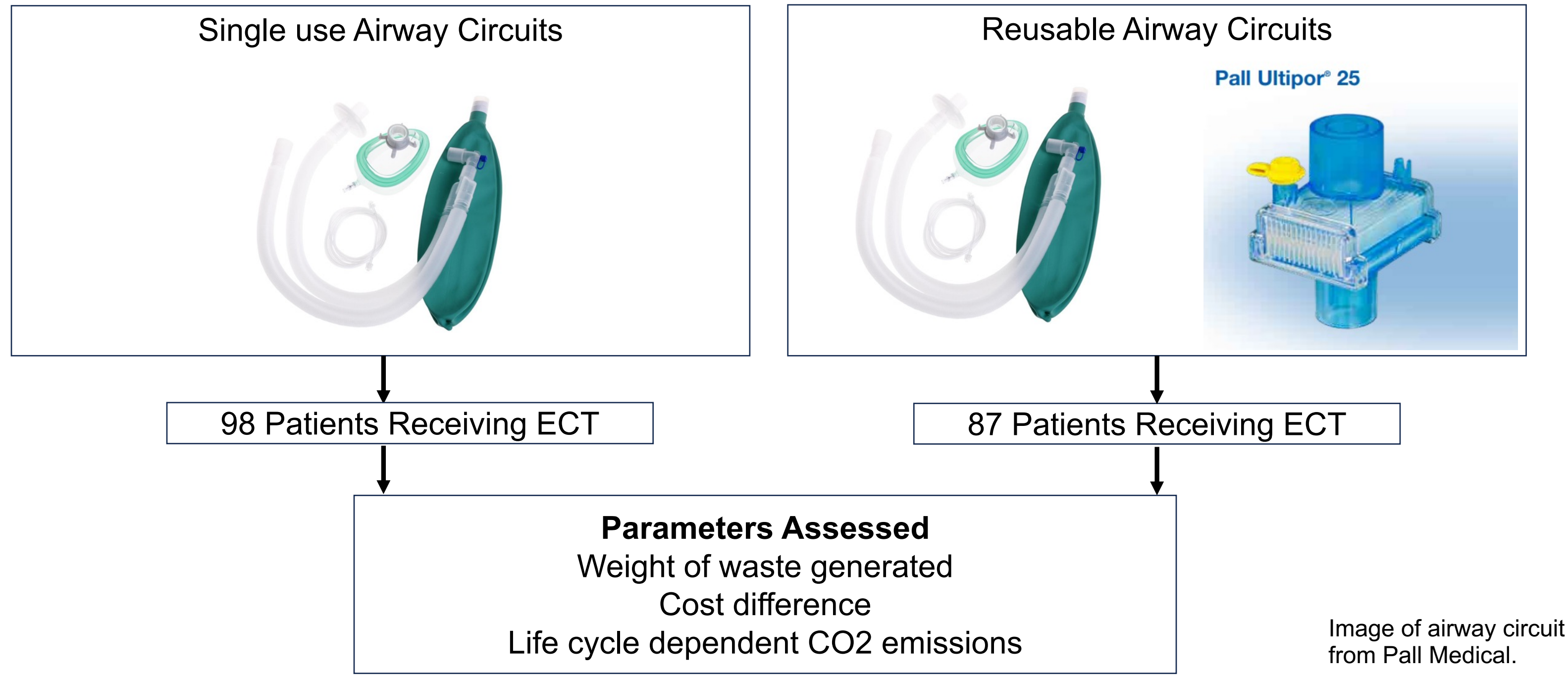


Figure 1. OR Emissions as a Percentage of Total Greenhouse Emission. Healthcare accounts for 5%. Of this, 25% is generated by the operating room. 25% of operating room waste is due to anesthesia waste.

Methods



Bibliography

- [1] W. Johnson, M. E. Goldberg, D. Vekeman, M. C. Torjman, J. L. Seltzer, and T. Kynes, "Medical Waste in the Environment: Do Anesthesia Personnel Have a Role to Play?," 1996.
- [2] D. Hartmann, M. Jung, T. R. Neubert, C. Susin, C. Nonnenmacher, and R. Mutters, "Microbiological risk of anaesthetic breathing circuits after extended use," *Acta Anaesthesiol Scand*, vol. 52, no. 3, pp. 432–436, Mar. 2008, doi: 10.1111/j.1399-6576.2007.01529.x.
- [3] S. Dubler *et al.*, "Bacterial and viral contamination of breathing circuits after extended use – an aspect of patient safety?," *Acta Anaesthesiol Scand*, vol. 60, no. 9, pp. 1251–1260, 2016, doi: 10.1111/aas.12768.

Results

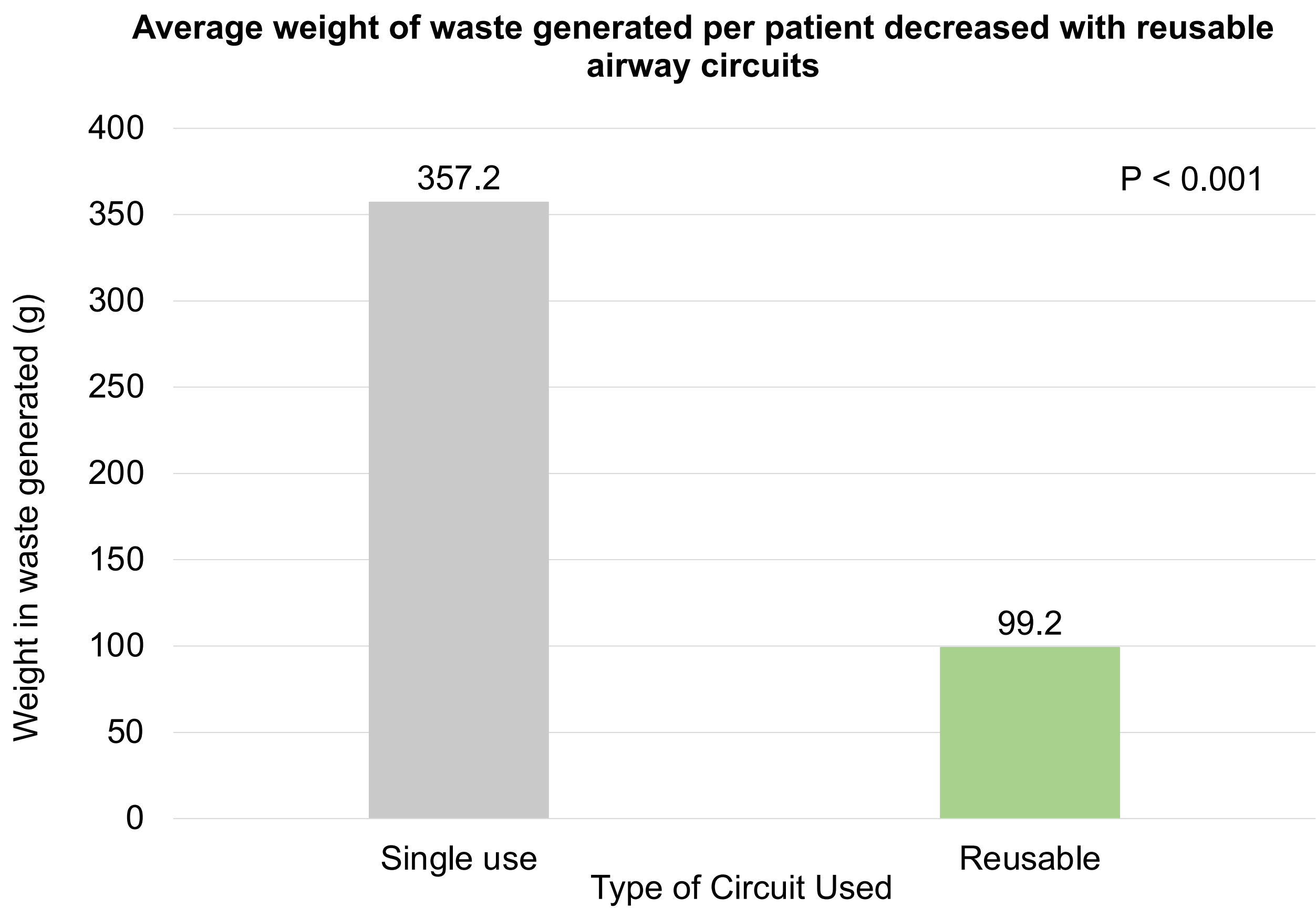


Figure 1. Switching to reusable circuits decreased the weight of waste generated. The use of single use airway circuits led to a generation of 357.2 grams of waste. By switching to reusable circuits, the waste generated was 99.2 grams.

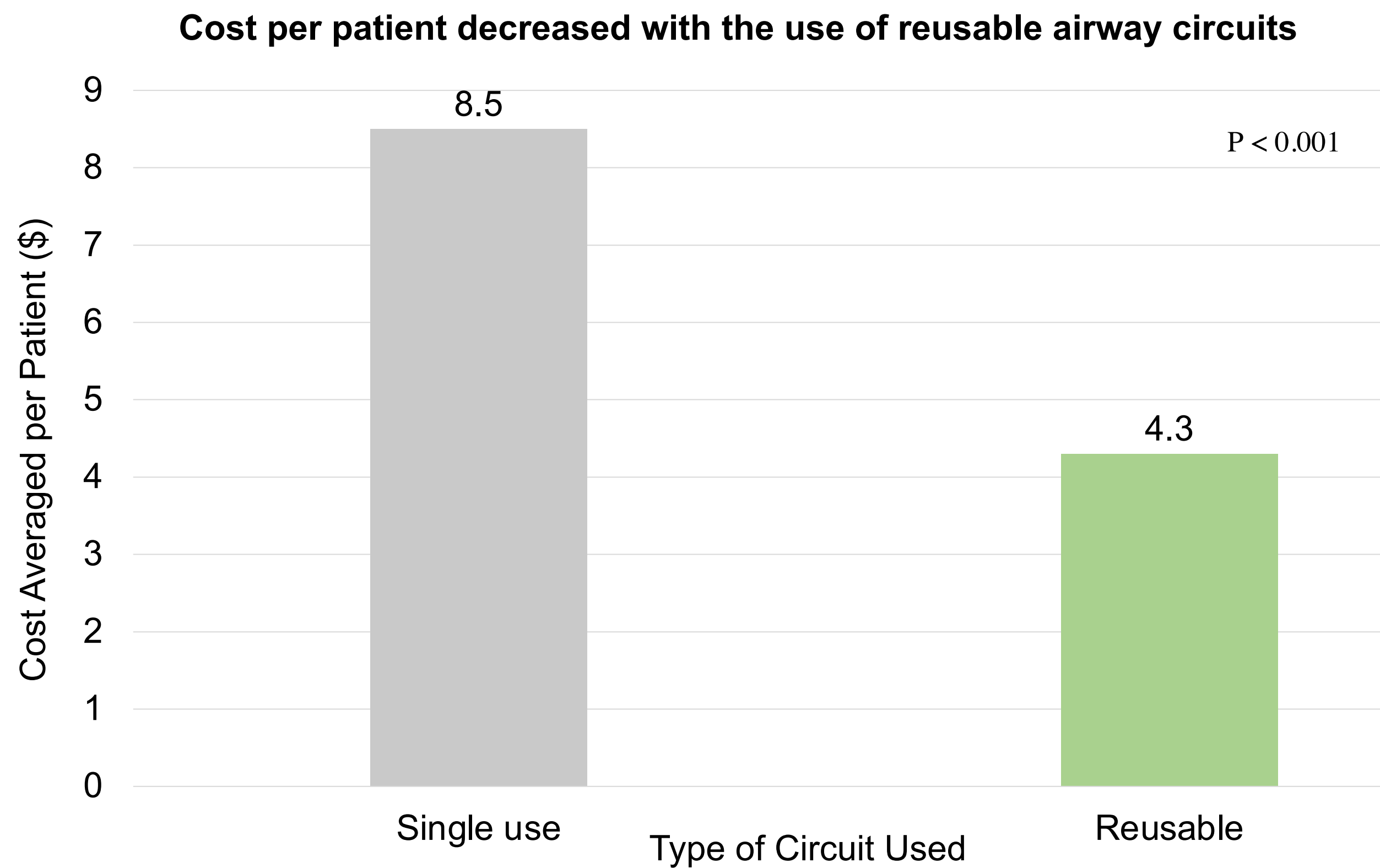


Figure 2. Cost averaged per patient decreased from 8.50 dollars per patient to 4.30 dollar per patient when switching to reusable airway circuits.

Results

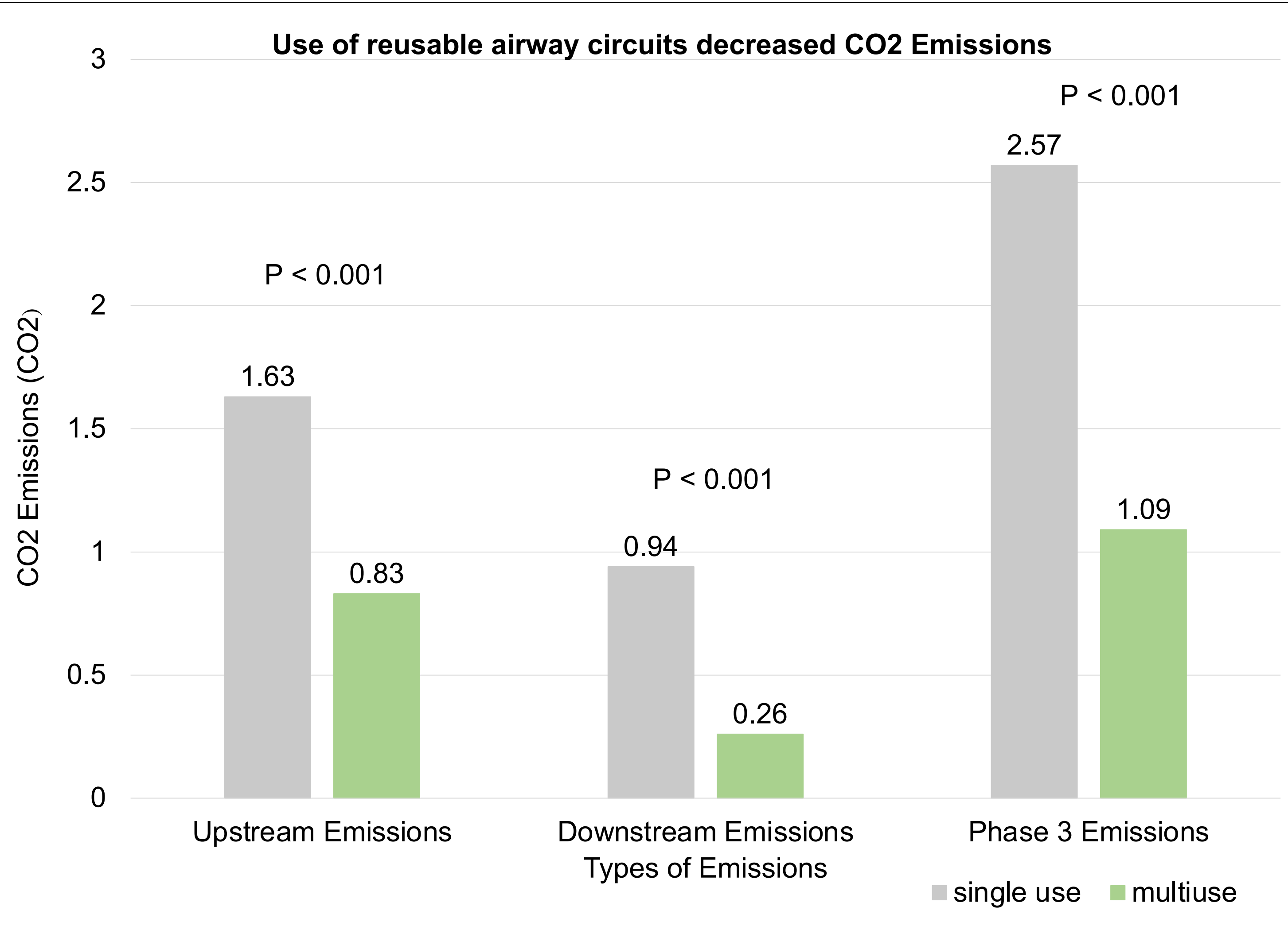


Figure 3. Emissions were calculated based on the decrease in the amounts of circuits used by switching to reusable circuits.
Upstream : Emissions associated with production, processing, distribution and storage of airway circuits
Downstream : Emissions from use, end of life treatment and disposal of airway circuits
Phase 3 : Emissions associated with care before and after providing care (Upstream + Downstream)

Conclusions

- Transitioning from single-use to reusable anesthesia circuits can significantly reduce waste generated in the operating room.
- Reusable circuits demonstrated a reduction in costs compared to single-use circuits.
- Reusable circuits were effectively used for high-turnover procedures without compromising procedural efficiency or safety.
- Reusable circuits generate lower greenhouse gas emissions across their lifecycle compared to single-use circuits, helping to reduce Scope 3 emissions.
- Given that anesthesia circuits contribute to a substantial portion of hospital waste, reusable circuits can contribute to more sustainable practices addressing healthcare’s contribution to climate change.