

**R.E.D.**  
**Research**  
**Education**  
**Dissemination**  
*anesthesia solutions*

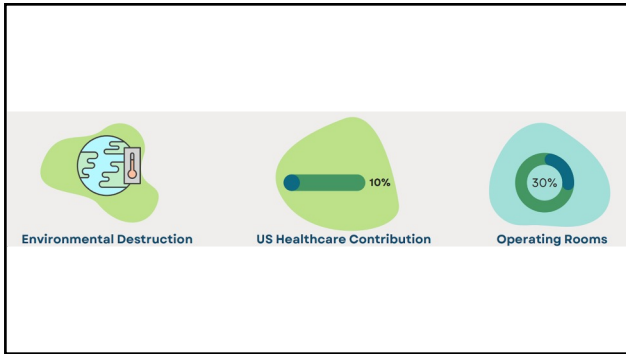
The Harmful Environmental Effects of Anesthetic Gases: A Literature Review With Practice Recommendations

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What extent of environmental impact do anesthesia providers have through the use of inhaled anesthetics?

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- Ozone layer
  - Troposphere
  - Global warming
  - Global warming potential (GWP)
  - CDE/ CDE<sub>20</sub>
  - Halogenated fluorocarbons
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- Literature Review: Environment and Cost
  - Best practice recommendations
  - Educational handout
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- Do no harm
- Regulations
- Minimal metabolism
- > 230 million procedures annually



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*1 Hour of Anesthetic is like driving a car....*

Dose (1-MAC-hr)	Sevoflurane 2.2%	Isoflurane 1.2%	Desflurane 6.7%	N <sub>2</sub> O 0.6 MAC-hour
0.5 L/min	-	4	93	29
1.0 L/min	4	7	189	57
2.0 L/min	8	15	378	112
5.0 L/min	19	38	939	282
10.0 L/min	38	74	1876	564

a. Because N<sub>2</sub>O is 21% fuel efficiency average of 23.9 miles per gallon.  
 b. Because N<sub>2</sub>O cannot be delivered at 100%, the more typical percentage of 60% is used. In combination, 0.6 MAC-hour of N<sub>2</sub>O would be added to 0.4 MAC-hour of a volatile agent. Environmental Protection Agency; MAC, minimal alveolar concentration; N<sub>2</sub>O, nitrous oxide.

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### Practice Recommendations

- Use low flow carrier gas
- Eliminate / decrease desflurane & nitrous oxide use
- Use regional or intravenous anesthesia when appropriate
- Limit anesthetic gas escape into the OR
- Provider education
- Invest in efficient / modern anesthetic delivery systems

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**Limiting Environmental Damage From Anesthetic Gas Use**



Information developed by the American Society of Anesthesiologists (ASA) in partnership with the Environmental Protection Agency (EPA) and the American Society of Environmental Anesthesiologists (ASEA).

**Why this matters:**

- Environmental destruction: Anesthetic gases are potent greenhouse gases. They have been shown to contribute to global warming and climate change.
- US health care emissions: Anesthesiologists contribute to 10% of the total greenhouse gas emissions from the health care sector.
- Quantity & toxicity: Desflurane is the most potent greenhouse gas, with a global warming potential (GWP) of 1,300. Nitrous oxide (N<sub>2</sub>O) is also a potent greenhouse gas, with a GWP of 298. Sevoflurane has a GWP of 1,300.

**Practice Recommendations:**

- Use low flow carrier gas
- Eliminate or decrease desflurane and nitrous oxide use
- Use regional or intravenous anesthesia when appropriate
- Limit anesthetic gas escape into OR
- Educate providers on these strategies
- Advocate for efficient and modern anesthetic delivery systems

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