RADOM

# *MICAP-OES 1000 Value Analysis*

MAY 2023

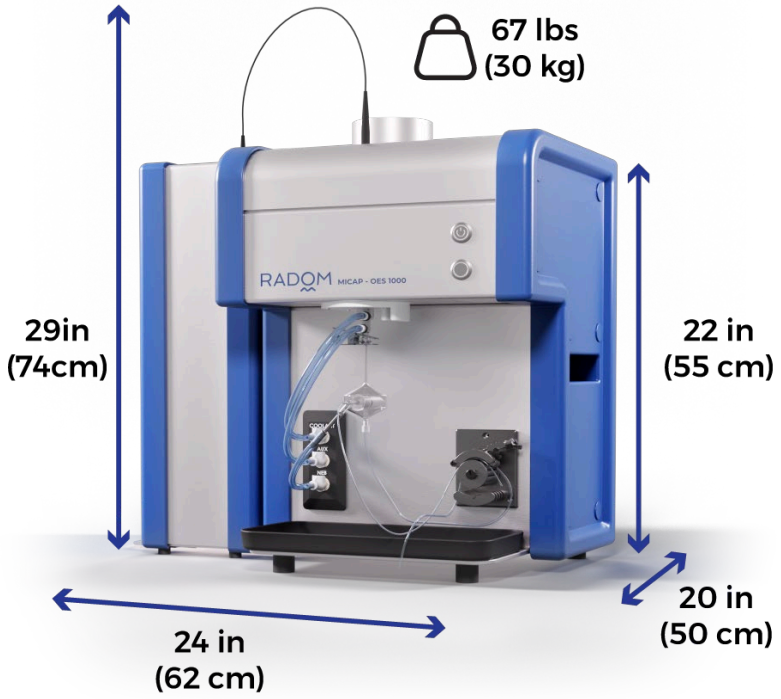
# SAFER, FASTER, AND EASIER TECHNOLOGY



# MICAP-OES vs. ICP-OES

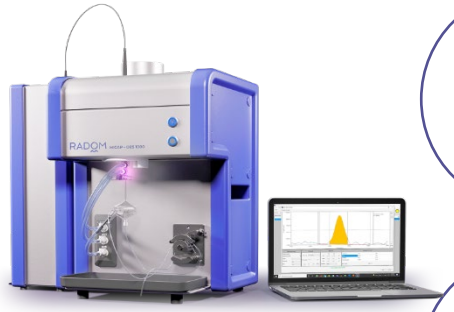
# NEW POSSIBILITIES

- Powered by proprietary Cerawave™ technology
- Smallest and lightest instrument on the market
- Easy setup (box-to-bench in less than one hour!)
- Works with local nitrogen generation
- Lower service maintenance
- Higher operational efficiency
- Lower ownership cost (pays for itself in less than 3 years!)
- Lower carbon footprint




*It's better for your lab and for the environment!*

# SERVICE MAINTENANCE ADVANTAGE

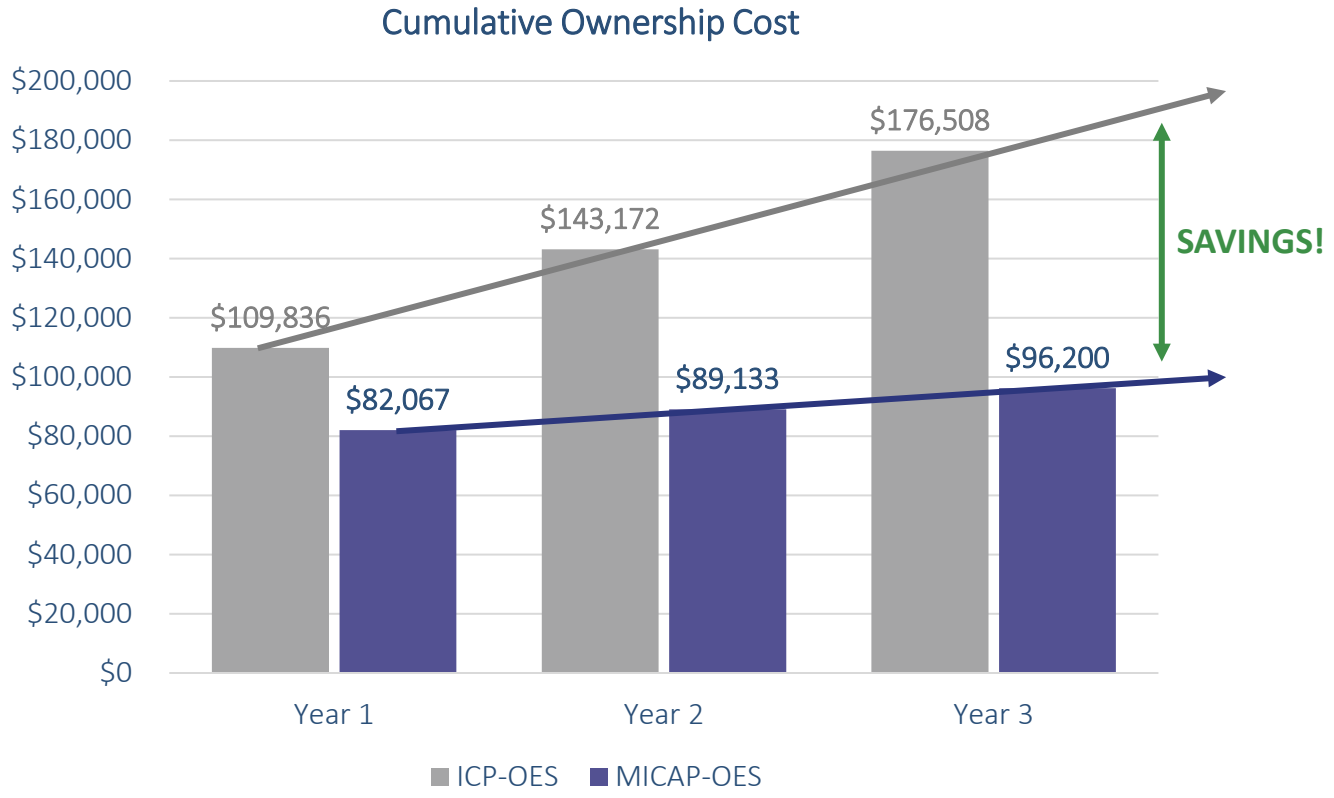


- NO maintenance required for RF generators/coils, detector or optical alignment, chiller malfunction (overheating or not in well-ventilated area) – MICAP does not have these!
- Simple, easy maintenance by end-user of peristaltic pump and fiber optic connection – no more waiting for service engineers!
- 3-year warranty vs. 1-year warranty
- *Dr. M.I. CAP Service Package* -1st year includes user replaceable components (peristaltic pump, fiber optic cable, collimator, and second Starter Kit)

# LOWEST TOTAL COST OF OWNERSHIP

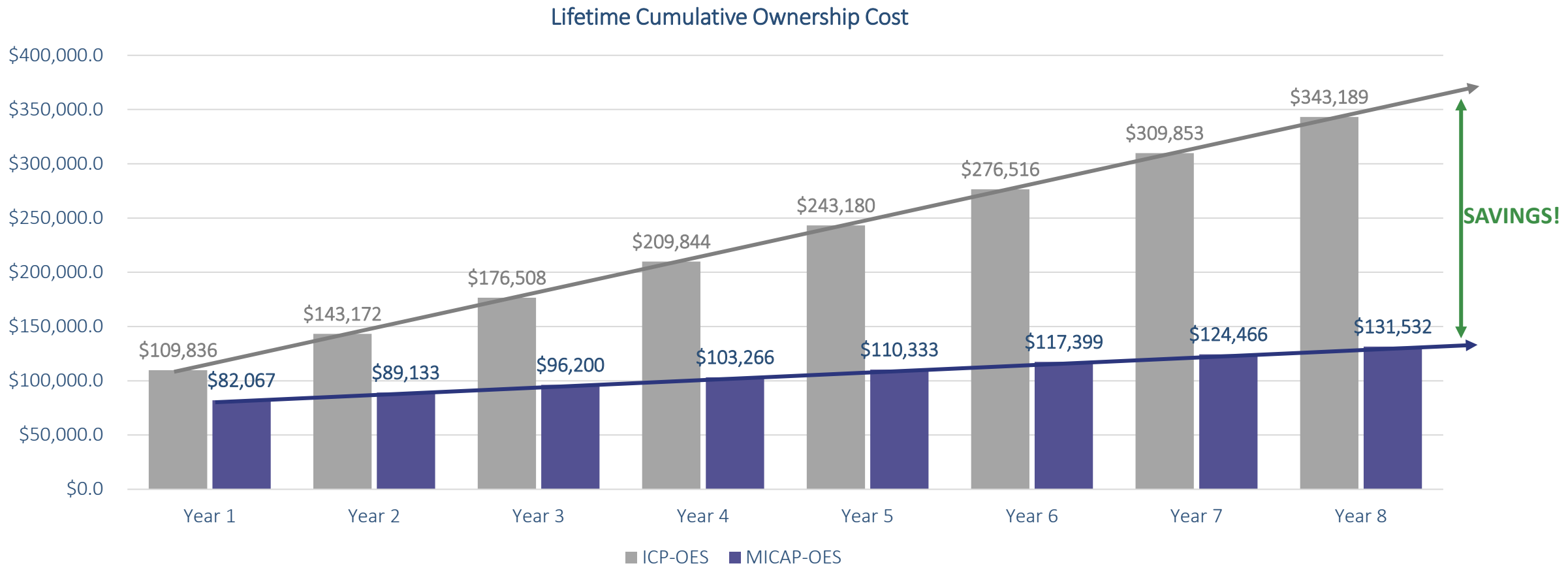
Annual Ownership Cost

| | ICP-OES | MICAP-OES |
|---|---|---|
| Year 1 | $109,836 | $82,067 |
| Year 2 | $33,336 | $7,067 |
| Year 3 | $33,336 | $7,067 |
| Total Cost | $176,508 | $96,200 |
| *Cost Savings* | *NA* | *$80,308* |




*3-year total cost of ownership savings of $80,308 over traditional ICP-OES!*

# LOWEST TOTAL COST OF OWNERSHIP




*Total lifetime cost of ownership savings of $211,657 over traditional ICP-OES!*

# LOWEST CARBON FOOTPRINT



## Lifetime $CO_2e$ Emissions Savings Compared to Argon-Based Instruments

| | |
|---|---|
| kWh Saved | 1,772,640 |
| Metric Tons of $CO_2e$ Saved* | 1,256 |

### Equivalent to:

| | |
|---|---|
| Homes' annual electricity use | 244 |
| Gasoline-powered passenger vehicles | 280 |
| Total gallons of gasoline consumed | 141,357 |
| Total smartphones charged | 152,812,225 |

*MICAP-OES 1000 saves 1,256 Metric Tons of $CO_2e$ over 8 years.*
*It has the lowest carbon footprint of any OES instrument in the market!*

**Based on 8-year useful-life. Source: EPA.GOV (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.)*

# TESTIMONIALS

- *"MICAP-OES is a logical replacement to the many AA systems, existing MP-AES systems and even many ICP-OES systems in harsh mining environments." – Major Gold Mining Company User, US*
- *"Cerawave™ improves plasma robustness … improves detection capabilities." – Alicante University, Spain*
- *"I can see the MICAP-OES system used on oil platforms." – Danish Offshore Technology Centre*
- *"Laser ablation on the front of this OES instrument is likely a good solution for mine solid sampling in the field." – University of Gothenburg, Sweden*




**(877) 977-2366**

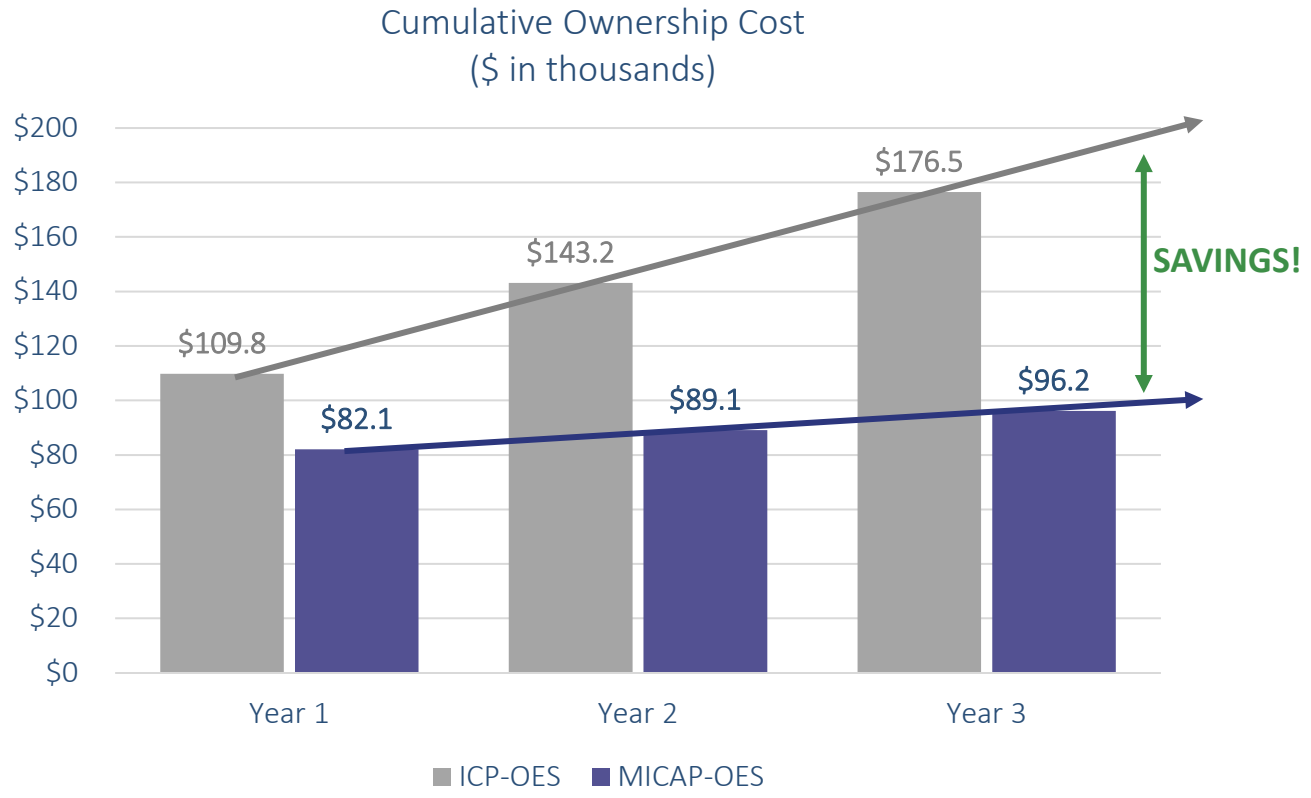
**inquiries@radomcorp.com**

# APPENDIX

# LOWEST TOTAL COST OF OWNERSHIP

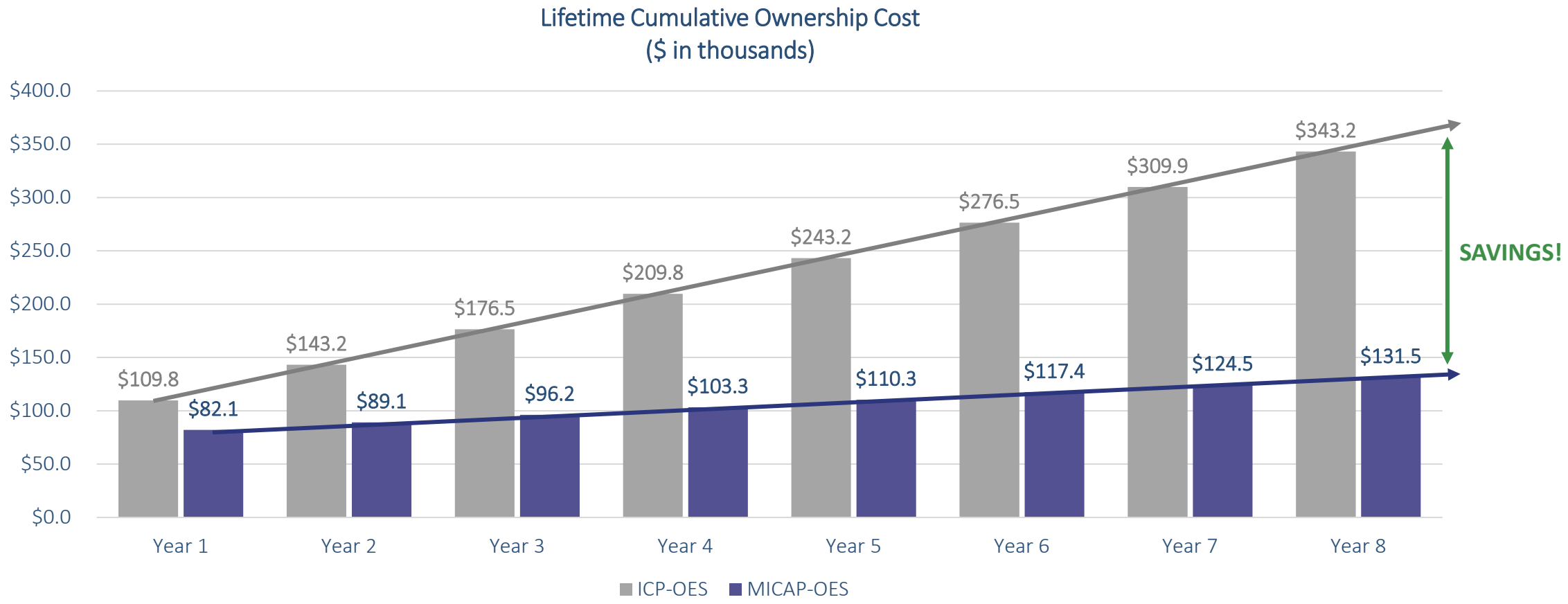
Annual Ownership Cost
($ in thousands)

| | ICP-OES | MICAP-OES |
|---|---|---|
| Year 1 | $109.8 | $82.1 |
| Year 2 | $33.3 | $7.1 |
| Year 3 | $33.3 | $7.1 |
| Total Cost | $176.5 | $96.2 |
| *Cost Savings* | *NA* | *$80.3* |




*3-year total cost of ownership savings of $80.3k over traditional ICP-OES!*

# LOWEST TOTAL COST OF OWNERSHIP




*Total lifetime cost of ownership savings of $211.7k over traditional ICP-OES!*

# *COST OF OWNERSHIP COMPARISON*

($ in thousands)

| ICP-OES | Year 1 | Year 2 | Year 3 | Total |
|---|---|---|---|---|
| Spectrometer & Computer | $65.0 | $0.0 | $0.0 | **$65.0** |
| Argon Dewar[1] | $17.0 | $17.0 | $17.0 | **$51.0** |
| Autosampler | $10.0 | $0.0 | $0.0 | **$10.0** |
| Service Contract[2] | $10.0 | $13.0 | $13.0 | **$36.0** |
| Chiller | $4.5 | $0.0 | $0.0 | **$4.5** |
| ***Energy Costs*** | | | | |
| Spectrometer & Computer | $1.6 | $1.6 | $1.6 | **$4.9** |
| Chiller | $1.4 | $1.4 | $1.4 | **$4.3** |
| Additional A/C | $0.2 | $0.2 | $0.2 | **$0.7** |
| **Total** | **$109.8** | **$33.3** | **$33.3** | $176.5 |
| ***Cumulative Cost*** | ***$109.8*** | ***$143.2*** | ***$176.5*** | |

| MICAP-OES | Year 1 | Year 2 | Year 3 | Total |
|---|---|---|---|---|
| Spectrometer & Computer | $65.0 | $0.0 | $0.0 | **$65.0** |
| Nitrogen Dewar[1] | $3.2 | $3.2 | $3.2 | **$9.6** |
| Autosampler | $10.0 | $0.0 | $0.0 | **$10.0** |
| Service Contract[3] | $3.0 | $3.0 | $3.0 | **$9.0** |
| Chiller | No Chiller Required | | | |
| ***Energy Costs*** | | | | |
| Spectrometer & Computer | $0.9 | $0.9 | $0.9 | **$2.6** |
| Chiller | No Chiller Required | | | |
| Additional A/C | No Additional AC Required | | | |
| **Total** | **$82.1** | **$7.1** | **$7.1** | $96.2 |
| *Cumulative Cost* | ***$82.1*** | ***$89.1*** | ***$96.2*** | |

*(1) Assuming 12hrs/day, 5 days/week and 50 weeks/year.*

*(2) Standard 1-year warranty.*

*(3) RADOM 3-year warranty.*

# LOWEST CARBON FOOTPRINT



## Annual $CO_2e$ Emissions Savings Compared to Argon-Based Instruments

| | |
|---|---|
| kWh Saved | 221,580 |
| Metric Tons of $CO_2e$ Saved* | 157 |

### Equivalent to:

| | |
|---|---|
| Homes' annual electricity use | 31 |
| Gasoline-powered passenger vehicles | 35 |
| Total gallons of gasoline consumed | 17,760 |
| Total smartphones charged | 19,101,528 |

*MICAP-OES 1000 saves 157 Metric Tons of $CO_2e$ per year.*
*It has the lowest carbon footprint of any OES instrument in the market!*

**Source: EPA.GOV (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.)*

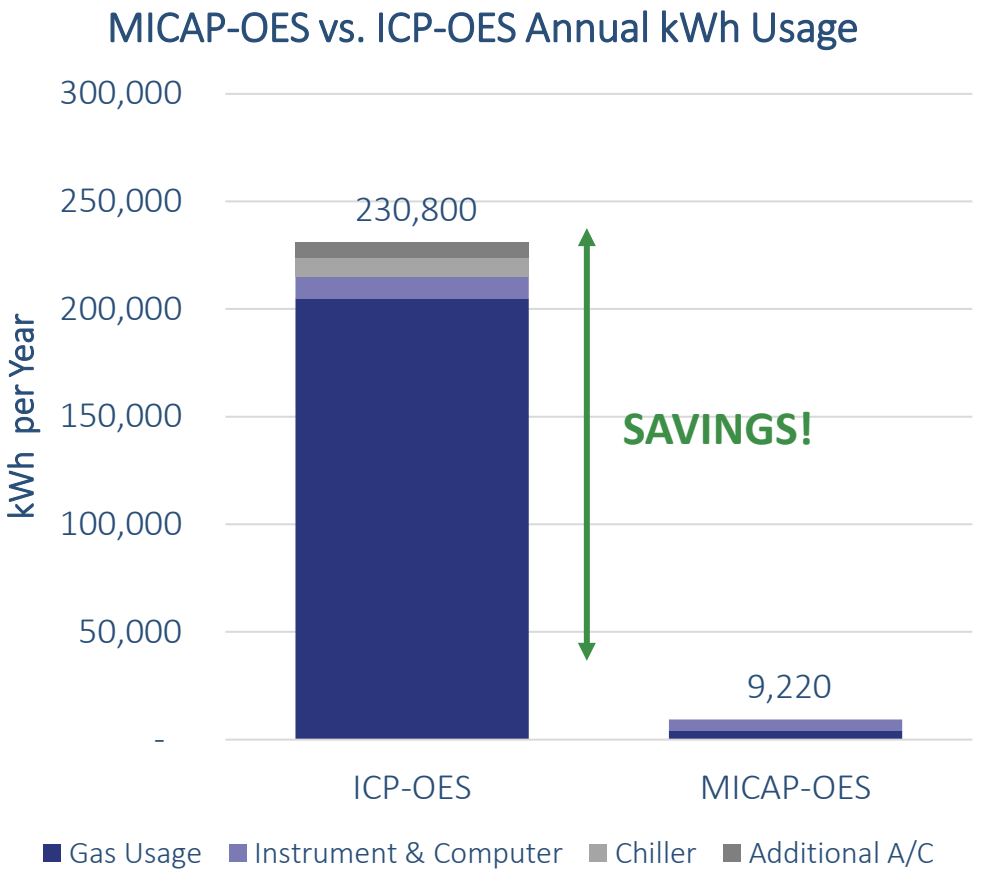
# NITROGEN PRODUCTION IS LESS ENERGY INTENSIVE

| | Nitrogen | Argon |
|---|---|---|
| Air Composition | 33.5% | 0.9% |
| Energy Used in Liquefaction (kWh/ton) | 338 | 338 |
| kg/ton | 1,000 | 1,000 |
| Composition (kg) | 335 | 9 |
| l/kg conversion | 1.23 | 0.72 |
| Composition (Liters) | 413.69 | 6.46 |
| **kWh/l** | **0.82** | **52.33** |
| Standard Dewar Size (Liters) | 230 | 230 |
| Dewars Used Annually | 21 | 17 |
| Spectrometer Gas Use (Liters/year) | 4,830 | 3,910 |
| **Total Energy Equivalence (kWh/year)** | **4,000** | **205,000** |
| Spectrometer Gas Use* (Liters/lifetime) | 38,640 | 31,280 |
| **Total Energy Equivalence* (kWh/lifetime)** | **32,000** | **1,640,000** |
| **kWh Avoided** | **1,608,000** | |

*Nitrogen production is much less energy intensive than Argon production. MICAP-OES 1000 saves 1,507,500 kWh during its lifetime!*

**Assuming 8-year lifetime.*

# ANNUAL CARBON FOOTPRINT COMPARISON

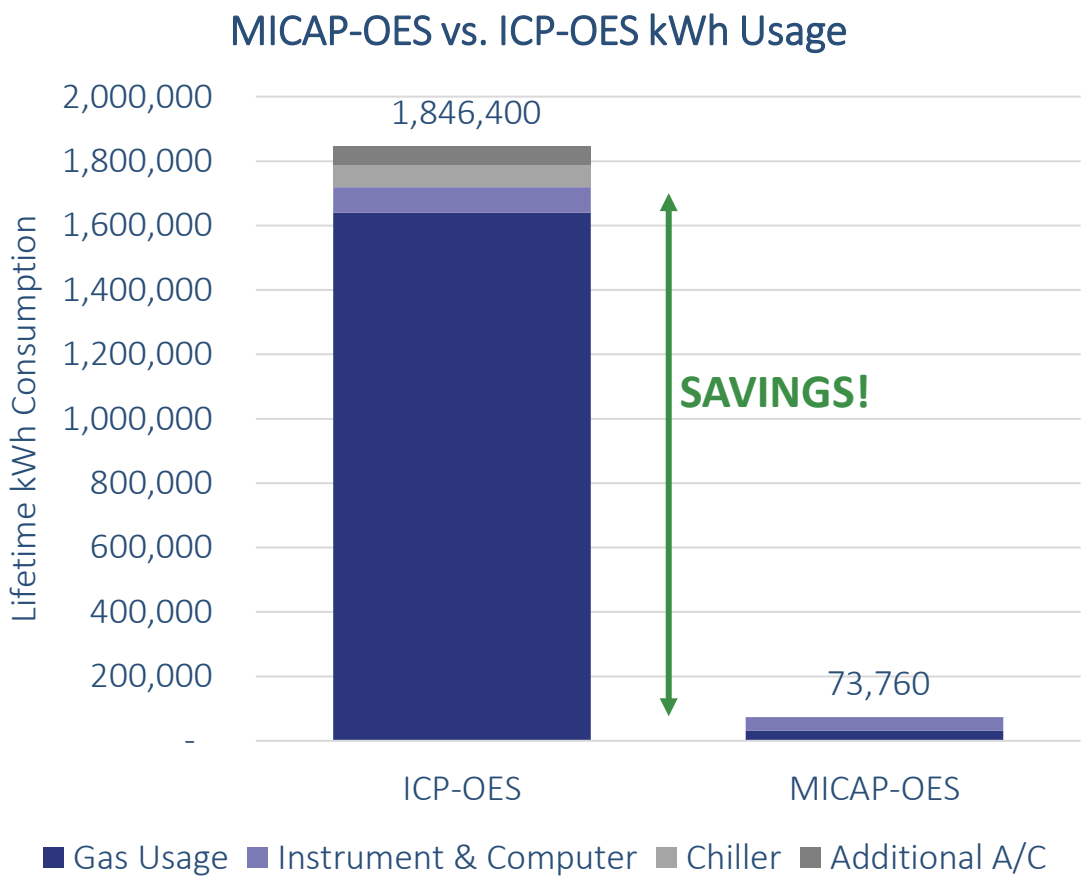



| | $CO_2e$ Contributors | kWh/Year |
|---|---|---|
| ICP-OES | Argon Usage | 205,000 |
| | ICP | 9,900 |
| | Chiller | 8,700 |
| | Additional A/C | 7,200 |
| | **Total ICP-OES** | **230,800** |
| MICAP-OES | Nitrogen Usage | 4,000 |
| | MICAP | 5,220 |
| | **Total MICAP-OES** | **9,220** |
| | **MT $CO_2e$ Avoided*** | **221,580** | **157** |

***MICAP-OES 1000 saves over 157 MT $CO_2e$ each year!***

**Source: EPA.GOV (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.)*

# LIFETIME CARBON FOOTPRINT COMPARISON

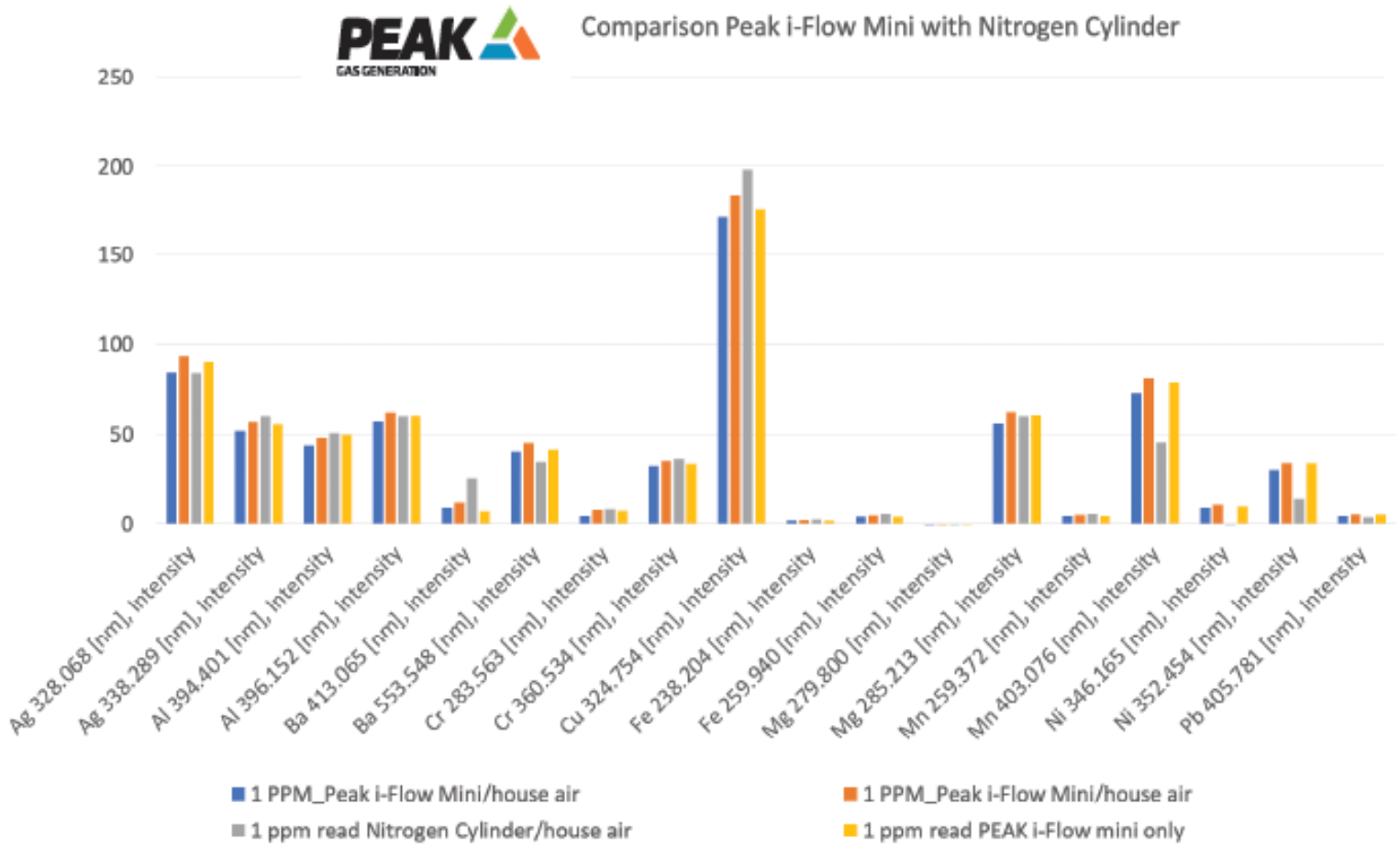



| | $CO_2e$ Contributors | kWh | |
|---|---|---|---|
| ICP-OES | Argon Usage | 1,640,000 | |
| | ICP | 79,200 | |
| | Chiller | 69,600 | |
| | Additional A/C | 57,600 | |
| | **Total ICP-OES** | **1,846,400** | |
| MICAP-OES | Nitrogen Usage | 32,000 | |
| | MICAP | 41,760 | |
| | **Total MICAP-OES** | **73,760** | |
| | **MT $CO_2e$ Avoided*** | **1,772,640** | **1,256** |

***MICAP-OES 1000 saves over 1,177 MT $CO_2e$ over its useful life!***

**Based on 7.5-year useful life. Source: EPA.GOV (https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.)*

# Local Nitrogen Generation







PEAK i-Flow Mini

Nitrogen can be generated from air. PEAK i-Flow Mini provides uninterrupted analyses and increases productivity.