

# Robert S. Heltzel, PhD

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## Education

<b>PhD</b>	Mechanical Engineering	West Virginia University	<b>2021</b>
<b>MS</b>	Mechanical Engineering	West Virginia University	<b>2016</b>
<b>BS</b>	Mechanical Engineering	West Virginia University	<b>2014</b>

## Professional Experience

**RaNDom Solutions, LLC.** **Co-Founder, Mar 2019 – Present**

- Direct methane quantification system development
- Data analysis and consulting

**West Virginia University** **Postdoctoral Researcher, Aug 2021 – Present**

- Methane emissions measurements from the oil and gas industry
- Natural gas engine test cell instrumentation and operation

**Volvo Group Trucks** **Certification and Compliance Engineer, Jul 2017 – Oct 2018**

- Heavy Duty In-Use Testing data analysis and reporting
- Greenhouse gas credit projections, predictions, and analysis
- CFR 1065 Test cell compliance operation and data analysis

**West Virginia University** **Graduate Research Assistant, May 2014 – Aug 2021**

- Machine learning applications to methane emissions
- Emissions testing of diesel, dual-fuel, and natural gas engines
- Test cell and in-field engine data instrumentation and acquisition
- Development of indirect methane quantification system
- Engine activity data collection and cycle development

## Skills and Expertise

- Engine emissions data analysis and reporting
- Engine instrumentation and data acquisition
- Direct and indirect methane quantification
- Greenhouse gas emissions
- Machine learning in python
- Big data modeling

## **Peer Reviewed Publications**

1. Johnson, D., Clark, N., **Heltzel, R.**, Darzi, M., Footer, T., Herndon, S., Murrall, C., and Thoma, E., "Methane Emissions from Oil and Gas Production Sites and their Storage Tanks in West Virginia," *Under EPA Final Review and Clearance*.
2. Johnson, D.; **Heltzel, R.** On the Long-Term Temporal Variations in Methane Emissions from an Unconventional Natural Gas Well Site. *ACS Omega* **2021**, acsomega.1c00874. <https://doi.org/10.1021/acsomega.1c00874>.
3. **Heltzel, R. S.**; Zaki, M. T.; Gebreselase, A. K.; Abdul-Aziz, O. I.; Johnson, D. R. Continuous OTM 33A Analysis of Controlled Releases of Methane with Various Time Periods, Data Rates and Wind Filters. *Environments* **2020**, 7 (9), 65. <https://doi.org/10.3390/environments7090065>.
4. Russell, S. J.; Vines, C. D.; Bohrer, G.; Johnson, D. R.; Villa, J. A.; **Heltzel, R.**; Rey-Sanchez, C.; Matthes, J. H. Quantifying CH<sub>4</sub> Concentration Spikes above Baseline and Attributing CH<sub>4</sub> Sources to Hydraulic Fracturing Activities by Continuous Monitoring at an Off-Site Tower. *Atmospheric Environment* **2020**, 228, 117452. <https://doi.org/10.1016/j.atmosenv.2020.117452>.
5. Johnson, D.; **Heltzel, R.**; Oliver, D. Temporal Variations in Methane Emissions from an Unconventional Well Site. *ACS Omega* **2019**, 4 (2), 3708–3715. <https://doi.org/10.1021/acsomega.8b03246>.
6. Johnson, D.; **Heltzel, R.**; Nix, A.; Darzi, M.; Oliver, D. Estimated Emissions from the Prime-Movers of Unconventional Natural Gas Well Development Using Recently Collected In-Use Data in the United States. *Environ. Sci. Technol.* **2018**, 52 (9), 5499–5508. <https://doi.org/10.1021/acs.est.7b06694>.
7. Johnson, D.; **Heltzel, R.**; Nix, A.; Barrow, R. Development of Engine Activity Cycles for the Prime Movers of Unconventional Natural Gas Well Development. *Journal of the Air & Waste Management Association* **2017**, 67 (3), 371–388. <https://doi.org/10.1080/10962247.2016.1245220>.
8. Johnson, D. R.; **Heltzel, R.**; Nix, A. C.; Clark, N.; Darzi, M. Greenhouse Gas Emissions and Fuel Efficiency of In-Use High Horsepower Diesel, Dual Fuel, and Natural Gas Engines for Unconventional Well Development. *Applied Energy* **2017**, 206, 739–750. <https://doi.org/10.1016/j.apenergy.2017.08.234>.
9. Johnson, D.; **Heltzel, R.** Methane Emissions Measurements of Natural Gas Components Using a Utility Terrain Vehicle and Portable Methane Quantification System. *Atmospheric Environment* **2016**, 144, 1–7. <https://doi.org/10.1016/j.atmosenv.2016.08.065>.

10. Johnson, D.; **Heltzel, R.**; Nix, A. Trends in Unconventional Well Development-Methane Emissions Associated with the Use of Dual Fuel and Dedicated Natural Gas Engines. *Energy Technology* **2014**, 2 (12), 988–995. <https://doi.org/10.1002/ente.201402088>.