

Derek R. Johnson, PhD, PE

Email: d007rj@gmail.com

Phone: 304-216-6592

PO Box 363

Pentress, WV 26544

Areas of Interest

Alternative fuels, dual fuel and dedicated natural gas engines, alternative engine design, large- and small-bore non-automotive engines, two-stroke engine design, efficiency and emissions, vehicle emissions, methane emissions, responsible natural gas utilization, energy conversion efficiency, environmental and economic impacts of emissions and efficiency, renewable energy, thermal and fluid sciences.

Education

West Virginia University	Mechanical Engineering	Ph.D. 2012
West Virginia University	Mechanical Engineering	MS 2008
West Virginia University	Mechanical Engineering	BS 2006

Appointments

- Co-Founder, RaNDom Solutions, LLC., Pentress, West Virginia, March 2019-Present.
- Associate Professor, Mechanical and Aerospace Engineering Department, West Virginia University, Morgantown, West Virginia, 6/1/2018-Current.
- Research Assistant Professor, Mechanical and Aerospace Engineering Department, West Virginia University, Morgantown, West Virginia, 5/1/2013 – 5/31/2018.
- Engineer, CONSOL Energy, Research & Development, 4000 Brownsville Road South Park, Pennsylvania, 1/1/2013 – 4/30/2013.
- Technical Writer/Curriculum Developer, National Alternative Fuels Training Consortium, West Virginia University, Morgantown, West Virginia, 1/1/2012 – 12/30/2012.
- Graduate Research Assistant, Center for Alternative Fuels, Engines, and Emissions, West Virginia University, Morgantown, West Virginia, 5/15/2006 – 12/31/2011.

Research Experience and Funding

VoiCE-MR: Vocation Integrated Cost Estimation for Maintenance and Repair of Alternative Fuel Vehicles (AFV) (DOE), 2020-2021 (\$445,947– Co-PI Task - \$21,861)

- *Co-Principal Investigator*, assist in develop a tool to estimate the vocation dependent variations in maintenance cost (MC) of heavy- and medium-duty vehicles fueled by alternative fuels that include natural gas, propane, and electric.

Research and Refinement of a Methane Watchdog System to Improve Longwall Mine Safety (The Alpha Foundation), 2020-2022 (~\$204,921)

- *Principal Investigator*, build upon the findings of our first Alpha Foundation program to address remaining concerns while improving the performance and accuracy of a multi-nodal methane monitoring system.

Collaboration on ERG/EPA Project to Disseminate Findings on Emissions from Well Sites (Eastern Research Group, Inc. – from EPA Funds), 2019-2021 (~\$15,000)

- *Principal Investigator*, analyzing data for the development and participations in multiple publications regarding well site methane emissions.

Methane Mitigator – Development of a Scalable Vent Mitigation Strategy to Simultaneously Reduce Methane Emissions and Fuel Consumption from the Compression Industry (DOE), 2020-2023 (~\$2.0M)

- *Principal Investigator*, collaborate with industry leaders to develop a cost-effective system to consume methane and other emissions streams using on-site, prime-mover engines.

Inter-comparison of Direct Quantification and Areal Micrometeorological Methods to Investigate the Transport and Fate of Methane from Heterogeneous Sources in Natural Gas Fields (National Science Foundation), 2018-2022 (~\$321,788)

- *Principal Investigator*, improving the mechanistic understanding of methane emission by combining multiple direct and indirect quantification methods.

Methane Watchdog Network – A Cost Effective Approach to Longwall Methane Monitoring and Control (The Alpha Foundation), 2018-2020 (~\$249,905)

- *Principal Investigator*, development of a methane sensing nodal network to improve the mine safety of long wall mines.

Collaboration on ERG/EPA Project to Quantify Emissions from Well Sites (Eastern Research Group, Inc. – from EPA Funds), 2018 (~\$67,605)

- *Principal Investigator*, deploying the WVU developed FFS system to quantify methane mass emissions from unconventional well sites for comparison with tracer release methods.

Collaborative Research: Measurement and Modeling of the Pathways of Potential Fugitive Methane Emissions during Hydrofracking (NSF), 2017-2018 (~\$102,190 - \$28,124 WVU)

- *Principal Investigator*, ambient monitoring of methane emissions (plumes and fluxes) during well development.

Marcellus Shale Energy and Environmental Laboratory (MSEEL) (DOE), 2014-2021 (~\$23.5M – Co-PI Task - \$306,336)

- *Co-Principal Investigator*, quantification of methane emissions associated with well development.

GENSETS – Oscillating Linear Engine and Alternator (OLEA) (ARPA-E), 2015-2018 (~\$2.0M)

- *Co-Principal Investigator*, development of a small bore two-stroke engine using natural gas direct injection for combined heat and power generation – 1kWe.

Evaluation of Novel Exhaust Resonator – Effects on Emissions and Fuel Economy of a HDDE (Private), 2015-2016 (~\$18,706)

- *Principal Investigator*, examination of the effects on emissions both gaseous and particulate as well as fuel economy of a HDDE outfitted with a novel exhaust resonator.

Evaluation and EPA Certification of Dual Fuel Standby Generator (Private), 2015 (~\$140,000)

- *Co-Principal Investigator*, development of test equipment and procedures to complete EPA emissions testing of a stationary generator.

Evaluation of Emissions and Combustion Effects from Integration of Heat Retaining Element (Private), 2015-2016 (~\$150,000)

- *Principal Investigator*, examination of the combustion performance and emissions of a legacy engine outfitted with a heat-retaining element.

Unconventional Resource Development Program (DOE), 2013-2017, (~\$2.3 M)

- *Co-Principal Investigator*, study focused on the conversion of the prime movers to operate as dual fuel or as dedicated natural gas.

VazTec Valveless Engines (Private), 2014-2015, (~\$12,500)

- *Principal Investigator*, study focused on the evaluation of the poppet valve trains to use rotary valves.

VazTec Valveless Engines (Private), 2014-2015, (~\$19,000)

- *Principal Investigator*, study focused on rotary valves in a single-cylinder diesel engine with combustion analysis.

Pump-to-Wheels Study on Heavy-Duty Natural Gas Vehicles, Task 5 (Environmental Defense Fund and Industry), 2014, (\$245,000)

- *Co-Principal Investigator*, research methane losses associated with the exhaust and crankcases of heavy-duty vehicles fueled by natural gas.

Evaluation of Gaseous Fuel Blends (MJ Bradley and Associates), 2014, (\$89,003)

- *Principal Investigator*, examine the equivalent methane number of gaseous fuel blends including higher hydrocarbon species (alkenes) using a CFR engine.

Barnett Shale Coordinated Campaign (Environmental Defense Fund), 2013-2015, (~\$234,283)

- *Principal Investigator*, CAFEE team participated in a multi-disciplinary multi-institutional fugitive methane emissions study in the Barnett Shale.

Teaching Experience

WVU, Mechanical, and Aerospace Engineering Department – Fall 2021

- MAE 423 – Heat Transfer – SEI Average –*.**/5.0

WVU, Mechanical, and Aerospace Engineering Department – Spring 2021

- MAE 427 – HVAC – SEI Average –4.88/5.0

WVU, Mechanical, and Aerospace Engineering Department – Fall 2020

- MAE 320 – Thermodynamics – SEI Average –4.73/5.0

WVU, Mechanical, and Aerospace Engineering Department – Spring 2020

- MAE 427 – HVAC – SEI Average –4.85/5.0

WVU, Mechanical, and Aerospace Engineering Department – Fall 2019

- MAE 321 – Applied Thermodynamics – SEI Average –4.90/5.0

WVU, Honors College – Spring 2019

- HONR 202A – Energy and Its Implications – SEI Average –4.62/5.0

WVU, Honors College – Fall 2018

- HONR 202A – Energy and Its Implications – SEI Average –4.49/5.0

WVU, Mechanical, and Aerospace Engineering Department – Spring 2018

- MAE 321 – Applied Thermodynamics – SEI Average –4.62/5.0

WVU, Mechanical, and Aerospace Engineering Department – Spring 2017

- MAE 320 – Thermodynamics – SEI Average –4.68/5.0

WVU, Mechanical, and Aerospace Engineering Department – Fall 2016

- MAE 321 – Applied Thermodynamics – SEI Average –4.30/5.0

WVU, Mechanical, and Aerospace Engineering Department – Summer 2015

- MAE 320 – Thermodynamics – SEI Average – 4.44/5.0

“Independent Study”

- MAE 495 – Spring 2020 (2 undergraduate students) – Energy Implications
- MAE 795 – Summer 2019 (1 PhD student) – Energy/Economics of CHP
- MAE 795 – Summer 2014 (1 PhD student) – Methane Dispersion

“Substitute Lecturer”

- MAE 331 – Fluid Mechanics – Summer 2017 (Besch) – Flow Over Immersed Bodies
- MAE 241 – Statics – Fall 2014 (Covington) – Zero Force Members, Method of Sections

Peer Reviewed Journal Publications (Note: Student authors are denoted with an asterisk, and presenter with an underline.)

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. Footer, T., Thoma, E., Clark, N., **Johnson, D.**, Nash, J., Herndon, S., and Murrall, C., “Evaluating Natural Gas Emissions from Pneumatic Controllers from Upstream Oil and Gas Facilities in West Virginia,” *Under EPA Final Review and Clearance*.
3. **Johnson, D.**, and Heltzel, R.*, “On the Long-Term Temporal Variations in Methane Emissions from an Unconventional Natural Gas Well Site,” *ACS Omega*, 2021. DOI: 10.1021/acsomega.1c00874.
4. Darzi, M., Zamani, N.*, and **Johnson, D.**, “Energy Optimization of a Micro-CHP Engine Using 1-D and 3-D Modeling,” *Applied Thermal Engineering*, 2021. DOI: 10.1016/j.applthermaleng.2021.116904.
5. Heltzel, R.*, Zaki, M.*, Gebreslase, A.*, Abdul-Aziz, O., and **Johnson, D.**, “Continuous OTME 33A Analysis of Controlled Releases of Methane with Various Time Periods, Data Rates and Wind Filters,” *Environments – Special Issue: Measurement of Greenhouse Gas Emission from Natural Gas Systems*, 2020. DOI: 10.3390/environments7090065.
6. Zamani, N.*, Darzi, M.*, **Johnson, D.**, Famouri, P., “Pre-design Investigation of Resonant Frequency Effects on Gas Exchange Efficiencies of a One-kW Natural-Gas Linear Engine Alternator,” *SAE Int. J. Adv. And Curr. Prac. In Mobility*, 2020. DOI: 10.42761/2020-01-0488.
7. Russel, S.*, Vines, C.*, Borher, G., **Johnson, D.**, Villa, J.*, Heltzel, R.*, Rey-Sanchez, C., and Hatala Matthes, J., “Paired CH₄ Concentration and Stable Isotope Measurements Identify Concentration Spikes and Source Attribution at A Hydraulic Fracturing Field In West Virginia,” *Atmospheric Environment*, 2020. DOI: 10.1016/j.atmosenv.2020.117452.
8. **Johnson, D.**, Heltzel, R.*, and Oliver, D.*, “Temporal Variations in Methane Emissions from an Unconventional Well Site,” *ACS Omega*, 2019. DOI: 10.1021/acsomega.8b03246.
9. Darzi, M.*, **Johnson, D.**, Ulishney, C.*, and Oliver, D.*, “Gaseous Fuels Variation Effects on First and Second Law Analyses of a Small Direct Injection Engine for micro-CHP Systems,” *Energy Conversion and Management*, 2019. DOI: 10.1016/j.enconman.2019.01.045.

10. Zamani, N.*, Clark, N., Musho, T., Darzi, M.*, **Johnson, D.**, and Famouri, P. "An Optimization Method for Flexural Bearing Design for High-Stroke High-Frequency Applications," *Cryogenics*, 2018. DOI: 10.1016/j.cryogenics.2018.09.008.
11. Darzi, M.*, **Johnson, D.**, Ulishney, C.*, and Clark, N., "Low Pressure Direct Injection Strategies Effect on A Small SI Natural Gas Two Stroke Engine's Energy Distribution and Emissions," *Applied Energy*, 2018. DOI: 10.1016/j.apenergy.2018.09.091.
12. **Johnson, D.**, Heltzel, R.*, Nix, A., Clark, N., and Darzi, M.*, "In-Use Efficiency of Oxidation and Threeway Catalysts Used in High-Horsepower Dual Fuel and Dedicated Natural Gas Engines," *SAE Int. J. Engines*, 2018. DOI: 10.4271/03-11-03-0026.
13. **Johnson, D.**, Heltzel, R.*, Nix, A., Darzi, M.*, and Oliver, D.*, "Estimated Emissions from the Prime-Movers of Unconventional Natural Gas Well Development Using Recently Collected In-Use Data in the United States," *Environmental Science and Technology*, 2018. DOI: 10.1021/acs.est.7b06694.
14. **Johnson, D.**, Heltzel, R.*, Nix, A., Clark, N., and 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. DOI: 10.1016/j.apenergy.2017.08.234.
15. Peng, Y., Nix, A., Li, H., **Johnson, D.**, and Heltzel, R.*, "Derivation of A Representative Engine Duty Cycle from On-Road Heavy Duty Vehicle Driving Data," *Journal of Transportation Technologies*, 2017. DOI: 10.4236/jtts.2017.74025.
16. Clark, N., **Johnson, D.**, McKain, D., Wayne, S., Li, H., Covington, A.*, Mongold, R.*, Hailer, T.*, Sandoval, C.*, and Rudek, J., "Future Methane emissions from the Heavy-Duty Natural Gas Transportation Sector for Stasis, High, Medium, and Low Scenarios in 2035," *Journal of the Air and Waste Management Association*, 2017. DOI: 10.1080/10962247.2017.1368737.
17. **Johnson, D.**, Heltzel, R.*, Nix, A., Clark, N., and Darzi, M.*, "Regulated Gaseous Emissions from In-Use High Horsepower Drilling and Hydraulic Fracturing Engines," *Journal of Pollution Effects and Control*, 2017. DOI: 10.4176/2375-4397.1000187.
18. Clark, N., McKain, D., **Johnson, D.**, Wayne, S., Li, H., Akkerman, V., Sandoval, C.*, Covington, A.*, Mongold, R.*, Hailer, T.*, and Ugarte, O.*, "Pump-to-Wheels Methane Emissions from the Heavy-Duty Transportation Sector," *Environmental Science and Technology*, 2016. DOI: 10.1021/acs.est.5b06059.
19. **Johnson, D.**, Covington, A.*, and Clark, N., "Methane to Ethane Ratios of Emissions at Natural Gas Compressor Stations and Storage Facilities," *JJ Petro Natu Gas. 2016, 1 (1): 006. Open-Access.*
http://jacobspublishers.com/images/Petrol/J_J_Petro_Natu_gas_1_1_007.pdf.
20. **Johnson, D.**, Heltzel, R.*, Nix, A., and Barrow, R.*, "Development of Engine Activity Cycles for the Prime Movers of Unconventional, Natural Gas Well Development," *Journal of the Air and Waste Management Association*, 2016. DOI: 10.1080/10962247.2016.1245220.
21. **Johnson, D.**, and Heltzel, R.*, "Methane Emissions Measurements of Natural Gas Components Using a Utility Terrain Vehicle and Portable Methane Quantification System," *Atmospheric Environment*, DOI: 10.1016/j.atmosenv.2016.08.065.
22. **Johnson, D.**, Covington, A.*, and Clark, N., "Design and Use of Full Flow Sampling System (FFS) for the Quantification of Methane Emissions," *Journal of Visualized Experiments (JoVE)*, 2015. DOI: 10.3791/54179.

23. Nathan, B., Golston, L., O'Brien, A., Ross, K., Harrison, W., Tao, L., Lary, D., **Johnson, D.**, Covington, A.*, Clark, N., and Zondlo, M., "Near-Field Characterization of Methane Emission Variability from a Compressor Station Using a Model Aircraft," *Environmental Science and Technology*, 2015. DOI: 10.1021/acs.est.5b00705.
24. **Johnson, D.**, Covington, A.*, and Clark, N., "Methane Emissions from Leak and Loss Audits of Natural Gas Compressor Stations and Storage Facilities," *Environmental Science and Technology*, 2015. DOI: 10.1021/es506163m.
25. **Johnson, D.**, Covington, A.*, and Clark, N., "Environmental and Economic Assessment of Leak and Loss Audits at Natural Gas Compressor and Storage Facilities," *Energy Technology*, 2014. DOI:10.1002/ente.201402086.
26. **Johnson, D.**, Heltzel, R.*, and Nix, A., "Trends in Unconventional Well Development – Methane Emissions Associated with the Use of Dual Fuel and Dedicated Natural Gas Engines," *Energy Technology*, 2014. DOI:10.1002/ente.201402088.
27. **Johnson, D.***, Ayre, L.*, Clark, N., Balon, T., and Moynihan, P., "Diesel Exhaust After treatment with Scrubber Process: NO_x Destruction," *SAE Int. J. Engines*, SAE Paper No. 2011-01-2440, 2011. DOI: 10.4271/2011-01-2440.
28. **Johnson, D.***, Bedick, C.*, Clark, N., and McKain, D., "Design and Testing of an Independently Controlled Urea SCR Retrofit System for the Reduction of NO_x Emissions from Marine Diesels," *Environmental Science and Technology*, 2009. DOI: 10.1021/es900269p.

Peer Reviewed Conference Publications

1. Cappellini, B.*, **Johnson, D.**, Clark, N., and Barr, A.*, "Improving Real-Time Methane Monitoring in Longwall Coal Mines Through System Response Characterization of a Multi-Nodal Methane Detection Network," *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, IMECE2021-69709, 2021. *Accepted*.
2. Dranuta, D.*, and **Johnson, D.**, "Analysis on Combined Heat and Power and Combined Heat and Power Hybrid Systems for Unconventional Drilling Operations," *Proceedings of the ASME Internal Combustion Engine Conference*, ICEF2021-67492, 2021. *Accepted*.
3. Zamani, N.*, Clark, N., Subramanian, J.*, Heiskell, G.*, **Johnson, D.**, Mahmudzadeh, F.*, Musho, T., and Famouri, P., "Quantification of Windage and Vibrational Losses in Flexure Springs of a One kW Two-Stroke Free Piston Linear Engine Alternator," *2019 SAE World Congress Experience*, SAE 2019-01-0816, 2019. DOI: 10.4271/2019-01-0816.
4. Darzi, M.*, **Johnson, D.**, Bade, M.*, and Famouri, P., "Impacts of Gaseous Fuel Quality on Combustion and Regulated Engines for a Small, Low-Pressure Direct Injected Natural Gas Engine," *2019 SAE World Congress Experience*, SAE 2019-01-0560, 2019. DOI: 10.4271/2019-01-0560.
5. Bade, M.*, Clark, N., Famouri, P., Guggilapu, P.*, Darzi, M.*, and **Johnson, D.**, "Sensitivity Analysis and Control Methodology for Linear Engine Alternator," *2019 SAE World Congress Experience*, SAE 2019-01-0230, 2019. DOI: 10.4271/2019-01-0230.
6. Darzi, M.*, **Johnson, D.**, Ulishney, C.*, Zamani, N.*, Bade, M.*, Thompson, G., Clark, N., and Famouri, P., "Quantification of Energy Pathways and Gas Exchange of a Small Port Injection SI Two-Stroke Natural Gas Engine Operating on Different Exhaust Configurations," *2018 SAE World Congress Experience*, SAE 2018-01-1278, 2018. DOI: 10.4271/2018-01-1278.

7. Darzi, M.*, **Johnson, D.**, Bade, M.*, Ulishney, C.*, Zamani, N.*, Clark, N., Thompson, G., and Famouri, P., "Continuously Varying Exhaust Outlet Diameter to Improve Efficiency and Emissions of a Small SI Natural Gas Two-Stroke Engine by Internal EGR," *2018 SAE World Congress Experience*, SAE 2018-01-0985, 2018. DOI: 10.4271/2018-01-0895.
8. **Johnson, D.**, Darzi, M.*, Zamani, N.*, Ulishney, C.*, and Bade, M.*, "Methods to Improve Combustion Stability, Efficiency, and Power Density of a Small, Port-Injected, Spark-Ignited, Two-Stroke Natural Gas Engine," *Proceedings of the ASME Internal Combustion Engine Conference*, ICEF2017-3557, 2017. DOI: 10.1115/ICEF2017-3557.
9. Darzi, M.*, **Johnson, D.**, Zamani, N.*, Ulishney, C.*, and Bade, M.*, "Baseline Evaluation of Ignition Timing and Compression Ratio Configurations on Efficiency and Combustion Stability of a Small-Bore, Two-Stroke, Natural Gas Engine," *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, IMECE2017-70078, 2017. DOI: 10.1115/IMECE2017-70078.
10. **Johnson, D.**, Besch, M., Heltzel, R.*, and Jammalamadaka, S.*, "Effects of Fuel Quality on Gaseous Emissions from an 8.9L Spark-Ignited Natural Gas Engine Operated over Prime-Mover Cycles for Unconventional Well Development," *Proceedings of the ASME Internal Combustion Engine Conference*, ICEF2017-3556, 2017. DOI: 10.1115/ICEF2017-3556.
11. **Johnson, D.**, Besch, M., Fowler, N.*, Heltzel, R.*, and Covington, A.*, "Addition of Exhaust Gas Recirculation onto a Large-Bore, Two-Stroke, Natural Gas Engine, and Its Effects on Fuel Consumption, Emissions, and Combustion," *Proceedings of the ASME Internal Combustion Engine Conference*, ICEF2016-9457, 2016. DOI: 10.115/ICEF2016-9457.
12. **Johnson, D.**, Besch, M., Fowler, N.*, Heltzel, R.*, and Covington, A.*, "Evaluation of Spark Plug and Timing Configurations on the Fuel Consumption, Combustion Stability, and Emissions of a Large-Bore, Two-Stroke, Natural Gas Engine," *Proceedings of the ASME Internal Combustion Engine Conference*, ICEF2016-9454, 2016. DOI: 10.115/ICEF2016-9454.
13. Besch, M., Covington, A.*, **Johnson, D.**, Fowler, N.*, and Heltzel, R.*, "Effects of EGR Addition onto Combustion Stability and Alternator Performance Variability of a Small, Single-cylinder Diesel Generator," SAE Technical Paper 2016-32-0063, 2016. DOI: 10.4271/2016-32-0063.
14. **Johnson, D.**, and Covington, A.*, "Potential Reduction of Fugitive Methane Emissions at Compressor Stations and Storage Facilities Powered by Natural Gas Engines," IMECE2014-38582, *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, 2014. DOI: 10.1115/IMECE2014-38582.
15. **Johnson, D.**, and Covington, A.*, "Methane Leak and Loss Audits of Natural Gas-Fueled Engine and Compressor Units," ICEF2014-5626, *Proceedings of the ASME Internal Combustion Engine Conference*, 2014. DOI: 10.1115/ICEF2014-5626.
16. Ayre, L.*, **Johnson, D.***, Clark, N., England, J., Atkinson, R., McKain, D., Ralston, B., Balon, T., and Moynihan, P., "Novel NO_x Emission Reduction Technology for Diesel Marine Engines," *Proceedings of the ASME Internal Combustion Engine Conference*, ICEF2011-60182, 2011. DOI: 10.1115/ICEF2011-60182.
17. Bedick, C.*, Clark, N., **Johnson, D.***, Balon, T., and Moynihan, P., "Demonstration and Evaluation of a Retrofit Urea-SCR After-Treatment System for NO_x Reduction in Marine Diesels," *Proceedings of IMarEST-Part A-Journal of Marine Engineering and Technology*, 2011. DOI: 10.1080/20464177.2011.11020239.

Presentations

- Dranuta, D.*, Heltzel, R., and **Johnson, D.**, “Analysis on Combined Heat and Power, and Combined Heat and Power Hybrid Systems for Unconventional Drilling Operations,” SHALE INSIGHT 2021 Conference, Erie, PA, September 2021. Poster Presentation.
- Barr, A.*, Cappellini, B.*, Johnson, D., and Clark, N., “Design and Development of a Multi-Nodal Methane Monitoring System for Improved Mine Safety,” Annual International Pittsburgh Coal Conference, 2020, Pittsburgh, PA, 2020, Oral Presentation – Virtual.
- Cappellini, B.*, Barr, A.*, Johnson, D., and Clark, N., “Evaluating CFD and Modeling Techniques for a Multi-Nodal Sensor Network Designed for the Detection and Control of Methane in Longwall Coal Mines,” 37th Annual International Pittsburgh Coal Conference, Pittsburgh, PA, 2020, Oral Presentation – Virtual.
- Gebreslase, A.*, Abdul-Aziz, O., Zaki, M.*, Heltzel, R.*, and **Johnson, D.**, “Linkages of Methane Emissions with Environmental Drives in Natural Gas Fields,” American Geophysical Union Fall Meeting, San Francisco, CA, 2019, Poster Presentation.
- Vines, C.*, Sanchez, C.*, **Johnson, D.**, Hatala Matthes, J., Russel, S.*, and Bohrer, G., “Baseline Methane Concentrations using Eddy Covariance Methods near a Hydraulic Fracturing Site,” American Geophysical Union Fall Meeting, Washington, D.C., 2018, Poster Presentation.
- Russel, S.*, Vines, C.*, Sanchez, A.*, Bohrer, G., **Johnson, D.**, and Hatala Matthes, J., “Partitioning Sources of Methane Emissions Near a Hydraulic Fracturing Field In West Virginia Using Stable Isotopes,” American Geophysical Union Fall Meeting, Washington, D.C., 2018, Poster Presentation.
- **Johnson, D.**, “CAFE’s Work Across the Natural Gas Supply Chain,” National Energy Conference 2018: Climate Change Issues Update. Invited presenter and panel member – Methane Emissions: What is the Present Danger, and What is Achievable?, Morgantown, WV, December 1st, 2018. Oral presentation and panelist.
- Li, H., Wayne, S., **Johnson, D.**, and Clark, N., “An Investigation of Methane Emissions from Heavy-duty Natural Gas Vehicles in America,” 2018 World Internal Combustion Engine Congress, China, November 10th, 2018. Oral presentation.
- **Johnson, D.**, “The Importance of Energy Literacy,” West Virginia University Honors Faculty Fellow Lecture Series, Morgantown, WV, September 18, 2018. Oral presentation/lecture.
- **Johnson, D.**, Clark, N., “Development and Use of a Full Flow Sampling System to Characterize Unregulated Methane Emissions,” Coordinating Research Council 28th Real-World Emissions Workshop, Garden Grove, CA, March 2018. Poster Presentation.
- Clark, N., McKain, D., **Johnson, D.**, Wayne, W., Li, H., Akkerman, V., Sandoval, C., Covington, A., Mongold, R., Hailer, J., and Ugarte, O., “Methane Emissions from Natural Gas-Fueled Heavy-Duty Vehicles and Associated Fueling Stations,” Coordinating Research Council 28th Real-World Emissions Workshop, Garden Grove, CA, March 2018. Poster Presentation.

- **Johnson, D.**, Clark, N., Darzi, M.*, and Heltzel, R.*, “Direct Quantification of Methane Emissions across the Supply Chain: Identification of Targets for Mitigation,” American Geophysical Physical Union Fall Meeting, New Orleans, LA, December 2017. Poster Presentation.
- **Johnson, D.**, Nix, A., Clark, N., Heltzel, R.*, and Darzi, M.*, “Powering the Prime-Movers of Unconventional Natural Gas Well Development with Dual Fuel and Dedicated Natural Gas Engines. Understanding the Impacts on Regulated Emissions, Efficiency, Costs, And Other Points to Consider,” SHALE INSIGHT 2017 Conference, Pittsburgh, PA, September 2017. Oral Presentation.
- Covington, A.* , Besch, M., **Johnson, D.**, Heltzel, R.* , and Fowler, N.* , “Effects of EGR Addition onto Combustion Stability and Alternator Performance Variability of a Small, Single Cylinder Diesel Generator,” SAE Small Engine Technical Conference, SAE 16SETC-0018. Charleston, SC, 2016. Oral presentation.
- **Johnson, D.**, Besch, M., Fowler, N.*, Heltzel, R.* , and Covington, A.* , “Addition of Exhaust Gas Recirculation onto a Large-Bore, Two-Stroke, Natural Gas Engine, and Its Effects on Fuel Consumption, Emissions, and Combustion,” Proceedings of the 14th Internal Combustion Engine Division Fall Technical Conference ASME, ICEF2016-9457, Greenville, SC, 2016. Oral presentation.
- **Johnson, D.**, Besch, M., Fowler, N.*, Heltzel, R.* , and Covington, A.* , “Evaluation of Spark Plug and Timing Configurations on the Fuel Consumption, Combustion Stability, and Emissions of a Large-Bore, Two-Stroke, Natural Gas Engine,” Proceedings of the 14th Internal Combustion Engine Division Fall Technical Conference ASME, ICEF2016-9454, Greenville, SC, 2016. Oral presentation.
- **Johnson, D.**, and Covington, A.*, “Methane Emissions from Various Portions of the Supply Chain,” Gas Technology Institute’s CH₄ Connections Conference, 2015. Poster presentation. <http://www.gastechnology.org/CH4/Documents/25-Derek-Johnson-CH4-Poster-Oct2015.pdf>
- **Johnson, D.**, and Covington, A.*, “Methane Leak and Loss Audits of Natural Gas-Fueled Engine and Compressor Units,” ICEF2014-5626, ASME Internal Combustion Engine Fall Conference, Columbus, IN, 2014. Oral presentation.
- **Johnson, D.**, and Covington, A.*, “Potential Reduction of Fugitive Methane Emissions at Compressor Stations and Storage Facilities Powered by Natural Gas Engines,” IMECE2014-38582 ASME International Mechanical Engineering Congress and Exposition, Montreal, QC, 2014. Oral presentation.
- **Johnson, D.***, Clark, N., Ayre, L.* , Balon, T., and Moynihan, P. “Diesel Marine Engines Emissions Reduction: A Combined, Onboard, NO_x Oxidation, Absorption, and Reduction System.” 22nd Coordinating Research Council: Emissions Workshop. San Diego, California. March 25-28, 2012. Oral presentation.
- Ayre, L.* , **Johnson, D.***, Clark, N., England, J., Atkinson, R., McKain, D., Ralston, B., Balon, T., and Moynihan, P.; “Novel NO_x Emission Reduction Technology for Diesel Marine Engines.” ASME Internal Combustion Engine Division’s 2011 Fall Technical Conference. Morgantown, West Virginia. October 2-5, 2011. Oral presentation.
- Clark, N., Bedick, C.* , **Johnson, D.***, Ralston, B., Balon, T., and Moynihan, P., “Testing of an Independently Controlled Urea-SCR Aftertreatment System,” 20th Coordinating Research Council: Emissions Workshop, San Diego, California, March 22-24, 2010. Poster presentation.

Additional Publications

- Barr, A.*, Cappellini, B.*, Johnson, D., and Clark, N., “Design and Development of a Multi-Nodal Methane Monitoring System for Improved Mine Safety,” Proceedings of the 37th Annual International Pittsburgh Coal Conference, 2020, *Abstract*.
<https://www.engineering.pitt.edu/PCC/>
- Cappellini, B.*, Barr, A.*, Johnson, D., and Clark, N., “Evaluating CFD and Modeling Techniques for a Multi-Nodal Sensor Network Designed for the Detection and Control of Methane in Longwall Coal Mines,” Proceedings of the 37th Annual International Pittsburgh Coal Conference, 2020, *Abstract*. <https://www.engineering.pitt.edu/PCC/>
- Gebreslase, A.*, Abdul-Aziz, O., Zaki, M.*, Heltzel, R.*, and **Johnson, D.**, “Linkages of Methane Emissions with Environmental Drives in Natural Gas Fields,” American Geophysical Union Fall Meeting, 2019, *Abstract*.
<https://ui.adsabs.harvard.edu/abs/2019AGUFM.A21L2799A/abstract>
- Darzi, M.*, Johnson, D., Ulishney, C.*, and Oliver, D.*, “Gaseous Fuels Variation Effects on First and Second Law Analyses of a Small Direct Injection Engine for Micro-CHP Systems,” *Advances In Engineering*, 2019, *Article Highlight*. <https://advanceseng.com/gaseous-fuels-variation-effects-first-and-second-law-analyses-small-direct-injection-engine-micro-chp-systems/>
- Vines, C.*, Sanchez, C.*, **Johnson, D.**, Hatala Matthes, J., Russel, S.*, and Borher, G., “Baseline Methane Concentrations using Eddy Covariance Methods near a Hydraulic Fracturing Site,” American Geophysical Union Fall Meeting, 2018, *Abstract*.
<http://adsabs.harvard.edu/abs/2018AGUFM.A43P3364V>
- Russel, S.*, Vines, C.*, Sanchez, C.*, Bohrer, G., **Johnson, D.**, and Hatala Matthes, J., “Partitioning Sources of Methane Emissions Near a Hydraulic Fracturing Field In West Virginia Using Stable Isotopes,” American Geophysical Union Fall Meeting, 2018, *Abstract*.
<http://adsabs.harvard.edu/abs/2018AGUFM.B41H2812R>
- Darzi, M.*, **Johnson, D.**, Heltzel, R.*, and Clark, N., “Direct Quantification of Methane Emissions across the Supply Chain: Identification of Targets for Mitigation,” American Geophysical Union Fall Meeting, 2017, *Abstract*.
<http://adsabs.harvard.edu/abs/2017AGUFM.A41F2360D>.
- **Johnson, D.** – Co-Author and Editor, “Petroleum Reduction Technologies,” National Alternative Fuels Training Consortium, 2012. ISBN 978-1-933954-42-4 and ISBN 978-1-933954-43-1.
- **Johnson, D.** “Understanding Energy Content.” NAFTC eNEWS. Let’s Clear the Air. December 20 2012. http://naftcenews.wvu.edu/naftc_enews/tags/cleartheair.
- **Johnson, D.** “CNG Use Ramping Up and NAFTC CNG Materials Getting Revamped.” NAFTC eNEWS. Let’s Clear the Air. November 30, 2012.
http://naftcenews.wvu.edu/naftc_enews/2012/11/30/let-s-clear-the-air.
- **Johnson, D.** “New Vehicles, More Acronyms.” NAFTC eNEWS. Let’s Clear the Air. July 25 2012. http://naftcenews.wvu.edu/naftc_enews/2012/7/25/new-vehicles-more-acronyms.
- **Johnson, D.*** “Implementation of Wet Scrubbing Technologies to Marine Diesel Engines for the Reduction of NOx Emissions, Doctoral Dissertation, West Virginia University College of Engineering and Mineral Resources. Morgantown, WV. May 2012.
- **Johnson, D.*** “In the Meantime: Reducing Fuel Consumption and Decreasing Your Carbon Footprint without Purchasing a New Vehicle.” NAFTC eNEWS. Let’s Clear the Air. April 5 2012. http://naftcenews.wvu.edu/naftc_enews/2012/4/5/let-s-clear-the-air.

- **Johnson, D.***, Ayre, L.*, and Clark, N.; “Marine Engine Sea Water Scrubber Report,” Center for Alternative Fuels, Engines & Emissions, West Virginia University, 2011, submitted to M.J. Bradley & Associates for inclusion in Final Project Report to Texas Environmental Research Consortium.
<http://files.harc.edu/Sites/TERC/NTRD/Projects/N040FinalReport.pdf>.
- **Johnson, D.***, Bedick, C.*, and Clark, N.; “Independently Controlled Urea-SCR Report,” Center for Alternative Fuels, Engines & Emissions, West Virginia University, 2009, submitted to M.J. Bradley & Associates for inclusion in Final Project Report to Texas Environmental Research Consortium.
<http://files.harc.edu/Sites/TERC/NTRD/Projects/N022FinalReport.pdf>
- **Johnson, D.*** Design and Testing of an Independently Controlled Urea-SCR System for Marine Diesel Applications, Master’s Thesis, West Virginia University College of Engineering and Mineral Resources. Morgantown, WV. August 2008.

*=student, underline = presenter

Graduate Students (Current)

Committee Chair

1. Benjamin Thornton, ME, Direct-Track PhD, Methane Mitigation Research, Expected Graduation May 2024.
2. Juan Pablo Rincon, ME, PhD, Methane Mitigation Research, Expected Graduation May 2024.
3. Zachary Peek, ME, MS, Longwall Methane System, Expected Graduation May 2023.

Committee Member

1. Jack Connor, ME, MS, TBD, Expected Graduation December 2021.
2. Mohammed Tamim Zaki, CE, PhD, Expected Graduation December 2022.
3. Nicholas Wells, ME, MS, TBD, Expected Graduation May 2022.
4. Nicholas Lindenfeldar, ME, MS/PhD, TBD, Expected Graduation August 2024.
5. Mustapha Animashaun, ME, PhD, Linear Engines, Expected Graduation May 2022.
6. Filiz Kazan, ME, PhD, TBD, Expected Graduation August 2024.

Graduate Students (Previous)

Committee Chair

1. Robert Heltzel, ME, PhD, On the Improvement of the Indirect Quantification of Methane Emissions: A Stationary Single Sensor Approach, Graduated August 2021.
2. Brian Cappellini, ME, MS, Improving Real-time Methane Monitoring in Longwall Coal Mines Through System Response Characterization of a Multi-Nodal Methane Detection Network, Graduated August 2021.
3. Diego Dranuta, ME, MS, Analysis on Combined Heat and Power, and Combined Heat and Power Hybrid Systems for Unconventional Drilling Operations, Graduated August 2021.
4. Amber Barr, ME, MS, Design and Development of a Multi-Nodal Methane Detection System for Longwall Coal Mining, Graduated December 2020.
5. Mahdi Darzi, ME, PhD, A Framework for Energy Optimization of Small, Two-Stroke, Natural Gas Engines for Combined Heat and Power Applications, Graduated August 2019.
6. Dakota Oliver, ME, MS, Implications of Sampling Methods on Geospatial Mapping of Methane Sources, Graduated August 2019.

7. Christopher Ulishney, ME, MS, Experimental Design, Testing, and Evaluation of Methods to Improve the Efficiency and Reduce Emissions from a Small Two-Stroke Natural Gas Engine. Committee Chair, Graduated December 2018.
8. Robert Heltzel, ME, MS, Development of Engine Activity Cycles for the Prime-Movers of Unconventional Well Completion. Committee Chair. Graduated August 2016.
9. Nathan Fowler, ME, MS, A Parametric Study on the Effects of Ignition Timing, Spark Plug Type, and Exhaust Gas Recirculation on a Legacy 2-Stroke Lean Burn Natural Gas Engine. Committee Chair. Graduated May 2016.

Committee Member

1. Saroj Lamichhane, IE, MS, An eQUEST Based Building Energy Modeling Analysis for Energy Efficiency of Buildings, Graduated August 2021.
2. Vivash Karki, IE, MS, Determination of Effectiveness of Energy Management System in Buildings, Graduated August 2021.
3. Christian Hushion, ME, MS, Development of Thermal Management Strategies Using Cylinder Deactivation for Low Load Operation in Heavy-Duty Diesel Trucks, Graduated August 2021.
4. Ghadi Sadek, ME, MS, Investigating Nox Vs Co2 Tradeoff in Hd Emissions Through the Years Under the Scope of Carb's 3binMaw Method, Graduated August 2021.
5. Mark Kerby, ESE, MS, Methane Emissions from Natural Gas Process and Delivery System - Coursework, Graduated May 2021.
6. John Adam Phillips, ME, MS, Investigation of Particle Measurement in Different Dilution Ratios with A Gasoline Direct Injection and Port Fuel Injection Vehicle, Graduated December 2020.
7. Nima Zamani, ME, PhD, Design and Optimization of Dynamic System for a One-kW Free Piston Linear Engine Alternator-GENSETS Program, Graduated December 2020.
8. Furkan Kodakoglu, ME, PhD, Experimental, Computational and Analytical Studies towards a Predictive Scenario for a Burning Accident, Graduated August 2020.
9. Rasik Pondicherry, ME, PhD, Development of an Activity-based Windowing Approach to Evaluate Real-World NOx Emission from Modern Medium and Heavy-Duty Diesel Trucks, Graduated August 2020.
10. Mehar Bade, ME, PhD, Measured and Modeled Performance of a Spring Dominant Free Piston Engine Generator, Graduated May 2020.
11. Vishnu Padmanaban, ME, PhD, Investigation of Pathways to Enhance SCR De-NOx Efficiency in Heavy Duty Diesel Vehicle Using an Optical Access Visualization Approach, Graduated December 2019.
12. Adam James, ME, MS, Design and Implementation of An Instantaneous Fuel Mass Flow Measurement System for Use in Verification of Locomotive Emissions, Graduated May 2019.
13. Sashank Jammalamada, ME, MS, Investigation of Natural Gas Fuel Composition onto Emissions and Performance of a Heavy-Duty Natural Gas Engine. Graduated May 2018.

Undergraduate Students

- Daniel O'Meara (July 2021 – Present), Kyle Draper (January 2020 – December 2020), Jacob Delloma (Fall 2019), Lisa Hilgar (June - November 2019), John Ruszkowski (September 2018 - May 2019), Brian Cappellini (June - December 2018), Rebekah Barrow (2015-2018), Christopher Ulishney (2016), Robert Heltzel (2014).

Invited Reviewer

- ASME Conference Papers (2017, 2 x 2018, 2 x 2020, 2021)
- ASME Journal Papers (2017, 2018, 2020)
- Atmospheric Environment (2015, 2020, 2021)
- Carbon Management-GHG (2015)
- Chemical Engineering Science (2018)
- Clean Technologies-MPDI (2018)
- Energy Reports (2021)
- Energy Science and Engineering (2015)
- Energy Technology (2016, 2017)
- Environmental Pollution (2019)
- Environmental Protection Agency (2016)
- Environmental Science and Technology (2 x 2015, 2016, 3 x 2017, 2018, 2 x 2019, 2020)
- Environments-MPDI (2016)
- Fuel (2019, 2020)
- Journal of the Air and Waste Management Association (2017)
- Measurements (2019)
- National Energy Technology Laboratory (2017)
- SAE Conference Papers (2015, 2018)
- Science of the Total Environment (2020)

Professional Organizations

- Society of Automotive Engineers (SAE)
- American Society of Mechanical Engineers (ASME)
- Air and Waste Management Association (AWMA)
- American Chemical Society (ACS)
- American Geophysical Union (AGU)
- American Society for Engineering Education (ASEE)
- American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) – Student Branch Advisor (2019 – Present)
- Professional Engineer (PE 22704), The State Board of Registration for Professional Engineers of West Virginia. (2017 – 2022)
- Engineering Intern (EI – Certificate Number - 10126), The State Board of Registration for Professional Engineers of West Virginia. (2017)

Academic Honors & Awards

- Statler College – Feature Friday (2021)
- Statler College – Outstanding Educator (2019/2020)
- Statler College – Junior Excellence in Research of the Year (2018/2019)
- WVU Honors Faculty Fellow (2018/2019)
- WVU Climb Higher Nominee - 2015
- Graduate Automotive Technology Education (GATE) Program Scholar (2006)
- Dean’s List (3.5 GPA or higher) at WVU (Spring 2004 & Spring 2005)
- President’s List (4.0 GPA) at WVU (Fall 2004 & Fall 2005)
- Promise Scholarship (2002-2006)
- Morgantown Energy Associates Scholarship (2002-2003)