



The Combustion Institute

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Kelly Senecal, Ph.D.

2024 Candidate Profile: The Combustion Institute Board of Directors

Reasons for Nomination

With over 25 years of experience in reactive flow computational fluid dynamics (CFD) through my company, Convergent Science, I've collaborated extensively with numerous entities, including corporations, universities, and national laboratories. My deep understanding of industry requirements in the field of combustion equips me to contribute effectively to The Combustion Institute (CI) Board of Directors. One notable initiative I spearheaded is the Computational Chemistry Consortium (C3), which fosters collaboration between original equipment manufacturers (OEMs) and academic/research institutions to develop a comprehensive kinetic mechanism covering both conventional and alternative fuels. This mechanism now drives the design of cleaner combustion systems.



In addition to my professional achievements, my passion for advancing combustion technology is evident, notably showcased in my 2016 TEDx talk "In Defense of Internal Combustion" shortly following the Dieselgate scandal. I have dedicated considerable effort to dispelling misconceptions surrounding combustion and alternative technologies. My recent book, *Racing Toward Zero*, underscores the importance of embracing a variety of technologies, including sustainable combustion options, in shaping the future of transportation. Advocating for such solutions is crucial for attracting new talent to the combustion sciences, a mission I am eager to pursue within the CI Board.

See the next page for the candidate's curriculum vitae.

Biographical Sketch of Kelly Senecal, Ph.D.

Current Positions

- Co-founder and Owner of Convergent Science, developer of the CONVERGE CFD software.
- Co-founder and Director of the Computational Chemistry Consortium.
- Visiting Professor at the University of Oxford.

Education

- Ph.D. in Mechanical Engineering from the University of Wisconsin-Madison.
- M.S. in Mechanical Engineering from the University of Wisconsin-Madison.
- B.A. in Physics from Lawrence University.

Select Honors and Awards

- Fellow of The Combustion Institute (CI).
- Fellow of the Society of Automotive Engineers (SAE).
- Fellow of the American Society of Mechanical Engineers (ASME).
- Recipient of the ASME Dedicated Service Award, 2024.
- Recipient of the SAE John Johnson Diesel Engine Research Medal, 2023.
- Winner of the Independent Press Award for Environment, 2022.
- Signature Lecture Speaker at the University of Georgia, 2022.
- Recipient of the ASME Internal Combustion Engine Award, 2019.
- Recipient of multiple HPCwire Awards for Best Use of HPC in Industry, Best Use of HPC in Automotive, and Best Use of HPC for Data Analytics and Artificial Intelligence, 2019, 2020, 2021.

Scientific Record

- Publications: 125
- H-index (Google Scholar): 45
- Citations (Google Scholar): 6,500
- Keynotes and invited talks: 75+

Select Publications

- Senecal, Kelly and Leach, Felix, *Racing Toward Zero: The Untold Story of Driving Green*, SAE International, 2021.
- Kalghatgi, Gautam, Avinash Kumar Agarwal, Felix Leach, and Kelly Senecal, editors. *Engines and Fuels for Future Transport*, Springer, Singapore, 2022.
- Shijun Dong, Scott W. Wagnon, Luna Pratali Maffei, Goutham Kukkadapu, Andrea Nobili, Qian Mao, Matteo Pelucchi, Liming Cai, Kuiwen Zhang, Mandhapati Raju, Tanusree Chatterjee, William J. Pitz, Tiziano Faravelli, Heinz Pitsch, Peter Kelly Senecal, Henry J. Curran, "A new detailed kinetic model for surrogate fuels: C3MechV3.3," *Applications in Energy and Combustion Science*, 2021, 100043, ISSN 2666-352X.
- Senecal, P. K., Richards, K. J., Pomraning, E., Yang, T., Dai, M. Z., McDavid, R. M., Patterson, M. A., Hou, S. and Shethaji, T., "A New Parallel Cut-Cell Cartesian CFD Code for Rapid Grid Generation Applied to In-Cylinder Diesel Engine Simulations," *SAE 2007-01-0159*, 2007.
- Senecal, P. K., Pomraning, E., Richards, K. J., Briggs, T. E., Choi, C. Y., McDavid, R. M. and Patterson, M. A., "Multi-Dimensional Modeling of Direct-Injection Diesel Spray Liquid Length and Flame Lift-Off Length Using CFD and Parallel Detailed Chemistry," *SAE 2003-01-1043*, 2003, *SAE Transactions*, Vol. 112, Section 3, pp. 1331-1351.

Select Professional Service

- Executive Committee Chair, 2024-Present, and Member, 2019-Present, ASME ICE Division.
- Member of the Advisory Committee for the Combustion Webinar, organized by Princeton University, 2020-Present.
- Member of the Scientific Advisory Committee for various conferences, including THIESEL (Spain) and others.
- Member of the Board of Advisors, Central States Section of The Combustion Institute, 2014-Present.
- Founder and chair of the ASME webinar series "The Future of the Internal Combustion Engine," 2021-Present.
- Member of various award committees including the Peters Award (CI) and the ICE Award (ASME).
- Reviewer and editor for various journal articles, conference papers, book chapters, and funding proposals.
- Routine challenger of the demonization of combustion in articles, invited talks, podcasts, and social media.