Exponent®
Engineering & Scientific Consulting

Achim Wechsung, Ph.D., P.E., CFEI

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Professional Profile

Dr. Wechsung applies his 17+ years of chemical and mechanical engineering expertise to investigate industrial incidents and analyze issues arising over the life cycle of industrial processes ranging from design, engineering, and construction through operation and maintenance extending after operations ceased. He also investigates product releases, fires and explosions and their origin and cause.

Dr. Wechsung consults for process industry clients such as alternative energy including hydrogen, petrochemical, chemical and industrial processing, oil and gas, pulp and paper, power generation and utilities. His expertise includes process safety, fire and explosions, product releases, risk analysis, historical site operations, greenhouse gas (GHG) emissions inventory accounting and lifecycle assessments (LCAs), and advanced modeling.

Dr. Wechsung has investigated incidents at petroleum refineries, chemical, industrial and waste processing plants and storage facilities and fires and explosions at residential and industrial sites. He has analyzed the flows of contaminants of concerns such as per- and polyfluoroalkyl substances (PFAS) and other hazardous substances through industrial sites from receipt through processing to waste treatment and discharge and testified at deposition. Dr. Wechsung has supported clients in international arbitrations concerning the design, engineering, construction, and commissioning of chemical plants and power generation systems and authored multiple international arbitration reports.

Dr. Wechsung is experienced in modeling, simulating, and optimizing industrial processes and process networks. He leverages his understanding of multi-component thermodynamics, fluid dynamics and reactive systems to analyze process scale-up, upsets, loss of containment, runaway reactions, and product releases from process systems and product storage. He is skillful in using commercial chemical process simulators such as Aspen Plus© and interpreting process historian data.

Dr. Wechsung also advises clients on greenhouse gas (GHG) emissions inventory accounting as it relates to corporate climate change disclosures and voluntary carbon offset markets. He has conducted lifecycle assessment (LCA) to quantify greenhouse gas emissions and understand the benefits of re-used and recycled products.

Dr. Wechsung has evaluated infringement and validity of patents and trade secrets for petroleum technologies. He has performed dust hazard analyses (DHA) for manufacturers handling combustible organic and metal dusts, hazard identification (HAZID) workshops and process hazard analyses (PHA) such as HAZOPs.

Prior to joining Exponent, Dr. Wechsung worked in multiple roles for BASF, one of the world's largest chemical companies. There, he held key roles in multiple industrial process development projects, including methane pyrolysis for sustainable hydrogen production with a reduced carbon footprint. He has successfully supported pilot plant operations for process scale-up and has worked closely with major

multinational engineering companies to bring new technologies to the market. He led research project teams and conducted thorough risk assessments. He advanced digital capabilities of BASF's research and development organization including steady-state and dynamic process modeling and simulation tools. Additionally, he has advised senior management on the impact and mitigation of incidents affecting chemical production at the world's largest integrated chemical complex in Ludwigshafen, Germany, a site with more than one hundred plants. He understands the value contained in industrial data sets and is experienced in analyzing these with state-of-the-art methods to draw actionable conclusions.

Previously, he conducted his Ph.D. research at Massachusetts Institute of Technology (MIT) in the Department of Chemical Engineering. His research focused on developing cutting-edge numerical methods for optimization of nonlinear models and their application in case studies taken from liquefied natural gas (LNG) processing and coal combustion.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Massachusetts Institute of Technology (MIT), 2014

Dipl.-Ing., Mechanical Engineering, RWTH Aachen University, Germany, 2008

Licenses and Certifications

Professional Engineer Chemical, California, #7005

Professional Engineer Chemical, Kentucky, #41319

Professional Engineer Chemical, Massachusetts, #60537

Professional Engineer Chemical, New Jersey, #24GE06249300

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

BASF SE, 2013-2019

Professional Affiliations

American Institute of Chemical Engineers (Senior Member, AIChE)

National Association of Fire Investigators (NAFI)

National Fire Protection Association (NFPA)

- Principal Member of the Committee on Hydrogen Technology responsible for NFPA 2 Hydrogen Technologies Code

- Alternate Member of the Committee on Classification and Properties of Hazardous Chemical Data responsible for NFPA 704 Standard System for the Identification of the Hazards of Materials for Emergency Response

International Council on Large Electric Systems (CIGRE)

- Member of Joint Working Group C5/C1.35 Integration of hydrogen in electricity markets and sector

regulation

CSA Group

- Member of the Fuel Cell Technical Committee

- Member of the Hydrogen Generators – Fuel Processing Technical Subcommittee

- Member of the Stationary Fuel Cell Power Systems Technical Subcommittee

Verein deutscher Ingenieure (VDI)

Languages

German

Patents

Appel H, Bernnat J, Glenk F, Kolios G, Olbert G, Scheiff F, Zoels B, Kern M, Flick D, Anderlohr CA, Klingler D, Wechsung A. Solids-packed apparatus for performance of endothermic reactions with direct electrical heating. US11,882,629.

Kolios G, Zoels B, Kern M, Bernnat J, Koenig R, Glenk F, Wechsung A. Method and device for carrying out endothermic gas phase-solid or gas-solid reactions. US11,691,115.

Zander HJ, Weikl M, Bode A, Klingler D, Kern K, Kolios G, Wechsung A, Scheiff F, Flick D, Antweiler N, Büker K. Reactor for high temperature endothermic reactions. EP 3,947,261.

Appel H, Bernnat J, Glenk F, Kolios G, Olbert G, Scheiff F, Zoels B, Kern M, Flick D, Anderlohr CA, Klingler D, Wechsung A. Device packed with solid matter for conducting endothermic reactions with direct electric heating. EP 3,744,154.

Publications

Hashad K, Wechsung A, Dimitrakopoulos G, Myers TJ. Promise and Potential Limitations of Power-to-heat Technologies. Proceedings, TAPPICon 2025, Minneapolis, MN, 2025.

Filie A, Wechsung A, James J, Morrison AM. Counting your C's: opportunities and risks associated with carbon credits. Proceedings, AIChE Spring Meeting & 21th Global Congress on Process Safety, Dallas, TX, 2025.

Ibarreta AF, Wechsung A, Hart RJ, Morrison DR, Reding N. Blended natural gas/hydrogen fuel gas systems: An evaluation of risk. Process Safety Progress 44:2 (2025) 232-238

Wechsung A, Orella MJ, Kersey KD, Myers, TJ. The energy transition — how will it impact fire investigation. Proceedings, ISFI, Orlando, FL, 2024.

Wechsung A, Barry MT, Dimitrakopoulos G, Spray RL, Colella F, Myers, TJ. Lithium-ion battery fire investigation fundamentals. Proceedings, ISFI, Orlando, FL, 2024.

Kytömaa H, Wechsung A, Dimitrakopoulos G, Cook N, Jaimes D, Hur I, Faraji S. Industry R&D needs in hydrogen safety. Applications in Energy and Combustion Science 18 (2024) 100271.

Reding N, Morrison DR, Hart RJ, Wechsung A, Ibarreta AF. Blended Natural Gas / Hydrogen Fuel Gas Systems: An Evaluation of Risk. Proceedings, 2023 Spring Meeting & 19th Global Congress on Process

Safety, Houston, TX, 2023.

Wechsung A, Yen M, Ibarreta AF, Myers TJ, Kytomaa HK. Venting of Hydrogen Explosions. Proceedings, AIChE Spring Meeting & 19th Global Congress on Process Safety, Houston, TX, 2023.

Wechsung A, Wikramanayake E, Banning M, Stern M, Buehler C, Long R, Kytomaa H. Hydrogen Fire Safety: An Old Acquaintance in New Roles. Fire Protection Engineering, 2022; 94:16-20.

Wechsung A, Buehler CS, James JN, Morrison AM, Stern MC. Carbonomics: introduction to carbon pricing, regulations, and frameworks. Chemical Engineering Progress, 2022, September:23-29.

Stern MC, Orella MJ, Wechsung A, Buehler CS. Carbon capture vs lithium ion batteries – which pairs better with renewable electricity? Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James JN, Morrison AM, Wechsung A, Buehler CS. Carbonomics: introduction to carbon pricing, regulations, and frameworks. Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James J, Morrison AM, Wechsung A, Buehler CS. Life cycle assessments: corporate value or potential risk lies in the details. Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Wechsung A, Buehler CS. What did I actually buy—guarantees of origin for hydrogen. Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Wechsung A, Watson HAJ, Scott JK, Barton PI. Reverse propagation of McCormick relaxations. Journal of Global Optimization, 2015; 63: 1-36.

Stuber MD, Wechsung A, Sundaramoorthy A, Barton PI. Worst-case design of subsea production facilities using semi-infinite programming. AIChE Journal, 2014; 60:2413-2524.

Wechsung A, Barton PI. Global optimization of bounded factorable functions with discontinuities. Journal of Global Optimization, 2014; 58: 1-30.

Wechsung A, Schaber SD, Barton PI. The cluster problem revisited. Journal of Global Optimization, 2013; 58: 429-438.

Wechsung A, Aspelund A, Gundersen T, Barton PI. Synthesis of heat exchanger networks at subambient conditions with compression and expansion of process streams. AIChE Journal, 2011; 57: 2090-2108.

Wechsung A, Oldenburg J, Yu J, Polt A. Supporting chemical process design under uncertainty. Brazilian Journal of Chemical Engineering, 2010; 27: 451-460.

Presentations

Hashad K, Wechsung A, Dimitrakopoulos G, Myers TJ. Promise and Potential Limitations of Power-to-heat Technologies. Poster presentation, TAPPICon 2025, Minneapolis, MN, 2025

Filie A, Wechsung A, James J, Morrison AM. Counting your C's: opportunities and risks associated with carbon credits. Oral presentation, AIChE Spring Meeting & 21th Global Congress on Process Safety, Dallas, TX, 2025.

Wechsung A, Orella MJ, Kersey KD, Myers, TJ. The energy transition — how will it impact fire investigation. Oral presentation, ISFI, Orlando, FL, 2024.

Wechsung A, Barry MT, Dimitrakopoulos G, Spray RL, Colella F, Myers, TJ. Lithium-ion battery fire investigation fundamentals. Oral presentation, ISFI, Orlando, FL, 2024.

Dimitrakopoulos G, Kytömaa H, Wechsung A. Reducing Risk: Safety and Efficiency Considerations for Electrolyzer Integration. World Electrolysis North America, Boston, MA, 2024.

Kytömaa H, Wechsung A, Dimitrakopoulos G, Cook N, Jaimes D, Hur I, Faraji S. Industry R&D needs in hydrogen safety. Industry R&D Needs in Hydrogen Safety. Industry Invited Perspective. Combustion Institute's 40th International Symposium, Milan, Italy, 2024.

Wechsung A, Sulmonetti T, Myers TJ, Kytomaa HK. Safely Implementing an Explosive Hydrogen Market: Applying Lessons Learned to Expanding Hydrogen Usage. 2024 Spring Meeting & 20th Global Congress on Process Safety, New Orleans, LA, 2024.

Wechsung A, Dimitrakopoulos G, Hashad K, Myers TJ. Are Power-to-Heat Technologies Ready to Transition Your Facility? 2024 Spring Meeting & 20th Global Congress on Process Safety, New Orleans, LA, 2024.

Wechsung A, Hart RJ, Morrison, DR, All Aboard: Hydrogen on Rail. Oral presentation, 2024 Center for Hydrogen Safety Americas Conference, Las Vegas, NV, 2024.

Wechsung A, Hietala D. Obviously New or Just a Copy – Engineers Play a Critical Role in Evaluating Patent or Trade Secret Infringement Claims. Oral presentation, AIChE Annual Meeting, Orlando, FL, 2023.

Wechsung A, Reding N, Ibarreta AF, Myers TJ. Navigating Unfamiliar Territory: US Hydrogen Safety Regulations and European Standards. Oral presentation, 2023 Center for Hydrogen Safety Europe Conference, Rotterdam, Netherlands, 2023.

Reding N, Morrison DR, Hart RJ, Wechsung A, Ibarreta AF. Blended Natural Gas / Hydrogen Fuel Gas Systems: An Evaluation of Risk. Oral presentation, 2023 Spring Meeting & 19th Global Congress on Process Safety, Houston, TX, 2023.

Wechsung A, Yen M, Ibarreta AF, Myers TJ, Kytomaa HK. Venting of Hydrogen Explosions. Poster presentation, AIChE Spring Meeting & 19th Global Congress on Process Safety, Houston, TX, 2023.

Stern MC, Orella MJ, Wechsung A, Buehler CS. Carbon capture vs lithium ion batteries – which pairs better with renewable electricity? Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James J, Morrison AM, Wechsung A, Buehler CS. Carbonomics: introduction to carbon pricing, regulations, and frameworks. Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James J, Morrison AM, Wechsung A, Buehler CS. Life cycle assessments: corporate value or potential risk lies in the details. Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Wechsung A, Buehler CS. What did i actually buy—guarantees of origin for hydrogen. Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

White CC, Streifel BC, Wechsung A, Myers TJ. Understanding the pathways for residual PFAS during fluoropolymer processing. Oral presentation, ACS Spring Meeting, San Diego, CA, 2022.

Wechsung A, Orella MJ, Stern MC, Kytomaa HK, Green hydrogen – removing hurdles and creating the right incentives to make it viable. Oral presentation, AIChE Annual Meeting, 2021.

Orella MJ, Wechsung A, Stern MC, Kytomaa HK, An electrofuel revolution: how direct carbon reduction can electrify the future. Oral presentation, AIChE Annual Meeting, 2021.

Sulmonetti TP, Buehler CS, Wechsung A, Dee SJ. Transitioning from one explosive fuel to the next - safety considerations in the emerging hydrogen economy. Poster presentation, AIChE Spring Meeting & 17th Global Congress on Process Safety, 2021.

Watson HAJ, Wechsung A. Use of nonsmooth models and generalized derivatives to improve the robustness of process simulations. Oral presentation, AIChE Spring Meeting & 16th Global Congress on Process Safety, 2020.

Bode A, Castro-Arce J, Heid B, Henschel C, Wechsung A, Wojcicka J. Process Technology Licensing: An Interface of Engineering and Business. Oral presentation, 12th International Symposium on Process Systems Engineering and 25th European Symposium on Computer Aided Process Engineering, Copenhagen, Denmark, 2015.

Wechsung A, Kellenbenz J, Klingler D, Bode A. R&D at BASF: Developing a more sustainable route to hydrogen and syngas. Invited oral presentation, AVT Kolloqium, Aachen, Germany, 2014.

Wechsung A, Barton PI. On-line modeling of NOx formation in a coal boiler. Poster presentation, European Symposium on Computer Aided Process Engineering, Lappeenranta, Finland, 2013.

Wechsung A, Barton PI. Improving relaxations of implicit functions. Oral presentation. International Symposium on Mathematical Programming, Berlin, Germany, 2012.

Wechsung A, Barton PI. Convex, continuous relaxations of discontinuous factorable functions. Oral presentation, INFORMS Annual Meeting, Charlotte, NC, 2011.

Wechsung A, Barton PI. Design of a self-supporting natural gas liquefaction process for accessing stranded off-shore resources. Oral presentation. AIChE Annual Meeting, Minneapolis, MN, 2011.

Wechsung A, Barton PI. Relaxations of bounded factorable functions with discontinuities. Oral presentation. 2nd World Congress on Global Optimization, Chania, Greece, 2011.

Wechsung A, Barton PI. Global optimization of discontinuous functions. Oral presentation. AIChE Annual Meeting, Salt Lake City, UT, 2010.

Wechsung A, Oldenburg J, Yu J, Polt A. Supporting chemical process design under uncertainty. Poster presentation. 10th International Symposium on Process Systems Engineering, Salvador, Brazil, 2009.