

Abstract Template

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Pulsed Electric Field Processing: From Scientific Concept to Industrial Reality – The ELEA Story

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Pulsed Electric Field (PEF) technology provides a compelling example of how an emerging food processing concept can evolve into industrial application. While the scientific foundations of electroporation have been established for decades, the transition from laboratory-scale experiments to reliable industrial implementation required overcoming a wide range of technical, economic, and organizational challenges.

Drawing on more than two decades of industrial experience, this presentation shares key lessons learned from the development and commercialization of PEF technology from the perspective of a technology developer and equipment manufacturer. Over time, PEF has progressed from a niche research topic to an established processing technology with applications in potato processing, fruits and vegetables, juice production, beverages, and other food sectors. Today, industrial PEF systems operate in food processing facilities around the world, delivering measurable benefits in process efficiency, product quality, and resource utilization.

Beyond the technical aspects, the presentation will reflect on key lessons learned in bringing an innovative food technology to market. Topics include technology validation, scale-up from laboratory investigations to industrial throughput, intellectual property strategies, collaboration between academia and industry, customer adoption, and the development of viable business models. Particular attention will be given to the importance of creating clear economic value for food processors, as technological superiority alone is rarely sufficient to achieve widespread market acceptance.

The presentation will also discuss current developments and future opportunities for electroporation-based technologies. These include the integration of inline sensing and advanced process control, emerging applications in fermentation processes and alternative protein production, the development of economically attractive business models for seasonal industries, and the scaling of electroporation technologies to entirely new throughput levels. These challenges represent not only significant opportunities for innovation, but also important lessons still to be learned as food engineering continues to bridge scientific discovery and industrial implementation.