

## A Profile of John McDonald

# A Pioneer in Power System Automation and Leadership

**From the Managing Editor:** *When I first met John McDonald, he was emceeding a client conference for GE. It struck me that his vast knowledge of, and commitment to excellence in his career, his volunteer life, and in his personal life, is a model for what I believe we must try to follow as engineers, as husbands, fathers and as leaders. I got to know him a little at the conference.*

*I got to know John a lot better at our lunches at Seasons 52, an Atlanta restaurant we both love, where I learned that John was a gift to our industry and a gift to IEEE PES and CIGRE based on his commitment to his career and his willingness to share with others. At many events John has been one of my "Go To" interviews of thought leaders for insight into the power industry.*

*When I read this profile published in PAC World Magazine in June 2020, calling him a Guru, I knew we had to share it with our community, as a way of challenging each of us, especially for those young engineers just entering the industry.*

**Many thanks to:** *PAC World Editor-in-Chief, Dr. Alex Apostolov, himself a Guru, who graciously allowed us to share this interview they did with John.*



Photo: John McDonald

# John McDonald

### How did you become involved in the development of energy management and control systems?

**JM** After nearly five years with Bechtel Corporation, I joined Brown Boveri Control Systems, Inc. (BBCSI) in Santa Clara, California, in 1979. The parent company Brown, Boveri & Compagnie (BBC) was a power engineering company with a new SCADA subsidiary. I became the first power engineer in BBC's SCADA subsidiary. That role introduced me to the development of energy management and control systems. On my first day, the top executive told me that BBCSI was short listed on a \$1 million proposal for a SCADA/Automatic Generation Control (AGC) system for a Midwest municipal utility. The proposal included four power system applications: Automatic Generation Control, Economic Dispatch Calculation, Interchange Transaction Scheduling and Interchange Transaction Evaluation (Economy A). BBCSI had a meeting scheduled in one week with a consultant steeped in power system application experience. BBCSI had no previous experience with SCADA/AGC systems.

I had one week to learn about SCADA and the four power system applications to convince the consultant that BBCSI could successfully perform the project. We won the project.

### After about 15 years work on energy and distribution management systems (EMS/DMS) you decided to become a consultant. What triggered the change?

**JM** By 1995, if you add in another four years working for McGraw-Edison Power Systems, I had worked on SCADA/EMS/DMS for 17 years. I had been active in the IEEE PES Substations Committee, leading standards development in substation automation and communications protocols. I had been active in developing the Utility Communication Architecture (UCA) in North America, later integrated with Europe's IEC 61850. I knew a lot of people across the power industry. I had never thought about going into consulting. But I felt well prepared to leverage my experience in a new way. I wanted to stay in Atlanta. Through a friend, I learned of a need at the precursor to KEMA Consulting and signed on in 1995.

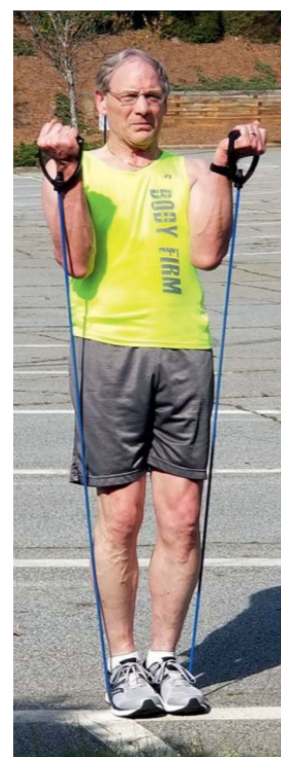
### In 2007 you joined GE Energy and you were there for 16 years, until retiring on November 30. What led you to work for a manufacturer?

**JM** By 2007, I had enjoyed working for KEMA Consulting for 12 years and thought I'd do that for the rest of my career. A friend alerted me to an executive level

position open at GE, reporting to the CEO of its T&D business. With changes underway at KEMA, it seemed like a good time for a career change. GE was the fourth automation system supplier (manufacturer) I worked for in my career.

When I was interviewed at GE, I was 56 years old, with 34 years of experience in T&D and 17 years of experience with three automation system suppliers. I had held many leadership positions in IEEE, IEEE PES and IEEE-SA (Standards Association). I had vastly more experience than anyone in the GE T&D business. GE's executive team saw the value I could bring to their business. Thus, I started working for the largest company in my career at the end of my career, which is the opposite of what I recommend to young professionals.

### You had started working with RTU-based EMS and have seen the transition to IEDs and integration-based systems. Was that transition difficult?



Yes. Our focus, for decades, was on data the RTU collected, processed, and sent upstream to the operators in the control center. With the advent of IEDs, we had two different types of data in the device to manage - operational and non-operational. However, our expertise, business processes, and organizational structure and skill sets were based on the traditional RTU data flowing to the operators. IEDs produced data that was not being utilized. The industry simply wasn't prepared to use it.

Eventually, the industry had to transition from an RTU-centric substation architecture to a network-based, distributed architecture with IEDs and data concentrators that could also route non-operational data to business groups across the utility. At that time, I led the IEEE PES standards development in substation automation as the IEEE PES Substations Committee Subcommittee CO Chair. When we updated IEEE Std C37.1 (for SCADA) in the early 1990s we introduced the term "Intelligent Electronic Device (IED)" so we would have an industry-wide term for the new microprocessor-based devices.

I introduced the concepts of operational and non-operational data in a guest editorial I wrote for IEEE Power & Energy Magazine (March/April 2003) titled "Substation Automation: IED Integration and Availability of Information". Even today, utilities are not realizing all the potential benefits from the available non-operational data throughout their enterprise. Sorry, I can't stop evangelizing for non-operational data!

### During the more than 40 years of your career, what was the most challenging project that you have been involved in?

**JM** When I joined BBCSI in 1979 and helped win the SCADA/AGC project with a municipal utility, BBCSI had no power application software and no experience with SCADA/AGC system projects. I had to source the four power application software programs we needed, then integrate them with our SCADA platform. I spent two months at corporate parent BBC in Baden, Switzerland, evaluating their power application software. Meanwhile, the project had already begun. I learned that Power Technologies, Inc. (PTI) in Schenectady, NY had developed the needed power applications for a utility in the Midwest, and they would run on the identical computer platform as our project. I licensed the four applications from PTI, did source code training at PTI, then worked with our software programmers at BBCSI to integrate the four applications with our SCADA platform. Since this was a "first" for BBCSI I wrote the documentation, test procedures and training material. I was 27 years old and had learned about SCADA and these four power applications a few months earlier. This was a very challenging project, with a lot of pressure to succeed, and we did.

### And the most satisfying one?

**JM** During my years with KEMA Consulting, three SCADA projects stand out.

One was a municipal utility, which had never had SCADA and lost a substation to a transformer explosion. I guided their SCADA implementation and substation automation.

Another municipal had SCADA, but it relied on a proprietary communications protocol from a defunct supplier. I helped them replace the SCADA master, implement substation automation and use protocol converters to use an industry standard protocol.

The third was a municipal agency with aging SCADA and a very slow scan rate. They needed a more accurate indication of customer load because they sold the difference between their

generation and load on the open market. The new SCADA system we implemented paid for itself in months.

### You have been actively involved in the development of the Smart Grid. How did that happen?

**JM** Actually, when the term "Smart Grid" first appeared, I took offense to it. Adding intelligence to the electric grid was not new. Many of us had been adding intelligence to the grid for decades. At Purdue my focus on digital computer modeling and analysis was truly new. I spent 50 years of my career on power system automation - adding smarts. So, I developed a PowerPoint slide I call the "Smarter Grid", which reflects already existing intelligence as well as the intelligence we were adding as part of "Smart Grid". It is important to recognize this point.

To young engineers

**Much of our work is art rather than science. One has to master the science, but it takes many years to learn the art - the application of the science.**

### In the last 25 years we have been developing IEC 61850. It is used today in thousands of substations around the world. What do you think about its role in the Smart Grid and why are some people still not using it?

**JM** The need for standard communications protocols and networking exists at three levels. For control center to control center data exchange, the one global standard is the Inter-control Center Communications Protocol (ICCP). For control center to field communications, the two standards globally are IEC 870-5-101 and 104 for European suppliers and IEEE 1815 (DNP3) for North American suppliers. For communications within the field, North American suppliers and utilities use IEEE 1815 (DNP3) and are beginning to adopt IEC 61850. The remainder of the world uses IEC 61850 to a much greater extent. I've seen a lot of global convergence in the past 25 years.

Globally, except for North America, utilities are comfortable with turnkey substation projects. Utilities in North America have standardized on one supplier's protective relay, a different supplier's transformer monitoring and diagnostic device, yet another supplier's tap changer monitor and control. With the turnkey approach the supplier has full control over all components,

therefore it's much easier to implement IEC 61850, due to long-established interoperability of components. The North American approach requires an integrator. That poses more risk due to potential lack of interoperability and that hampers greater implementation of IEC 61850.

#### When and why did you join the IEEE?

**JM** I joined IEEE in 1971 as an undergraduate EE student at Purdue. When Professor Ahmed El-Abiad suggested that we join IEEE, we didn't question him! Looking back, it has been invaluable to my career and 2024 marks 53 years of membership!

**You have been very actively involved for many years at all levels of the IEEE PES. How did you manage your high-level management positions at GE with all your responsibilities at the top levels of the IEEE PES?**

**JM** Briefly, it's about time management and staying ahead of deadlines to do quality work for either job or volunteer work. When collaborating, reach out early.

My professional roles enabled my volunteer work, just as volunteering advanced my career. And I manage these two roles in order to enjoy family time and respond to collegial requests for help. In addition, I mentor over 20 students and young professionals worldwide on a regular basis. You find the time to do the things you want to do.

**You are still very active also in CIGRE. What do you think is its role for the electric power industry compared to IEEE?**

**JM** The two organizations are complementary by having different approaches. First, CIGRE taught me a more global perspective on technology, as functionality and business cases differ by region. Second, participation in CIGRE by C-level executives translates to global networking opportunities. Third, CIGRE's focus is practical, not academic. Though IEEE is moving towards the policy implications of technology choices, it has vast and deep technical expertise. I would contrast them, but not compare them. Long ago I realized being a "complete" power engineer requires active involvement in both.



Photo: John McDonald



**What do you consider your greatest professional achievement?**

**JM** All the education and professional work I've done has enabled me to help others. No matter how busy I am, I will find time to help others succeed, without expecting anything in return. I've earned the opportunity to pay back the help I've received.

To young engineers

*My professional roles enabled my volunteer work, just as volunteering advanced my career. And I manage these two roles in order to enjoy family time and respond to collegial requests for help.*

**What do you consider your greatest personal achievement?**

**JM** Being happily married for over forty years with two children who are both happily married and having three grandchildren. I've managed my work/life balance, including extensive travel, in order to participate in my family's activities. By extension, that includes my own, my son's and my volunteer participation in Cub Scouts and Boy Scouts, as well as promoting STEM education for girls and boys. My son and I are Eagle Scouts.

**You have received many awards. Is there a specific one that you consider the most important?**

**JM** Three stand out. I was named an IEEE Fellow in 2003 "for technical leadership in the development of substation integration and automation". I helped pioneer the field of IED integration and substation automation and being named an IEEE Fellow recognized that work. I received the IEEE PES Meritorious Service

Award in 2015, bestowed by past winners for those who've made outstanding contributions in leadership, technical activities, and educational activities of IEEE PES. That was humbling. And now I'm chair of that award committee.

In 2022 I was elected to the National Academy of Engineering "for leadership in smart grid development and for advancing the professional growth of power system engineers". Election to the National Academy of Engineering is among the highest professional distinctions accorded to an engineer. Academy membership honors those who have made outstanding contributions to "engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature" and to "the pioneering of new and developing fields of technology, making major advancements in traditional fields of engineering, or developing/implementing innovative approaches to engineering education".

**You have so much knowledge and experience. How do you share it?**

**JM** I write, talk, teach, travel and mentor. After 50 years in the business, I have assembled my thoughts on career decisions in a talk titled "Key Insights to Career Management", to help young professionals, in an interview on mentoring for IEEE-HKN as Career Conversation Episode 2, and a talk titled "Building and Leading a Volunteer Organization".

To young engineers

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