

# BCIT's Smart Microgrid is Shaping the Future of Energy

Canada's electric power utilities are facing a serious crisis. Aging infrastructure, rising demand for electricity, and environmental concerns have made it crucially important to improve how the electrical grid manages both the distribution and intake of electricity. BCIT's Dr. Hassan Farhangi and smart microgrids have an integral role to play in solving this problem.

A smart microgrid is a modern, small-scale version of the electricity system with smart new features. They incorporate variable electricity generation such as wind and photovoltaic solar, which must either be used or stored when available. Smart microgrids can also connect and disconnect from the larger macrogrid without negative impact. Modern smart microgrids use forecasting, sensing, and communication technologies to more closely match demand and available generation. All of this is great, but with so much new technology, how do we know what will work with our existing grids and what won't? Dr. Farhangi wanted to answer this question.

Dr. Farhangi's research started in 2007 in close collaboration with BC Hydro. They developed a strategic road map to build North America's very first smart microgrid on BCIT's Burnaby campus.

"We were fortunate enough to get support from the government of BC through the ICE (Innovative Clean Energy) fund. Further funding was obtained from the federal government through the Western Economic Diversification fund to begin the project and lay the framework," says Dr. Farhangi.

BCIT's Burnaby campus is comprised of industrial areas, housing, office space, and commercial restaurants - all of the same components seen on a larger grid, just on a smaller scale. From this base, Dr. Farhangi and his team were able to smarten-up the infrastructure with the addition of photovoltaic and wind power sources and the technology to monitor the grid.

The success of the BCIT-BC Hydro smart microgrid project sparked the creation of the NSERC Smart Microgrid Network (NSMG-Net) of which Dr. Farhangi is the principal investigator and scientific director. This network is a multi-disciplinary research program, in partnership with government and industry that is testing and verifying the technologies and regulations required for Canada's future smart grid. NSMG-Net involves eight different universities, more than 50 researchers, and approximately 250 master's and PhD students.

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BCIT's smart microgrid provides much needed opportunities for electrical utility companies, technology providers, and researchers to work together to develop architecture, protocols, configurations, and models of the evolving smart grid. The work done here enables researchers to develop and validate technologies required to meet Canada's growing electricity needs.

"Energy is our biggest challenge in the new millennium. The fact of the matter is that, we are growing as an economy and there is a need for reliable energy across the country," says Dr. Farhangi.

Canada is not the only country with growing electricity needs. Dr. Farhangi's research has garnered international attention, with delegations from Mexico, Brazil, Singapore, China, and Europe touring the BCIT Smart Microgrid and learning how they can collaborate and apply his findings to their energy problems.

