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SPEEDING UP THE LINE SWITCHING SOLUTION

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When you need to move electricity from A to B, sometimes transmission bottlenecks force the use of expensive generators, increasing the cost to consumers. Paradoxically, switching some transmission lines out of service can relieve the need for the expensive generation. The problem is figuring out which transmission lines to switch in or out to optimize the network.

Juggling the different variables requires hours of computing, making it impractical for real-time adjustments. At least, that used to be the case. Now, Waterloo researchers have made the process a whole lot faster.

Management sciences professor David Fuller and two graduate students developed two different approaches. One solves a series of linear programs, removing one transmission line at a time to achieve a near-optimal configuration. The other solves a sequence of mixed integer programs (MIPs), likewise removing one line at a time. Each MIP is solved very quickly by an efficient heuristic.

When the researchers put these solutions to the test, they found that they could slash the computation time required substantially, yet still come up with solutions that saved as much money as the best current heuristics.

By reducing the computing time to a matter of minutes, Fuller and his students have made optimal transmission switching a practical option for grid managers, opening the door to big savings.

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