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Solving the unit commitment problems with quantum annealers.

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The Unit Commitment problem (UC) is a well known problem in the context of energy engineering and optimization. Generally described as a family of optimization problems where the energy production of some generators is coordinated based on an objective function, typically the minimization of costs or maximization of revenue. There exist many different versions that take into consideration one or multiple specifics depending on the practical case study considered. The problems in this family presents some common elements such as generators, consumption forecast, rules or laws (physical or legislative), error tolerance and a temporal horizon. In literature there are many classical and quantum techniques that solve this problem with varying degrees of success. In this article we will utilize a quantum annealing approach to solve a specific instance of the problem where we consider the presence of batteries and the performance of the energy market. We will first describe our problem in its general form, then move it to a quadratic programming, and lastly to a QUBO formulation. The latter problem will be solved by a quantum annealer and the result will be compared to a classical solution obtained through simulated annealing.

Theme

Theme 1. Energy advantage and cost of quantum technology

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