

The grid's most complex problem, solved with quantum.



Quantum-accelerated energy unit commitment delivers better schedules at lower cost, validated on an industrially relevant problem. Validated with bp on an industrially relevant problem

ENERGY UNIT COMMITMENT

1. The energy commitment problem

The energy unit commitment problem, deciding which generators to switch on or off and when to meet demand at minimum cost, involves tens to hundreds of thousands of variables at industrial scale. Classical solvers increasingly struggle to find optimal solutions within operational timeframes, and their rigid, precomputed schedules leave operators exposed when grid conditions change unexpectedly.

2. The value that ORCA delivers

Jij's JijZept SDK, in combination with ORCA's hybrid quantum solver, tackled a 25,755-variable energy unit commitment problem, one of the most computationally intensive challenges in electricity grid operations. It outperformed classical optimisation algorithms at every problem scale tested, and when grid constraints tightened unexpectedly the hybrid solution proved more robust to stress tests than the classical baseline.

3. What's next?

ORCA's next-generation PT-3 photonic quantum accelerator is projected to deliver 40% faster runtimes than classical baselines, bringing quantum scheduling to production-scale industrial environments.



This work with ORCA Computing, bp and the NQCC combines industrially relevant energy scheduling problems, commercial quantum hardware and rigorous hybrid optimisation workflows, providing a concrete benchmark for understanding where quantum computing may deliver value in large-scale energy optimisation."

Yu Yamashiro, Chief Executive Officer – JIJ Inc

25,755

variable energy unit commitment problem solved on ORCA's PT-2 photonic quantum accelerator

40%

faster projected time-to-solution on ORCA's nextgeneration PT-3 vs classical baselines

USE-CASE IMPLEMENTATION

Hybrid solution

PT-2 photonic quantum accelerator (48 qumodes)

Classical HPC with NVIDIA GPUs

ORCA SDK, JijZept SDK

Optimisation approach

Hybrid quantum-classical solver for energy unit commitment problem