QPU Decomposition Methods Benchmark (10-100 Farms)
6 QPU Methods + Classical/Hybrid Baselines

Solution Quality

Legend:
- PuLP (Optimal)
- DWave Hybrid CQM
- DWave BQM Hybrid
- HybridGrid(5,9)_QPU
- HybridGrid(10,9)_QPU
- PlotBased_QPU
- Multilevel(5)_QPU
- Multilevel(10)_QPU
- Louvain_QPU
- Spectral(10)_QPU
- cqm_first_PlotBased
- HybridGrid(5,9)_QPU
- HybridGrid(10,9)_QPU

Y-axis: Objective Value
X-axis: Number of Farms

Optimality Gap (vs Gurobi)

Legend:
- PlotBased_QPU
- Multilevel(5)_QPU
- Multilevel(10)_QPU
- Louvain_QPU
- Spectral(10)_QPU
- cqm_first_PlotBased
- HybridGrid(5,9)_QPU
- HybridGrid(10,9)_QPU
- Optimal
- 10% Gap

Y-axis: Gap from Optimal (%)
X-axis: Number of Farms

Solve Time Comparison
(PuLP: solve_time, DWave: hybrid_time, QPU: qpu_time)

Legend:
- PuLP (solve_time)
- DWave Hybrid (hybrid_time)
- DWave BQM (hybrid_time)
- PlotBased_QPU (qpu_time)
- Multilevel(5)_QPU (qpu_time)
- Multilevel(10)_QPU (qpu_time)
- Louvain_QPU (qpu_time)
- Spectral(10)_QPU (qpu_time)
- cqm_first_PlotBased (qpu_time)
- HybridGrid(5,9)_QPU (qpu_time)
- HybridGrid(10,9)_QPU (qpu_time)

Y-axis: Time (seconds, log)
X-axis: Number of Farms

Solution Efficiency vs Problem Size
(higher is better)

Legend:
- PuLP
- DWave Hybrid
- DWave BQM
- HybridGrid(5,9)_QPU
- HybridGrid(10,9)_QPU
- PlotBased_QPU
- Multilevel(5)_QPU
- Multilevel(10)_QPU
- Louvain_QPU
- Spectral(10)_QPU
- cqm_first_PlotBased
- HybridGrid(5,9)_QPU
- HybridGrid(10,9)_QPU

Y-axis: Efficiency (QPU: 1/(t×gap), Classical: obj/t)
X-axis: Number of Variables