

BNL-ATLAS Collaboration Ideas: Advancing Data Center Sustainability

Brookhaven National Laboratory's (BNL) data center operations team has extensive experience collaborating with leading technology companies, academia, and government funding agencies on data center efficiency projects. We see an excellent opportunity to explore synergies between BNL and ATLAS CERN data center teams to:

- Advance research on innovative cooling solutions to enhance operational efficiency.
- Leverage AI-driven automation to streamline and optimize sustainability processes.

Relevant BNL Expertise and Projects

- **AI and Energy Research Recognition:** BNL's work on AI training workloads running on heterogeneous GPU nodes was recently cited in a U.S. Congressional energy report.
- **Energy Optimization in Europe:** Led a successful collaboration at Europe's largest colocation data center (1.2 GW), achieving significant reductions in cooling costs and carbon footprint while creating opportunities for heat reuse, contributing to a circular economy.
- **ARPA-E COOLERCHIPS Award:** BNL is set to receive a \$250K ARPA-E grant to develop AI-based reliability modeling for air and liquid cooling systems, optimizing efficiency and resilience.

Inquiring About ATLAS Data Center Sustainability

Key Metrics

- What metrics are currently used at the ATLAS CERN data center to track energy efficiency and carbon footprint (e.g., PUE, GHG emissions)?
- Are there specific targets or benchmarks to achieve sustainability in data center operations?
- Is a digital twin incorporated for improving reliability and failure prediction?

Scaling Sustainability

- What strategies are in place to ensure sustainable scaling of power and cooling demands as the data center grows?
- Are there plans to test or adopt alternative energy sources or advanced cooling technologies to support sustainable expansion?

Challenges and Opportunities

- What are the primary challenges in balancing high-performance requirements with sustainability goals?
- Are there specific areas where collaboration on cooling technologies or decarbonization strategies could yield mutual benefits?

Next Steps

We propose hosting a follow-up meeting or workshop to align on shared research objectives and actionable next steps. This forum could focus on exchanging insights and identifying areas for joint innovation to drive sustainability in data center operations.