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# Sustainability Efforts at the KIT Scientific Computing Center

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KIT operates not only the GridKa WLCG Tier-1 Center but also extensive HPC facilities, large-scale storage services, and the fundamental KIT IT infrastructure.

Across these domains, we are actively working on various initiatives to optimize energy consumption and maximize waste heat reuse. We'll present our multifaceted approach which encompasses the following key areas:

1. **Component-Level Energy Profiling:** We meticulously measure the energy consumption of individual components within our data centers to identify potential hardware optimizations and enhance data center efficiency.
2. **Energy-Efficient Hardware Procurement:** When acquiring hardware for large-scale computing installations, we prioritize energy efficiency over the projected lifespan. Additionally, our involvement in the WLCG benchmarking working group enables us to rigorously test and select the most energy-efficient hardware.
3. **Optimized Data Center Cooling:** We implement different data center cooling strategies to significantly improve the Power Usage Effectiveness (PUE) of our facilities.
4. **Energy-Efficient Software and Resource Allocation:** We develop software solutions that leverage distributed and opportunistic resources, which are especially energy-efficient. Furthermore, this approach can be adapted to dynamically adjust the allocation of local computing resources based on external factors such as real-time CO<sub>2</sub> emissions associated with the energy mix.
5. **Energy-Conscious Data Center Planning:** The planning and location of new data centers are primarily driven by the potential for waste heat reuse, ensuring sustainable and efficient operations.

**Author:** PETZOLD, Andreas (KIT - Karlsruhe Institute of Technology (DE))

**Presenter:** PETZOLD, Andreas (KIT - Karlsruhe Institute of Technology (DE))

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