

Prepared by Natalie Bates, Energy Efficient HPC Working Group  
22 December 2013  
Report on SC13 TUE BoF

**TITLE: Total Power Usage Effectiveness: A New Take on PUE**

BoF Moderator:

- Michael Patterson, Intel Corporation

Presenters:

- Chung-Hsing Hsu, Oak Ridge National Laboratory (ORNL),
- Anna Maria Bailey, Lawrence Livermore National Laboratory (LLNL),
- Herbert Huber, Leibniz Supercomputing Center (LRZ),
- Satoshi Itoh, Advanced Industrial Science and Technology (AIST).

The Energy Efficient HPC Working Group proposes two new metrics: ITUE (IT-power usage effectiveness), similar to PUE but “inside” the system and TUE (total-power usage effectiveness), which combine for a total efficiency picture. TUE provides a ratio of total energy, (internal and external support energy uses) and the specific energy used in the HPC. This BoF provided a forum for reviewing the test results from ORNL, LLNL and LRZ. It also provided further community feedback on the new metrics and opened the opportunity for Satoshi Itoh to present his parallel work developed independently at AIST.

The BoF attendance and participation was strong, with ~ 60 people in attendance. It was advertised through the EE HPC WG website, at the SC13 Workshop on “Building Energy Efficient HPC”, as well as at the EE HPC WG Booth on the SC13 Exhibition Floor.

Presentations from the BoF (as well as those from a related panel session in a workshop) can be found at: <http://eehpcwg.lbl.gov/documents/sc13-technical-program/birds-of-feather>

Discussion and feedback from BoF participants:

There was good discussion and interest. LRZ reported that they could measure TUE, but that it would be a lot of work and difficult to accomplish. Generally, there needs to be better infrastructure for capturing the data necessary for the TUE metric. It was suggested that the Procurement Considerations Team could and should help with driving the measurement capabilities required to capture the data required to calculate TUE.