



# Energy Efficient HPC Working Group:

## Driving Energy Efficiency for HPC Data Centers & Systems

Natalie Bates

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# Why EE HPC WG?

Mobilize the community to accelerate EE HPC

- Explore early adoption and innovative approaches
- Share general experiences, lessons learned and state of the practices
- Gain from peer to peer exchange
- Take collective action



# What is the membership like?

- 800 members worldwide; 50% sites, 30% vendors, 20% academe
  - All of the major Department of Energy Supercomputing Centers
  - Key European and Japanese Supercomputing Centers
  - All major system integrators, many liquid cooling suppliers
- Blend of HPC computer and data center expertise
- Open, virtual and accessible



# What is the leadership like?

Chairs: Natalie Bates EE HPC WG and Anna Maria Bailey LLNL

- Conferences: Torsten Wilde HPE and Siddhartha Jana Intel
- Infrastructure: David Martinez SNL and David Grant ORNL
- Systems: James Laros SNL and John Shalf LBNL

Provide executive direction for WG

- Team formation and maintenance
- Face-to-face events (e.g., SCxx)
- Data and information policy





# What are the teams?

## ACTIVE TEAMS

- Energy and Power Aware Job Scheduling and Resource Management, Greg Koenig KPMG
- Operational Data Analytics, Michael Ott LRZ
- System Power Measurement Methodology, Tom Scogland LLNL
- Grid Integration, Grant Stewart LANL
- Procurement Considerations, Jason Hick LANL
- Liquid Cooling Standards, Dale Sartor LLNL
- Power API, Ryan Grant SNL

## EMERGING TEAMS

- Cooling Controls, Chris Deprater LLNL and Luca Bortot ENI
- RAS and Manageability, Barbara Macchioni LLNL and John Gutman ORNL

## INACTIVE TEAMS

- iTUE and TUE, Dashboards, Liquid Cooling Controls, Warm Water Cooling, Liquid Cooling Commissioning, Energy Reuse Effectiveness



# What are the teams like?

- Goal oriented technical task force convened as needed, inactive when done
- Deliverable(s) are documents
  - Position papers
    - Used to influence other organizations
    - E.g., Power Measurement Methodology - Green500,, “Hot for Warm Water Cooling” - ASHRAE
    - Based on expertise and extensive review
  - State of the practice
    - Used to explore general experiences with early adoption of technology and/or operational practices
    - Example: “Energy and power aware job scheduling and resource management: An In-Depth Analysis” Based on interviews and questionnaires
- Volunteers from different geographies, job functions, levels of experience
  - Broad perspective and opportunity for excellent synergy
  - Great venue for peer to peer exchange and relationship building
  - Can be slow moving
  - Language, culture and time difference that arise from working across geographies is challenging



# What other organizations?

Top 500, Green 500, ASHRAE, The Green Grid, PowerAPI, Redfish, PRACE, PowerStack, Liquid Cooling Rack Standard



**The HPC PowerStack**





# What is a technical team lead?

- Content expert
- ‘Final decision maker’ for collaborative decision making impasse
- Document’s primary author (generally)
- Attends team meetings, provides team reports to General Membership, participates in conferences and workshop activities
- The EE HPC WG provides administrative team support for the technical lead





# How to participate in teams?

- First, please join the EE HPC WG membership list
- Try one- just call in using website calendar
- Or, ask to join one or more EE HPC WG teams
  - Agree to be included on all team email correspondence
  - Participation can range from an ‘on-looker’ to an active participant
- Ask about technical leadership for an EE HPC WG team

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- Opportunities for further collaboration and leadership?



- Set meeting time for two geographies
  - Japan and either the US or Europe
- Chat during meeting for clarification
- Record and/or transcribe the meeting
- Encourage relationships beyond team activities



Text Documents

DETECT LANGUAGE ENGLISH SPANISH FRENCH

JAPANESE ENGLISH SPANISH

Within the context of energy and power aware job scheduling and resources management, there may be an opportunity for an EE HPC WG team to understand site policies regarding controllable resources that consume a lot of power.



エネルギーと電力を意識したジョブスケジューリングとリソース管理のコンテキスト内では、EE HPC WGチームが大量の電力を消費する制御可能なリソースに関するサイトポリシーを理解する機会があるかもしれません。



Enerugī to denryoku o ishiki shita jobusukejūringu to risōsu kanri no kontekisuto-naide wa, EE HPC WG chīmu ga tairyō no denryoku o shōhi suru seigyō kanōna risōsu ni kansuru saitoporishī o rikai suru kikai ga aru kamo shiremasen.



# What are the teams?

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- Discussion, questions, feedback, thoughts?

ありがとうございます

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