U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Microelectronics' Energy Efficiency Scaling for 2 Decades (EES2) Pledge and WG Day 1 Closing

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EES2 Workshop Co-Chair

Advanced Materials and Manufacturing Technology Office (AMMTO)

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https://microelectronics.slac.stanford.edu/amo-microelectronics

Tina's Highlights from this Morning Intro and Pledging

- **Paul McIntyre, Associate Director of SLAC**
  - Microelectronics Energy efficiency scaling is vital to DOE missions such as HPCC
- **Tina Kaarsberg, EES2 Roadmap co-chair**
  - In general, the industry will NOT improve energy efficiency as they did in the past unless they aim at it.
  - Quantum impact: 1-through the AP manufacturing required for solid state quantum, through quantum calculations (10x-10,000x), 3-through discovery of breakthrough materials (e.g. RT superconductivity).
- **Paul Syers, EES2 Roadmap co-chair**
  - Workforce, microbattery
- **Dan Green, Pseudolithic**
  - Energy efficiency in communication
- **Caecilia Gotama, BRDG**
  - Bridge to connect first in family underrepresented STEM graduates—to micro industry
- **Chris Librie, AMAT**
  - IX to 10,000 X slogan: Joined Manufacturing Energy Efficiency and SUstainability

Tina's Highlights from Today's Morning Presentations

- **Sadas Shankar**
  - Comparison with nature shows inefficiency of AI. For example the Energy used in the entire average human life (74 years @ 73,000kwh) is orders of magnitude less than ChatGPT3 Inference energy per year (2,000,000 kwh).
- **AMD**
  - AMD Instinct +energy efficiency, 25x by 2020 (delivered 32x)! 5Cs (not just compute) AMD leadership: energy efficiency is a technology leadership path
- **Micron**
  - In the past, hybrid systems (e.g. Sun Microsystems) were able to match 1 byte with one operation (1000x typical energy efficiency) so it should be possible in future. CH Multicore disservice
- **ARM**
  - Infrastructure Energy use revolutionized since 2018. DPU replaces NIC, CPU and has No forward looking…
- **Panel**
  - All three companies internal goals are significantly more aggressive than EES2 on 2-7 year

Intellectual Property Issues

- EES2 is not a public forum (internal documents on Teams)
- Patent filing is essentially full public disclosure no point in doing NDA

Additional Thoughts

- What do we do from the consumer side? Think about consumer perspective.

Thank you

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