

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

Microelectronics' Energy Efficiency Scaling for 2 Decades (EES2) Pledge and WG WELCOME

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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>



Next Steps: Expanded Pledge as our Guide

We the undersigned agree to cooperate

- To document and learn from the extraordinary record of microelectronics', including power electronics', energy efficiency such as increases greater than 1,000,000x in energy efficiency since the invention of the transistor nearly 75 years ago;
- To document and learn from microelectronics' past and forecasted future ability to enable all sectors of the economy to become more energy efficient and sustainable;
- To identify and publicize problems solved and opportunities offered by microelectronics' Energy Efficiency Scaling over 2 Decades (EES2);
- To participate in the **AMMTO-led EES2 2022-2023 R&D roadmapping effort**; and
- To explore formation of a partnership, an "EES2 Alliance" that enables the EES2 1000X efficiency increase goal by leading EES2 R&D Roadmapping after 2023 and by catalyzing the deployment of cost-effective technologies, including power electronics, needed to stay on the EES2 path of doubling microelectronics' energy efficiency every two years.

We do this because

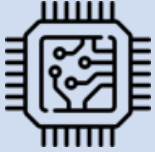

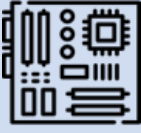

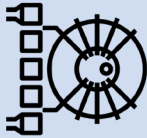


- Microelectronics' life-cycle energy use is rapidly becoming unsustainable as microelectronics demand begins to outpace continuing efficiency improvements due to burgeoning computing, communication, and electrification demands
- EES2 is a key organizing principle that aims to help meet new energy demands
- The EES2 is a technology leadership path that provides economic and other public benefits.

We can DO This!

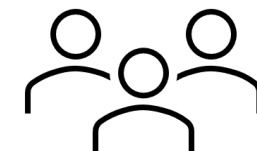
- We did it before for 30 generations
- The first pledgers' response has been amazing and humbling
- In the short- and medium-term
 - The best technologies are already on EES2 path*.
 - We understand the difference between the best and the rest*.
- For the long term --getting from 100X to 1000x and beyond
 - Shankar's analyses (2021 & 2022) show potential for 1,000,000X.
 - Consistent with SRC analysis.



EES2 Working Group Homework **Today**

	Materials and Devices	Circuits and Architectures	Het Intg Adv Pkg	Metrology & Benchmark	Power & Control	Software Algorithms	Mfg Energy Efficiency
Working Group							
Co-chair Point for February 2023	John Doe, XYZ Lab	Jane Doe, XYZ Inc.	Raj Doe, ABC Inc.	Dong Doe, ABC Lab	Mo Doe, 123 Inc.	Melinda Doe, MLM Corp.	Cochairs TBD by Feb.
Working Group Highlight Month	March	April	May	February	June	July	August

...don't stop thinking about the Workforce





Thank you

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