U.S. DEPARTMENT OF
ENERGY

Office of
**ENERGY EFFICIENCY &
RENEWABLE ENERGY**

**ADVANCED MATERIALS &
MANUFACTURING
TECHNOLOGIES OFFICE**

EES2
ENERGY
EFFICIENCY
SCALING

1ˢᵗ Virtual Presentation

Day 2 Closing EES2 Workshop #7

**Tina Kaarsberg, PhD
EES2 Workshop Co-Chair**

June 22, 2023

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

EES2 Secretariat Deliverables
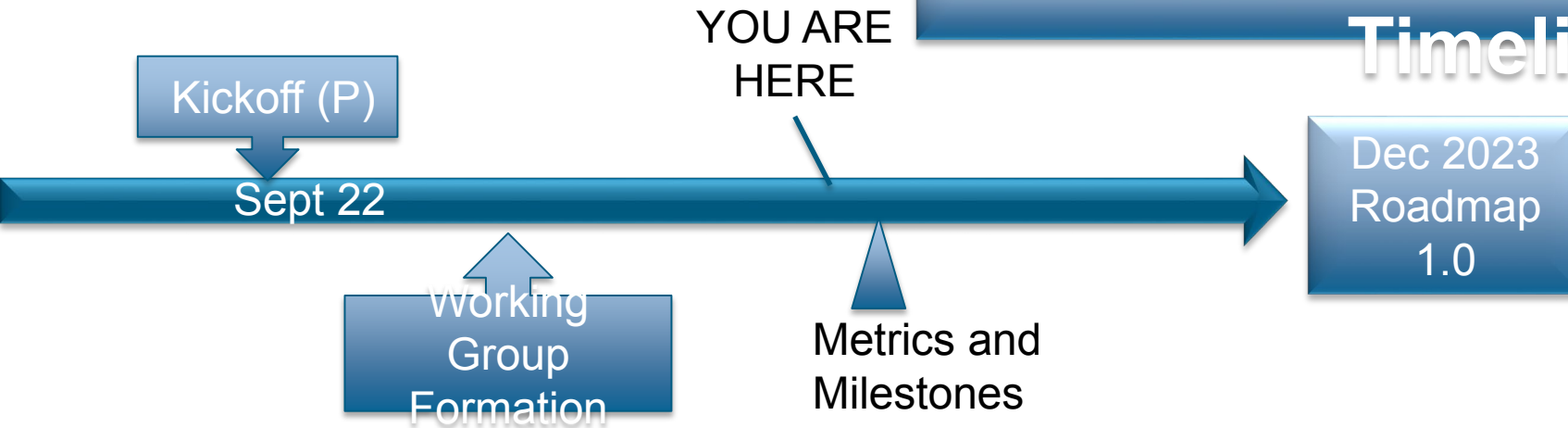
1. **Overall Management including Non-Roadmap Milestones**
2. **Update Canonical Slides (S, P)**
   - Keep Recruiting Pledgers, update the outreach presentation with cool new figures (A, C)
3. **Launch Wikipedia Page** **and Newsletter/BLog (C)**
4. **Make list of (expected) Federal Microelectronics Funding Opportunities DOE, DOD, NIST, and NSF CHIPS programs**
5. **Write articles and response letters—update White Paper (C)**
   - Perspectives article on EES2 Goal for Sr. Pledge Officials to sign (Science, Nature, Issues in S&T) (P)
   - Technical letter on Analysis leading to EES2 Goal for Working Group members to sign (A)
   - Publicize Sadas' Findings on energy hogs (Oct 2022 URL) (C)
6. **More, Better Data on Microelectronics Energy Use (EIA, DOC)** **and pledgers energy use**
   - Meetings and input to EIA Energy Use Surveys
   - Create energy data feedback form for Pledgers (A)
7. **Develop ideas for projects with Performance Benchmarking Organization on Efficiency (WG)**
8. **Microstructure Infrastructure and other Prizes that narget key segments such as students and retirees**
9. **Develop Fall Event for Pledge Partner Senior Officials? (C?)**
10. **Set up Speaker Series for Post WG Workshop Plenaries (C?)**
    Get Briefings from Sadas' Postdocs, other AMMTO Microelectronics activities (PI meeting)
11. **Write non-WG part of Roadmap (C,P)**
    - Create separate teams comprising xsection of WG members and other)
    - List (and Justify) what we're NOT including in version 1.0 of roadmap—e.g. Communication/ WIreless
12. **Come up with new excuse to update Social Media kits include tweets, LinkedIn, FB etc (C)**
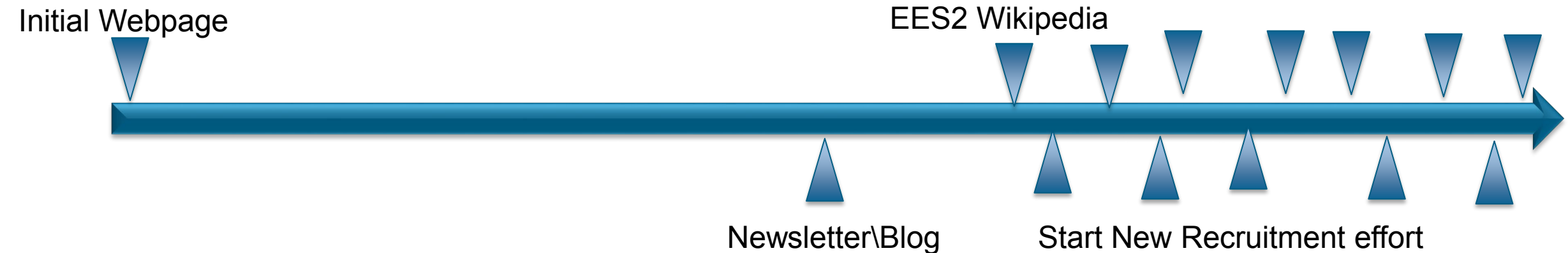13. **Develop Prize and Fellowship Proposals**
14. **Update BookClub**

Put EES2 To Do List on a Timeline

EES2
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EES2 Roadmap 1.0 WG Timeline

Kickoff (P)

YOU ARE HERE

Sept 22

Dec 2023 Roadmap 1.0

Working Group Formation

Metrics and Milestones

EES2 Secretariat & Communications Timeline

Initial Webpage

EES2 Wikipedia

Newsletter\Blog

Start New Recruitment effort

Updating Canonical Slides

- Energy Efficiency Scaling for 2 Decades (EES2) Goal Slide
  - **Doubling* of microelectronics' energy efficiency every two years _or faster_ for the coming decades**
  - **In two decades, increase energy efficiency of next generation microelectronics by >1000X**
- Energy Efficiency Scaling Definition
- Pledge Signer Count and Logo Slide
- Microelectronics Energy Use Benchmarks from Bits to Bitcoin Update
- The Pledge—last updated November 2022 -Update

Proposed Newsletter/Blog?

- WG Highlight Section (from past months too)

> July 18-19 Action Planning
> Aug 16-17 EES2 Final WG Meeting in Person

> Other Agency Highlights
> DOC, DOD, NSF, State

Examples of Newsletter Story Ideas

Tiptek, a DOE SBIR, is being awarded the SBIR/STTR small business of the year. They have excelled at one or more of the following:

- Stimulating U.S. technological innovation and enhancing the nation's return on its DOE SBIR/STTR investment.
- Providing the DOE and/or its national laboratories, research facilities, or university research partners the benefits of commercial applications derived from DOE SBIR/STTR funded R&D.
- Stimulating U.S. economic growth and/or increasing private-sector commercialization of innovations as a result or in part of DOE SBIR/STTR funded R&D.

Agenda: 2023 Small Business Forum & Expo: Agenda | Department of Energy

The CEO of founding EES2 partner Applied Materials is presenting on their sustainability efforts at SEMICON West: Path to Net Zero, mentioning their involvement with EES2

Agenda: 2023semiconwest.eventscribe.net/SearchByBucket.asp?f=CustomPresfield96&bm=Path to Net Zero&pfp=BrowsebyBucket

Tracking DOE and AMMTO

DOE Microelectronics Science Research Centers
    Authorized by the CHIPS and Science Act (Section 10731, Micro Act

Advanced Materials & Manufacturing Technologies Office
    New Webpage with new org chart Mission and Vision
    First AMMTO Director—Christopher J. Saldaña will start July 18
    AMMTO Microelectronics Lab Call mid-August announcement

AMMTO' GPRA Goal—beyond R&D to D and D

Advanced manufacturing processes, materials, technologies and systems **that demonstrate progress towards commercialization across the clean energy economy**, where progress towards commercialization is demonstrated by at least one of the following:

- **Commercialized or implemented in the market**

- Attracted follow on funding > cumulative AMMTO investment, excluding project cost share

- **Validated cost reduction, performance improvement or lifecycle efficiency improvement meeting published targets**

- R&D 100 Award

New Webpage Sections—

- **WG Highlight in Each Monthly Meeting**
  - Monthly Highlight Presentation (teams)
  - Monthly Summary/Discussion

- June Metrics, targets, Milestones
- July 19-20 Action Planning in Person
- Aug 16-17 EES2 Final WG Meeting

NEW

https://live-slac-microelectronics-d9.pantheonsite.io/sustainable-computing

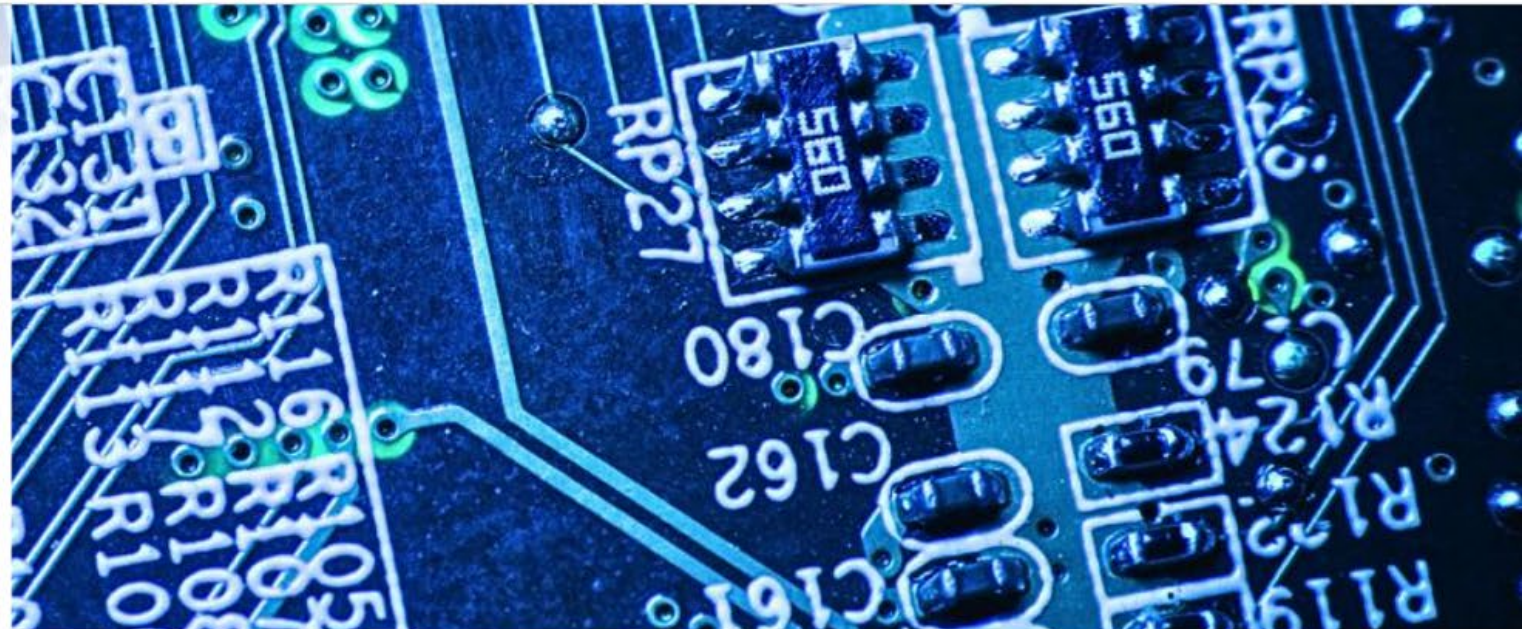SUSTAINABLE COMPUTING ∨   RESEARCH AREAS ∨   EVENTS ∨   RESOURCES ∨   ABOUT ∨   PROGRAMS ∨

RESOURCES & PUBLICATIONS

U.S. Department of Energy's Effort on Energy Efficient Scaling of Computing (EES2)

Learn more about sustainable computing research and development efforts at SLAC and beyond.

EES2 Roadmap Non-WG Chapters

- – *1. Introduction and Overview*

- – *9. "Topics that Crosscut more than 3 Working Groups" (e.g. Photonics, Applications) (XCUT)*

- – *10. Microelectronics Education and Workforce Development (MEWD)*

We can DO This!

- In the short- and medium-term
  - Both S&WGs Must detail linkage between meeting EES2 goals and other government mission technical goals to get resources for Roadmap

- For the long term –getting from 100X to 1000x
  - Microelectronics Infrastructure Reinvention needed for nature-inspired
  - Also quantum, carbon-based and photonic

Thank you!

Q&A and Discussion