



Energy Harvesting Committee (EHC) Minutes 7th Jan 2025

Attendees	Apologies/Non attendees	
John Horzepa, PSMA Matthias Kirn, WTO Steve Savulak, Collins Aerospace Sebastian Bader, MIUN Maeve Duffy, Univ. of Galway Roberto la Rosa, ST Eoin Ahern, Tyndall Lorandt Foelkel, Würth Norm Elias, Norm Elias Model/Sim Brian Zahnstecher, PowerRox Mike Hayes, Tyndall	Toshi Yamamoto, Nichicon Cristina Rusu, RISE Thomas Becker, Thobecore Jean-Michel Bidault, ITEN Ed Spence, Machine Instrumentation Group Ningning Wang, Hangzhou DU Soumyajyoti Maji, Univ of Galway Torben Dankwort, Fraunhofer ISIT Pallawi Joshi, Juniper Networks Dan Stieler, PowerFilm Francesco Carobolante, IoTissimo/Intel John Fiske, Armor (EMAIL INVALID, REMOVE) James Rohan, Tyndall Ed Spence, TMIG (guest) Justin Henspeter, IBM Eric Swenson, IBM Pulugurtha Markondeya Raj (Dr. Raj), FIU Sergiy Tykhonov, FRABA Baoxing Chen, Analog Devices Dinesh Kithany, Wired & Wireless Cem Som, Würth Vincenzo Pecunia, SFU-SEE	Lisa Horzepa, PSMA Peter Spies, Fraunhofer IIS Denis Pasero, Ilika George Slama, Würth Renee Yawger, EPC Technologies David Tang, Netbit Gary Johnson, Ilika Toby Best, FRABA Johan Pederson, Ignion Nathan Jackson, Univ of New Mexico Mike Donnelly, Mentor/Siemens Christian Pennisi, Jennova TBD, Wisepower (NEVER MATERIALIZED) Juan Carlos Rodriguez, ADI Andreas Beckes, FRABA Dusan Vuckovic, Zvertech John Flannery, Tyndall (RETIRED, REMOVE) Michalis Kiziroglou, Imperial College London Hani Kanaan, Dracula Tech Prateek Asthana, L&T semiconductor

(Co-chairs in bold font) (New/First-time members indicated in GREEN)

Next meeting:- Tues 4th Feb 9am CT US Brian to chair, Mike to type.

Agenda for today

1. Welcome any new members/guests.
2. APEC 2025 planning.
3. EnerHarv 2024 close out & 2026 planning
4. Media activities.

GENERAL NOTICE: PSMA is supporting a mentoring program for APEC, which has a formal sign-up process now. Anyone attending APEC who is interested in participating please REGISTER HERE: <https://www.pasma.com/technical-forums/education/news>.

1. Welcome new members

Annual housekeeping...affirm/purge member list? BRIAN/MIKE OFFLINE ACTIVITY. Will table activity until after annual F2F at APEC '25 (Mar). NOTE: CURRENT EMAIL BOUNCES FROM LIST = John Fiske, Gabriel Barrientos. CHANGES: John Flannery has retired, we wish him all the best and thank him for his fantastic service to PSMA & Tyndall. Prateek Asthana has changed jobs, using his personal email for now.

2. APEC 2025 - PSMA Energy Harvesting Industry Session

- PSMA EHC ANNUAL F2F (not hybrid) MTG = Tue, Mar 18, 8-10 ET (**tentative**). Mike/Brian have conflicts so lobbying to combine with ES/EM Comms in their slot (Tue, 10-12 pm), **final pending...**
- We plan to collaborate with the PSMA Energy Management & Storage committees at APEC2025 & have an 8 slot industry session for the **morning of Thurs 20 Mar** (SESSION IS21, <https://apec-conf.org/attendees/sessions-seminars/industry-sessions/>). We have been allocated 2 presentation slots (#4 & #5) + time for some demos at the back of the room during coffee break (built into slot #4). The overall session will be broad, covering energy for microwatt IoT, computing and micro-grid applications.
- (<https://apec-conf.org/attendees/sessions-seminars/industry-sessions/>)
- Planned Demos
 - i. Nichicon will be there so Toshi will attend with a booth. Will plan a demo.

- ii. Reach out to ambient photonics & ePeas for a demo. ePeas actually reached out to us for further engagement, was in holding pattern pending finalization of rest of IS logistics/speakers. **BRIAN WILL FOLLOW UP WITH BOTH. BZ SENT PING 12/3, WILL FOLLOW UP AGAIN NEXT WK (POST-CES).**
- iii. Wurth will be there so Lorandt will attend with a booth. Will plan a demo(s).
- iv. Tyndall will have demos run by Mario Costanza.
- v. Lobby GA Tech. **BRIAN/MIKE PURSUING.**
- vi. ST and/or INNOITALY to support. **ROBERTO WILL SHARE A DEMO** for Mike/Brian to display, maybe supported by Mario. Lorandt offers to have sent to him in GER for hand carry if makes more sense.
- vii. EHC APEC ROLL CALL = Lorandt, Toshi, Mike/Mario/Tyndall crew, Brian. Anyone else going?

3. EnerHarv 2024 close out & 2026 planning

Ref www.enerharv.com and [Energy Harvesting Forum | Power Sources Manufacturers Association \(psma.com\)](http://EnergyHarvestingForum.com)

- EnerHarv '26 Workshop Comm (EWC) shall be formed in Q2 '25!!!
- ISBN number provided by PSMA, John will email, **BRIAN WILL UPDATE PROCEEDINGS DOC (WORK WITH LISA).**
- PSMA published newsletter 9/24/24 (<https://www.pdma.com/HTML/newsletter/page10.html>), EPS derivative published 10/15/24 (<https://eps.ieee.org/publications/enews/october-2024/1234-enerharv-2024-report.html>). **Bodos/H2P derivatives PENDING.** Given timeframe, we decided it is better to retool these for announcing release of proceedings along with event overview. Raises question of value of ROI to generate content for Bodos/H2P vs. a purely marketing-based relationships...once we ship any final EnerHarv '24 content, reach out to partners to re-evaluate relationship (what value do they see from their perspective?). **BZ WILL REACH OUT ONCE ARTICLES SHIPPED.**
- Time to release EnerHarv '24 proceedings fully-open to the public? While likely low demand for APEC audience, can be useful for lobbying participants in APEC EHC activities. In general, we target the public release 6-9 months following EnerHarv (i.e. – late-Q1/early-Q2 '25 release target). Alternate consideration is to delay until 6-9 months prior to next EnerHarv event. Overall team decision is to publish pre-APEC. **BZ WILL DRIVE WITH PSMA OFFICE.**
- Maeve as an APEC '25 reviewer seeing many micro-power EH submissions, consider for 2026 onwards as a tech track. Keep eye out for EnerHarv 2026 participants. Also watch demography, looking to strengthen N American engagement. Maeve notes EH activity at Univ of Alberta Edmonton.
 - Need to start EnerHarv 2026 cycle EARLY to secure speakers, participants, venue, etc. Updated GANTT chart shared to capture improved timeline/mitigate issues from lessons learned. Start looking NOW for potential hosts in N. America. Keep an eye out to kick up EnerHarv 2026 opportunities in mid-2025. Thinking Georgia Tech, SFU... what about, UCB, UCSD, Northwestern, Northeastern, OSU? Brian established new (to EHC, not BZ) contacts to facilitate at both SFU ([Ignacio "Nacho" Zurbruggen](http://Ignacio 'Nacho' Zurbruggen)) & GT (local PELS chapter, Maryam Saeedifard, Deepak Divan, etc.)! Preface with satellite event at APEC '25 since in Atlanta (co-lo with GT)? Mike has new link in UBC (British Columbia) – biodegradable supercaps. They know some SFU people. Look at previous EnerHarv speaker trackers. Also if possible look at Chips Act submissions (is there a public abstract and list of participants?). Look at IEEE Xplore, PowerMEMS, Applied Physics, Energy, IJDSN, ISSCC, ECCE, SSI, patent search, ECS-SRIA authorship, SRC roadmap, <https://srcmapt.org/>, MIT/Berkley spin-offs?, NREL (Faisal Khan – 3D PEIM link, interest to consider hosting) – Brian.
- Also watch out for fees from IEEE if formally affiliated even if no publications. This drove systemic change within PELS...changing official policies to address this, proposing to cover for events moving forward.
- Mike & Brian will do a focused call and create a shortlist early Jan. Want to have good prospects of a host by early Q2 2025. **SFU SSE, NREL, GA Tech? UC(s)?**
- Try to increase company content (esp. NA-based) – REMINDER. **CHIPS Act NAPMP NOFO2** (<https://www.nist.gov/chips/notice-funding-opportunity-chips-napmp>) roll call?

4. MEDIA ACTIVITIES – Any updates?

(a) Webinars/PTR? **PERPETUAL OPEN CALL TO EHC FOR WEBINAR SUGGESTIONS.**

- Toshi Yamamoto, Nichicon – LTO Battery Tech. Possibly leverage material related to Sensors Converge (already has ~50% of required content)? Upgrade & share overview with team by next meeting (early-'24). TOSHI PROVIDED PROPOSAL/ABSTRACT/DRAFT PPT FOR TEAM REVIEW. Still Worked with Ed Spence on white paper, perhaps better content/collaborate with him. Mike & Brian to review and follow up.
 - Ed (Spence) considering and will revert. **STILL NEED TO PING HIM FOR WEBINAR ABSTRACT IF STILL INTERESTED.** BZ pinged 12/3, again 1/6
- Lorandt Foelkel, Wurth – EH Tech Update. **LORANDT SHARED PREVIOUS DIGIKEY WEBINAR FOR REFERENCE.** Mike & Brian feel it is good but needs higher % of new material – under review. **LORANDT**

WORKING TO CREATE A NEW PPT FOR '25 WITH ~90 % NEW MATERIAL, WE SHALL REVISIT BASED ON NEW STUFF AT APEC '25, DISCUSS IN APR+ MTG.

- Any other topics?

(b) Conferences/workshops

- CES – Nichon will be there with ePeas as partners

(c) Publications

- Jean Michel – ITEN working on a white paper for release in Dec. Let us know if we can help with preparation, distribution, promotion, etc. Resource issue – delayed but still being planned, hopefully Sept. possible webinar.
- Roberto – we should consider putting together an updated white paper, esp. application focused, with lots of new EHC members, leverage EnerHarv?
- Also looking at cross promotions for IPC – industrial automation, Industry 4.0, smart mobility, etc.
- Any material you want to re-cycle.... once not too much of a sales pitch?
- New suggestions
Hoping to mine upcoming events (APEC, APEX, EnerHarv, etc.)

(d) Virtual conferences, articles, etc.

- Suggestions please

5. Industry Event Watch & List of EH companies – REVISIT AT APR '25 EHC MTG

•Event tracker

- Revisit/update the list of good industry events for tracking.
- Make more sense to transition from standalone doc to list in mtg mins...capturing lots of good contributors via current efforts in EnerHarv/RISEnergy/Infrachip, etc.

•Company ecosystem (review quarterly, supported by APEC/EnerHarv activities)

- BZ CONTINUES TO UPDATE AS INFO TRICKLES IN.** Any companies to leverage from US Top 100 GreenTech companies of '24 (<https://time.com/collection/americas-top-greentech-companies-2024>)? **BZ WILL TARGET RELEASE FOLLOWING DISCUSSION IN APR '25 MTG.**

TREASURE CHEST

Approach these items one at a time in future meetings as people raise them.

6A. Sponsorship of a program where students build demonstrators.

- Lorandt has a budget to supply kits
- Help with education links – Qualcomm 'High Tech High'. Francesco will follow up.
- Green story. International dimension. Technology and applications dimensions.
- Wurth running design challenge.
- Keep simple, easy to use
- Competition or roadshow?
- PSMA has money to support.
- **Action:- write ½ page strawman for student engagement mechanism NEED A CHAMPION TO LEAD EFFORT FOR COMM**

“Here are Katherine’s thoughts on the competition:

There are two main styles of the competition that could be developed:

1. Engineering-Style Competition

- planning committee chooses specific EH devices that can be used and the target load
- planning committee also specifies energy input conditions (lighting setup, vibrational input, etc) for testing
- specifications are announced and teams would develop the power converter solution based on the specification
- teams can submit videos and/or reports on their team and proposed idea
- final teams are selected and they test their prototypes on site at an event competition (could be a conference)
- judging is based on technical criteria measured during the test (size, weight, efficiency, etc.)
- implementation is the most important aspect for this style of competition
- over different years, the specification and scenarios would focus on different technologies with the same basic format
- more similar to the International Future Energy Challenge run by PELS

2. Design-Style Competition

- planning committee could choose a theme based on a technology or application (e.g. smart homes, wearables, building monitoring, etc.)
- planning committee may want to specify some constraints or scenarios for the competition
- teams come up with complete EH design ideas (transducers, circuitry, load) and develop a prototype
- teams can submit videos and/or reports on their team and proposed idea
- final teams are selected and they present and demonstrate their prototypes on site at an event competition (could be a conference)
- judging is based on mostly qualitative and some quantitative judging criteria (so balanced judge selection will be important)
- this style of competition is more focused on the idea and design, but implementation is also important

There should probably be some discussion on which style the committee would like to see. The engineering-style requires a lot of prep work before even announcing the competition, while the design-style is more work for the judging and evaluation. I could see either being good for students. I hope someone can take these basic ideas and further development them into a competition.”

6B. Updated Goals

- Open to suggestions.
- We should try to forge links with other groups/sessions, e.g. capacitor, magnetics, packaging. – addressing this via “Tiger Team” effort within PSMA (multiple focused initiatives with small teams from various committees).

6C. Forward-looking Thoughts

- Software? Packaging/industrial design? Modelling? Hackathon?
- Incorporate some kind of student competition as part of EnerHarv (Best Student Demo/Poster) or otherwise.

Mike Hayes & Brian Zahnstecher,
8th Jan 2025.