



Energy Harvesting Committee (EHC) Minutes 16th May 2023

| Attendees | Apologies/Non attendees | |
|---|--|--|
| John Horzepa, PSMA Toshi Yamamoto, Nichicon Maeve Duffy, Univ. of Galway Francesco Carobolante, IoTissimo Thomas Becker, Thobecore Lorandt Foelkel, Wurth Joe Horzepa, PSMA Prateek Asthana, Tyndall Norm Elias, Norm Elias Model/Sim John Fiske, Armor James Rohan, Tyndall Brian Zahnstecher, PowerRox Mike Hayes, Tyndall | Ed Spence, TMIG (guest) Justin Henspeter, IBM Eric Swenson, IBM Pulugurtha Markondeya Raj, (Dr. Raj), FIU Gabriel Barrientos, Nowi Sergiy Tykhonov, FRABA Torben Dankwort, Fraunhofer ISIT Baoxing Chen, Analog Devices Dinesh Kithany, Wired & Wireless Jean Michel Bidault, ITEN Cem Som, Wurth John Flannery, Tyndall Andreas Beckes, FRABA Dusan Vuckovic, TBD Sebastian Bader, MIUN Roberto la Rosa, ST Juan Carlos Rodriguez, ADI Ningning Wang, Hangzhou DU | Lisa Horzepa, PSMA Peter Spies, Fraunhofer IIS Denis Pasero, Ilika George Slama, Wurth Renee Yawger, EPC Ronald DeGraaf, NAWA Technologies David Tang, Netbit Michalis Kiziroglou, Imperial College London Steve Savulak, Collins Aerospace Gary Johnson, Ilika Dan Stieler, PowerFilm Toby Best, FRABA Johan Pederson, Sigma Design Nathan Jackson, Univ of New Mexico Mike Donnelly, Mentor/Siemens Christian Pennisi, Jenova |

(Co-chairs in bold font)

Next meeting:- Tue 13th June 11 am Central Mike to chair, Brian to type.

Agenda

1. Welcome any new members/guests.
2. **EnerHarv 2024 planning.**
3. **APEC 2023 – feedback on our open letter**
4. **PTR and technology opportunities... HIR (heterogeneous integration roadmap) major focus in May**
5. **Industry Event Watch & List of EH companies**
6. **Media activities**
7. **Norm/Gabriel Collaboration Update**
8. **‘Treasure Chest’ at end of the minutes.**

1. Welcome new members

James Rohan, Tyndall – Energy storage (micro-batteries) expert, class of EnerHarv 2018 & 2022.

2. EnerHarv 2024 planning Ref www.enerharv.com and [Energy Harvesting Forum | Power Sources Manufacturers Association \(psma.com\)](http://Energy Harvesting Forum | Power Sources Manufacturers Association (psma.com))

- Workshop **committee created 7 meetings underway – please let us know who is interested.** Most of EnerHarv 22 EWC interested.
- Will be EUROPE based, probably May-June - Who is interested in hosting? At this point, looking likely to be in either Germany or Italy.
 - German consortium:- Wurth (talk with **Fraunhofer IMS (Gerd vom Boegel)?** ~~(ISM, IIS and ISIT are out)~~, KIT, Dresden, FRABA & Thobecore?) **MH/BZ TO HAVE FOCUSED DISCUSSION WITH LORANDT TO SOLIDIFY INTEREST.** Thomas also confirms interest in supporting on the ground, **is feeling out local industry for support** (i.e. – Airbus, etc.). **THOMAS/ROBERTO REPORT BANK HOLIDAYS IN GERMANY/ITALY (RESPECTIVELY) TO PLAN AROUND.** **Lorandt says Wurth not good for size/location, Fraunhofer ISIT & IIS also feel they don't have a sufficient facility.**
 - Germany - 1/5, 9/5, 20/5, 30/5
 - Italy - ????
 - Italian:- Roberto might talk with Palermo or **Catania (both Palermo & Catania on Sicily...no charge for venue usage)** Need a top tier university partner.
 - Who else? France? UK?
- Will be submitting a proposal to PSMA board. Then will be an RFP process. Target down selection of RFP process and recommendation for BoD special project form by **end-May and open call till 16th – 30th June.** Final awardee of RFP contingent on BoD approval of special project **early Aug.**
- Typ. 2.5-3 day event. Will need 4 day venue access.

- **Release EnerHarv 2022 proceedings.** Now that fully public, take advantage of a press release to double as heads up for EnerHarv 2024 as well? Can be heads up now and followed by a “save the date” notice in the months following. **MH/BZ TO DRIVE NOTICE STRAT WITH PSMA OFFICE – SUBMITTED and will be hopefully approved by PSMA board 20th May.**
- Allow for more breaks – Lorandt feedback.
- Maeve notes we should be cognizant of academic calendars when picking a target date for the event. John also notes APEC '24 is a little earlier (Feb 25-29, 2024, Long Beach, CA, USA) than normal.

3. APEC 2023 - PSMA Energy Harvesting Industry Session

ExecComm have issued letter to APEC IS Comm on our declined offer & proposed re-structure of selection process. Ideas included having emerging technologies session and shifting expo with closure on Thurs instead of Wed. A new rating system and attendance headcount sheet was now used for 2023 – a good start. Response received from APEC Industry session committee and is attached with minutes. Key elements in the proposal:-

- PSMA designated min of 10 slots (2 x Tues, 4 x Wed, 4 x Thurs) and can make advance proposal of who should present when, subject to APEC IS approval
 - Emerging tech session welcome but will be treated the same as other proposals – please note EHC is willing to participate (in addition to having our own dedicated session) in this but will not lead such an activity.
 - Headcount and rating system will be in place as we saw for 2023
- Mike and Brian will monitor progress at PSMA board meetings, please advise if you have any comments.

4. PTR and technology opportunities

- IEEE HIR 2023. HIR = heterogeneous integration roadmap, packaging and system integration focus
- Review content from previous edition and identify opportunities for updates/expansion in this update (e.g. chips act). **CALL TO ACTION FOR EHC PARTICIPANTS.**
- Work completion plan Apr/May. Proposed schedule as follows –
- **5/16/23** = 2nd focused meeting with author team – completed
- 6/15/23 = target for draft completion by EHC
- 6/30/23 = draft due to HIR Team
- Maeve & Thomas confirmed interest to co-author.
- Sustainability is one of the major additions to 2021 – Brian, Roberto & Daniela to write
- Flex and printed electronics also getting revamp.
 - Lorandt colleague (Mahmoud Shousha), Juan Carlos & Roberto will add content from industry perspective
- F & M also will write mag. feature by end May – draft submitted to IEEE with Mike, Brian and Daniela Iacopino (Tyndall) as co-authors.

5. Industry Event Watch & List of EH companies

- **Event tracker**
 - Revisit/update the list of good industry events for tracking. Hoping EnABLES2 proposal will be accepted/funded so can continue to share info with EHC and broaden the PowerIoT ecosystem and PSMA EHC communities.
For context check out the EnABLES position paper (& website)
[Position Paper – Access to facilities & expertise \(enables-project.eu\)](#)
 - **Next update target June/July '23.**
- **Company ecosystem**
 - **BZ CONTINUES TO UPDATE AS INFO TRICKLES IN.**

6. MEDIA ACTIVITIES

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

- Toshi Yamamoto, Nichicon – LTO Battery Tech. Possibly leverage material related to Sensors Converge? July onwards.
- Lorandt Foelkel, Würth – EH Tech Update. Working on it. Should have a new Digikey webinar ready by April. **June possible slot?**
- Mike Hayes/Prateek Asthana, Tyndall - either eSiP/testbed or condition monitoring value proposition? July/August. Planning to share in **June** meeting.

- Leverage Ranajit Sai presentation from magnetics workshop? – Mike will chat with him offline.
- Ed considering and will revert.
- Any other topics?

(b) Conferences/workshops

- BZ signed up for Sensors Converge (<https://www.sensorsconverge.com/>) June 20, 2023, in Santa Clara, CA (i.e. – Silicon Valley) – will be looking for speakers for a 4-slot, half-day, pre-conference symposium on EH. Also will include functional demo session at end. Reach out direct to BZ if interested. So far Tyndall and Nichicon, Fraunhofer ISIT, Powerfilm (MPPT) confirmed.
- **Lorandt will be at IEEE EMC conference, let him know if interested..... <https://emc2023.org/>**

(c) Publications

- IEEE now looking for feature article on our white paper – lead edits (Thomas, Michalis, Bahareh, Maeve) created a small team.
 - PELS mag - we are targeted for June '23 issue, but needed a revamp draft to meet formatting/content requirements – all done and submitted no complaints so far. **Post-review final provided by the team to editor on 4/19/23, anticipating publication in June. CONGRATS TO THE TEAM ON CLOSING THIS OUT!!!**
 - John to dig out the endorsement from Bahareh and use it to **CREATE PITCH FOR VALUE OF PSMA, esp. looking for underwriters – John talking with Toshi.** PSMA member endorsements now posted on LI/Twitter. **JOHN H. TO CHECK WITH MKG COMM ON STATUS.**
- 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, EnABLES, APEX, EnerHarv, etc.)*

(d) Virtual conferences, articles, etc.

- Suggestions please

TREASURE CHEST

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

8A. 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.”

8B. 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).

8C. 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,
16th May 2023.**