



## Energy Harvesting Committee (EHC) Minutes 22<sup>nd</sup> Feb 2023

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

(Co-chairs in bold font)

**Next meeting:- Wed 22<sup>nd</sup> Mar 12-2 pm Eastern (Room Salon 14, Rosen Centre Hotel, Orlando, FL), F2F (only, sorry no hybrid support) @ APEC!!!, Brian to chair, Mike to type.**

### Agenda

1. Welcome any new members/guests.
2. EnerHarv **2024 planning.**
3. APEC 2023 – **briefing note + feedback on our open letter**
4. PTR and technology opportunities... **HIR discussion in March/Apr**
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

**No new members this month.**

Sergiy notes company with interest in EH and may be worth following up with.

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

- KICK OFF ENERHARV '24 DISCUSSIONS AT APEC '23 F2F MTG. Teaser preview topic at Jan EHC mtg.
- Will be forming a workshop committee
- Will be EUROPE based, probably May-June? Who is interested in hosting? Tyndall, MIUN/RISE, Wurth (talk with Fraunhofer, FRABA & Thobecore...**CHECK SPECIFICALLY WITH LORANDT**)? Roberto might talk with Palermo or Genoa? Who else? France? UK?
  - **Feedback from: MIUN/RISE will pass, Roberto positive but TBD location**
- 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-Apr. Final awardee of RFP contingent on BoD approval of special project.**
- Typ. 2.5-3 day event. Will need 4 day venue access.
- **Target draft of special project event proposal doc for PSMA BoD by May (5/19/23), seek approval by June (6/16/23).**

#### 3. APEC 2023 Set for March 19<sup>th</sup>-23<sup>rd</sup> 2023 in Orlando, FL.

**PSMA Energy Harvesting Industry Session**

**7-SLOT DENIED, 4-SLOT (i.e. – THUR PM) AWARDED...WE DECLINED. Open letter provided to**

**PSMA Exec Comm on Fri 12/16/22...awaiting their review and status on any potential follow-on actions. ExecComm shared a preview of response and intentions of messaging to APEC OrgComm,**

though key part left out in terms of data collection gaps/methodology...ExecComm seems firm in leaving this request out as it does not include actionable suggestions to drive solutions. Mike suggests we ensure we keep our own count to improve data integrity, question is if APEC OrgComm will be willing to accept data as input to interpretation of their own data. Brian/Mike will be sure to raise as part of EHC update at annual mtg.

- F2F meeting confirmed for Wed 22<sup>nd</sup> March 12-2pm (local), Rosen Centre Rm. Salon 14. All welcome, esp. guests.
- People going so far:- Brian, Francesco, Mike, Lorandt (& Co.), Toshi, PSMA office. Possibly John Fiske. Please let us know. Ranajit Sai (Tyndall magnetics expert), Maeve. Known **NOT** going: Gabriel, Roberto, Sebastian, Torben, Prateek, Sergiy
- Mike giving presentations at energy management (IS05 – 21<sup>st</sup>) and energy storage (IS24 – 23<sup>rd</sup>) industry sessions. <https://apec-conf.org/conference/sessions/industry/>
- Mike & Brian plan to re-use & modify previous wording and verbalize the agenda to attract people. Sent to Lisa.

#### 4. PTR and technology opportunities

- HIR 2023 – need to start thinking about what we add, needed Q1-2. Review content from previous edition and identify opportunities for updates/expansion in this update (e.g. chips act). **CALL TO ACTION FOR EHC PARTICIPANTS.**
  - Need 1-2 slides outlining plans for new revision by ~20<sup>th</sup> Feb. Francesco to send today for review by EHC at F2F meeting at APEC...enables determining next steps based on EHC feedback for chapter update content.
  - Work completion plan Apr/May.
  - Francesco & Mike will share 1<sup>st</sup> draft with EHC shortly.
- Norm talking with Mentor about integrating simulation models, any suggestions for EH applications, please contact Norm. Any updates/interest for this month or feedback on presentation on 22<sup>nd</sup> Feb?

#### 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 ready by late Feb. April/May possible slot. **Lorandt any chance to have this ready for april, PSMA has PTR webinar slots needing to be filled?**
- Mike Hayes/Prateek Asthana, Tyndall - either eSiP/testbed or condition monitoring value proposition? July/August. **Planning to share in F2F meeting at APEC next month.**
- Leverage Ranajit Sai presentation from magnetics workshop? – Mike will chat with him.
- Any other topics?

##### (b) Conferences/workshops

- Magnetics workshop APEC2023 (<https://www.pdma.com/technical-forums/magnetics/workshop>) – committee has asked for suggestions for EH related magnetics.  
**- Ranajit Sai (Tyndall) will give a presentation**
- 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 confirmed.**

- 3D-PEIM (Feb 1-3, 2023, Miami, FL, <http://www.3d-peim.org/program/>), BZ presented “Energy Harvesting at the Edge: When the Package **IS** the System”. BZ reports great event, EH content seemed to be well-received, optimistic for future EHC and/or PSMA membership as a result.
- Tyndall presenting talk and poster on Mar 28, 2023, Bruges, Belgium at Smart System Integration (SSI) workshop ([https://smartsystemsintegration.com/#schedule\\_section](https://smartsystemsintegration.com/#schedule_section))

### (c) Publications

- IEEE now looking for feature article on our white paper – lead edits (Thomas, Michalis, Bahareh, Maeve) created a small team.
  - PELS mag (submitted end March). BZ Talked with Ashok at ECCE, said we are targeted for June '23 issue, but need to revamp draft to meet formatting/content requirements (**tabled below**). They also mentioned the draft looked like it was a bunch of excerpts compiled by numerous authors (perhaps not an unfair criticism) so needs work there as well. Working with him on a hard deadline, but the current update needs are clear and can immediately drive update efforts. **MICHALIS/THOMAS CAN WORK WITH TEAM TARGETING END-JAN/MID-FEB FOR NEW DRAFT IN INTERIM**. BZ has confirmed we are good to for June 23 edition with absolute draft deadline end-Mar. FYI – details of article format/requirements in Nov '22 EHC mtg mins for reference. Updated draft provided 2/22/23, BZ requested minor edits on word/reference counts to comply with Editor formatting requirements.
  - John to dig out the endorsement from Bahareh and use it to **CREATE PITCH FOR VALUE OF PSMA**, ep. Looking for underwriters. 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

## 7. Norm/Nowi PZT Sim Efforts Update

- a. Norm/Gabriel provided overview of collaborative work. Using 5-DOF example load and parameterized model of transducer to aid other analyses. **NORM WILL SHARE SUMMARY DOCUMENTATION FOR MIKE/BRIAN TO DISTRIBUTE TO EHC (IDEALLY WITH MTG MINS)**.

## 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,  
22<sup>nd</sup> Feb 2023.**