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Printed Zinc Ion Batteries

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Printed Battery Technology Adoption

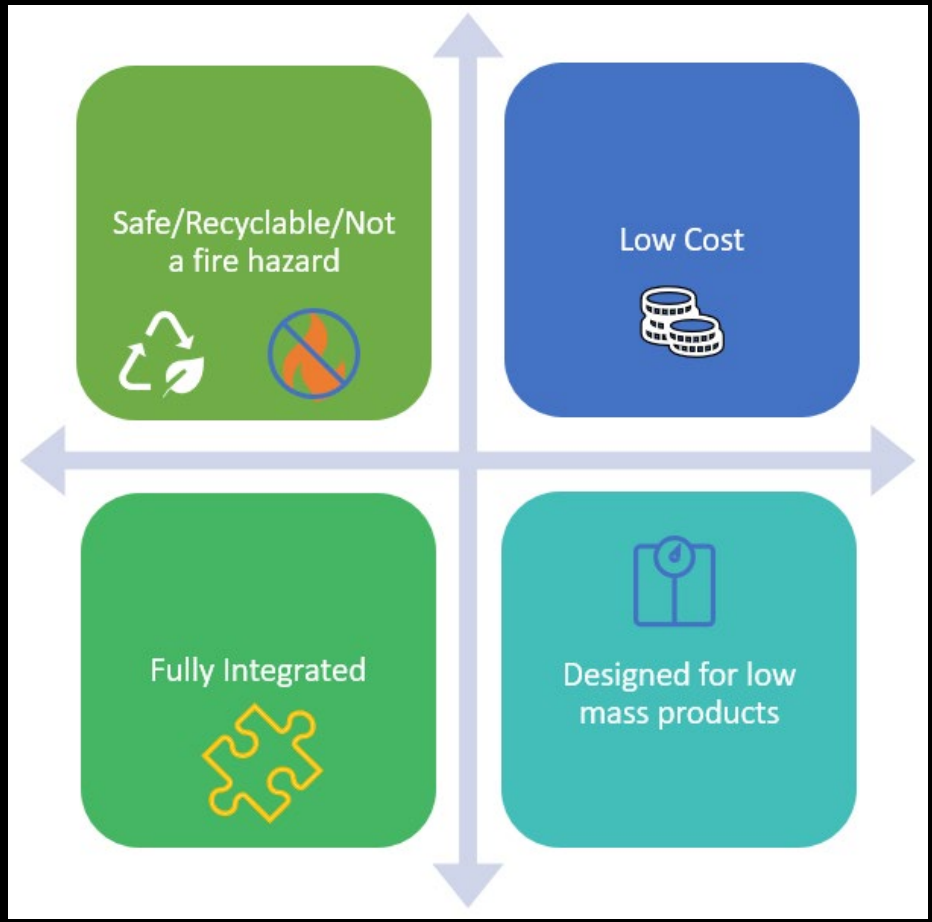
One of the key market players said “ We care about being sustainable and eco-friendly, but the solution must be economical for mass market adoption”

This is Printed Energy(PE)’s MOTO and key element for Printed Battery Technology Success

The “Enablers” of Printed Energy Battery Technology

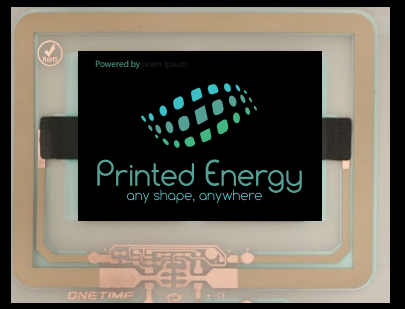
Printed Energy Development Steps

- ❑ Readily available materials
- ❑ Cost Effective
- ❑ Optimal performance of batteries
- ❑ Non-Toxic and Safe
- ❑ Conform to any shape
- ❑ Electrochemistry designed for Pulse Load (IOT & Active RFID)
- ❑ Fully Printable

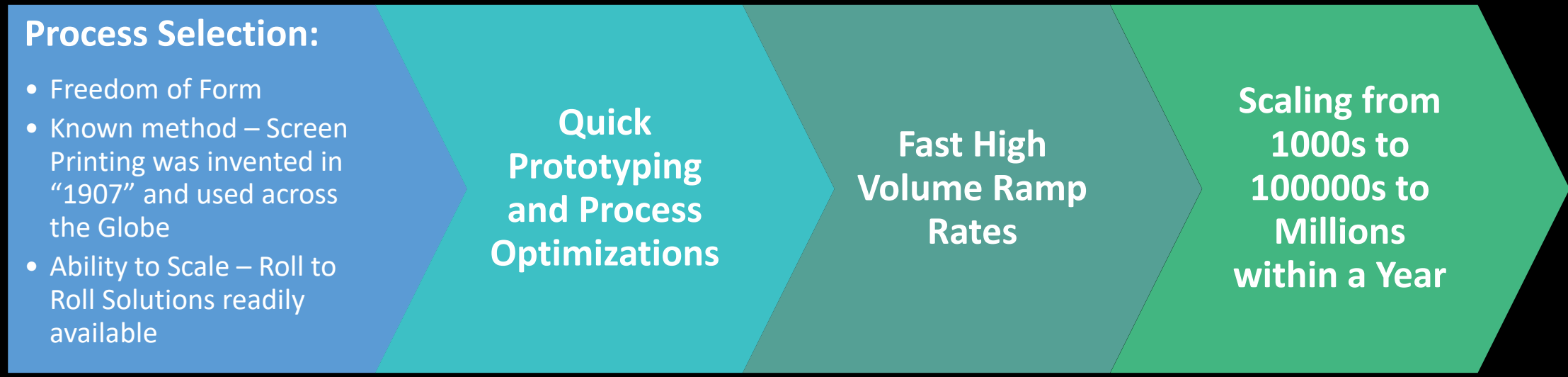


Portfolio

- Printed Energy over the course of 10+ years has developed a variety of solutions
  - 93+ patents across 13 patent families
  - Primary Zinc Ion Chemistry
  - Rechargeable Zinc Ion Chemistry
  - Supercapacitor Zinc Chemistry
  - Fully Printed systems – NO-PART MANUFACTURING
  - Made to required voltage during printing



Printed Batteries are designed for Scale-up



PE's Current volume roadmap will ramp to 1,000,000 units a month by Q3 2024

All in One Solution Space – State of the Art Manufacturing Solution by Printed Energy

- In-House Ink Development & Manufacturing
  - ✓ Proprietary inks/slurries internally manufactured
    - ✓ Anode
    - ✓ Cathode
    - ✓ Separator
    - ✓ Current collector
    - ✓ Other supportive layers
  - ✓ More functional chemistries in development
  - ✓ High Volume, High-Speed, High-Quality Slurry Manufacturing Process - **Plant Online**
- In-House Full Device Development & Manufacturing
  - **State of the Art R2R Kilo Factory Online**
  - ✓ Roll to Roll battery manufacturing
  - ✓ Quick prototyping labs
  - ✓ High throughput SMT

Ink Manufacturing

↓

R2R Battery Manufacturing

↓

Device Manufacturing

↓

Fully Functional Unit

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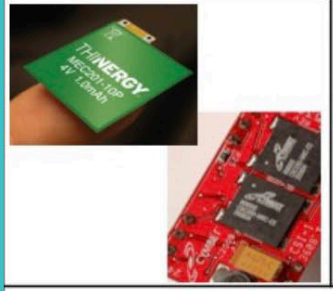
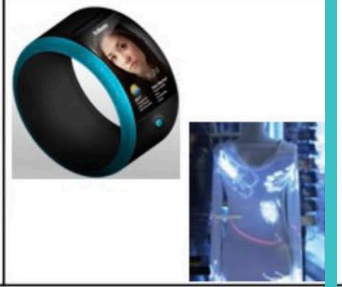
Printed Batteries Market/Roadmap

IoT, MEMS, CMOS memories, Medical implantable	Smart cards, Skin patch, RFID	Wearables, E-textile, Medical device	Smartphone, Tablet, Power tool, Toy	Transport	Large-scale energy storage
Capacity range →					
1 mAh	10 mAh	100 mAh	1 Ah	100 Ah	> 1 kAh
Important features					
• Rechargeable • Small footprint, many micro-batteries • Long life time • Rapid discharge • Tend to incorporate with energy harvesting	• Can be both disposable and rechargeable • Laminar and thin, some with special form factor • Relatively low power • Cost sensitive	• High energy density for small volume • Long working hours • Flexible, stretchable or thin, some with special form factor	• Light-weight and small volume • Long working hours • Some with special form factors • High power	• Safe • Reliable • High power • High capacity	• Cost advantage • Long life time • Reliable • High capacity
					
Technology Status					
Small volume production	Available, mostly customized	Prototypes available	Research to prototype	Research	Very early stage

PE's Current Market

Source:IDTechEx

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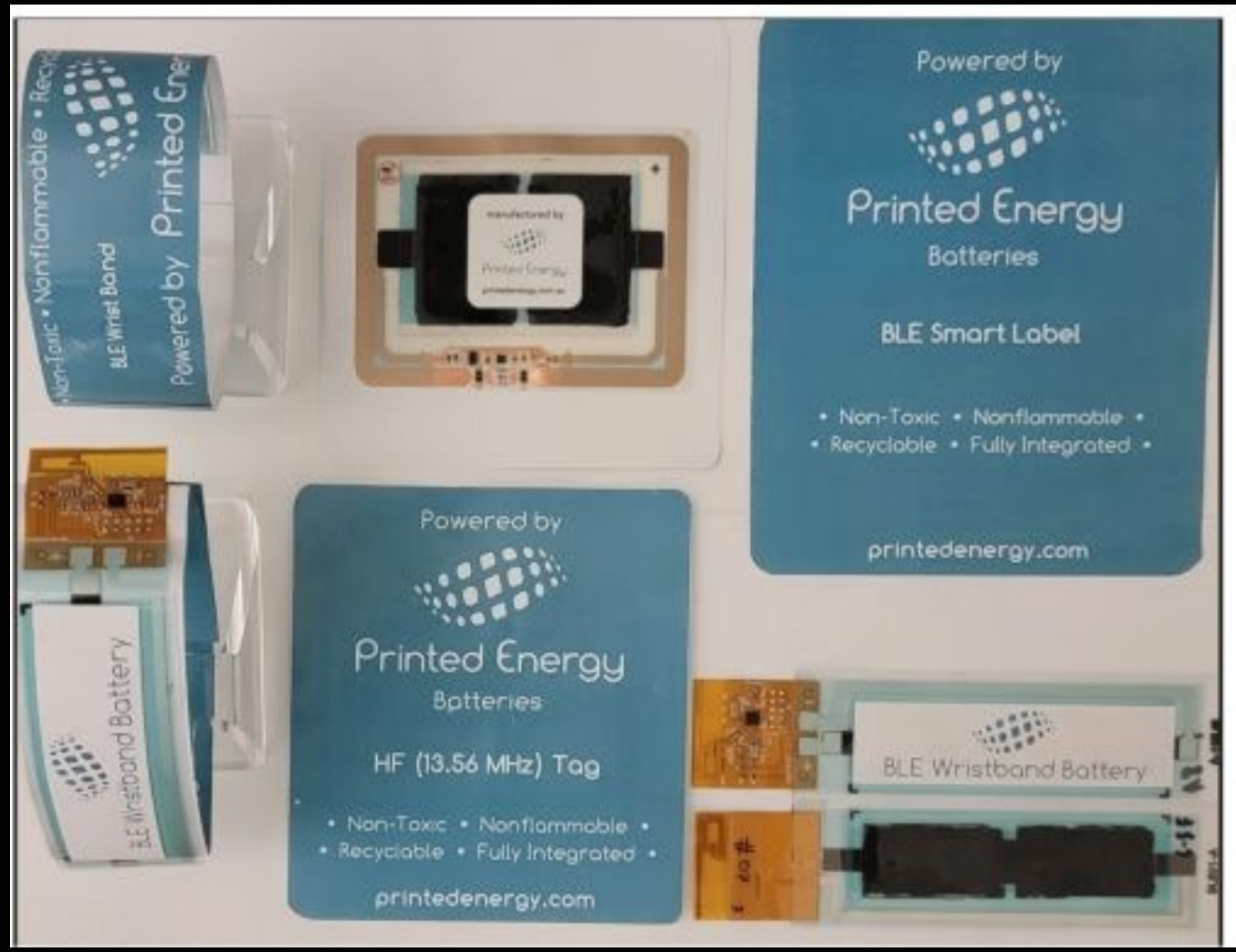
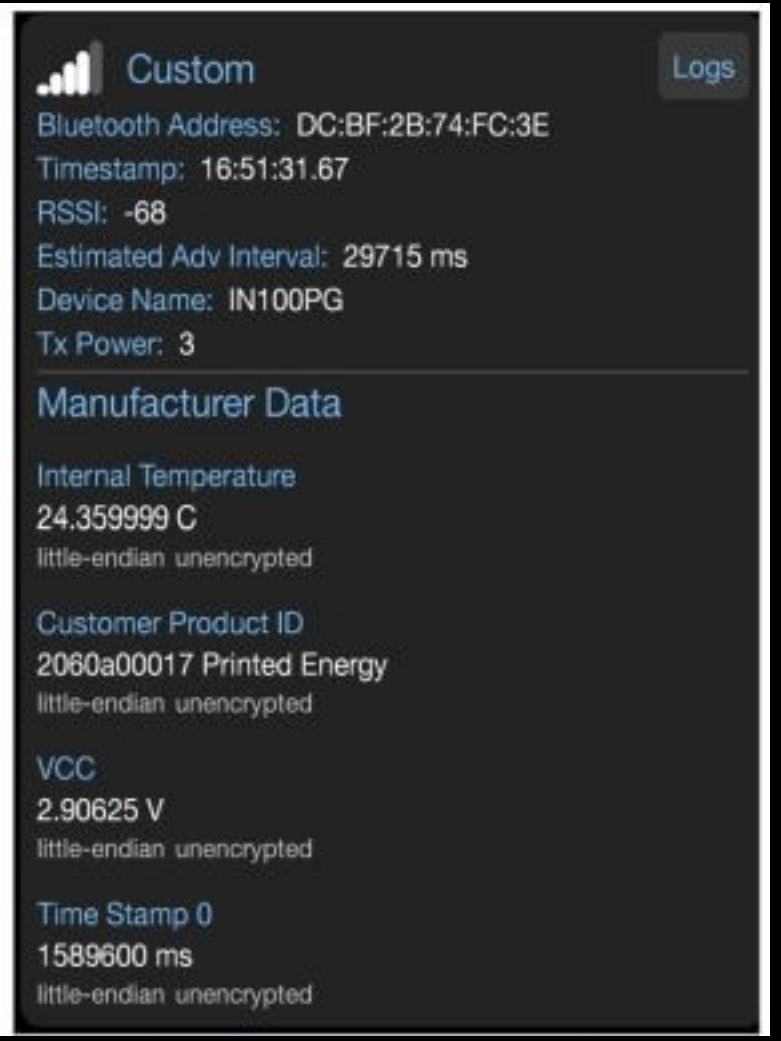
Current Products – BLE, UHF etc.





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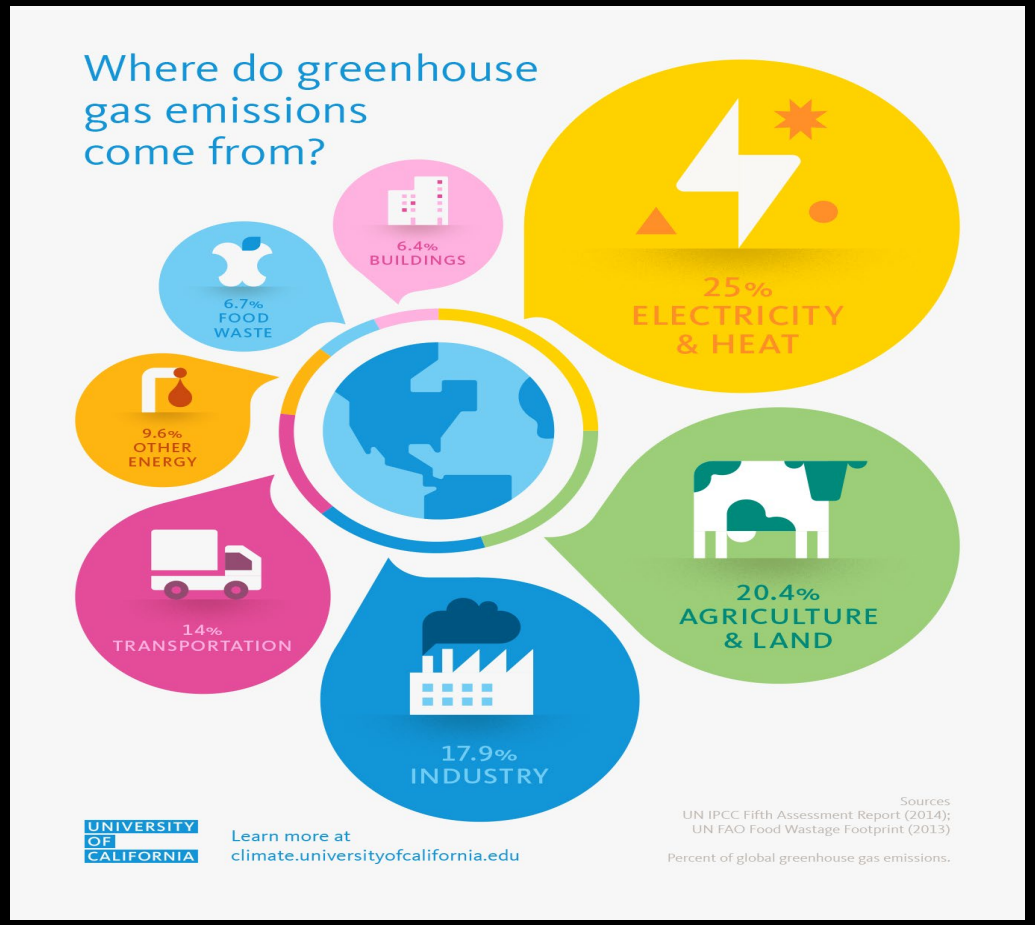
Current Use Case of Printed Batteries in Reducing Green House Gas Emissions



- Food waste is the cause of 6.7 % of the total GHG emissions
- PE has created a non-toxic battery chemistry that is cost effective in enabling smart tracking
- Farm to Table tracking and traceability will reduce the loss in food while transport
- UN estimates the saving of millions of ton’s of waste with addressing the cause at the site which is mostly during transportation/supplychain

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Printed Energy has been successful in developing solutions into the marketplace using sustainable Zinc chemistry. The future roadmap delivers into other sections of the market and world needs furthering the use of Zinc ion batteries.

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Thank You

Any Curious Questions?

For more information email: hkolli@printedenergy.com