Efficiency for Access Design Challenge Webinar: Product Lifecycle

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- Mechanical Engineer, holds a PhD in Management, Economics and Industrial Engineering from Politecnico di Milano University
- Experience on e-waste management, capacity building and policy, including expertise on Operations & Quality, take back scheme for e-waste, batteries, PV, and other industrial waste streams
- Managing Director of the UK branch of Sofies, providing consulting, project management and services in the field of sustainability.

Declan Murray
- Internationally-recognised expert on the deployment of off-grid solar technologies in the Global South
- Work on repair, recycling and waste management, having completed a doctoral thesis on these topics from the University of Edinburgh, with a geographic focus on Kenya
- Advises companies, donors, investors and NGOs alike on making products, projects and processes to be more sustainable.
Circular Economy & Off-Grid Solar Sector

Federico Magalini
The circular economy

Design out waste and pollution

Keep products in use for longer

Regenerate natural systems
Perspectives on the future

- Access to Energy enables huge societal benefits (sanitation, education, food preservation, clean-cooking,…)

- Also exposes segments of populations previously not exposed to electronics

- Products need to be “designed to last”, easily maintained, with safe materials, compliant with mandatory and voluntary standards

- Consumers & customers have to be pro-actively engaged, as they play a key role

Henry Ford

*Great Today and Greater Future, 1926*
Why do we need rules/standards

“Setting” the rules

“Pushing” for Best Available Technologies

“Shaping” operations

Environmental (societal) Perspective
The risks & opportunities at EOL for OGS

If you dispose/discard the product, where do you throw it away?
- Burn it
- Bury it
- Damp it at fundis place
- Dispose with trash
- Leave it outside somewhere
- Throw away in the trash

Circular Economy & Off-Grid Solar Sector
## Options to foster collection & recycling

<table>
<thead>
<tr>
<th>Reverse Logistics Scenario</th>
<th>Waste Stream</th>
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<tbody>
<tr>
<td></td>
<td>Small Appliances</td>
</tr>
<tr>
<td>Retailers &amp; Distributors acting as reverse logistics players</td>
<td>More difficult as products are usually sold and they have low residual value</td>
</tr>
<tr>
<td>Maintenance services</td>
<td>No network of collection of waste from repair centres</td>
</tr>
<tr>
<td>Network of collection by recyclers</td>
<td>Incentive to set-up collection centres (consolidation) if more waste is being collected; those might complement collection infrastructures from government (currently not available)</td>
</tr>
<tr>
<td>Informal collectors</td>
<td>Hard to collect in rural areas and low-value products (no valuable components, only spare parts)</td>
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Circular Economy principles

- Done by OGS
- Happening for OGS
Where EcoDesign could play a role?

- Improving EoL performances of Electronic product:
  - Decrease the “value” of materials in manufacturing stage
  - Minimize worst case scenario (landfilling & toxicity control)
  - Maximize environmental value of fractions recovered (eco-efficiency)

![Diagram showing environmental burden and gain with values 1, 2, and 3 marked.]
Re-Design in Life-Cycle perspective

Focusing only on EoL: maximum environmental gain on 3 Life Cycle perspective need to be taken in account!!!

Environmental gain (mPt)

Source: J. Huisman
## Perspectives & role for designers

<table>
<thead>
<tr>
<th>Product or Component</th>
<th>Presence of toxic/hazardous components</th>
<th>Relevant from resource management perspective</th>
<th>Relevant disposal costs</th>
<th>Main sources of potential revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHS</td>
<td></td>
<td></td>
<td>Plastics, (with BFR)</td>
<td>Copper cables PWB control panels</td>
</tr>
<tr>
<td>Lamps</td>
<td>Mercury in CFL</td>
<td>Rare Earth in LED (mainly Y, Lu)</td>
<td>CFLs containing mercury</td>
<td></td>
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<tr>
<td>PV modules</td>
<td>Cadmium and Tellurium</td>
<td>Gallium, Tellurium, Germanium and Indium</td>
<td>Eventually the Glass</td>
<td>Aluminium for larger frames</td>
</tr>
<tr>
<td>Batteries</td>
<td>Lead, Cadmium</td>
<td>Lead</td>
<td>Li-Phosphate, Ni-Cd</td>
<td>Lead, Li-Ion, Ni-MH</td>
</tr>
</tbody>
</table>

Design can play a crucial role, but not only..

Adventures in EcoDesign of Electronic Products
Any questions?

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Product Lifecycle: Repairability

Dr Declan Murray
Independent consultant
The next 15 minutes…

- What is repair and why does it matter?

- Repair in your brief

- Repair in the judging criteria
What is repair?

And why does it matter?
What is repair?
And why does it matter?

Everyone does it:
- hacking, jugaad, bricolage, DIY, fixing, mending, design

- some things more than others:
  - cars ✓, vacuum cleaners X

- some parts of the world more (affordably) than others

- reconnecting, adding, removing, cleaning, using

We’ve always done it

Resource constraints, e-waste, manufacturing emissions, mining impacts

Ownership and rights
Repair and your brief
Repair and your brief

- “a lack of access to energy and other basic services”
  - ≠ isolated or void of human and material resource

- “affordable”
  - now or over the long term?

- “super-efficient”
  - think about the energy of manufacture and shipping

- “improvements to existing appliances”
  - people have routines and attachment
Repair and the judging criteria
Repair and the judging criteria

- **Innovation**
  - whose innovation?
  - price of components
  - cost of production/assembly
  - materials used

- **Social impact**
  - “leave no one behind”

- **Scalability**
  - existing supply chains and distribution channels
Want to know more?

Initiatives
- **iFixIt** – repair guides for electronics
- **The Restart Project** – do a great podcast and it’s all on Spotify

Exemplar products
- **Fairphone**
- **Gerrard Street** – repairable headphones
- **Solar What?!** – recyclable, repairable, reusable solar lantern

Reading
- **Caring for the "next billion" mobile handsets: opening proprietary closures through the work of repair** – Houston and Jackson (2016)
Any questions?

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