Tech Topic Series: Eco-Design for Circular Electronics Economy

Session 2
Schneider Electric & Fairphone

June 17, 2021

Watch the recorded webinar: https://youtu.be/C13lVQvPTrg
Welcome to the Learning Series on Eco-design

1. Our speakers will be highlighting best practices for eco-design for circular electronics

2. We welcome you to use the Chat to share your own best practices and to ask questions about the tools and resources used to achieve their eco-design successes

3. iNEMI will compile the information into a final report expected later in 2021
Session 3: Tuesday, July 27
ADVA Optical and Google/Nest
10:00-11:00 a.m. EDT (Americas)
4:00-5:00 p.m. CEST (Europe)
10:00-11:00 p.m. CST (China)

ADVA Optical
Confirmed Speaker: Klaus Grobe, Director of Global Sustainability

Google/Nest
Confirmed Speakers: Katie Morgenroth and Adi Narayanan
Circularity is Business

Schneider Electric – iNEMI Eco-Design Series - Session 2
Christophe Garnier – Environmental Standardization Manager
Gaurav Sharma  Director, Circular Business Models – Group Strategy & Sustainability

June 17th, 2021
Seizing the ‘Circular Business Models’ opportunity

**Upstream initiatives & targets**
- Double recycled plastics in products by 2025
- 80% product revenues with Green Premium
- 200 ‘Waste-to-resource’ sites
- 100% packaging from sustainable sources
- Circular innovations at each site

**Downstream initiatives & targets**
- 420K metric tons of primary resources avoided
- ‘Circular’ services growth
- Lifecycle offers: lifespan extension, 2nd & 3rd life, responsible end-of-life
- +46% YoY Assets under Management (3.8M in total)
Upstream examples
Internal
Superior environmental performance with Green Premium
Resource
Product is RoHS and REACh compliant

- Transparent environmental information
- Life Cycle Assessment, compliant with ISO14025
- End of Life instructions

Well-Being
Contributing to improved energy efficiency
The MasterPact MTZ has energy monitoring capabilities which are an essential part of an efficient architecture such as EcoStruxure

Substances of very high concern free
Peace of mind is granted by the absence of SVHC which are potentially harmful and toxic for both humans and the environment.

Circular
Upgradeability & durability
Modernization can be performed without disrupting electricity services. Improved digital monitoring services can allow preventive maintenance, improving the performance over lifetime.

Overall, the Masterpact MTZ can help you achieve a Green Building certification, for instance LEED™ points are awarded in the Building Product Disclosure and Optimization section:
- Environmental Product Declaration
- Material Ingredients
- Advance energy management
PEP ecopassport – ISO 14025 Life Cycle Assessment (LCA) based information

80% of product turnover covered by products having a Product Environmental Profile (PEP)
Circularity Profile providing End of Life Instructions (EoLIs)

Product End of Life Instructions

Masterpact MT1 16H1 three pole draw out circuit breaker with Micrologic 5.8X control unit

Localisation of components & recyclability rate

End of Life Instructions

The breaker must be in OFF position and DECHARGED state before starting dismantling operations.

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential hazard</td>
<td>1</td>
<td>energy spring</td>
</tr>
<tr>
<td>Tyre disconnected</td>
<td>2</td>
<td>Electronic Board</td>
</tr>
<tr>
<td>Tyre disconnected</td>
<td>3</td>
<td>Airbag</td>
</tr>
<tr>
<td>Tyre disconnected</td>
<td>4</td>
<td>Battery</td>
</tr>
</tbody>
</table>
Freely accessible through our online platforms…

Check-a-Product + mySchneider App + On-line Catalog

Downstream examples
Practical and scalable examples of our Circular business models

- Extending life
  Modernisation

- Giving a 2nd life
  Refurbishment

- Handling end-of-life
  Collection & Recycling

Product Environmental Profile

End of Life Instructions
Extending lifespan by Modernisation (Retrofit)

Energy depletion: 773,904 MJ
Global warming: 40 tonnes CO₂
Water depletion: 389 m³

x 135 oil barrels
x 8 cars traveling around the world
x 7 years

Environmental benefits of a typical primary distribution retrofit solution (calculated using Product Environmental Profiles)
5 oil transformers depolluted

13 refurbished switchgear (of 36 total) & 5 dry transformers

Savings on:
- Total cost
- Metals (26 tonnes)
- CO₂ (170 tonnes)

~5-10% reduction in down-time

End-user benefits
- No pollution risk / peace of mind
- Humidity & consumption monitoring

Watch video https://www.youtube.com/watch?v=KLq0VfSSeAY
In summary, PEP & EoLIs: practical applications

<table>
<thead>
<tr>
<th>What it provides</th>
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<tbody>
<tr>
<td>• Product environmental impacts and material composition (including some circular economy attributes such as recycled content, recyclability rate…)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>What users could achieve</th>
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<tbody>
<tr>
<td>1. <strong>Benchmark</strong> with other products following same rules</td>
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<tr>
<td>2. Consolidate such environmental attributes for a <strong>full</strong> system/solution (retrofit example)</td>
</tr>
<tr>
<td>3. Adapt ecoDesign on full lifecycle, ex: <strong>which is ‘greener’</strong>? Al or Low CO₂ Al or Copper?</td>
</tr>
<tr>
<td>4. Environmental benefits calculation: <strong>refurbished vs new</strong> products</td>
</tr>
<tr>
<td>5. Enabling to <strong>reduce</strong> emitted CO₂ (could be <strong>costs</strong> on this in the future)</td>
</tr>
<tr>
<td>6. Identify ‘green’ <strong>claims / revenues</strong> (fuel into EU Green Deal and new CEAP)</td>
</tr>
</tbody>
</table>
Circularity – the winning strategy for all stakeholders

**Our Customers**
- Reduction in Total Cost of Ownership

**Our Planet**
- Moving the date, saving resources

**Governments**
- Local jobs creation

**Our Company**
- Lifecycle relationship with customers
Circularity is Business

Schneider Electric

Christophe.garnier@se.com
How modular design enables circularity

June 17, 2021
@Eco-Design for Circular Electronics Economy

Miquel Ballester,
Product Management Lead

Thea Kleinmagd,
Circular Material Chains Innovator

FAIRPHONE
How it started

Founded in 2013, emerging from an awareness campaign on Conflict Minerals

Fairphone 1
2013

Fairphone 2
2015

Fairphone 3
2019

Fairphone 3+
2020
Our Mission

By establishing a market for ethical electronics, we motivate the industry to act more responsibly.
We’re making a positive impact in 4 areas:

- Fair materials
- Fair factories
- Longevity
- Take-back
Agenda

> Environmental impact of smartphones
> Designing a more sustainable smartphone
> Closing the material loop
Why does the impact of smartphones matter?

ICT carbon footprint as a percentage of total footprint projected through 2040

(Belkhir and Elmeligi, 2018)
**Electronic waste** is the world’s fastest growing waste stream...

- **1.4 billion** phones are sold each year
- The average lifespan is **2-3 years**
- Only **20%** are reused or recycled
Longevity is crucial to reduce the environmental impact of smartphones

Relative impact per life cycle phase

Relative impact per year use for the impact category Global Warming

(LCA Fairphone 3, Fraunhofer IZM)
> Environmental impact of smartphones
> Designing a more sustainable smartphone
> Closing the material loop
Slowing and closing the loop

(Achterberg et al., 2016)
Limitations of the lifetime of (most) smartphones

1. Limited durability of standardized components
2. Battery charging cycles
3. Limited software support of chip set by producers
4. Promotion of phone replacements for newest technology (although mature)
5. Lack of cost-effective and easily accessible repair options
6. User behaviour

The average lifespan is 2-3 years
Fairphones approach to design a ‘long-lasting’ smartphone

1. Allows for easy opening and break down in smaller subsystems
   I. Repair
   II. Upgrades
2. Reliability! (resistance i.e against drops, dust, etc)
3. Easy to diagnose and to update
4. Provide affordable spare parts and information for repairs
5. Easy to ‘take back’
Modular Design
Fairphone 3

Top Module
The Top Module includes the 8 MP front camera for selfies, the receiver, 3.5mm earphone jack, secondary microphone and proximity sensor.

Camera
The 12 megapixel main camera with Dual LED flash and up to 8x digital zoom allows you to capture precious, high-quality memories.

Display
Our sturdy display module is fitted with a 5.65 inch Full-HD display and a 18:9 ratio for a bright and clear view, while Gorilla Glass 5 provides greater scratch resistance.

Battery
If it’s time to replace the battery, keep the phone running with this lithium-ion battery that has a capacity of 3000 mAh and a voltage of 3.8V.

Back Cover
The black translucent back cover of Fairphone 3 not only protects the phone but also allows to see inside it.

Bottom Module
The Bottom Module gives the phone a voice: it contains the vibration motor, USB-C connector and the primary microphone.

Speaker Module
The Speaker Module provides crisp, clear sounds and high-quality audio experiences for the Fairphone 3 user.
Enabling a longer lifespan through modular design

Easy to repair

Phone upgrade instead of replacement

Camera+ Module

Top+ Module
Would you say repair and modularity is a hotspot?

Replacing with a 'repaired' core module brings large environmental benefits of about **90%**

Components enabling modularity only represent **2.3%** of the CO2 emissions resulting from production.
Agenda

> Environmental impact of smartphones
> Designing a more sustainable smartphone
> Closing the loop
Slowing and closing the loop

(Achterberg et al., 2016)
An ecosystem for take-back with modularity as its backbone
Recycling Route 2 – Dismantling

(TSL furnace)

(Light metal remelt/refine)

(Electric furnace)

(Plastic extruder)

Recovered materials and energy
How much can we recover? Or - how much is lost?

Material recovery FP3 (to be published)

Material recovery FP2 (Recycling Route 2)

(FP Recyclability Study, 2017)
How does modular design enable circularity?

Modularity enables
1. prolonging life spans through repair and upgrades
2. refurbishment of modules for reuse as spare parts
3. module harvesting and refurbishment
4. more efficient and targeted recycling
FAIRPHONE

Change is in your hands

www.fairphone.com
References


(Joe McLeod, n.a.) http://www.andend.co/tools-and-examples/2018/1/25/designing-ends-for-apple
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