

Orange Expert Energy & Environment

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Editorial

Within the framework of *Essentiels 2020*, Circular Economy has been presented as a new Business Model. It clearly expressed the stakes, challenges and enablers that have to be developed during the next five years. Orange has subscribed more than one year ago to the Ellen Mac Arthur Foundation, to accelerate the development of Circular Economy within the Group.

Within the nature there is no ultimate waste, because what is waste for some is considered as raw material for some others. Circular Economy's business model is based on what happens in the wild.

Today's the traditional linear "take, make, dispose" economic model relies on large quantities of cheap, easily accessible materials and energy. This model is reaching its physical limits. At the opposite, the circular economy is an attractive and viable alternative that business stakeholders have already started exploring today. A circular economy is restorative and regenerative by design and aims at keeping products, components, and materials at their highest utility and value at all times.

This objective of this newsletter, is to first show briefly all the existing ongoing actions within the Group and then present some proposals in the home network domain and network infrastructures to try to reduce resource consumption. The idea explored here is to try to increase the life duration of the different kind of equipments.

The basis of circular economy should be considered as an input for each new research or anticipation project in order to limit resources consumption.

Marc Vautier, Referent Expert

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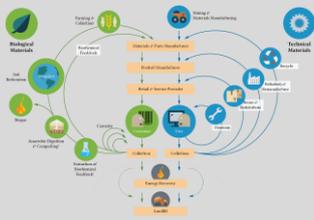
Useful Links:

Orange Expert

http://sites.com.intraorange/teams/a12b/fr/orange_experts/Pages/communautes.aspx

SharePoint of Orange Expert Energy & Environment Community : [here](#)

Follow up



Circular Economy and ongoing action

In fact Orange has been involved in Circular Economy for a long time towards different actions (Repair, Reuse, Refurbish, Recycle...) in order to increase life duration of its product or to optimize the end of life process in order to reduce the quantity of ultimate waste.

Refurbishing of Livebox & Set top box: When a customer experiences a problem with the box or wants to change service offer, he has to bring back the box to the operator and therefore can get a new product with extended services. In this case the old box is not transformed in Waste of Electric and Electronic Equipment but is sent to an Orange subcontracting company. This company checks the good behavior of the equipment, can make a software upgrade if needed and eventually can also change also the shells if they are slightly damaged. Then the box is put in a new packaging and sent to the retail network like a new product. Like this the customer does not know if he has a new or second hand box. To do so, Orange has to develop its boxes in order to reduce as much as possible the refurbishing cost (shell replacement...). Livebox 4 has been especially designed to optimize the refurbishing process.

Reuse of equipment:

Support Orange affiliated companies (EU/AMEA) to reuse some products or equipments which are no longer used by Orange France : for instance Orange Romania is very interested to get some old STB from Orange France for their customers. This operation needs an optimized refurbishing process in order to adapt the software layer in the boxes towards the local market needs. This could be extended to some other equipments. Ivory Coast, Cameroun and Jordan are interested in LB2 for which a specific middleware has been implemented and almost 170k LB2 should be sent in these countries.

Regarding mobile phone, Orange France has launched the “*collecte citoyenne*” operation with the objective to get mobile phones back from customers when they decide to change or replace their old mobile phones by a new one. With this approach the retrieved mobile phone can be resold by Orange or by other reseller after refurbishment, or sent to a recycler to recover precious metals if they are considered as obsolete. Today in one ton of smart phones, one can recover between 15k€ to up 40k€ of precious metal. Indeed the average mobile phone contains small quantities of scarce metals such as silver (used for soldering), gold (used for integrated circuit wire bonding) or platinum/palladium (used in ceramic capacitors for electrodes), but also a few grams of copper (for printed circuit conductive layers e.g.) or cobalt (used in Li-ion batteries for electrodes). Modern plants, such as the one manage by Umicore in Belgium, are able to recover around 20 of these precious and non-ferrous metals within a smelter using the ISASMELT process (see [here](#) for process description)

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Anticipation activities

Circular Economy and Network equipment

The Orange Experts communities Network of Future and Energy and Environment have decided to join their efforts to carry out a study about the circular economy concept applied to network infrastructure and propose some first thoughts ([here](#)). Different brainstorming arrived at the following statement : instead of a focus only on circularity, it was decided to consider different solutions to save raw material like for example how to increase the lifetime of network equipments.

Several axes have been investigated for that purpose :

- Improving involvement of equipment makers to optimize end of life of equipment, that would encourage industry to go towards long lasting goods.
- Improving reuse of network equipment inside or outside the Group. This axis seems complicated due some interoperability issue for transmission system but also at management level for IP equipments.
- New architecture like network virtualization and software define network could be relevant within the framework of circular economy by the use of IT equipments, but a more in-depth studies have to confirm this proposal.
- Studying some disruptive business models, like functional economy which lead to evolve from purchasing a product to purchase of a service. We have analyzed the risks of such a strategy for Orange which can lead to a loss of competences in network engineering and network operation.

At the end for this first analysis we recommend network sharing as a very interesting principle to integrate circular economy. A second version of this study should be delivered during 2017.

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Circular autonomy helping to reach the 100% renewable energy target

Photovoltaic modules and their installation can be optimized in cost when they offer more than one single service (e.g. electric generator and roof services). In that case the end of life is progressive: after 20 years they produce less energy but they are still a good roof. This is similar for the batteries. Car manufacturers are thinking of a second life for their Lithium batteries. When their performances become insufficient for vehicle, they could still have value as energy storage associated to solar photovoltaic PV module. Reuse or second life could be also possible for datacenter and telecom network batteries if an adapted technology is used (progressive loss rather than sudden death as majority of lead acid used today).

Last but not least, some studies have highlighted an overuse of copper (about 100 Mt) to reach a worldwide 100% Renewable Energy scenario. A lot of copper is needed to for wind turbine generator. Indeed, a whole home solar PV generator usually interconnected at about 600VDC is using less copper than home distribution in 230VAC which is much oversized for LED lights or ICT device consuming less than 100 W. Already there are worldwide activities around another distribution e.g. in international standardization such as IEC and ITU-T that may include complementary AC and DC voltage.

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R&D Activities & Standard



Modular Box

Currently two projects are dedicated to circular economy and modularity.

The first one, which covers modularity for all ICT equipment, is handled with 5 industrial partners within the Ellen Mac Arthur Foundation. First, several examples of equipment were analyzed to determine their modularity level. Then studies on the characteristics and benefits of modular design that increases circularity were carried out. For example, two architectures were assessed for Livebox 2 from Sagemcom and ZTE. The first being designed with a mini-PCI expansion card for Wi-Fi function. The life cycle assessment results indicate that, for a 5 year life cycle, the modular design can be beneficial for environment if the products reparability can be significantly enhanced. A 20 % improvement is necessary for Global Warming indicator, but 5 % is enough for Raw Material Depletion.

The second project (with Arts & Métiers ParisTech and Supmecca Toulon) deals with Smarthome and modular designs required to achieve sustainable business models and understand how modularity can be applied on electronic products. Three workshops were set up in order to:

Identify the most adequate use cases to apply modularity. The outcome of this workshop was that for Smarthome the best case studies are AirBnB, families with young children and elder people; when considering security, monitoring and healthcare purpose

Scenarios. Among the 6 initial scenarios, the most interesting considers the long term evolution : starting with a baby monitoring device, evolving to a home monitoring system to detect intrusion for example, and finally, to be used as an elder people at-home health care solution.

Define the best business model. This exercise is still in progress currently. The main challenges being to determine how the products can be retrieved and eventually refurbished, to allow a smooth evolving of the system.

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Circular Economy & Standardization

One of the major problems faced when dealing with circular economy today is how to assess the “circularity” of a product or a service. Environmental impact assessment methods like life cycle assessment or *Bilan Carbone* were designed for “cradle-to-grave” systems, rather than for “cradle-to-cradle” ones. To tackle this issue, several standards are in preparation for the ICT sector. The common document delivered by the ITU SG5 WP3 Q13 and ETSI (“Circular Economy in Information and Communication Technology; Definition of approaches, concepts and metrics”) investigates current state of the art of circular economy and resources efficiency and their applicability for the ICT infrastructure goods. This document highlights that present mass-based recyclability metrics are insufficient as cost drivers are missing (resulting in unbelievable and misleading high recycling rates even for complex electronic products). Therefore, rather than focusing on a single metric, this standard points to the fact that circular economy should include several aspects such as upgradability, refurbishability, reusability or removability.

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