



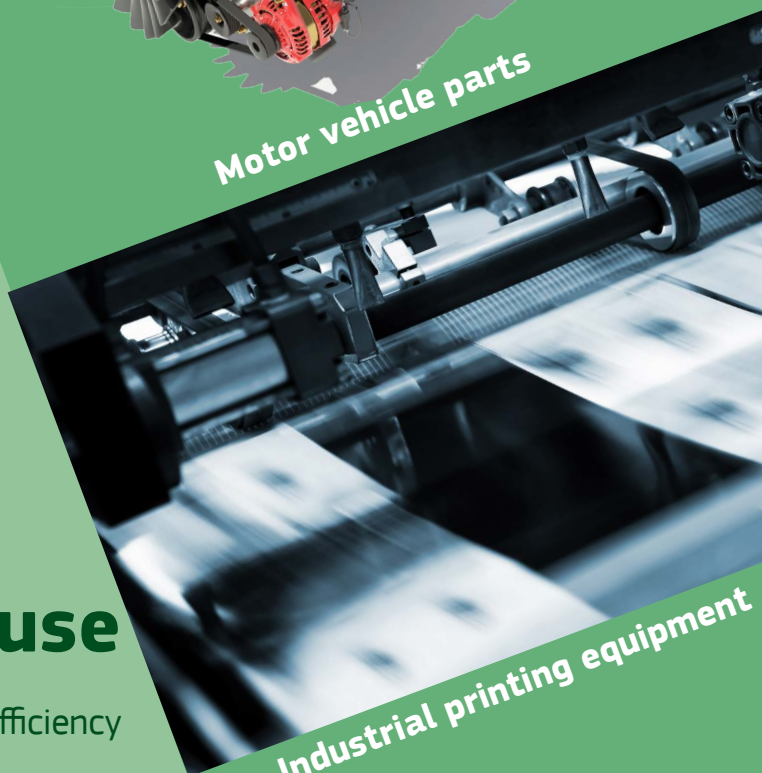
Workshop Report

Promoting Remanufacturing, Refurbishment, Repair, and Direct Reuse

As a contribution to the G7 Alliance on Resource Efficiency
7-8 February 2017 Brussels, Belgium



Motor vehicle parts



Industrial printing equipment



Heavy duty equipment

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The Workshop

The International Resource Panel and the European Commission, under the aegis of the G7 Alliance on Resource Efficiency, organised a workshop in Brussels (Belgium) to present the preliminary findings of the upcoming report by the International Resource Panel on remanufacture, refurbishment, repair and direct reuse, and discuss measures for overcoming market and policy barriers to promote these circular economy processes. The workshop was held back-to-back with a G7 Meeting on Resource Efficiency and the recommendations on how to advance remanufacturing, refurbishment, repair and direct reuse fed into discussions about the G7 Roadmap on Resource Efficiency.

Chairs' Conclusions

Introduction

1. The 20th century saw material extraction increase by a factor of about eight. Global resource consumption is expected to continue growing significantly due to population expansion and increasing resource use per person as average incomes rise. This will probably require natural resource extraction to more than double from 85 to 186 billion tonnes by 2050. Despite the apparent decoupling of GDP from resource use in member countries of the Organisation for Economic Co-operation and Development ('OECD'), global resource productivity has been worsening in recent years as a result of the transfer of production of globally traded goods to countries with lower average resource productivity. Each year, the urgency to act on resource productivity becomes greater.



2. The continued expansion of global resource consumption poses a number of challenges for the achievement of sustainable development, including the Sustainable Development Goals ('SDGs') in the Agenda 2030 for Sustainable Development adopted by the UN Assembly in September 2015. The International Resource Panel has shown that it is physically impossible to overcome resource constraints on delivery of the SDGs without significant increases in resource productivity¹. Moreover, the International Resource Panel has highlighted that most SDGs can be cost-effectively achieved through greater resource efficiency. Furthermore, meeting the 2°C scenario provided for in the Paris Agreement can be made cost-positive through the adoption of policies for resource efficiency².

3. Circular economy thinking offers a model that can help to significantly reduce pressure on resources and lead a transition to an economic system that encompasses the concept of decoupling. The European Commission's Circular Economy Action Plan³ was adopted in December 2015 with



the aim to go further in "closing the loop" of product lifecycles through greater recycling and reuse, and to bring benefits for both the environment and the economy. Circular economy in practice needs to be based on proper scientific evidence to inform policy-making about the potential environmental, social and economic consequences along the life cycle. For this reason, the International Resource Panel is currently undertaking an assessment of the resource-saving potentials of the circular economy, looking at the less resource-intensive lifespan extension activities such as reuse, repair, refurbishment, and remanufacturing.

4. The purpose of the International Resource Panel assessment report is to estimate the resource efficiency contributions of remanufacturing, refurbishment, repair and direct reuse in three sectors: motor vehicle parts, heavy-duty equipment and commercial imaging products. The study will quantify current and potential material savings, energy/emissions avoidance, waste reduction, economic value generation, and job creation opportunities in both developing and developed countries. The study will also identify potential gains through barrier removal,

¹ Policy Coherence of the Sustainable Development Goals (2015)

² Resource Efficiency: Potential and Economic Implications (2016)

³ http://europa.eu/rapid/press-release_IP-15-6203_en.htm.

suggest product design strategies, and policy options to accelerate promotion of these product life-extension practices. The quantification of resource efficiency potential for different life extension processes will help to inform the development of policy options and strategic industry insights. No study has yet been conducted which addresses these aspects of circular and product life extension processes. The final report should be available at the end of 2017.

Key messages of the workshop

The potential scale and benefits of remanufacturing, refurbishment, repair and direct reuse

5. Remanufactured or refurbished products can help firms compete at a lower price with cheaper or lower quality competitors, without reducing quality, due to the resource savings realised, allowing firms to secure greater market share. Whilst the resource saving differs per piece and material, it is often between 80% to 95% for the first extension of life, compared to a new product. Each component goes through its own number of life cycles, which can vary from 2 to 9. However, after a certain number of cycles, it becomes economically unviable to continue to remanufacture.



6. Based on the interim findings, the potential economic and resource benefits appear significantly greater than previously analysed. There are net national employment gains, because creating valuable products through remanufacturing, refurbishment, repair and direct reuse involves a greater share of labour inputs than manufacture of new products. There are also substantial societal benefits that are not captured in prices and benefits to companies – these reflect the reduction in environmental harm and the increased availability of future resource stocks which are current unpriced externalities. These benefits appear to be available to both developed and developing countries, in about equal measure, per product.

The International Resource Panel takes a system-wide view of barriers

7. To investigate needs for the promotion of remanufacturing, refurbishment and repair the International Resource Panel is taking a system-wide view – modelling product flows and then looking at all the barriers to actions to extend lifetimes in those flows. Identified barriers can be categorised as: regulatory barriers, technical barriers, market barriers and barriers to product recovery. Successful support needs the removal of all barriers, as removing one is not sufficient if others remain.

8. Definitions are one cause of regulatory barriers. End-of-use or broken products are often categorised by legal definitions as waste. The same applies to what the industry calls 'core' - product components that are destined to be remanufactured or refurbished but that legally speaking are often classified as waste.

9. According to the industry, cores destined for remanufacture or repair can be disadvantaged or excluded from trade as a result of being classed as waste. Remanufactured products themselves are neither new, or used, and can also be disadvantaged or blocked in trade. In addition, imports of remanufactured products between jurisdictions can be blocked, even if remanufactured sales are allowed within that jurisdiction because these products do not fulfil the new standards and requirements that have been introduced by regulators since the time when the product had been first put on the market.

Areas for further research were identified

10. Workshop participants identified the following knowledge gaps and research questions as being of high priority:

- The trends in the value of remanufacturing, refurbishment, repair and direct reuse globally
- The barriers in trade, in consumer perception and for SMEs
- A stocktaking exercise on the best practices and existing policies related to remanufacturing, refurbishment, repair and direct reuse in order to allow for an exchange of experience between countries
- The effectiveness and impact of current and suggested support instruments to promote remanufacturing, refurbishment, repair and direct reuse by conducting a comparative policy analysis
- The macro and micro-economic benefits of large-scale economic change from product-supply to service-provision models

Policy needs were identified - Packages of tailored policy will be needed

11. Remanufacturing, refurbishment, repair and direct reuse can be promoted by a) levelling the playing field between remanufactured, refurbished, repaired and reused products and new products, b) removing legislative barriers, and c) facilitating international trade in used products for remanufacture and refurbishment and in sales of remanufactured, refurbished and repaired products. Examples discussed included:

- Creating clarity on the definitions that differentiate true 'waste' from products that have life left in them
- Agreeing international standards for remanufactured products as this would harmonise the way in which countries apply environmental or human health trade restrictions,

including by addressing possible mis-classification as waste. New international standards would set the boundaries of what is interpreted as 'legitimate' with beneficial impacts for the interpretation of international trade law

- Facilitating the development of international reverse logistic chains, i.e. collection and transport systems of cores
- Asking industry to identify perceived legislative barriers to remanufacturing, refurbishment, repair and direct reuse innovation in their businesses and inform regulators, so that these can be discussed and addressed (similar to 'Innovation Deals' launched by the EU)
- Framing waste in the context of its economic value, rather than its environmental risk, partly by ensuring its risk to the environment is eliminated

12. Increasing remanufacturing and repair is partly a cultural challenge, reliant on a change in values inside companies and product users, so that engineers see ways to use remanufactured parts and consumers understand the value of repair and of returning products. Such changes often need to be driven by legislation, for example, by changing incentives or stimulating design for repair. Examples discussed included:

- A Swedish tax-refund for the labour segment of household repair bills for white goods and electronics
- The first mandatory Italian Green Public Procurement scheme covering 17 product sectors and setting minimum criteria for eligibility and further criteria to reward innovation which are revised every three years
- The use of modular fees in France, which reduces Extended Producer Responsibility fees for producers who inform consumers consumer how long spare parts will be available for the product on purchase

13. Several measures can be used to increase consumer acceptance of remanufactured or refurbished products including: changing the financial incentives, introducing standard contractual clauses, working with consumers' existing trusted sources to shape opinion, peer to peer marketing, support for local community communication and exchange platforms (IT tools and physical spaces), and marketing aiming at young people. Specific examples included:

- Clubs to share experience on how to repair products (e.g. London's Restart Project)
- Technology platforms which can provide the links to create reverse supply chains from consumers to repair, reuse or remanufacture (e.g. returns management software developed by 12Return)
- Certified quality standards for recycled materials (e.g. label ReMade in Italy)

- Campaigns to change values and educate on options (e.g. Ljubljana’s waste collection authority, Snaga, which runs many inventive campaigns to stimulate consumers to reconsider the value of reducing waste and what they buy)
- Putting in place national and municipal consumer education plans to raise awareness on circular economy (e.g. see examples from the report ‘Enjoying more with less. Leading examples of grassroots circular economy initiatives and lessons for policy-makers’ by the European Environment Bureau)

14. Neither industry nor policy makers currently know the true extent of the market share of remanufactured, refurbished, repaired, and directly reused products. Policy progress will need agreed metrics for the activities which are to be promoted, and the setting of targets.

15. To overcome the barriers, resource policy will need to be taken seriously across different departments within a company (e.g. sales people talking to sustainability and design people) and by different arms of government (e.g. economics ministries working with waste management policy makers).

16. There are many, simultaneous areas of policy action which are needed to promote circular economy. Solving barriers individually will not have much impact on levels of remanufacturing, refurbishment, repair and direct reuse. Packages of measures, applied appropriately to each situation in a systemic manner will be required.



Astrid Schomaker

Director for Global Sustainable Development, Environment Directorate-General, European Commission



Janez Potočnik

Co-Chair, International Resource Panel



Federica Fricano

Director for EU Affairs and International Climate Negotiation, Ministry of Environment, Land and Sea, Italy

Workshop Programme

Tuesday 07 February 2017	
09:30-10:00	<p>Opening session: Welcome and introduction to the workshop</p> <p>Welcome addresses by:</p> <ul style="list-style-type: none"> -Kestutis Sadauskas, Director, Circular Economy and Green Growth, Environment Directorate-General, European Commission -Federica Fricano, Director for EU Affairs and International Climate Negotiation, Ministry of Environment, Land and Sea, Italy -Janez Potočnik, Co-Chair, International Resource Panel <p>Introduction and objectives of the workshop</p> <p><i>Luca Marmo, Environment Directorate-General, European Commission</i></p>
10:00-11:40	<p>Session 1: Presentation of the preliminary findings of the report on 'Resource Efficiency and Innovation in Circular Economy through Remanufacturing, Refurbishment, Repair, and Direct Reuse' by the International Resource Panel.</p> <p>Moderator: <i>Janez Potočnik, Co-Chair, International Resource Panel</i></p> <p>Gains from remanufacturing, refurbishment, repair, and direct reuse: insights from the International Resource Panel</p> <p><i>Nabil Nasr, International Resource Panel member, lead author of the report and Director of Golisano Institute for Sustainability at Rochester Institute of Technology, USA</i></p> <p>Barriers for advancing remanufacturing, refurbishment, repair, and direct reuse: insights from the International Resource Panel</p> <p><i>Nabil Nasr, International Resource Panel member, lead author of the report and Director of Golisano Institute for Sustainability at Rochester Institute of Technology, USA</i></p> <p>Questions and answers</p>
11:40-13:00	<p>Session 2: Addressing barriers on a firm level</p> <p>Moderator: <i>David Parker, European Remanufacturing Council (CER) and European Remanufacturing Network (ERN)</i></p> <p>Panel to discuss actions to be taken by businesses to advance remanufacturing, refurbishment, repair, and direct reuse:</p> <ul style="list-style-type: none"> • <i>Markus Braun, Siemens Healthcare, Head of Quality Management of the Business Unit for Refurbished Systems</i> • <i>Patrick Carminati, Lexmark's Manager Supplies Sourcing & Manufacturing Operations</i> • <i>Nestor Coronado Palma, Circular Economy Expert, former Director of the Circular Economy Program, Philips Healthcare</i> • <i>John Disharoon, Director, Market Access, Caterpillar Inc.</i> • <i>Salvador Munoz Zarate, WABCO Reman Solutions - General Manager</i> <p>Discussion with the audience</p>

13:00-14:30	Lunch
14:00-16:00	<p>Session 3: Effective policy frameworks for remanufacturing, refurbishment, repair, and direct reuse Moderator: <i>Carsten Wachholz, Senior Policy Officer, European Environmental Bureau (EEB)</i></p> <p>Panel to discuss actions to be taken by governments to advance remanufacturing, refurbishment, repair, and direct reuse:</p> <ul style="list-style-type: none"> • <i>Fabio Eboli, Ministry of Environment, Land and Sea, Italy</i> • <i>Anna Karin Jönbrink, Swerea-IVF, Sweden</i> • <i>Michal Len, Director, RReuse</i> • <i>Aik Hoe Lim, Director, Trade and Environment Division, World Trade Organization</i> • <i>Hugo-Maria Schally, Environment Directorate-General, European Commission</i> <p>Discussion with the audience</p>
16:00-16:30	Coffee Break
16:30-18:15	<p>Session 4: Increasing consumer acceptance of remanufacturing, refurbishment, repair, and direct reuse Moderator: <i>Tristan Steichen, ANTEA Group</i></p> <p>Presentation of the report “Enjoying more with less. Existing grassroots initiatives for circular consumption and how to overcome barriers to scale them up”⁴ <i>Carsten Wachholz, Senior Policy Officer, European Environmental Bureau (EEB)</i></p> <p>Panel to discuss strategies and actions to increasing consumer acceptance of remanufactured, refurbished or repaired products:</p> <ul style="list-style-type: none"> • <i>Stef de Bont, Founder and CEO, 12Return</i> • <i>Jože Gregorič, Project Manager, Snaga, Ljubljana</i> • <i>Klaus Hieronymi, Global Resource Efficiency and Circular Economy Strategies, Hewlett Packard</i> • <i>Ugo Vallauri, Co-Founder, The Restart Project</i> • <i>Carsten Wachholz, Senior Policy Officer, European Environmental Bureau (EEB)</i> <p>Discussion with the audience</p>
18:15-18:30	<p>Summary and closing of Day 1 <i>Janez Potočnik, Co-Chair, International Resource Panel and Fulvia Raffaelli, Internal Market, Industry, Entrepreneurship and SMEs Directorate-General, European Commission</i></p>

⁴ The full report can be found here: <http://makeresourcescount.eu/wp-content/uploads/2017/02/EEB-Report-on-Circular-Consumption-Patterns-1.pdf>. The summary report can be found here: <http://makeresourcescount.eu/wp-content/uploads/2017/02/Enjoying-more-with-less-Summary-of-the-EEB-report-2.pdf>

Wednesday 8 February 2017	
09:30-09:40	Re-cap and scene setting Fulvia Raffaelli, Internal Market, Industry, Entrepreneurship and SMEs Directorate-General, European Commission
9:40-10:40	Session 5: Strengthening collaboration Moderator: <i>Janez Potočnik, Co-Chair, International Resource Panel</i> Discussion open to all participants, to identify knowledge gaps/research questions of high priority and discuss future collaboration opportunities between scientists, businesses and governments to promote product lifetime extensions activities
10:40-11:00	Coffee Break
11:00-12:15	Session 6: Recommendations Moderator: <i>Federica Fricano, Director for EU Affairs and International Climate Negotiation, Ministry of Environment, Land and Sea, Italy</i> Discussion open to all participants, to identify possible recommendations related to promotion of product lifetime extension activities that could feed into the preparation of the 2017 G7 Environment Ministers' Meeting under the Italy's Presidency.
12:15-12:30	Closing session Addresses by: - <i>Federica Fricano, Director for EU Affairs and International Climate Negotiation, Ministry of Environment, Land and Sea, Italy</i> - <i>Janez Potočnik, Co-Chair, International Resource Panel</i> - <i>Astrid Schomaker, Director, Global Sustainable Development, Environment Directorate-General, European Commission</i>

Report by Workshop Session

Tuesday 7 February 2017

Opening session: the welcome and introduction to the workshop



Kestutis Sadauskas, Director, Circular Economy and Green Growth, Environment Directorate-General, European Commission

Kestutis Sadauskas welcomed participants by setting the context of the workshop and the EU's goals for the related international resource efficiency agenda.

The workshop is a contribution to the G7's work on resource efficiency. Resource efficiency is now part of the DNA of the European Commission's agenda, taken forward by the Circular Economy Action Plan and specific policy measures, like the revision of the Regulation of Hazardous Substances (RoHS) which should deliver €170m in health savings, and facilitate much greater markets for secondary materials. The possibility to decouple economic progress, job creation and environmental harm exists – practical solutions are available.

The EU realises that the potential and need for resource efficiency is global, and is looking to promote it globally, through work with the G7, the IRP and the OECD. The G7's Toyama Framework must be taken forward. Resource efficiency is essential for implementation of the Paris Agreement on climate and the achievement of the 2030 Agenda, with its Sustainable Development Goals. Even more progress can be made by working on resource efficiency within the G20, upstream, and in all parts of the world. With the G20, the growth of green finance can be better promoted. So, the ambitions of Italy's Presidency of the G7 on promoting resource efficiency are to be applauded and supported.

The draft IRP report on remanufacturing, refurbishment, repair and direct reuse is robust. We need action in these areas on a bigger scale – the kind of scale that co-operation at G7 and G20 level can offer.



Federica Fricano, Director for EU Affairs and International Climate Negotiation, Ministry of Environment, Land and Sea, Italy

Frederica Fricano thanked the European Commission and IRP for hosting the workshop, affirming its importance.

Resource Efficiency is very high on the Italian agenda, and has been since the Italy's EU Presidency in 2004. The rising profile of resource efficiency

was satisfying to see. It would most likely be on the agenda of the G7 Leaders' Summit and would certainly be discussed at the subsequent G7 Environment Ministers Meeting on 11-12 June 2017 in Bologna.

This workshop was an occasion to feed recommendations into substantive discussions on priorities for the G7 Alliance on Resource Efficiency taking place directly after this workshop on 8-9 February. Italy's Presidency would pay particular attention to the priorities and activities discussed over these three full days, to feed into the G7 Environment Ministers' Meeting and Summit.



Janez Potočnik, Co-Chair, International Resource Panel

Janez Potočnik thanked the European Commission for their support in organizing the workshop, stressing the importance of the discussions.

According to findings from the International Resource Panel (IRP), the 20th century saw material extraction increase by a factor of about eight. Meeting the needs of a growing and increasingly affluent population, ever more concentrated in cities, will require natural resource extraction to more than double from 85 to 186 billion tonnes by 2050. The urgency for decoupling escalating resource use from economic growth is now widely acknowledged by policy-makers, industry leaders and civil society. Circular economy thinking offers a model that can help to significantly reduce pressure on resources and lead to a transition to an economic system that encompasses the concept of decoupling.

In order to realise a transition to a circular economy, policy-makers need to create enabling regulatory conditions, increase incentives and remove barriers that can hinder the transition. Manufacturers need to re-think their production strategies and redesign business models to allow for more durable, repairable and recyclable products. In addition, raising consumer awareness and engagement will be essential to change consumption patterns and to increase demand for reused products and services.

In practice, the circular economy needs to be based on sound scientific evidence to inform policy-making of the potential environmental, social and economic consequences along the life cycle. To respond to this knowledge need, the International Resource Panel is conducting an assessment analysing the resource-saving potentials of the circular economy, looking at less resource-intensive lifespan extension activities such as reuse, repair, refurbishment, and remanufacturing.

Luca Marmo, Environment Directorate-General, European Commission



Luca Marmo introduced the political context of the workshop for the European Commission and its specific objectives.

The European Commission has a history of policy engagement on sustainable resource management. Milestones were the Natural Resource Thematic Strategy in 2005 (which launched the idea of the International Resource Panel), the Raw Materials Strategy in 2008, the Roadmap to a Resource Efficient Europe in 2011, the Towards a Circular Economy Communication of 2014 and the Circular Economy Action Plan in 2015. Current policy emphasises the co-delivery of environmental and economic goals through: preservation of the value of products and natural resources, increased competitiveness through innovation, minimisation of waste and more complete delivery of societies' wider values.

The importance of resource management for societal progress is well reflected in the 2030 Agenda for Sustainable Development. Its Sustainable Development Goal 12 deals directly with resource management, and several of the other SDGs reliant on improved resource productivity for their achievement.

This workshop forms part of a series of workshops that are at the heart of the work of the G7 Alliance on Resource Efficiency, which was launched in 2015 under the German G7 Presidency. The work was taken forward in 2016 under the Japanese G7 Presidency with the adoption of the *Toyama Framework on Material Cycles* and may be taken further by a roadmap on resource efficiency to be adopted in Bologna at the G7 Environment Ministers' Meeting under Italy's Presidency. The G7 meeting on the 8-9 February, that takes place just after this workshop, will contribute to that work.

The IRP will publish a report at the end of 2017 on *Resource Efficiency and Innovation in Circular Economy through Remanufacturing, Refurbishment, Repair and Direct Reuse* with a research focus on three sectors: motor vehicle parts, heavy-duty equipment and commercial imaging products.

This workshop is designed to present the preliminary findings of the IRP report and receive feedback from participants on its findings, specifically:

- To better understand the role that remanufacturing, refurbishment, repair, and direct reuse can play in a circular economy
- To identify main barriers and how to address them
- To discuss policy frameworks and consumer acceptance
- To identify the main knowledge gaps and research needs associated with transitioning towards a circular economy
- To discuss possible recommendations that could feed into the preparation of the 2017 G7 Environment Ministers' Meeting under Italy's Presidency

Luca Marmo concluded by inviting the participants to take an active part in the discussion at the workshop and looked forward to a successful outcome.

Session 1: Presentation of the preliminary findings of the IRP report



Nabil Nasr, International Resource Panel member, lead author of the topical report and Director of Golisano Institute for Sustainability at Rochester Institute of Technology, USA.

Prof. Nabil Nasr provided an overview of the ongoing study undertaken by the International Resource Panel on “Resource Efficiency and Innovation in Circular Economy through Remanufacturing, Refurbishment, Repair, and Direct Reuse”. The report aims to estimate the resource efficiency contributions of remanufacturing, refurbishment, repair and direct reuse for motor vehicle parts, heavy-duty equipment and commercial imaging products in both developed and developing countries. To conduct this analysis, a hybrid approach is utilized: bottom-up modelling is used to quantify the resource inputs at the product level, and to aggregate these impacts to the sector/country level, while top-down modelling is employed to reflect the impact that the presence/absence of key technological, regulatory and market conditions can have upon the scaling of remanufacturing, refurbishment, repair and direct reuse within the economy.

The preliminary findings show that the first cycle of remanufacturing entails significantly lower material (steel, copper, aluminium, cast iron) requirements for both developed and developing countries. In the second cycle, some new components are added in order to ensure the quality of a “like-new” product. Each component goes through its own number of cycles which can vary from 2 to 9 cycles. The design for remanufacturability and reparability of these components plays an important role in the number of feasible cycles. After a certain number of cycles, it becomes economically unviable to continue to remanufacture.

In addition, the most important barriers that have a real impact on the intensity of remanufacturing, refurbishment, repair and direct reuse have been identified using sensitivity analysis. They can be classified into four categories:

- 1. Regulatory and access barriers** are typically imposed through government regulations and/or policy. They affect production permits and/or access to capital; import/export restrictions; additional import/export requirements (e.g. taxes, fees, inspections); and relate to definitions for ‘previously used products’, ‘wastes’, and/or specific circular economy process.
- 2. Technical barriers** are typically a condition of the state of the economy. They affect access to technology and equipment, skilled labour, key inputs (including cores), and product information (specifications, core location).
- 3. Market barriers** are typically a reflection of the predominant culture of an economy. They affect customer awareness of circular economy processes, customer attitudes

towards circular economy processes and prevalence (supply) of circular economy processes in a marketplace.

- 4. Recovery barriers** are typically a reflection of infrastructure and predominant end-of-use behaviour in an economy. They affect the social norms associated with diversion vs disposal; the efficiency, cost, and convenience of diversion programs; the allocation of cost associated with reverse-logistics for circular economy processes; the overall diversion rate, and domestic supply of 'cores' for circular economy process inputs. For example, in 75% of cases the damage to a recovered product happens during the collection phase because the product is not properly packaged for being sent back.

The preliminary findings show significant differences between barriers in developed vs developing countries. The modelling also shows that solving barriers individually will not have much impact on levels of remanufacturing, refurbishment, repair and direct reuse; a package of measures is needed that addresses the barriers in a systemic way.

Prof. Nasr also highlighted the problem of definitions. The term "remanufacturing" does not have a standard internationally approved definition and the potentially recoverable "cores" are often classified as "waste". In addition, there is a difference between the processes: repair and direct reuse allow the continuation of a product's lifetime, while remanufacturing or refurbishment return a product to a "like new" condition and start a new life-cycle of the product. So, the term "life-extension processes", which has been used to describe the aggregate activities of remanufacturing, refurbishment, repair, and direct reuse, is not accurate.

The final report to be published by the end of this year will quantify current and potential material savings, energy/emissions avoidance, waste reduction, economic value generation, and job creation opportunities based on micro and macro level data collected in Brazil, China, Germany and the USA. The study will also analyse the rebound effect, identify potential gains through barrier removal, suggest product design strategies, and policy options to promote remanufacturing, refurbishment, repair and direct reuse.

Prof. Nasr welcomed feedback and additional data from participants in order to further strengthen the report.

Summary of discussions

- One of the findings that most surprised the research team was the potential of commercial printers, for which remanufacturing or refurbishment was expected to have a lot less value due to obsolescence of different electronic components. It turned out that these printers were designed for remanufacturability and reparability and took into account technological advancement by designing fast obsolete parts to be easily replaceable

- It becomes economically unviable to continue remanufacturing and refurbishment after a certain number of life-cycles due to the degradation of cores, which then require excessive substitution with new parts. Often the remanufactured product is no longer produced in high volumes and the company needs to acquire new parts from somewhere else, which brings the cost up
- According to the preliminary findings, overall net job generation is much higher for remanufacturing, refurbishment, repair and direct reuse than for manufacturing of new products because there is much more variability/irregularity in product, which requires more labour force
- The take back system to recover cores from B2B products varies according to the sector. For example, the commercial imaging sector often uses leasing schemes; the automotive sector relies on a large network of core collectors; the heavy-duty equipment sector collects through dealerships
- If society keeps looking at waste only through an environmental lens, end-of-life products will always be considered as a problem, but if it starts also looking at waste through an economic lens, waste suddenly becomes a resource

Session 2: Addressing barriers on a firm level

This session asked a panel of experts from businesses involved in remanufacture and refurbishment to discuss the actions to be taken by businesses to advance remanufacturing, refurbishment, repair, and direct reuse. Each panellist was asked for their views, and responded to questions from the audience.

The moderator was David Parker, of the European Remanufacturing Council and European Remanufacturing Network.

Summary of interventions



Patrick Carminati, Lexmark, Manager Supplies Sourcing & Manufacturing Operations

Lexmark has about 10% market share of laser printer cartridges. In 2012, it was importing all laser cartridges from China and Mexico and none were produced in Europe. By 2016, Lexmark produced 45% of its cartridges in the EU – while the cost to manufacture such product in the EU was higher, the decision was taken to do so thanks to the remanufacturing benefits which turn the case positive. Lexmark can remanufacture these cartridges close to the sources of returned cartridges, avoiding long-distance shipping costs. So, thanks to remanufacturing, there was an opportunity to produce again in Europe and create new jobs.

Fundamental success factors for remanufacturing, refurbishment, repair and direct reuse are: the design of the product (e.g. separation of toner cartridge from imaging unit) and excellent, efficient reverse logistics which avoid contamination of the product with waste. To boost remanufacturing across the board, companies need regulatory targets and incentives.



John Disharoon, Director, Market Access, Caterpillar Inc.

Caterpillar is the world's largest producer of heavy-duty construction and mining vehicles, with a very large remanufacturing business. It promotes the safe return of used and end-of-service-life components (called 'cores') for remanufacture by charging a 'core deposit' on each remanufactured product sold. This 'core deposit' is refunded when the core is safely returned to Caterpillar. The value of the core is about 45-50% of the corresponding new component, and a high deposit price incentivises the proper packaging and transportation of cores across the world. This deposit system also avoids the cores having the problem of being treated as waste by trade regulations – the value given to the core is convincing evidence that it is not waste.

The remanufacturing work is very labour intensive, creating higher employment than the manufacture of new components, and the sale of remanufactured components allows

Caterpillar to sell same-as-new components at lower-than-new prices, defending its market from inferior and cheaper competition in the market while providing factory warranted products to the customer.



Markus Braun, Siemens Healthcare, Head of Quality Management of the Business Unit for Refurbished Systems

Siemens Healthcare remanufactures high value medical imaging devices, such as MRs and CTs so that they are as good as when they were put on the market, earn an existing valid declaration of conformity (the CE - Conformité Européenne - mark) and resells them, usually to a new customer. Siemens Healthcare experience unnecessary restrictions on their business. The industry has worked (for ten years) on a standard to ensure that refurbished medical devices are tested to be as safe and effective as the new products at the time they were first placed on the market. However, there are different prerequisites and requirements for refurbished medical devices, depending on whether they were placed on the market for the first time inside or outside of the EU even though both are CE-marked goods. Products from within the EU can be resold if they meet the technical standards and requirements applicable at the time that the products were first placed on the market, but CE-marked remanufactured products from outside the EU must comply with the legal and regulatory requirements which are valid at the time the refurbished medical device is placed on the EU market as well as the relevant current technical standards. Technical standards and requirements have usually changed with time – so for remanufactured products, which might be 10 years old, meeting new standards and requirements would require too much investment to be economically viable. The discriminatory treatment therefore acts as a barrier to successful remanufacture business and to serving demand in Europe for affordable high quality medical imaging devices.



Salvador Munoz Zarate, WABCO Reman Solutions - General Manager

There are significant restrictions on the potential of remanufacturing, refurbishment, repair and direct reuse business around world due to the assimilation of products which could be remanufactured ('cores') to waste. An illustration of this is found in the EU Directive 2008/98/EC on waste that classifies end-of-use products as waste. It defines "waste" as any substance or object which the holder discards or intends or is required to discard. Furthermore, the Court of Justice of the EU has confirmed that this implies that the definition of waste covers a wide range of substances and objects, irrespective of their market value and destination. As a consequence, it is impossible to exclude a certain object or substance from the definition of waste in advance.

In addition, each EU country has its own interpretation of 'waste' which makes it difficult to transport cores across borders. It is of course not attractive for remanufacturers to enter the

waste management industry. The additional costs of transportation of waste are significantly higher and therefore highly restrictive. The solution would be to have an EU regulation that recognizes the difference between cores and waste and enforces appropriate sorting at the source (by the holder that discards), transport and handling of used products intended for remanufacturing.



Nestor Coronado Palma, Circular Economy Expert, former Director of the Circular Economy Program, Philips Healthcare

When talking about changing the business models of a company it is very important to consider first changing the business culture if you want a long-lasting change. The following factors can help the companies to successfully change their business culture:

1. Defining company values so that the firm considers product value loops
2. Creating economic incentives for circular businesses for the firm's leadership, and rewarding longer term commercial agreements (which are not usually something management are looking for)
3. Measuring the transformation of business results (the costs and revenues)
4. Encouraging long term value creation in the business (creating several loops within and beyond your industry)
5. Defining circular business processes

When talking about changing business models, the following aspects can be considered:

- Visionary partnerships that are economically attractive for all stakeholders
- Integral life cycle management, where value is updated and upgraded, creating common platforms and modular systems
- Rewarding customers' access and usage vs. ownership, which can ease the access to technology in emerging markets
- Making the focus all about the customer needs rather than the age of the equipment

Summary of discussions

Delivering new business models, based on services, that facilitate remanufacture

- Shifting business models from the sale of devices to the delivery of services (originating from a product that remains owned by the firm) instead of the sale of product looks promising as a way to facilitate 'core' return for remanufacture and incentivize design for the long-term – the business model has integral life cycle management.

- Another model that looks at the lowest owning and operating cost of the product throughout its lifetime – not just the initial purchase price – will drive customer behavior to invest in more durable and sustainable goods, for example, Caterpillar products
- These have potential because they are designed about what the customer needs (the service), when and how that can be delivered hassle-free. They also allow products to be transformed as technology and customer needs change
- Although forms of leasing would make remanufacturing, refurbishment, repair and direct reuse much easier, customers do not always want to lease – it can be perceived as expensive or bad value. Customer mindsets need to change here
- The environmental benefit of leasing depends on what it does to replacement life-times of the products – for some, it might increase replacement rates, with greater resource use if the subsequent remanufacture is not substantial
- Moving to these kind of business models requires a shift in thinking from capital expenditures and revenues to operational expenditures. As its often an unfamiliar business (e.g. in the reverse logistics) firms will need partnerships
- An advantage of leasing is that customers are more inclined to use products coming from remanufacturing, refurbishment, repair or direct reuse because they are not concerned about the risk of malfunction

Scaling reverse logistics through collective schemes

- Collective reverse logistics could theoretically be more cost effective than individual firm logistics. In some lower-income countries there is already a very high rate of reverse logistics, but for developed countries it is lower
- The big barrier is confidentiality – for collective schemes you have to tell a third company who your customers are, and what products they have – information which is very sensitive for the competing firms likely to be sharing those reverse logistics schemes. A truly independent company would be needed
- Where remanufactured products are high value – for example Caterpillar’s cost from EUR 100,000 to millions, standardised individual transporting kits and individual logistics already pay off
- Where product markets are more generic, and there is potential for generic, disruptive, third party remanufacturing, collective solutions may come more naturally

Michelin tyres as an example of ways to increase remanufacturing business

- Michelin produces high quality tyres which it can remanufacture up to 3 times – yet is now losing market share to cheap, low-quality and less remanufacturable imports, because some tyre purchasers are not concerned about longevity

- The panel advised that increasing customer awareness that they could return tyres in 3 years and receive (for example) 30% of the purchase price might help them factor the long-term value of the better tyre into their decision making
- Michelin might also try selling remanufactured tyres at a price that competes with the low-quality imports – in the way that Caterpillar does

Solving the problem of ‘cores’ being defined as waste

‘Cores’ for remanufacture tend to fall outside regulators’ waste categories where they are clearly treated as having particular economic value. (For example, when vehicle garages separate out used car-parts for refurbishment and pack them appropriately, in the same way that householders separate recycling from waste.) When parts are correctly packaged, labelled for refurbishment and shipped in return for economic value, they do not appear to be waste.



Ways to stimulate new remanufacturing businesses

To stimulate new remanufacturing, refurbishment, repair and direct reuse businesses, leadership is key, you need passionate people driving the new business forward who will overcome repeated obstacles. Success metrics must change, for example the way that profitability is accounted. Company structures may also need to change – changing incentives and mindsets, for example i) the mindsets of engineers, whose technical challenge changes into how to find the best way to transform cores into remanufactured products with a “like-new” condition, or ii) mindsets of business leaders and sales associates so that they develop business strategies, financial incentives and sales approaches that include integrally closed business loops practices (from repair, maintenance and upgrades to refurbishment and remanufacturing).

Session 3: Effective policy frameworks for remanufacturing, refurbishment, repair, and direct reuse

In session 3, individual panellists made interventions in response to specific questions.

This session asked a panel of experts on effective policy measures to advance remanufacturing, refurbishment, repair, and direct reuse. Each panellist was asked for their views on a specific question, and responded to questions from the audience.

The moderator was Carsten Wachholz, Senior Policy Officer, European Environmental Bureau.

Summary of interventions

What are the EU policy frameworks for promoting remanufacturing, refurbishment, repair, and direct reuse activities and how do they relate to the measures proposed in the EU Action Plan on the Circular Economy?



Hugo-Maria Schally, Head of Unit for "Sustainable Production, Products and Consumption", Environment Directorate-General, European Commission

In the framework of the EU Action Plan on the Circular Economy, the EC is currently developing several activities which deal with barriers to remanufacturing, refurbishment, repair and reuse. For example, in order to address legislative barriers to innovation and to new business models, the EC has launched the "Innovation Deals", creating a pilot approach to provide practical help to innovators in overcoming perceived regulatory obstacles and ambiguities. The currently selected pilots focus on water, waste and energy innovations.

Different pieces of legislation often deal with remanufacturing, refurbishment, repair, and direct reuse. Each of them exist in their own logic and are not always coherent with each other. That is why the EU Action Plan on the Circular Economy includes an action on the interface between chemicals, waste and product policy, which aims to identify among many other things where the interpretations, applications and use of different policies can stand on the way of smooth functioning of the market for secondary raw materials and for remanufactured, refurbished, repaired or reused products. The EC plans to announce by the end of the year how these frameworks can work better together.

At the end of last year, the EC adopted a new working plan for eco-design, which has a very strong focus on reparability, upgradability and recyclability. Through development of eco-design standards, the promotion of remanufacturing, refurbishment, repair, and direct reuse should be facilitated. Furthermore, the EC put forward a proposal to update legislation to restrict the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive). This will have a direct impact on remanufacturing, and will address some of the concerns raised by the industry (e.g. how products produced several years ago can be remanufactured and put

back in the market, for example of medical equipment). The EC is mindful of the importance of consumer protection in the context of circular economy and the importance of regulation to encourage producers to provide products that last longer and can be refurbished and repaired. DG Environment therefore works in close collaboration with DG Justice and Consumers on these questions, including work on proposals on consumer protection in the on-line sales of goods and the guidance document in the area of unfair commercial practices.

Overall there are a number of initiatives underway in the EU which should facilitate the operations of companies involved in remanufacturing, refurbishment, repair, and direct reuse. In 2018, the EC aims to look at the product policy framework in a larger sense to see how it can be turned into a more supportive legislative framework to facilitate the transition to a more circular economy.

What are the findings from the Swedish project focusing on policies that drive or in contrary become a barrier to circular economy?



Anna Karin Jönbrink, manager of research group, Energy and Environment at Swerea-IVF, Sweden

SWEREA, together with IVL and Profu, conducted a research project within the Swedish research program RE:source looking at the policy drivers and barriers to circular economy for three sectors: buildings, textiles and electronics. The project classified the challenges into three groups: 1) design, production, cooperation; 2) consumption and waste prevention and 3) waste management and recycling. It looked at different scenarios: 1) today's situation 2) a scenario with the EU Circular Economy Package 3) a scenario with the suggestions from the research team.

The findings show that today for almost all criteria, the challenges of transition to circular economy have not yet been addressed and the EU Circular Economy Package will help addressing some of these challenges but will not cover them all. The study calls for a more holistic vision and actions rather than focusing on a specific issue, sector or circular economy process. It also calls for better information among the SMEs, regarding the existing and upcoming pieces of legislation on circular economy. In addition, incentives should be put in place to make it less costly for compliant companies to transition to circular economy, which is not always the case today. The study also highlights the importance of clear definitions and harmonization between European and national definitions and regulations. Labelling, quality standards, information sharing, innovative business models and cooperation between companies have been highlighted as important elements of the transition to circular economy.

Sweden has recently put in place a reduced VAT rate on labour cost for repair. The Swedish repair companies have not felt the full consequences of this incentive yet but say that it is still very costly to repair because of the high price of spare parts. Some of them suggest that a

legislation that sets a long product warranty (e.g. in Norway, the minimum product warranty is 5 years) could have been more effective and could have forced companies to provide better products and establish systems for repair services.

How can remanufactured, refurbished, repaired or reused goods be promoted and included in the public procurement criteria?



Fabio Eboli, Senior Environmental Economist at the Directorate-General for Sustainable Development, Environmental Damages and International Relationships, Ministry of Environment, Land and Sea, Sogesid T.A., Italy

Italy is in process of implementing the Law 221/2015 (Environmental annex to the stability law) to further promote the green economy and reduce pressure on natural resources in Italy. It is also in process of developing the national strategy for sustainable development, the first report on the state of natural capital as well as the national plan for sustainable consumption and production.

In 2015, Italy spent around 4 billion euros on “Green Purchases by Public Administration”, which is four times more than in 2010. Introduced on a voluntary basis in April 2008 with the adoption of the National Action Plan, then revised in 2013, the application of “green” criteria for Public Procurement is now mandatory. In fact, the article 34 of the updated code of public conduct (Legislative Decree n. 50/2016) explicitly mentions minimum environmental criteria to be applied for public procurement in 17 sectors, which should promote: eco-design; modular design; durability of materials; recycled content; criteria for reuse and repair; and leasing vs buying options. This will be implemented progressively, setting different targets for different sectors. The minimum environmental criteria are currently undergoing stakeholder consultation. They will be revised every 3 years to avoid negative impacts on competitiveness. The regulators hope that it will not only increase competitiveness on price between companies but also relevance for the quality of products. Moreover, the possibility to add to the basic criteria for eligibility through specification of additional criteria to further characterize the supply of goods and services to the public sector provides a large incentive for innovation.

In addition, Decree 140/2016 offers a discount on eco-tax to electrical and electronic equipment producers if they reduce end-of-life management costs by: 1) using recyclable and biodegradable components; 2) minimizing quantity and heterogeneity of materials; 3) increasing recyclability of the product and its components; 4) limiting the use of hazardous elements; 5) optimizing reparability of the product; 6) increasing durability.

What are the international laws, multi-lateral frameworks and trade agreements that promote or impede trade of remanufactured or refurbished goods and cores between countries?



Aik Hoe Lim, Director, Trade and Environment Division, World Trade Organization

One of the key aspects for scaling-up the use of remanufactured goods is through the increased supply of cores. That is why it is important to understand where the cores are coming from and the barriers to trade that these cores might face.

In terms of trade obstacles, trade tariffs do not play a very important role in remanufacturing because customs do not often make a distinction between new and remanufactured goods. This means that a remanufactured good would in principle be classified into the same tariff line as the equivalent new good, and be subject to the same tariff rate. The barriers that affect trade in remanufactured goods stem mainly from the fact that there is no commonly accepted definition of remanufactured goods. As a consequence, many customs authorities classify remanufactured goods as used products and cores as waste, which for health or environmental reasons are often heavily restricted and in many cases prohibited. Thus, from the trade perspective, the key challenge to promoting the freer circulation of cores and remanufactured goods lies in developing a classification for remanufactured goods that can be applied by customs authorities and avoids the default categorization "used" or "waste" products.

Non-tariff measures typically faced by remanufactured goods can consist of a complete ban, a quota, the application of discriminatory and/or unnecessarily burdensome technical regulations, standards and conformity assessment procedures, a requirement for import licensing or pre-shipment inspections, and so on. Since such measures are particularly targeted at used and waste products, the challenge for policy makers is to carve out a distinct trade classification for remanufactured goods. In doing so, reference to a harmonized international standard for that category would help to ensure the balance between promoting the trade of remanufactured goods and cores on the one hand and environmental, health and consumer concerns on the other one.

In brief, there are a number of actions that could help promote remanufacturing, including: 1) product classification, which would distinguish between remanufactured, used and newly manufactured products; 2) international standards for remanufactured goods including the involvement of developing countries (and stakeholders) in the formulation of such standards; 3) regulatory cooperation between different countries/organizations to ensure that their regulations are compatible with each other, are inclusive and improve market opportunities for all; and 4) further research to map out the trade barriers in the remanufacturing value chain and the economic and environmental benefits of opening up to the trade of remanufactured

products, taking into consideration concerns of developing countries for capacity building, technology transfer, investment.

What are the effective regulations that could promote remanufacturing, refurbishment, repair, and direct reuse activities?



Michal Len, Director of RREUSE

Repair is increasingly more expensive, because of high labour costs, VAT and prices of spare parts. According to a recent study conducted by ADEME, people tend to repair their products if the cost of repair does not exceed 30-50% of the price of a new product. According to a recent Eurobarometer survey, 77% of people would like to have their items repaired but they tend to replace them because they find it too expensive to repair. In addition, spare parts are not available; it is sometimes impossible to disassemble the product with commonly available tools or there is a lack of information about how to repair the appliance. All these issues put severe pressure on independent repair operators and many are shutting down. It is also an issue for consumers because they have less options on where to repair their goods. Policies need to account and respect the different business models that exist and not only concentrate on recycling.

To promote repair on the EU level several measures can be put in place:

- Repair-friendly criteria could be included within the eco-design to ensure that products are easy to disassemble and spare parts are available. This will cut the amount of time needed to repair and thus labour costs (e.g. “right to repair” bill in the USA)
- Set price and fiscal incentives for repair services. In Austria, there is a proposal put forward by the Federal Chancellor Christian Kern in January 2017 to make repair cheaper by reimbursement of 50% of the labour costs of repair. The maximum amount would be 600 EUR per year per private person, applicable for bikes, shoes, clothes, leather goods and electric household appliances⁵. The city of Graz had already introduced this system in November 2016 with maximum support of 100 EUR per household per year⁶. In the state of New York USA, there is a tax deduction to encourage donation of goods to charitable organizations. In France, there are differentiated EPR scheme fees depending on how easily you can dismantle a product for repair, on the availability of spare parts or on whether the information/instructions on how to repair a product are available
- Provide information to encourage consumers to repair. This could include information about where to repair, the average expected lifetime, etc. (e.g. in France, the law on

⁵ Action programme for Austria “Plan A” [available here](#) (in German).

⁶ Guideline for support of repair in Graz [available here](#) (in German)

consumption obliges the manufacturer to tell the consumer how long spare parts will be available for the product on purchase)

- Set national or sectoral targets for repair and reuse (e.g. France, Spain and Flanders)
- Collaboration with other stakeholders (e.g. cooperation between re-use centres and waste management companies to avoid waste being directly recycled; or organization of take back systems in cooperation with big retailers)

Summary of discussions

- There should be a variety of both voluntary and mandatory instruments and measures to advance the transition to the circular economy. Voluntary agreements could be effective if a significant part of the market complies and consumers are actively involved. It is important to ensure that labelling is not creating even more barriers for remanufactured goods
- The EC could consider setting up targets on the percentage of circular goods to be put on the market if it sees that the market for circular products is not picking up. However, the circular economy has a very good economic and business case and mandatory measures might not be necessary. The EC is therefore willing to continue discussing with stakeholders about their experiences and suggestions on how to scale up the transition
- Green Public Procurement measures are crucial for the promotion of remanufactured, refurbished, repaired, and directly reused products. Based on experience, policy makers need to assess whether and to which extent these products should be included in the public procurement criteria
- There were some discussions in the past about the creation of a special customs code for remanufactured goods. In order to move forward with this, there is a need for a standard definition of remanufactured goods (which could be created by the International Standard Organization). It should then be brought to the World Customs Organization for creation of a harmonized custom code system and to the WTO afterwards for adoption
- The EC is piloting a product and organisation environmental footprint methodology, which provides information to consumers about the environmental performance of products and organisations throughout their lifecycle. This methodology is especially interesting for the types of products that do not have an eco-label
- The EC is developing standards for material efficiency to be delivered in 2018-2019

Session 4: Increasing consumer acceptance of remanufacturing, refurbishment, repair, and direct reuse

An expert panel discussed ways to increase consumer acceptance of remanufacturing, refurbishment, repair and direct reuse, stimulated by the findings of a recent study. The session was moderated by Tristan Steichen of ANTEA Group.

Summary of interventions



Carsten Wachholz, Senior Policy Officer, European Environmental Bureau presented findings from the new report [“Enjoying more with less. Existing grassroots initiatives for circular consumption and how to overcome barriers to scale them up”](#)⁷ written by EEB and their member organisation Legambiente for the Italian Ministry for the Environment and the Sea.

The study found that many people are currently rejecting the classic take, make, and dispose approach of today’s consumerism, and explored the reasons for these positive behaviours, and how they could be encouraged to spread.

People are extending the life of products for lots of different reasons: from saving money to convenience and reigniting social links in their neighbourhoods. Those reasons are mostly about enhancing (and not limiting) consumption experiences, handing back consumer control over the things that we buy and how we use them.

The result is a patchwork of initiatives, with different features and goals, linked by the common benefits of repair, re-use or reduction in the need for new materials. The report presents examples of organisations co-ordinating these activities – like “Made to last”, which promotes the buying of products that can be repaired or upgraded, reused or given for reuse or buying second-hand, refurbished or remanufactured products – for example, heirloom goods, products with a long warranty period or reusable items. Another example is “Disown ownership”, which facilitates the sharing of products that we do not use every day, renting or leasing and exchanging.

The study highlighted several key areas of activity to increase consumer acceptance, including:

- Multiply the number of initiatives supporting remanufacturing, refurbishment, repair and direct reuse that consumers can choose or use
- Change the financial incentives for repair and reuse
- Standard contractual clauses, and standard quality assurance for repair shops

⁷ The full report can be found here: <http://makesourcescount.eu/wp-content/uploads/2017/02/EEB-Report-on-Circular-Consumption-Patterns-1.pdf>. The summary report can be found here: <http://makesourcescount.eu/wp-content/uploads/2017/02/Enjoying-more-with-less-Summary-of-the-EEB-report-2.pdf>

It also recommended marketing to shape consumers' awareness and behaviours. In particular, working with consumers' existing trusted sources to shape opinion:

- support local community communication and exchange platforms (tools and real spaces)
- work through peer to peer marketing
- aim at young people (who are often trend leaders/early adopters)

Segmenting consumers can help identify the potentials and the challenges of spreading circular economy consumption patterns, and so help focus resources. Categories of consumers like 'occasional purchasers', 'aspirational' and 'practical' consumers should be targeted, since they can systematically adopt circular consumption patterns when barriers are removed. These segments of consumers represent both the majority of consumers and the groups most ready to change practices if convenient and not over costly.



Klaus Hieronymi, Global Resource Efficiency and Circular Economy Strategies, HP

HP is in the middle of moving from 'transactional to contractual' i.e. value from providing services, rather than hardware. A good goal to set would be 40% of revenues from contractual (sale of services) in 5 to 10 years. We do not know the existing extent of used product exchange (for example, for IT products). There is incomplete data, but the potential here may be huge.

HP remanufactures 2.5 million laptops per year. 70% of HP spare parts are remanufactured. For their business, free movement of 'core' is essential – if their input products are considered waste, increases costs by 15 to 20% (estimated by German university research) and this means that the competitive price point of remanufactured products compared to new products disappears.



Ugo Vallauri, Co-Founder, The Restart Project

The avenues for repair of broken products seem to be decreasing, as does knowledge of when it makes sense to repair a product. The increasing complexity of electric and electronic devices removes trust in IT and the capability of repair. For example, [research](#) done by Restart in East London found that only 15% of commercial repair services offered warranties and had good online customer approval ratings.

To counter these trends, the Restart Project runs pop-up repair events for small electrical and electronics in London, and supports groups replicating them in 10 countries. At their "Restart Parties" events, volunteers share repair tips and support participants to repair. Half of all repairs are successful within these repair parties, other require spare parts or additional support work. The Restart Project are collecting real life data about barriers and potentials of repair, focussing on the needs of the consumers - helping those who have products to continue to realise the

value of their product (e.g. updates or repair). They are now working with other repair-focused organisations to create an open standard for data on repair – more information is available at <https://therestartproject.org/fixometer>



Stef de Bont, Founder and CEO, 12Return

Technology platforms (like 12Return) can deliver reverse supply chains to take product from consumers to repair, reuse or remanufacture, even though these reverse supply chains can be complicated and must be low-cost.

These platforms allow customers to initiate the return of products by making that return hassle free, in effect making the cost of return lower than the cost not returning it. Platforms facilitate efficient and effective return by providing information, smart routing and pooling logistics, so that a product can be easily collected for return, and cost-effectively pooled by different actors (transportation and disposition companies) along the complex return supply chain without the customer needing to make those links themselves.

The technology offers the other benefit that it can allow better exchange of information with the customers, including about their follow up product needs. Finally, technology offers the benefit of preventive and predictable analytics.



Jože Gregorič, Project Manager, Snaga, Ljubljana

Snaga is an example of a public waste management authority which has embraced the benefit of its customers reducing the waste they produce, and so actively promotes waste-reducing behaviour through a series of consumer-oriented initiatives. From 2013, they went beyond encouraging recycling, to include campaigns and facilities for repair, re-use and exchange. They also emphasise the value of reducing waste and promote consumer consideration of how much they buy. Their initiatives include a repair café, a resale shop, and a packaging-free supermarket, together with publicity campaigns.

Summary of discussions

For the purchase of extended life products, there is a tipping point depended on price/quality and performance. Business to business customers are very sensitive to these price/quality balances. Private consumers are more influenced by cultural issues. This can lead to problems changing consumer behaviour – for example selling a printing service (rather than ink cartridges) did not really work initially with consumers, and needed to be tailored, so that the customers received a hassle-free, constraint-free service.

There are opportunities for greater return of products – there are many customers who want to give the product back for remanufacture, refurbishment, repair or direct reuse, but bring back

needs to be easy, and it has a social component around creating norms and new practices for return.

The movement of support around community repair activities shows that consumers care about product durability, and that it would be unfair to assume that we should concentrate only on returning products and creating secondary uses. A lot of people do not want to upgrade all of the time and would rather keep using the products they own, as long as they are secure.

For many electronic products, in particular with the growth of the Internet of Things sector, the key issue for the future or remanufacture, refurbishment, repair or direct reuse is not with hardware but with the continued operability of the hardware after software updates, for example for security. Manufacturers need to act in this area.

Wednesday 8 February 2017

Session 5: Strengthening collaboration between scientists, businesses and governments

In this session, all participants were asked to identify knowledge gaps and research questions of high priority in the area of remanufacture, refurbishment, repair and direct reuse and so identify future collaboration opportunities between scientists, businesses and governments to promote remanufacture, refurbishment, repair and direct reuse activities. The outcomes of the discussion would



inform the ongoing work of the International Resource Panel as it planned its future work and they were taken across into discussions of the G7 Alliance on Resource Efficiency's discussions of its future actions.

Participants first discussed in four smaller groups, with the overall session moderated by Janez Potočnik, Co-Chair, International Resource Panel.

Summary of break-out group discussions

The participants identified a range of issues of further interest for policy-relevant research:

Establishing Baselines

Exploration of the baseline of remanufacture, refurbishment, repair and direct reuse activity in the context of overall market trends, looking at over-arching trends over time, including identification of the major actors and organisations behind remanufacture, refurbishment, repair and direct reuse, and the reasons for those trends. This could be established by bringing together already existing data sources and complementing it with additional market and environmental data sets to understand past and future potential impacts of different products. The choice of indicators is important – it would be ideal to develop an indicator for impacts which was able to represent impacts from more than one cycle of product lifetime extension.

Greater understanding of barriers

Development of greater clarity of the detailed nature of trade barriers, in sufficient depth to allow the development of solutions.

Deeper understanding of the factors which drive consumer perceptions, acceptance of remanufacture, refurbishment, repair and direct reuse products and return behaviours, starting from a clear understanding of what (segmented) consumers really want and what drives the difference between B2B and B2C. Use this information to consider which solutions might promote change – including which information might help consumers understand their best action when a product breaks.

Development of a greater understanding of the process of business transition to a service-supply model, and the barriers. Exploration of the barriers for SMEs, how to improve reverse supply chain management and the barriers to remanufacture, refurbishment, repair and direct reuse from intellectual property rights, and how they might be overcome in practice. Exploration of how accountancy rules and norms could change to avoid company ownership of products appearing as stock instead of sales.

Analysing potential policy solutions

To inform future policy action, development of a comparative policy analysis, based on the impacts of existing policies to promote remanufacture, refurbishment, repair and direct reuse, and exploration of the potential impacts of some suggested policies, like; extended guarantee periods, favourable changes to labour and tax regulations, training programmes to promote product design for remanufacture, refurbishment, repair and direct reuse.

To scope where policy should best go forward, quantification of the potential benefits from different actions (e.g. comparing remanufacture, with refurbishment, repair and reuse) and identification of the products likely to have the greatest potential benefit.

Going further, development of an understanding of the macro and micro-economic benefits of large-scale economic change from product-supply to service-provision models. The analysis would usefully look at material flows and changes in jobs (skilled, unskilled and jobs for disadvantaged workers), take into account net fiscal impacts for government, sectoral impacts and environmental impacts.

Session 6: Recommendations for the 2017 G7 Environment Ministers' Meeting under Italy's Presidency

In this session, participants provided policy recommendations related to promotion of product lifetime extension activities that could be used by policymakers and feed into the preparation of the 2017 G7 Environment Ministers' Meeting under Italy's Presidency. The session was moderated by Federica Fricano, Director for EU Affairs and International Climate Negotiation, Ministry of Environment, Land and Sea, Italy.

Summary of break-out group discussions

Participants suggested that policy-makers:

- Take a holistic approach looking at all related sustainability issues, product and lifecycle issues and continue highlighting the economic benefits of these policies. Take up the message at the G7 Leaders' Summit level to demonstrate that the G7 countries are living up to their responsibilities under the SDGs on these issues
- Develop an indicator and set a target for the market share of remanufactured, refurbished, repaired, and directly reused products
- Take national measures (e.g. economic instruments, fiscal incentives, extended producer responsibility measures, longer product guarantees) to ensure a level playing field for, and promotion of remanufacture, refurbishment, repair and direct reuse
- Remove barriers to market access and global movement of remanufacture, refurbishment, repair and direct reuse products
- Agree on international definition and standards
- Remove trade barriers to support reverse logistics
- Promote remanufacture, refurbishment, repair and direct reuse goods through public procurement
- Agree on indicators for the lifetime of products and establish a consumer and product information system based on these indicators



- Put in place consumer education plans to raise awareness on circular economy in general and in particular on products from remanufacture, refurbishment, repair and direct reuse
- Encourage information sharing and collaboration between different stakeholders
- Conduct a stocktaking exercise on the best practices and existing policies related to remanufacture, refurbishment, repair and direct reuse in order to allow for an exchange of experience between the G7 countries

Definitions of terms used in the draft IRP report on Remanufacturing, Refurbishment, Repair, and Direct Reuse

Circular Economy: *A continuous positive development cycle that preserves and enhances natural capital, optimizes resource yields, and minimizes system risks by managing finite stocks and renewable flows. It works effectively at every scale. A circular economy is restorative and regenerative by design, and aims to keep products, components, and materials at their highest utility and value at all times.* (From the Ellen MacArthur Foundation)

Core: *A core is a previously sold, worn or non-functional product or part, intended for the remanufacturing process. During reverse logistics, a core is protected, handled and identified for remanufacturing to avoid damage and to preserve its value. A core is not waste or scrap and is not intended to be reused before remanufacturing.* (From the international agreement on a remanufacturing definition, developed by six global remanufacturing associations in the automotive sector⁸, September 2016)

Direct Reuse: *The using again of a product, object or substance that is not waste for the same purpose for which it was conceived without the necessity of repair or refurbishment.* (From document UNEP/CHW/OEWG.10/INF/10 under the Basel Convention)

Repair: *Fixing a specified fault in an object that is a waste or a product and/or replacing defective components, in order to make the waste or product a fully functional product to be used for its originally intended purpose.* (From document UNEP/CHW/OEWG.10/INF/10 under the Basel Convention)

Refurbishment: *Modification of an object that is a waste or a product to increase or restore its performance and/or functionality or to meet applicable technical standards or regulatory requirements, with the result of making the waste or product a fully functional product to be used for a purpose that is at least the one that was originally intended.* (From document UNEP/CHW/OEWG.10/INF/10 under the Basel Convention)

Remanufacturing: *A standardized industrial process⁹ by which cores are returned to same-as-new, or better, condition and performance. The process is in line with specific technical specifications, including engineering, quality, and testing standards. The process yields fully warranted products.* (From the international agreement on a remanufacturing definition, developed by six global remanufacturing associations in the automotive sector¹⁰, September 2016)

⁸ From Europe, the European Association of Automotive Suppliers (CLEPA), and European Organization for the Engine Remanufacture (FIRM); From USA, the Motor & Equipment Remanufacturers Association (MERA), and Automotive Parts Remanufacturers Association (APRA); From Brazil, the Automotive Parts Remanufacturers National Association (ANRAP); and from China, the Remanufacture Committee of China Association of Automobile Manufactures (CPRA)

⁹ An industrial process is an established process, which is fully documented, and capable to fulfil the requirements established by the remanufacturer.

¹⁰ From Europe, the European Association of Automotive Suppliers (CLEPA), and European Organization for the Engine Remanufacture (FIRM); From USA, the Motor & Equipment Remanufacturers Association (MERA), and Automotive Parts Remanufacturers Association (APRA); From Brazil, the Automotive Parts Remanufacturers National Association (ANRAP); and from China, the Remanufacture Committee of China Association of Automobile Manufactures (CPRA)

List of Speakers



Markus Braun, *Siemens Healthcare, Head of Quality Management of the Business Unit for Refurbished Systems.* Chairman of the task force representing the global industry on Good Refurbishment Practice for Diagnostic Imaging, Healthcare IT and Radiation therapy.



Patrick Carminati, *Lexmark's Manager Supplies Sourcing & Manufacturing Operations,* responsible for worldwide manufacturing sourcing activities for Lexmark's laser printers, leading strategies and negotiations with major contract manufacturers in China, Mexico and Central Europe.



Nestor Coronado Palma, *Circular Economy Expert, former Director of the Circular Economy Program, Philips Healthcare* who was responsible for developing closed business loops, service and solution business models, growing the refurbishing and remanufacturing business, reverse logistics infrastructure.



Stef de Bont, *Founder, 12Return* a leading returns management software company for branded and retail companies that streamlines the authorization, transportation, processing and settlement of product returns from consumers and business customers.



John Disharoon, *Director, Market Access, Caterpillar Inc.* John leads market access initiatives for Caterpillar. John is a Broad Member of the Remanufacturing Industries Council.



Fabio Eboli, *Senior Environmental Economist at the Directorate-General for Sustainable Development, Environmental Damages and International Relations, Ministry of Environment, Land and Sea, Italy* responsible for analysis of transition to circular economy, assessment of climate mitigation policy and impacts, the National Strategy for Sustainable Development; evaluation of natural capital stock and related ecosystem services.



Federica Fricano, *Director for EU Affairs and International Climate Negotiation, Ministry of Environment, Land and Sea, Italy* with 20 years' experience within the Ministry.



Jože Gregorič, *Project Manager, Snaga Ljubljana*, the public company providing waste management for 392,707 residents in Ljubljana and suburbs. Snaga separately collects 65% of municipal solid waste and generates only 117Kg of residual waste per capita/year.



Kalus Hieronymi, *Global Resource Efficiency and Circular Economy Strategies, Hewlett Packard* chairs Hewlett Packard's environmental strategy body for Europe, the Middle East and Africa, with responsibility for mandatory and voluntary Take Back programmes.



Aik Hoe Lim, *Director, Trade and Environment Division, World Trade Organization*, responsible for the WTO's work on trade and environment, as well as on the Agreement on Technical Barriers to Trade.



Anna Karin Jönbrink, manager of a research group, Energy and Environment at Swerea-IVF, Sweden, on industry sustainability issues incl. Ecodesign, Life Cycle Assessment (LCA), Energy Efficiency, Environmental Management Systems, Chemical Issues and Social Responsibility.



Michal Len, *Director of RREUSE*, a European NGO representing social enterprises active in reuse, repair and recycling activities, and specialises in waste, product and employment policies.



Luca Marmo, *Environment Directorate-General, European Commission* who since July 2016 is responsible for the international aspects of sustainable consumption and production (SCP), including the International Resource Panel. He is also G7/G20 Coordinator for matters of relevance to the Environment Directorate-General.



Salvador Munoz Zarate, *General Manager, WABCO Reman Solutions*. Salvador is leading the Reman activities and is responsible for the strategic direction, objective and goal setting as well as the organization of resources.



Nabil Nasr, *International Resource Panel member, lead author of their topical report and Director of Golisano Institute for Sustainability at Rochester Institute of Technology, USA*.



David Parker, *European Remanufacturing Council (CER) and European Remanufacturing Network (ERN)* which is leading work to create an industry-led springboard for growth of competitive remanufacturing in the EU.



Janez Potočnik, *Co-Chair of UNEP International Resource Panel, Partner of SystemIQ, EC Commissioner for Environment, 2010-2014*. During his term as the Commissioner for the Environment, he launched and pioneered on the implementation of Circular Economy and sustainability policies.



Fulvia Raffaelli, *Internal Market, Industry, Entrepreneurship and SMEs Directorate-General, European Commission* responsible for the competitiveness aspects of Circular Economy, Energy efficiency and Climate related policies, and Ecodesign Directive Implementation



Kestutis Sadauskas, *Director, Circular Economy and Green Growth, Environment Directorate-General, European Commission* is responsible for supporting the transformation of the European Union into a Circular Economy. He was previously Head of Cabinet for Tax and Customs.



Hugo-Maria Schally, *Head of unit for "Sustainable Production, Products and Consumption", Environment Directorate-General, European Commission* responsible for development, implementation of EU policies and instruments related to EU policy on Circular Economy.



Astrid Schomaker, *Director, Global Sustainable Development, Environment Directorate-General, European Commission* who since joining the Commission in 1992 held a variety of posts in the areas of international relations and environment policy, amongst them leading the work on chemical policy, marine issues and the EU's environment policy strategy to 2020.



Tristan Steichen, *Senior Consultant, ANTEA Group* with over 20 years of experience providing environmental, health & safety consulting services to global and small organizations.



Ugo Vallauri, *Co-Founder of The Restart Project*, London-based social enterprise encouraging people to use their electronics and helping them learn to repair their own electronics in community events and in workplaces.



Carsten Wachholz, *Senior Policy Officer, European Environmental Bureau (EEB)* responsible for monitoring the implementation of the EU Circular Economy Action Plan.

About the Organizers

The **European Commission** (EC) recently adopted a [Circular Economy Package](#) to stimulate Europe's transition towards a circular economy. With this new plan, the EC is delivering ambitious measures to cut resource use, reduce waste and boost economic development and job creation.

The [International Resource Panel](#) (IRP) is a UN Environment-based initiative created in 2007, supported by the EC. It provides independent and authoritative scientific assessments of policy relevance on the sustainable use of natural resources. In 2016, the United Nations Environment Assembly adopted resolution 2/9 which acknowledges that a circular economy approach can contribute to sustainable consumption and production, and encourages countries to find innovative ways to become more resource efficient. The resolution invited the IRP to produce reports related to this resolution.

The [G7 Alliance on Resource Efficiency](#) was launched at the G7 Summit in 2015, to share knowledge and create information networks, in collaboration with businesses, small and medium sized enterprises, and other relevant stakeholders. The objective is to advance the opportunities offered by resource efficiency, promote best practices, and foster innovation. This includes through public-private partnerships and collaboration with developing countries. Recently complemented by the Toyama Framework on Material Cycles (adopted at the 2016 G7 Environment Ministers' Meeting in Toyama, Japan), the Alliance provides a common vision and a guide for future actions to deepen G7 efforts on resource efficiency and the 3Rs (reduce, reuse, recycle).

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