The Circular Economy Concept – what is it all about?

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Shortly before the launch of the Circular Economy Package in 2014, former EU Commissioner Janez Potočnik described the Circular Economy concept as "the greatest innovation challenge of the coming decades". While some stakeholders view it simply as another ambitious and costly regulation, others see it as an inevitable socio-economic shift that actually has a strong business case behind it.

What does the circular economy or CE mean?
CE is an industrial system that is restorative or regenerative by intention and design. In other words, it's an economy that explores ways to reuse products or components and restore more of their precious material, energy and labor inputs. It keeps the added value in products for as long as possible and eliminates waste. Transition to this model requires changes throughout value chains, from product design to new business and market models, from new ways of turning waste into a resource to new modes of consumer behavior. This implies full systemic change and innovation not only in technologies but also in organization, society, finance methods and policies. But in return it delivers huge potential for innovation, job creation and economic growth as well as raw material savings and environmental benefits. And that is why it deserves serious attention.

Where is this transition coming from and why?
Since the early days of industrialization, our industrial economy has basically followed the simple linear model of resource consumption – extract materials, use them to manufacture a product, sell it to a consumer, who then discards it when it no longer serves its purpose. As natural resources are limited while the global consumerism grows tremendously, the 21st century unavoidably needs a new model. Many experts see the solution in the CE system where products are designed and optimized for a cycle of reuse and recycling. Waste does not exist. Thinking in life-cycles has an important advantage, as the whole lifespan of a product can be evaluated – production, use and disposal at the end of life. Environmental impacts are present during the entire supply chain – at the production site, during the extraction of raw materials and their transport, and at power plants supplying the energy to the production site. Assessing both direct and indirect impacts should avoid shifting the environmental burden from one life cycle stage to another, which is often the case today. Environmental regulations which only regulate one phase (production or use) of a product's life cycle can create unintended consequences such as increased CO2 emissions.

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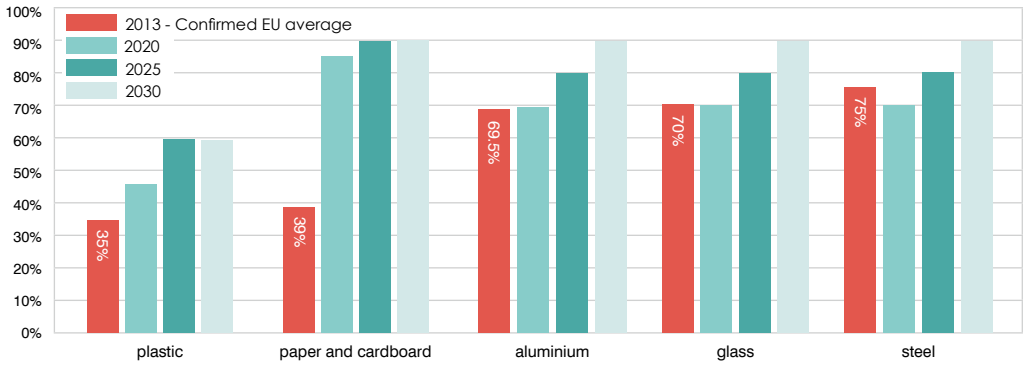
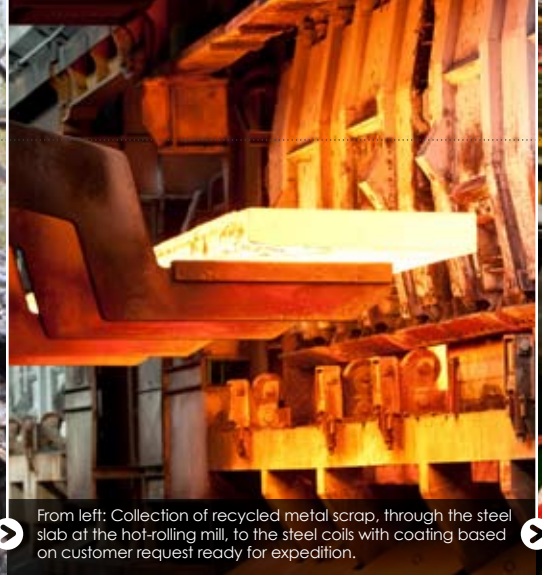
1. RECYCLING RATE TARGETS PER PACKAGING MATERIAL
(2014 draft Packaging and Packaging Waste Directive, currently under review)



Source: Industry experts - PlasticsEurope, eaa , FEVE, APEAL

The Business Case for CE
The EU estimates that resource efficiency improvements all along the value chains could reduce raw material input needs by 17% - 24% by 2030 (2011 Study for the European Commission – DG Environment) with an overall savings potential of €630 billion per year for the European industry (Europe INNOVA 2012). Separate collection at source should ensure high quality recycling and lead to high quality secondary raw material markets. Prevention of landfilling of all recyclable waste is estimated to create more than 180 000 direct jobs in the EU by 2030, in addition to the estimated 400 000 jobs related to the new waste legislation implementation. Non-reusable and non-recyclable waste shall become the subject of energy recovery. To explain the positive environmental impact which brings a direct economic as well as security benefit, let me use the case of steel. Each ton of recycled steel saves over 1.5T of CO2 emissions, over 2T of raw materials and uses 70% less energy than producing steel from virgin sources. Importantly, in order to fully demonstrate the positive impact of recycling, a life cycle perspective must be applied.

CE is Back on the Table
On July 8, the European Parliament approved the resolution on the EU Circular Economy, calling on the Commission to present by the end of 2015 an even more ambitious proposal than the



From left: Collection of recycled metal scrap, through the steel slab at the hot-rolling mill, to the steel coils with coating based on customer request ready for expedition.

draft from 2014. It should include binding municipal, industrial and commercial waste reduction targets to be achieved by 2025, as well as 70% recycling and 80% packaging recycling targets for 2030. The resolution promotes the "life-cycle" approach to product policy and eco-design, but also suggests that the Commission should define requirements for criteria such as durability, reparability, reusability and recyclability. The Commission has already started its public consultation which expired by the end of August 2015.

Where do we Stand Today?
There are widespread differences in recycling across Europe, across materials and across countries. In the steel sector, according to the latest figures published by APEAL (the Association of European Producers of Steel for Packaging), recycling rates vary from 42% to 94% with Germany being the champion. For packaging materials, current recycling rates vary from 35% to 75%, from steel as the best performer to plastics (see chart No. 1). As for the landfill rates, differences in performance between Eastern and Western Europe are tremendous. While statistics for packaging material landfill rates are difficult to compile, rates for municipal waste give an indication of tendencies – in 2010, Bulgaria landfilled 100%, Romania 99%, Slovakia 81% while Germany and the Netherlands sent 0% to landfills, Belgium and Sweden 1%, and Denmark 3%.

The example of steel
If we take the packaging market as an example, most materials associations have criticized the Circular Economy concept, pointing to high anticipated costs and investment necessary to meet the ambitious targets. It's easy to understand, as different materials offer different possibilities for collection, separation, recovery and recycling. As for steel, the industry is known to have set its own objective of an average of 80% recycling by 2020, and a vision of zero steel packaging to landfill. That's higher than the proposed EU targets. This can be essentially attributed to the inherent properties of steel that have been taken advantage of to the fullest extent. Infinite recyclability without loss of quality combined with easy and economic separation from waste streams thanks to steel's magnetic nature. Furthermore, every steel manufacturing plant is also a recycling facility as steel scrap is a natural part of the production process for new steel. As a result, there is no need to invest in new recycling plants or extra logistics which even further reduces the CO_2 emissions and energy usage. (chart No. 2)

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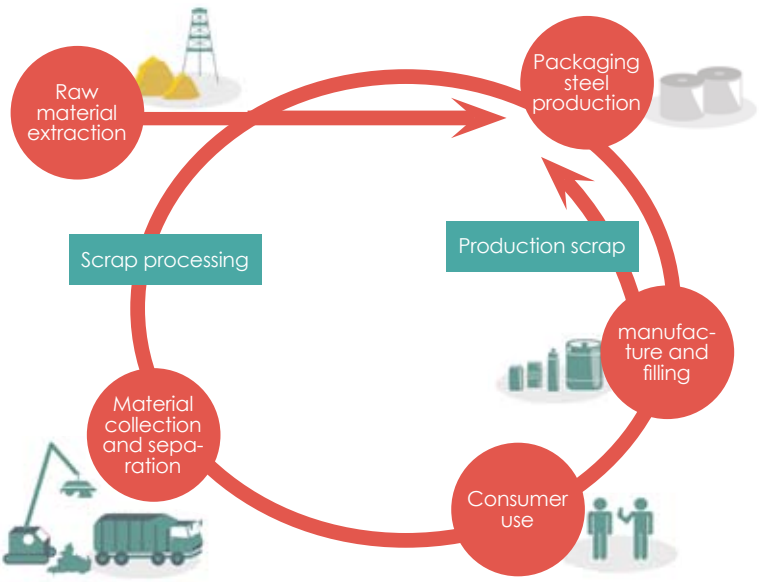
What is worth mentioning, as it is often overlooked, is the approach of the steel industry to the valuable by-products of the steel-making process. This is the case of the gases unavoidably generated during the production process in the blast furnaces or the coking batteries, or the case of slag, the by-product of the smelting process when the desired metal has been separated (smelted) from its raw ore (e.g. iron from iron ore). With regard to the gases that used to be considered and treated as waste, these have been utilized as secondary energy sources for many years and are the dominant energy source for many European facilities (for illustration, U. S. Steel Košice covers around 60% of its energy needs by generating its own electricity from the process gases – up to 900 GWh/year). The story of slag is similar, as it is used for cement production or road construction, replacing natural stone and thus avoiding all the environmental and energy impact and costs related to the stone mining. Unfortunately, Slovak authorities responsible for road construction have so far been quite reluctant to accept this material as a relevant substitute for natural stone, despite the fact that it has been used as such all around Europe for decades. But our efforts during the past years as well as the EU concept of green procurement should soon improve utilization of this by-product on the market.

So if you have difficulties comprehending the "closed material loop" or the "permanent material" concept within the CE, you may use the steel life cycle as an example. It may also explain why some sectors have been opposing the simplistic division of resources to "renewable" and "non-renewable". Just for information, the Worldsteel association estimates that between 75% of all steel ever produced is currently still in use.

But favorable natural properties of the material are not enough to make this system work. This requires the involvement of all members across the supply chain, the processes and infrastructure in place, and making sure that the benefits of recycling are well understood by all key stakeholders. And even though Central and Eastern Europe has been far behind its older EU peers, a certain level of dynamism is present and the key consumers of steel are also starting to be aware of the need to save resources.

2. MATERIAL FLOW IN CASE OF STEEL
example of a circular economy principle



Source: APEAL