



15 May 2015

### **How companies in Europe approach circular economy – selection of examples from different sectors**

This section showcases a number of concrete examples on how EU industry is already engaging into more circular business models. The diversity of examples is important to illustrate the wide scope of activities, but also the challenge of developing the adequate policy approaches.

#### **Remanufacturing mechanical components**

A car manufacturer redesigns components (such as gearboxes) to increase the reuse ratio and make sorting easier by standardizing components. While more labour is required for remanufacturing than making new parts, there is still a net profit because no capital expenses are required for machinery, and no cutting and machining of the products, resulting in significantly less waste and better materials yields. Remanufactured parts use up to 80% less energy, 88% less water, 92% fewer chemical products and generate 70% less waste during production compared to a new part.

In 2013, 28,200 engines, 20,100 gearboxes and 16,840 injection pumps were remanufactured and given a second life by this car manufacturer. To an automotive supplier the remanufacturing is an important strategic approach to secure a long-term after market supply. Where economic viable an automotive supplier also has introduced reverse logistic systems. An automotive supplier annually takes back 2.7mio used parts, equivalent to 11,000t, worldwide as secondary raw materials for remanufactured products.

*For more information please click on the link [here](#)*

#### **Cement – waste as a fuel**

When manufacturing clinker, the cement industry is able to use waste as a fuel instead of coal and petcoke. At the same time, the mineral content of waste is recycled as a raw material. We, in the cement industry, refer to this combination of energy recovery and material recycling as 'co-processing'. In addition the main end-product of cement manufacturing, concrete a durable construction material, it is also 100% recyclable. At the end of its life, concrete can be recycled either back into concrete as a recycled aggregate or into other applications (as a road base, for example).

*For more information please click on the link [here](#)*



## **“Pay per lux” – a new way of delivering light**

Philips has developed a new concept to deliver lighting as a service. ‘Pay per lux’ is a business model where its business customers pay only for the light they use, not for lighting equipment. They pay a service fee for the light provided, while Philips retains ownership of the fixtures and fittings. For the duration of the contract, provider installs, maintains and upgrades the lighting system as needed. At its end of life, Philips recycles the equipment and closes the materials loop. This proposition gives customers an access to the most energy efficient lighting solutions while recycling and reusing the materials reduces the environmental footprint.

*For more information please click on the link [here](#)*

## **Regional waste management practice**

The Cuneo province in the North of Italy (500.000 inhabitants) has followed the most advanced European regions and countries in order to recover a significant amount of municipal solid waste, leaving for landfill only the residual waste which is not further recoverable. They incorporated an existing cement fabric in their waste management plan. Only in 2010 around 50.000 tons of waste-derived fuels have been used, which allowed for a saving of about 34.000 tons in non-renewable fossil fuel and avoided 55.000 tons of CO2 emissions.

## **Waste as an important resource in chemical industry**

Waste is an important resource in chemical industry. The chemical industry has been successfully putting the “waste-as-a-resource” approach into practice for many years. Here, wastes undergo optimal material recovery (recycling) or energy recovery, substituting important raw materials. This reduces the input of primary raw materials and preserves resources. Waste streams of a nature which is found best suitable for energy recovery process serve as fuel substitutes. This fuel substitution very often takes place directly on site, i.e. without long transportation processes (neither of energy nor of fuels). Wastes substitute the resources gas and oil as energy sources. As the chemical industry uses also large volumes of gas and oil directly as materials, the above-described energy recovery reduces the input of primary raw materials too. For the waste streams in the chemical industry this energy recovery is, in consequence, quasi equal to material recovery.

## **Collecting waste without wasting money**

Enevo provides smart sensors and logistics optimization solutions for the waste management and recycling industry. Enevo helps both commercial waste management companies and public organizations to operate more resource efficiently. Enevo ONE is an innovative Smart City solution that optimizes waste collection by using its network of small wireless sensors to measure the fill-level and forecast the fill-up date of individual bins and containers. Based on these forecasts the service will calculate millions of



different collection plan alternatives and select the plan that is most cost efficient. With smarter collection plans, Enevo's customers have saved up to 50% in total operations costs.

## **Bio-based products – solutions for the circular economy**

The forest industry often replaces products based on fossil material with products mainly based on renewable raw material, products which are recyclable and bio degradable. Energy for the processes is to a high degree based on residues from the trees used for production. Other by-products are delivered to other sectors like the chemical industry. Textile fibers are also produced and replace fossil alternatives. Modern building technique makes it possible for high rise buildings in wood. There are significant CO<sub>2</sub> savings to be made by using timber in the construction of housing and other buildings, both in terms of GHG emissions and in the terms of embodied energy and in energy efficiency.

Products based on wood have an eco-efficient life cycle. At the end of their service life, they can in most cases be recycled, thus extending the carbon storage effect, and/or be used as a carbon neutral fuel in cascade use, substituting fossil fuel.

## **Turning agricultural waste into paper**

The paper industry is also working with alternative resources. One of these is waste from the agro-industrial sector, including waste from lemons, oranges, nuts, apples, corn and olives, now being used as a raw material for paper. The principle has been developed at Italian producer Favini who also came up with Alga Carta (a paper which uses algae as raw material). The new paper, CRUSH, makes best use of a food waste which would otherwise be dumped, or perhaps burned for energy. Now that waste can be recycled, adding value and sustaining the circular economy.

## **Scania and Swedfund investing in Indian biogas**

Scania and the development financier of the Swedish state Swedfund has established a partnership to develop the production of biogas as an automotive fuel in the Indian city of Nagpur, with 2.5 million inhabitants. The biogas will be produced from digested sludge from one of the city's wastewater treatment plants in collaboration with local companies. Nagpur is participating in the Indian Government's initiative to improve the environment and transport systems in the country's 100 largest cities.

*For more information please click on the link [here](#)*

## **Steel production using scrap**

Steel production is carried out using large quantities of ferrous scrap coming from products discarded at their end-of-life (post-consumer scrap) and from industrial



production processes (pre-consumer scrap). In 2011, 100 million tons of ferrous scraps have been used, out of which 56% of the EU steel production was made. The sector produces valuable by-products during the steel-making such as process gases – used to produce electricity and slag – largely used in the cement production and in many civil engineering applications, which save the depletion of natural resources as minerals and fuels and contribute to reduce CO<sub>2</sub> emissions. In 2012, around 44 million t of slag have been used corresponding to a mountain higher than three times the Eiffel tower.

*For more information please click on the link [here](#)*

## **Industrial cooperation and resource use optimization**

The unique blend of skills of the partners from aviation and environmental services (AIRBUS Group, SUEZ environment Group, SNECMA/SAFRAN Group and Equip’Aero Industrie) has enabled a joint venture TARMAC AEROSAVE to achieve over 90% recovery rates for the aircrafts it dismantles, whilst guaranteeing aircraft owners that the equipments have been handled according to aeronautical standards, hence fit for reuse once recertified by third parties. In 2013, TARMAC AEROSAVE has developed new skills and infrastructure for the dismantling and recycling of CFM56 family engines. Tailor-made dismantling infrastructure was also implemented in 2013, increasing productivity and recycling rates. End 2014, five years after it was created, the company has handled 200 aircrafts, for recycling or storage and maintenance services.

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