MAKING THE CIRCULAR ECONOMY A REALITY: EXAMPLES AND CHALLENGES

ISWA BEACON CONFERENCE ON CIRCULAR ECONOMY AND RESOURCE MANAGEMENT

KUALA LUMPUR, MALAYSIA

30 March 2016
Resourcing the World
Leading the Circular Economy, our services encourage the efficient use of water, waste and energy resources

DEVELOPING ACCESS TO RESOURCES:
Veolia offers operational solutions that consume fewer environmental resources and are more economically efficient, so as to expand both the potential and the accessibility of the resources available.

PRESERVING RESOURCES:
Veolia develops solutions to conserve resources and optimize their use, while protecting their quality and efficiency throughout the usage cycle.

REPLENISHING RESOURCES:
Veolia provides solutions for creating new “secondary” resources that will gradually offset the increasing scarcity of natural “primary” resources, generating new opportunities for social and economic development that protect the environment.
VEOLIA, THE GLOBAL LEADER IN OPTIMIZED RESOURCE MANAGEMENT

- Over 179,000 professionals dedicated to designing and implementing the best possible solutions for local management of essential resources: water, energy and raw materials.

- Veolia partners with manufacturers, cities and local residents to make optimal resource management the foundation for a new approach to human progress, regional appeal and sustainable growth.

Water, waste and energy: a unique combination of expertise

- €24.4 billion in revenue
- 179,000 employees on 5 continents
- 96 million people supplied with drinking water
- 60 million people connected to wastewater systems
- 52 million MWh generated
- 31 million metric tons of waste recovered

(2014 global data)
PLASTICS: AN INTEGRAL AND IMPORTANT PART OF THE GLOBAL ECONOMY

Multiple Benefits of Plastics

✓ Weight Reduction
✓ High Reliability
✓ Superior Wear Resistance
✓ Chemical & Corrosion Resistance
✓ Increased Service Life
✓ No Product Contamination
✓ Noise Reduction
✓ Flexibility
✓ Ease of Machining
✓ …
CHALLENGES - PLASTIC RECYCLING

- Insufficient collection capacity
- Insecure Feedstocks
- Immature end-markets
- Technological innovation
- Inadequate / split incentives
- Increasing complexity of polymers / additives
- Volatile Oil prices
- Lack of Data / Information
TODAY, PLASTIC PACKAGING MATERIAL FLOWS ARE LARGELY LINEAR

8% CASCaded RECYCLING
4% PROCESS LOSSES
14% COLLECTed FOR RECYCLING
2% CLOSED-LOOP RECYCLING
98% VIRGIN FEEDSTOCK
78 MILLION TONNES (ANNUAL PRODUCTION)
14% INCINERATION AND/OR ENERGY RECOVERY
40% LANDFILLED
32% LEAKAGE

WORLD ECONOMIC FORUM, ELLEN MACARTHUR FOUNDATION, MCKINSEY & COMPANY, A NEW PLASTIC’S ECONOMY: DESIGNING THE FUTURE OF PLASTICS (2016)
WWW.ELLENMACARTHURFOUNDATION.ORG/PUBLICATIONS

1 Closed-loop recycling: Recycling of plastics into the same or similar-quality application
2 Cascaded recycling: Recycling of plastics into other, lower-value applications
Source: Project Horizon analysis – for details please refer to the extended version of the report available on the website of the Ellen MacArthur Foundation
WWW.ELLENMACARTHURFOUNDATION.ORG
VEOLIA EXAMPLES IN PRACTICE: «CLOSING THE LOOP»

- Integrated waste management contracts based on material and energy recovery
- State of the Art Sorting Centers
- Dismantling and recycling of all variants of WEEE
- Regenerate used oil into high-grade lubricants
- Bottle-to Bottle Recycling
- Metals recycling and recovery
Veolia’s solution

Performing infrastructures respectful of the environment.

The PRF features the latest optical sorting technology which is equipped to separate nine different grades of plastic polymers and colours for quality sorting of materials, ranging from bottles, yogurt tubs and trays.

Market-leading end product

The PRF ensures high quality and value for the end user by maintaining an elevated standard of segregation.

Increased scope of recycling

As well as helping to end confusion among residents as to what they can and cannot recycle, the PRF is contributing to increased landfill diversion.
Veolia’s Solution

- First plant in France, capable of treatment and valorisation of all variants of WEEE

- The plant uses a combination of pioneering techniques to extract hazardous components and recoverable materials from household and industrial WEEE

- Recycling of 15,000 tons of plastic every year using Optical sorting capable of separating more than 10 polymers.

- Capable of separating different chemistries and plastics containing brominated flame retardants

- Resulting plastic polymers with purity of >98% which are reused in the electronic and automotive industry

- Veolia currently owns 5 plants in France with total capacity of 100,000 tons – plant can be set up elsewhere in the world
« BOTTLE TO BOTTLE »
RECYCLING PROCESS (PET)

Technical Materials

Rostock, Germany
Veolia’s solution

- In Rostock, Germany, Veolia has set up a recycling process for PET (Polyethylene terephthalate) bottles, which allows direct re-use of the recycled PET in a “new” beverage bottle.

- The bottles are ground into flakes and subjected to a hot wash. The transformation of the flakes into food-grade quality is achieved by a mechanical/chemical recycling process (Hybrid-UnPET process by URRC).

- After being purified in a final step, the food-grade PET flakes are packed into big bags and can be delivered to PET bottle manufacturers.

- CleanPET® is the brand name for a high-end recycled PET in the form of free-flowing "flakes".

- These recycled products fully comply with the relevant regulations for direct food contact materials in the EU and the US.
Veolia’s solution

- Customized manufacturing of high quality, recycled, polypropylene (PP) granulates

- Advanced sorting of PP(1) and PE(2) (Lquisort®) and reformulation (granulation, mixes, extrusion) of high-quality resins (~37kt/year)

- Customer applications of products notably include horticultural, infrastructure, electronic appliances, automotive and packaging products.

- With a state-of-the-art equipped laboratory, providing comprehensive analysis in each stage of the production process, in combination with highly developed formulation skills, as well as advanced currently developed separation technologies

- The Vroomshoop facility will be the cornerstone for the expansion of Veolia’s European platform of recycled raw plastic materials manufacturing.
VEOLIA POLYMERS - RECYCLED PLASTIC MANUFACTURER, NL

Custom manufacturer of a broad assortment of high-quality polypropylene (PP) granulates

Civil Engineering

Hortiproductions

Automotive

Hobby & Leisure
Challenges

- Castorama, a leader in home furnishings has committed to being “Net Positive”, by going one step further of environmental protection and seeking to have a positive impact on the planet’s future.

Veolia's solutions

- Research and development in cooperation with the Castorama teams.
- Creation of an ad hoc logistics unit to collect the timber waste from Castorama’s stores in France.
- Design of a wood flour with 35% wood and 65% plastics that can be recycled industrially.

Customer benefits

- Commitment to supply 1,000 metric tons a year for five years.
- Improved water-resistant and 40% lighter weight product.
- A first in France for a 100% recycled composite timber used to manufacture a laminated kitchen countertop, a pure circular-economy product.
Challenges

- Solvents are liquids used to dissolve, dilute or extract other substances; they are essential and used intensively by the pharmaceuticals and automobile industries.

Veolia’s solutions

- Network four recycling units in France, Switzerland and the United Kingdom.
- Develop several economic models for solvent recirculation, resale or lease.
- Collect solvents directly from the industrial concerns to which they are again made available after regeneration.
- Collect and consolidate for treatment at our SPR unit based in Picardy (France), and redistribute throughout Europe.

Customer benefits

- Maximize performance.
- Guaranteed supply and quality.
- Budget management.
- Reduced environmental impact.
### VEOLIA EXAMPLES IN PRACTICE: « CLOSING THE LOOP »

#### Biological Materials

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<td><img src="image2.png" alt="Anaerobic digestion for generating biogas" /></td>
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<td><img src="image6.png" alt="Energy generation from biomass" /></td>
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Veolia’s Solution

- In wastewater treatment plants in Belgium, The Netherlands, and Denmark, Veolia, is running pilot prototyping for the production and recovery of Polyhydroxyalkanoates (PHA) – an intermediate material used to produce bioplastics.
- Organic residual streams, including sewage, contain all the necessary ingredients for biopolymers to be created.
- The biorefinery unit uses bacteria that absorb the carbon in the wastewater and store it in the form of biopolymers.
- The properties of PHA are similar to those of polypropylene.
- The PHA polymers in the biomass can then be refined into biodegradable bioplastics that are 100% sourced from wastewater.
- These can be used over a wide range of applications – from specialty packaging to functional agro-industry products and services.
**Challenges**

- Transform wastewater and waste from a source of pollution into an opportunity for sustainable development
- Make the Billund Biorefinery (Denmark) a real laboratory for large-scale technical innovation to open the door to a new way of treating wastewater and biowaste

**Veolia’s solutions**

- A facility equipped with Veolia’s proprietary thermal hydrolysis and anaerobic digestion technology, EXELYS™, that simultaneously treats the wastewater from the city’s 70,000 residents and the 4,200 metric tons of organic waste from agriculture, industry and local households

**Customer benefits**

- Production of biogas from the biowaste and treatment sludge to provide heat and electricity to the site
- Production of organic fertilizer for agriculture and bioplastics for industry
- The treated water will be discharged back into the neighboring stream
- City-country-industry loop
- Reduced environmental footprint
- Protection of the local biodiversity
Veolia’s goal is to become a reference producer of recycled raw materials

- Through our continuous innovation and improvement processes,
- By adapting our output products and offering a unique solution to meet clients’ specifications.
- By partnering with our existing and potential clients to identify together new circular solutions and opportunities.

**Recent partnerships:**

- **DANONE**
  A new world alliance in management of resources

- **PHILIPS**
  Using recycled plastics to co-design « green products »

- **SEB**
  Create1st industrial partnership for small household appliance recycling in France
VEOLIA JOINED THE ELLEN MACARTHUR FOUNDATION CE100 AND PROJECT MAINSTREAM

- ... because it takes a concerted effort to transition to a Circular Economy (CE).

- **Circular Economy 100 (CE100)** is a global platform bringing together leading companies, emerging innovators and regions to accelerate the transition to a circular economy.

- Veolia also plays an active role in **Project MainStream**
  - Launched by the EMF, World Economic Forum & McKinsey at Davos in 2014
  - A. Frérot, Veolia’s Chairman and CEO, as a member of the Steering Board.

- **Project MainStream**: Programme of large-scale cross-sector, pre-competitive collaboration
  - To achieve what companies / industries cannot do themselves
  - Builds closely on CE100 and WEF networks
  - One of the three projects was the “Global Plastic Packaging Roadmap”
  - Over 30 Companies participating in the initiative
The report:
• provides a comprehensive overview of global plastic packaging material flows,
• has assessed the value and benefits of shifting this linear sector to a circular economic model, and
• has identified a collaborative approach to enable this shift.

The study suggests that the first initiatives in Phase 2 should include:

1. Establish Global Plastics Protocol,
2. Coordinate Large-scale and pilot projects,
3. Build up an economic and scientific evidence base,
4. Engage policymakers, and
5. Drive communication of the vision.
NEW PLASTIC ECONOMY

1. CREATE AN EFFECTIVE AFTER-USE PLASTICS ECONOMY

2. DRASTICALLY REDUCE THE LEAKAGE OF PLASTICS INTO NATURAL SYSTEMS & OTHER NEGATIVE EXTERNALITIES

3. DECOUPLE PLASTICS FROM FOSSIL FEEDSTOCKS

THE NEW PLASTICS ECONOMY

- RECYCLING: RADICALLY IMPROVED ECONOMICS & QUALITY
- REUSE
- DESIGN & PRODUCTION
- RENEWABLY SOURCED VIRGIN FEEDSTOCK
- ENERGY RECOVERY

WORLD ECONOMIC FORUM, ELLEN MACARTHUR FOUNDATION, MCKINSEY & COMPANY, A NEW PLASTICS ECONOMY: RETHINKING THE FUTURE OF PLASTICS (2016) WWW.ELLENMACARTHRUFNDATION.ORG/PUBLICATIONS

1. Anaerobic digestion
2. The role of landfill boundary conditions for energy recovery in the New Plastics Economy needs to be further investigated.
Source: Project Mainstream analysis
THANK YOU FOR YOUR ATTENTION!

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