



CIRCULAR ECONOMY: COMPLEXITIES, TRENDS, CHALLENGES

David Newman ISWA Past President

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And 70% of the world still has this model.....





70% of all waste is not recycled or dumped40% is not even collectedRecycling is still a rich man's game or for the very poor.

A global perspective, OECD



The Countries Winning The Recycling Race

Recycled & composted waste as a share of total municipal waste in OECD countries (2013)





- 1. Circular Economy and Bioeconomy
- 2. Climate change and SLCPs
- 3. Public health and disease prevention
- Resource management and security, prevention and product design
- 5. City decor and personal security
- 6. Soil fertility and agriculture

- 7. Energy production and security
- 8. Creating secure employment and wealth : engaging informal sector
- Protecting natural environments, such as rivers, lakes, seas, coastlines
- 10. Tourism and inward investment
- 11. Funding and taxation, producer responsibility and legislation
- 12. Public outreach and communications
- 13. Data management



Let's take a quick look at the Circular Economy



Minimising inefficiences, maximising opportunities





CradletoCradle organic + synthetic materials plants raw materials disassembly & waste seperation organic products biological technical animal nutrients consumption manufacture product decomposers $\mathbf{5}$ 1 100% Renewable Energy Use criteria 2 Water Stewardship clean water output 3 Social Responsibility positive impact on community 4 Material Reutilization recyclability / compostability 5 Material Health impact on human & environmental





Ellen MacArthur Foundation



Where does this company sit within the circular economy?



The German Nova Institute





ISWA's take on it





http://www.iswa.org/iswa/iswa-groups/task-forces



What the European Commission means

by Circular Economy ?

The Circular Economy - a win-win situation:

Savings of €600 billion for EU businesses, equivalent to 8% of their annual turnover

Creation of 580,000 jobs

Reduction of EU carbon emissions by 450 million tons per year





EU, New Waste Directive

What objectives are being proposed ?

•A binding EU target for recycling 65% of municipal waste by 2030 (& 2035);

•A binding EU target for recycling 75% of packaging waste by 2030;

•A binding EU target to reduce landfill to maximum of 10% of all waste by 2030;

•A ban on landfilling of separately collected waste;

•Promotion of economic instruments to discourage landfilling;

•New rules on EPR systems and harmonised implementation

- Simplified and improved definitions and harmonised calculation methods for recycling rates throughout the EU;
- Waste prevention policies must be enacted
- Concrete measures to promote re-use and stimulate industrial symbiosis - turning one industry's by-product into another industry's raw material;
- Economic incentives for producers to put greener products on the market and support recovery and recycling schemes (eg for packaging, batteries, electric and electronic equipment, vehicles).

How do they compare to current reality ?





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Waste prevention policies must be applied

Sell by dates, an example of how to make waste





What are barriers to achieving these objectives ?

- 1. FINANCING
- 2. COMMODITY MARKETS AND SECONDARY RAW MATERIALS
- 3. THE IMPACT OF NEW MATERIALS MANAGEMENT
- 4. NEW TECHNOLOGIES
- 5. DEMOGRAPHICS IN EUROPE





How much recycling in EU countries with similar targets ?

- •Serbia €30/person/annum
- ●Hungary €60/person/annum
- ●Portugal €100/family/annum
- ●UK €120/person/annum
- •Belgium €165/person/annum
- ●Germany €400/family/annum

5% recycling rate, no energy recovery

- 15% recycling rate + energy recovery
- 21% recycling rate + energy recovery
 - 44% recycling rate + energy recovery
- 70% recycling rate + energy recovery
- 65% recycling rate + energy recovery

Boundaries for Strong and Stabile



Improvements in Solid Waste Management



Thanks to Goran Vujic

Boundaries for Strong and Stabile



Improvements in Solid Waste Management



Thanks to Goran Vujic



KEY TO HIGH RECYCLING LEVELS IS TO GET ORGANICS BACK TO SOIL THROUGH COMPOSTING AND A.D.



Here's one good reason why







- 80% of the world's agricultural land suffers moderate to severe erosion
- 10 million ha of agricultural land are lost through soil erosion every year (~0.7%)
- Over last 40 years ~30% of world's cropland has become unproductive



Source: Pimentell, D. & Burgess, M. (2013) Soil Erosion Threatens Food Production. Agriculture 3, 443-463



How are energy and commodity prices

affecting Circular Economy policies ?

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Crude oil prices 2000- 2016







Iron Ore Fines Price 46.58 USD/t 30 Nov '15 220 Iron Ore Fines Price (USD/t) 200 180 160 140 120 100 80 60 40 20 InfoMine.com 0 -Jan 21 Mar 16 May 10 Jul 4 Dec 1 Aug 28 2015 2009 2011 2012 2013 2014

Iron Ore prices 2009-2016













And known reserves of copper are due to be depleted in 30 years time......





Phosphate rock, a finite resource in our lifetimes.....





Food price inflation runs at 2.6% p.a. average since 1975



International Solid Waste Association





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Mining precious metals instead of recycling them because it is cheaper





- 1. Carbon price 2. Landfill or incineration taxes 3. Incentives to repair
- 4. Preferential VAT on recycled materials 5. Minimum recycled content obligatory
- 6. Tax on extraction of raw materials 7. EPR schemes which cover full collection and recovery costs 8. Re-design for re-use, incentives for this
- 9. Recycling in EU, not exporting to less developed countries our waste
- 10. Quality criteria for recycled materials, end of life standards

IF WE DON'T PRICE IN THE ENVIRONMENTAL COSTS OF RAW MATERIALS, SECONDARY RAW MATERIALS ARE NOT COMPETITIVE !



How are new technologies and materials

affecting Circular Economy ?

New materials entering the waste streams



Bioplastics



Source: European Bioplastics | Institute for Bioplastics and Biocomposites (December 2013)



So If BB Institute for Bioplastics and Biocomposites

Carbon fibre products







Dreamliner





Nanoparticles







Nanomaterials in Waste Streams Current Knowledge on Risks and Impacts

<u>3D printing</u>





Internet and mobile readers change consumption patterns



Goodbye to

Newsprint and printed paper, shopping malls, driving, cameras, photo albums, maps, telephone books, encyclopedias, fixed phones, privacy

Hello to

Shared cars, homes, photos, home deliveries, more flying, more packaging, teleconferences, shared office space, less privacy. Is the waste industry ready for these new scenarios, materials and patterns ? We were not ready for the massive amounts of WEEE

Robotics and micro chips transforming collection



https://www.youtube.com/watch?v=fNIV6Dcj29E





Who has heard of Rubicon?





No? Who has heard of this guy then?



- 1. Technological change is now happening very fast
- 2. International intellectual collaboration is now the rule
- 3. Waste industry management models are becoming obsolete
- 4. New materials are not yet considered by our industry
- 5. We need dialogue with industry about recycling these materials
- 6. Your business needs an international perspective if you want to survive



The demographic conundrum in Europe

Stopping immigration while EU population is generally in decline and ageing rapidly

European population is ageing quickly



By 2050 about 30% of the EU population will be over 65 years of age (10% in 1960)



POPULATION – AGEING AND CONSUMING LESS



Eastern populations falling and ageing fast







The CEP is essential to meeting **GHG emission** reduction targets

SLCPs play a vital role and waste management is key to abating them

The real low hanging fruit is in **organic waste** treatment and soil recovery is the stimulus

CEP drives the waste industry towards **greater investments**, more turnover, more jobs and profitability and the industry needs to **adapt fast to new technologies**

CEP drives the waste industry into **new relationships** with design, FMCG companies, industrial giants.

CEP makes landfill redundant and increases material and energy recovery

BUT

The CEP needs **regulations**, **investment models**, collective action to succeed The CEP **will fail without financial support** and creation of viable markets for material recycling



Read and download the ISWA Task Force reports

on Resource Management and the GWMO from the ISWA Website

•www.iswa.org http://www.iswa.org/iswa/iswa-groups/task-forces https://www.iswa.org/fileadmin/galleries/Publications/ISWA Reports/GWMO summary web.pdf Read the ISWA blogs and consult the Waste Library, they're free Thank you David Newman david@jordanglia.com