

# So, what is a 'circular economy'?

## From today to tomorrow

Businesses today follow a pattern of production that could be described as linear. They take resources out of the ground, process them to create products, sell them, and then we discard them. Take-make-dispose. It could be argued that this design for obsolescence approach makes business sense when materials and energy are cheap, and when the public has a plentiful supply of credit, but what happens when those conditions are no longer in place?

We are now in an era where commodity prices - that's everything from soy to oil, from copper to plastic - are high and volatile, and they are predicted to remain so for the foreseeable future. An intelligent company would ask themselves how they could ensure a prosperous long-term future in such an environment. Mainstream ideas, like asking people to 'use less', only delay the inevitable. Surely the goal should be to be able to use things without using them up, creating value at every turn, growing employment, whilst regenerating the biosphere, ready for the next cycle?

**This is a short introduction to the circular economy, written by Colin Webster, to whet the appetite for a forthcoming interdisciplinary opportunity run by the Ellen MacArthur Foundation and SSERC.**

The circular economy offers a potential route out of the challenges described, and it offers a fundamental challenge to how we produce, use and consume. In a circular economy, biological materials flow effectively through the system before being returned to the biosphere where they add value for another cycle. That's how nature works - nothing is wasted, everything is 'food' for another cycle. Technical materials - metals, polymers and alloys - are made to be made again; designed for durability and reuse. In practice this means designing goods for repair, for upgrade, for remanufacturing; never losing the materials or the material integrity, whilst making use of embedded energy. To put the circular economy into practice we need to rethink design principles, rethink materials, and rethink business models.

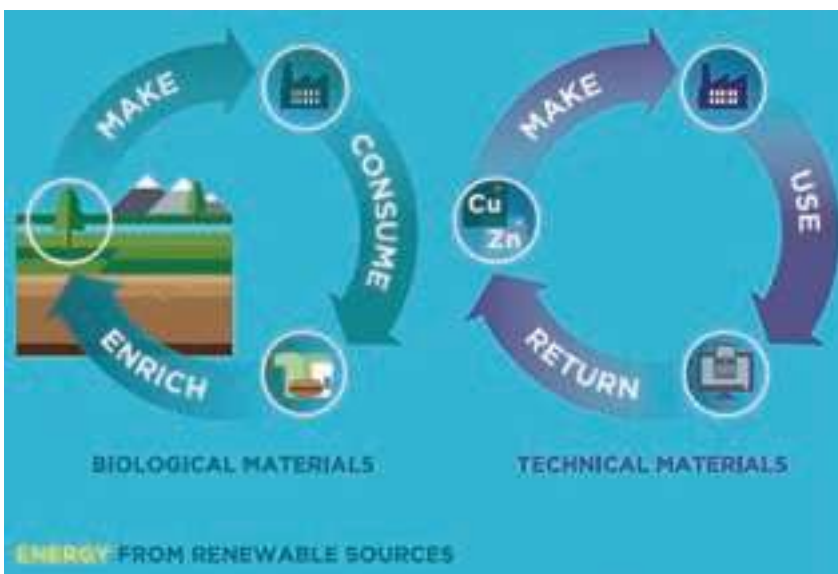
## So... is there any money in this?

Yes. The economic reports of the Ellen MacArthur Foundation and the global management company, McKinsey and Company, conclude there are worldwide savings of at least USD\$1 trillion to be made every year by adopting this approach. The Ellen MacArthur Foundation now works closely with the World Economic Forum, the EU and many major companies on supporting the transition to a circular economy. The Scottish Government became a member of the Foundation's Circular Economy 100 group in 2013 and they are now actively educating businesses in Scotland about the economic potential of a circular economy.

But this isn't just about companies making a saving: many have noted the social advantages of a circular economy, such as increased employment, access to higher quality goods at a lower cost than today, and the multitude of advantages in taking a regenerative approach to the biosphere.

## Is this all about recycling?

No. Most recycled material suffers a reduction in quality - it is 'downcycled' - into something of inferior value, then eventually lost. The crucial thing about a circular economy is effective material flows. We need to find a way to ensure material quality is maintained, and we have seen many examples of companies choosing not to recycle their goods, but to remanufacture products designed at high quality. This not ►



only reduces their eventual materials bill, but saves a significant amount on their energy bill, too. Renault, for example, reduced their energy bills by 80% when remanufacturing old car engines and gear boxes.

### Energy and the circular economy

Meeting the energy demands of the future will require significant changes to production and use. The circular economy has shown some very encouraging signs of reducing the energy demand of one of our most energy-hungry sectors: industry. The economics favour a switch to renewables (\$72 per watt for solar in 1972, but only \$1 per watt today), but the really crucial questions are over design and effective energy use. We are interested in how emerging technology, such as smart meters, LED lighting and a distributed energy network can combine with clever design to reduce energy demand.

### Business models for a new economy

It is no fluke that the sharing economy has emerged at this time of powerful and ubiquitous mobile computer devices: services such as Park in my Drive, AirBnB and Car Clubs rely upon the mobile internet, and people are using these services in rapidly growing numbers. Now reflect on what it means to see the death of long-term businesses such as HMV and Kodak, while Netflix and Instagram thrive. There has been a switch away from ownership of products to access, perhaps brought about by prevailing economic circumstances, particularly for the 20-something generation.

Sensing these changes, Renault have already stated they are moving away from being a company that sells cars to become a company that sells mobility, while B&Q have announced their plans to launch 1000 products fit for a circular economy; products that B&Q would retain ownership of, while the customer would enjoy their use for a defined time period. Philips now lease lumens, rather than sell

lights. In a world of high and volatile commodity prices, businesses will find it hard to plan for a long-term future by selling their materials, or so the theory goes.

### Design implications

One thing we will certainly need to change is the way we design stuff. A move away from planned obsolescence is required, towards product durability, product upgrades, simple repair work and remanufacturing. Think 'design for disassembly', smart screws, soluble adhesives, standardised fittings and repair manuals. This approach requires new design skills and, crucially, a new design mentality around a whole systems approach so we can maximize the possibilities a regenerative approach offers. In addition, the demand for Material Scientists is likely to grow as companies seek durables as well as bio-based alternatives.

### Where is the circular economy relevant to the curriculum?

Any idea as complex as the circular economy requires an interdisciplinary approach. It simply cannot be taught in just, say, a Business Management class. The implications of changing our development model are far-reaching - beyond energy and materials to the money system, geopolitics, globalization, emerging technologies and more. The relevance of teaching the circular economy can be seen in the following subjects, from N4 to Advanced Higher:

#### Design and Manufacture

- Design and Manufacture
- Materials and Manufacturing

#### Engineering Science

- Engineering Contexts and Challenges
- Electronics and Control
- Mechanisms and Structures

#### Economics

- Economics of the Market
- UK Economic Activity
- Global Economic Activity

#### Business Management

- Management of People and Finance
- Understanding Business

#### Physics

- Electricity and Energy
- Dynamics and Space

#### Biology

- Cell biology
- Multicellular Organisms
- Life on Earth
- Sustainability and Interdependence Chemistry
- Chemical Changes and Structure
- Nature's Chemistry
- Chemistry in Society
- Researching Chemistry

#### Environmental Science

- Living Environment
- Earth's Resources
- Sustainability

#### Textiles and Fashion Design

- Fashion and Textile Technology
- Fashion/Textile Item Development
- Fashion and Textile Choices
- Making a Fashion/Textile Item

#### Geography

- Global Issues

#### Modern Studies

- International Issues

#### Computing Science

- Software Design and Development
- Information System Design and Development

### Want to learn more?

Then sign up to the interdisciplinary CPD event run by the Ellen MacArthur Foundation and SSERC on 17<sup>th</sup> September 2014. At the event, you will learn more about the circular economy and begin to develop an interdisciplinary project for your school. Find out more about this opportunity at <http://www.sserc.org.uk/index.php/cpd-sserc/cpd-courses-sserc32>.