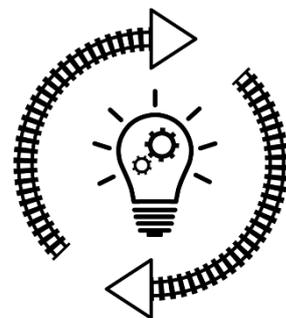


Resource Efficiency Workshop – Supplementary information

This leaflet is an extra resource to provide delegates with a fuller understanding of some of the terminology and concepts associated with circular economy.



Network Rail's definition of circular economy

From NR/L2/ENV/015

'A circular economy is a sustainable alternative to the traditional linear economy of make, use and dispose. The aim of a circular economy is to **extract fewer virgin resources** from the planet and to **keep existing resources in use** for as long as possible. Resources, products and materials should be **re-used, repaired and regenerated** in order to extend their useful lifespan and extract their maximum environmental, social and financial value. This approach **reduces embodied carbon, water and social impacts** and keeps waste to a minimum.'

Resource efficiency and Circular economy are not interchangeable terms.

Resource efficiency is a broad term. In the context of the workshop it means efficient use of materials, preventing waste and minimising environmental impacts of our works. It is possible to work in a resource efficient way in a linear economy system.

Circular economy is a whole systems perspective. Processes are designed (or re-designed) in such a way that resources are systematically restored or regenerated. Resources have to be managed across their life cycle(s) time and again.

This text paraphrases BSI 8001:2017, the British Standard on Circular Economy.

What does preserving the value of a material mean?

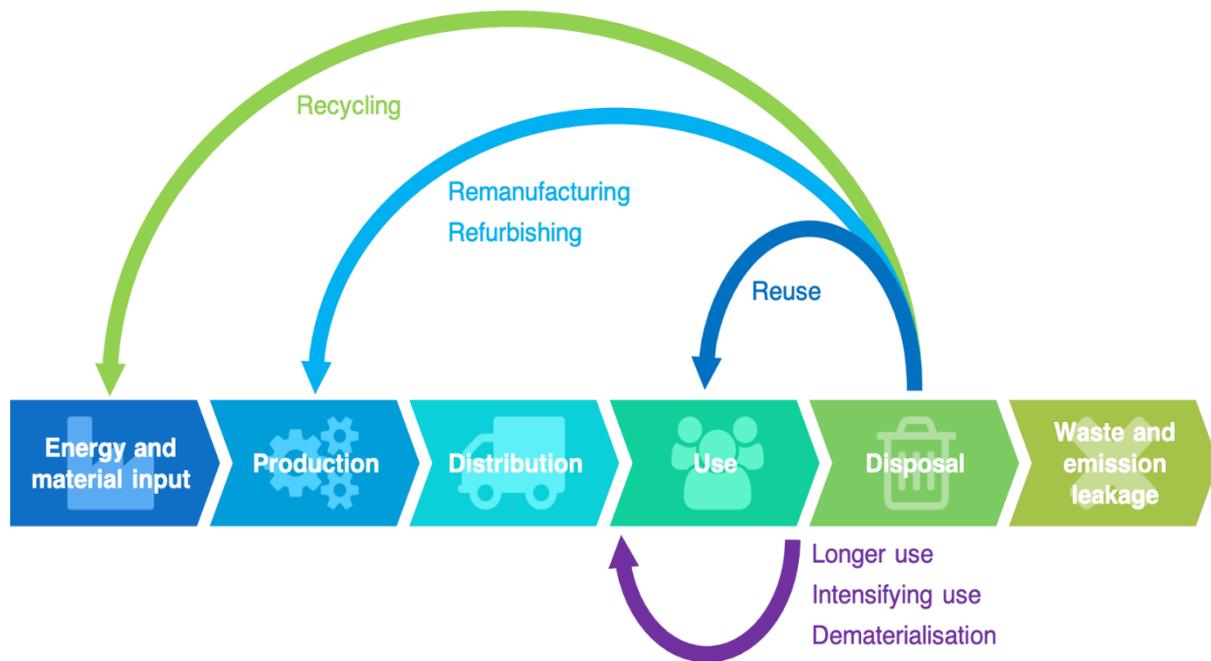


Image: Wikipedia

In circular economy the concept of 'loops' are often discussed. The above diagram shows a number of loops. The smaller the loop on the diagram, the better the option is, as the material's value is preserved. Sometimes the concept of 'closed loops' are mentioned. A closed loop system is where a product can be recycled (or remanufactured) back into the same product at the end of its first use. A good example of this is Britain's old milk bottle system where bottles were delivered and collected from the consumers multiple times for reuse. The glass could eventually be remanufactured back into new bottles.

In open loop systems material may be recycled or remanufactured into other products. Sometimes this kind of recycling means that some of a material's value is lost in the process. Positive association with the word 'recycling' sometimes obscures that fact. For example if we cut up old lengths of rail to make metal doorstops that could be considered a form of recycling but it wouldn't be the most effective use of the material's properties.

There are many better ways that steel could be re-used in industry (and steel is infinitely recyclable). Rails can even be re-used on the rail itself if it met the standard set by Route Services. This would have greater benefits for the environment.

Circular economy and climate change

Research undertaken by the Ellen MacArthur Foundation found that indicate that tackling climate change by relying solely on energy efficiency and switching to renewable energy will only address 55 % of global GHG emissions. The remaining 45 % are attributable to management of land for food production and production of buildings, vehicles and all the other products we use every day. Industry is responsible for around 21 % of global CO₂e emissions with production of cement, steel, plastics and aluminium account of the majority of this. By adopting circular economy principles and processes in how we design and manage materials we can start to tackle this.

If you are interested in reading more about Circular Economy visit:

<https://ellenmacarthurfoundation.org>

More information on Circular economy within Network Rail can be found here:

<https://networkrail.sharepoint.com/sites/EnvironmentSustainabilityLearningDevelopment/SitePages/Circular-Economy.aspx>

Reducing carbon emissions in projects

Emission Scopes Some companies must legally report their carbon emissions. The standard for reporting is done in accordance with the Greenhouse Gas Protocol which sets out three scopes of carbon emissions.



Direct emissions from sources owned by Network Rail e.g. burning fuels such as natural gas for heating or petrol and diesel to fuel cars and vans



Indirect emissions from the electricity, heat or cooling that we buy



Other indirect emissions along Network Rail's value chain from suppliers or customers



30tn of Ballast
New = 233.1 kgCO2e
Recycled = 96.3 kgCO2e



Raw Materials & Manufacturing

Sourcing local raw sustainable materials and having products manufactured responsibly.

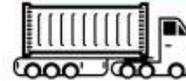
E.G Using recycled ballast (from NR aggregate depots) for civils works instead of new third party quarried ballast

Transportation of Materials

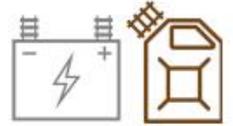
Sourcing local sustainable materials reduces distance travelled and fuels consumed/burnt.

E.G Rail transport is 3x more efficient than road haulage (HGV - 30tn) over same distance.

30tn over 180km
Rail = 138 kg CO2e
Road = 389 kg CO2e



A 20Kva generator using 5.4ltr petrol an hour emits 125 kg CO2e per shift (10hrs).
A solar generator produces 0kg CO2e.



Site Operations

Reducing carbon output of site activities.

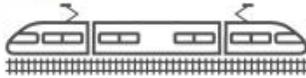
E.G battery and solar powered lighting and generators. Battery operated tools. Staff attending site using company electric vehicles.

Workplace Management



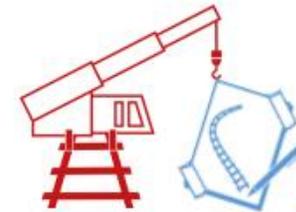
Reducing carbon output of offices, business and staff operations and activities including staff personal travel

E.G flexible working, use of digital meeting platforms, strong energy behaviour culture



3 staff members travelling 500 km between them for an 8hr meeting with accommodation.
Rail = 3.62 kgCO2e or Road (medium car) = 19.99 kgCO2e plus Hotel = 47.1 kgCO2e
Or all log in from home using a Zoom call = 0.2 kgCO2e

Reducing Carbon in Projects Through Lifecycle Thinking



Construction



Reducing carbon in construction through sustainable design of infrastructure and site operating techniques.

E.G Platform extension uses techniques to reduce total carbon in construction.

30tn of Concrete produces 3.95 tnCO2e, or 1:7.5.



Low Carbon Infrastructure

Developing low carbon and climate resilient infrastructure that uses less energy, requires less maintenance and lasts longer or helps to remove carbon from the atmosphere

E.G planting trees to sequester carbon or installing renewables energy technology on network to power daily operations



It would take 1 year for 46 trees to absorb the equivalent of 1 tonne of carbon.



Waste Management

Designing out waste and improving segregation for higher reuse, recycling and diversion to landfill, which produces methane which is 25x worse than carbon.

E.G Providing clean excavated site soils to local construction development.

30tn of Soils
Recycled = 30.27 kgCO2e
Landfill = 527.76 kgCO2e

Key



Carbon Scope, 1, 2, 3



Capital Carbon



Operational Carbon