SAP, WASTE & RECYCLING ONE

Providing the foundation required to help manage the Circular Economy
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Recycling in the UK

The majority of recycling undertaken in the UK is completed by local authorities. Although responsible for the Collection of Municipal Waste Schemes, local authorities often outsource to privately held companies who provide contracts to collect waste materials, known as kerbside collections.

Recently, both national and regional governments have imposed levies on the amount of waste materials going to landfill.

The focus for household recycling is now on separating waste materials at source for kerbside collection, recycling at a variety of recycling banks, reducing the use of certain materials and composting organics waste - rather than landfilling or incinerating.

Commercial and Industrial waste materials also help to account for the millions of tonnes of materials that are produced annually in the UK. Together they equate to over 177 million tonnes of waste materials generated every year in England alone.

It is widely accepted that, although on the increase, recycling of materials in the UK falls behind its European counterparts. Wasting materials costs business and households additional money and produces methane gas from landfill activities; a powerful greenhouse gas proven to contribute to global warming.

There is a common agreement that the UK needs to move towards a ‘zero waste economy’, this does not actually mean an economy where waste doesn’t exist. It’s a society where resources are fully valued, both financially and environmentally. This means resources are reused, recycled or reduced in use and are only discarded as an absolute last resort.

There are a number of initiatives already in place that are designed to aid and encourage better use and re-use of resources. Programmes designed to reduce resource consumption, reengineer business models and deliver new products and services; all of which are helping to promote greater efficiency and support sustainable, long-term growth.

Perhaps the most radical idea, is that of changing the economic business model from a linear model into a circular one. This challenges current methods of production and disposal and facilitates demand for a resource-centric model. The circular economy is one based on promoting the value and distribution of high quality recycled materials to reprocessors and remanufacturers.

The incentive? Instead of spending more money on waste management than on housing and planning, councils can aid in the supply of high quality resources. This would enable the private sector to deliver over £2bn of investment in recovery infrastructure, which could capture over £1.7bn in material value and re-use per annum, instead of exporting waste materials or sending to landfill.
The Circular Economy

The Circular Economy is a generic term for an economy which features two distinct types of material flow, organic and inorganic.

Organic materials can re-enter the ecosystem safely without contamination and inorganic materials are recycled as high-quality resources that do not re-enter the ecosystem, but are designed to be repurposed with the minimal use of energy.

The Circular Economy encompasses processes beyond the simple production and consumption of goods, to include a move away from fossil fuel dependency to the use of renewable energy.

More advanced models also go as far as questioning the role of money within the Circular Economy and incorporate new economic performance and measurement tools.

The Circular Economy represents a fundamental shift away from linear systems and industrial processes – the Take, Make and Dispose model. It represents a coherent framework for future growth that is a direct response to the end of cheap raw materials and sources of energy within the economy.

The Circular Economy draws its architecture from system design, rather than the cradle-to-grave concept of individual components that dominates today. It is heavily influenced by systems such as bio mimicry, industrial ecology and the blue economy.

The Circular Economy has been conceptualised for over 25 years. Stahel and Reday, its founders, visualised the economy in a series of closed loops and how this would impact on job creation, competitiveness, resource retention and the prevention of waste.

The objectives of the Circular Economy

- Extending the life cycle of products
- Reconditioning and prevention of waste
- Establishing functional service economies
- Localising services within communities

One of the founding principles of the Circular Economy is that of waste as a resource; whereby the biological and technical components of a product are designed with the materials lifecycle in mind.

Biological components are composted and technical components are re-used.

Modularity, versatility and scalability are prioritised within the Circular Economy. In an uncertain, rapidly evolving world, multi-faceted systems with a greater degree of interconnectivity are more resilient to macro-economic change than those built on efficiency alone.
Challenges

The UK’s resource management systems were never designed for a Circular Economy. They have evolved from the simple principle of collecting waste and transporting it to landfill sites. Primarily the responsibility of local authorities, the transport of waste within these systems has been based purely on geography, rather than material flow.

Cost management has, inevitably, been a major consideration in the past. The cost of transportation has been the primary focus, rather than managing the quality and supply of the materials.

As an extension of this linear process, recycling systems have delivered partial benefits to date. However, far more resources could be recycled in the UK, rather than exporting for reprocessing overseas.

The landfill-based system impedes greater circular resource flow within the UK. The infrastructure currently available to capture value from waste resources requires materials from multiple local authorities.

Maximising value is now more important than the past focus of reducing collection cost. Disposal to landfill costs an average of £100 per tonne, while some waste streams are now generating in excess of £300 per tonne.

“According to the Circular Economy Task Force, over £1.7bn worth of plastics, food and electronics materials are lost to the UK economy every year.”


To try and capture this value effectively, quality recovered materials have to be delivered to reprocessing facilities in the UK. However, there are 376 individual waste collection authorities across the UK; within which, the administration of resource collection is unrelated to the quality and optimal flow of materials managed.

The supply of quality materials (known as feedstock) is not reliable at the scale a circular economy dictates. As a result, reprocessors aren’t building the infrastructure required to handle the total volume of available materials.

As a part of a vicious circle, waste companies are not ensuring the quality and consistency of materials, because of the lack of infrastructure for effective reprocessing. This, in turn, sends manufacturers elsewhere for raw materials.
Facts & Figures

Electronics Recycling Capacity

Regional collaboration between electronics recyclers could additionally support another 8-16 general electronics recyclers (WEEE) while 50-200 reuse companies could specialise in appliance types.

Sorting for reuse and shredding for recycling, rather than sending to landfill, would mean capturing an additional £500 million – half of which would come from re-use.

There is currently no infrastructure to organise collection and delivery to reprocessing facilities that can adequately manage both re-use and the recycling of electronic raw materials.

Plastics Recycling Capacity

The UK could support an additional 45 high quality, closed loop, plastics recyclers. Currently, there are just 5 in the UK. Each recycler could operate 5-8 plants that specialise in different polymers. Plants would be located to meet the supply and demand across wide areas and would facilitate a significant degree of collaboration between business partners.

An additional 25 recyclers could support less high quality plastics materials to be down-cycled. This would require an estimated £850m in infrastructure, yet capture £900m a year from recycling plastics that would otherwise have been sent to landfill, incinerated or exported.

Currently, plastic grades are managed within council organised systems. Removing the different domestic and commercial waste streams, greater determination of levels of separation and cross border collaboration would increase raw material supply to re-processors and release this latent value.

Food Recycling Capacity

Managing food waste can be administered at a local authority level. Currently, there are 135 Anaerobic Digestion (AD) plants in the UK, but we produce enough biodegradable waste to supply feedstock to 500 Anaerobic Digestion plants. The size of these plants suits materials generated within each authority, so less collaboration is required.

Biodegradable waste will need to be separated from the main waste stream. However, this could enable AD facilities to hit their national target of £140m annually from biogas. At present, just 14% of organic resources captured is suitable for anaerobic digestion.

The food waste recycling sector requires a drastic overhaul. The AD sector alone is missing out on around 200 AD facilities to process landfilled organic resources that could be generating £1.2bn.

 Alternatively, the sector could use energy crops as a feedstock, which would utilise anywhere from 60,000 to 270,000 hectares of farmland.
What’s The Problem?

According to the Green Alliance Circular Economy Task Force Reports, there are five factors that inhibit market demand for quality recyclates and reused goods. In turn, inhibiting investment in new reprocessing plants.

1. Devolvement of Local Power

Accountability to local citizens is beneficial in many cases. However, it is detrimental when it creates outcomes for which it is difficult to hold politicians to account over.

In Germany, refuse bins are all the same. By comparison, in the UK, very few councils purchase bins and local preference is rife. The lack of joint procurement increases per-bin-cost by £5. The result, £200m additional spend on bins alone.

Similarly, some local authority contracts require new reprocessing infrastructure to be built within the local area, which ignores capacity in neighbouring areas, the result, total cost of recycling is higher due to existing assets being used inefficiently.
2. Central Government Policy

The creation of split incentives by central government hinders efficient recovery of raw materials. Collection authorities pay for the collection of materials, but may not benefit from the value of those recycled materials. This encourages collection cost savings, even if cheaper collections mean raw materials are lost. Costs are incurred by separate disposal authorities and commercial and industrial waste streams are separated, creating two parallel systems that duplicate collection efforts for the same waste streams.

3. Central Government Strategy

Mixed messages have been sent to local authorities, waste companies and reprocessors. The Department for Communities and Local Government has promoted and funded more expensive weekly collections. At the same time, the Treasury has cut grants to councils and limited their ability to raise taxes. Spending is set to fall between 2008-15 by nearly 30%, reducing the ability of industry and local government to plan effectively.

4. Fundamentals of Competition

Waste companies compete fiercely on projects, driving down the cost of infrastructure. However, local authorities are only thinking at a local level and not considering the total value of the system and materials.

Effective digression of this system would see companies competing at a system level, rather than for individual projects. As it stands, local authorities and waste companies don’t have enough control to deliver an integral approach where materials are processed on a much larger scale. As a result, the value of the materials is not fully factored into bids.

5. Risk Averse

The volatility of the value of secondary materials exposes local authorities in longer-term contracts, in order to accurately forecast revenue and expenses. This has led councils to favour higher-priced contracts that do not factor in the value of materials, rather than lower priced contracts that do.

Budget cuts entrench these problems, making councils more risk averse. This results in lost valuable materials for both councils and recyclers, who can’t source materials reliably. To counter the impact on supply and demand fluctuations, more stable system management is required.
How to create a better system

Designate Funding

Central Government can help to facilitate recovery systems to feed high value reprocessing facilities at an economic scale. This can be achieved by several methods, including £250m for recovery infrastructure. This could aid in supporting cross-boundary assessments for feedstock potential, broker agreements through the supply chain and create a fund for financial stability; addressing market price volatility.

An Integrated & Uniformed Process

For materials that demand a national, collaborative infrastructure the government could assess the requirement for reprocessing infrastructure, while setting collection standards nationally to aid in continuity of supply. This would include removing the divide in commercial and municipal waste streams.

A less centralised version of this could focus on the collection of specific goods. Waste Electronics’ greatest barrier to effective refurbishment and reuse is poor collection.

Online retailers, doorstep collections (Collect+, Amazon Locker) via post offices, rather than funding generic collection schemes. Japan has implemented such systems and captures 72% or WEEE compared to the UK’s 32%.
Opportunistic Redesign Through Reform

In addition to the infrastructure changes, government could stimulate further demand by offsetting recycled materials against producers packaging waste obligations.

This would encourage collaboration throughout the supply chain, improve product redesign for reuse and recycling and entice householders into the circular economy.

The redesigning of electrical products can facilitate huge opportunities in reuse-focused reprocessing. For example, ensuring that electrical goods are easily refurbished, salvaging parts from end-of life products and disassembly for the recycling of parts.

Additional benefits could be realised by following WEEE obligations advice for repair and recyclability of products and by including design standards in government procurement, setting examples and standards.

Conclusion: What Needs to Happen?

Firstly, address the national infrastructure. Secondly, move on to businesses utilising a range of technologies to help raise recycling rates.

Improve collection systems, create a reliable supply of materials, counter market volatility, preserve the value of materials and generate revenue from reuse and remanufacturing.
SAP, Waste & Recycling One Providing the foundation required to help manage the Circular Economy
How can ISB Global & SAP help?

By providing a networked infrastructure to aid UK councils and the Circular Economy.

**SAP Business Management Software**

SAP is the largest business management software company in the world. Many councils and local authorities use SAP due to large user numbers, complex process and the need for robust, compliant multi-functional software applications in finance and procurement.

ISB Global has developed the pre-integrated Waste & Recycling One add on for SAP Business One (for small to medium size companies), complimented by a set of mobile and web tools called SmartWorld.

The Resource Information Data Exchange (RiDx) platform is a part of the web toolkit. It is a customer and supplier portal, used to monitor transactions between trading entities.

**Waste & Recycling One**

**Resource Information Data Exchange Portal (RiDx)**

As an SAP Software Solutions & Technology Partner (SSTP), ISB Global has developed the pre-configured, pre-integrated add on Waste & Recycling One (WR1) for SAP Business One.

WR1 allows for the complete management of the end-to-end process for organisations to administer the forecasting, contracting and scheduling of materials; transport, haulage, logistics, billing, accounting and banking activities.

WR1 works irrespective of organisational model – whether transport and reprocessing for one or more legal entities is managed internally or the entire process is outsourced, including logistics and recycling materials services.

ISB Global’s SmartWorld set of applications, which include the Resource Information Data Exchange Portal (RiDx), help with the quick, easy and cost effective transfer of data between business partners.

SmartWorld provides transparency of transactions and material master data between supplier and customer, as well as the value added in such a closed loop process.

The process is fully integrated, from mobile Proof of Delivery (PoD) and material transfer, to operations, accounts and banking. Waste & Recycling One can also be integrated to larger SAP software components in procurement or finance if necessary.
How can ISB Global help the national system decide where to locate reprocessing facilities, where the materials go and how much it costs to get them there?

ISB Global's Supply Chain Modelling tool helps organisations understand supply chain networks; aiding in decision making on inventory level and transport costs and helping to identifying national supply chain configurations.

The Supply Chain Modelling tool also takes into consideration forecasted or actual lead times and supply and demand volumes by location. By optimising in cyclical time horizons, ISB Global can also help with identifying optimal material flows for a growing supply chain network, continually aiding in cost savings for the planning organisation.

ISB Global can help organisations to build stock levels across a total supply network to meet fluctuating ebb and flows in supply; sizing network resources over time and adding flexible capacities in the network such as additional plants or overflow inventory sites.

Optimisation of supply, demand, plant and transport can be achieved at an economy-wide level or for separate companies within the supply chain.

How can the collection, transport, forecasting and inventory level of materials be administered cost effectively?

Comprehensive customer and supplier master data helps administer work orders, contracts and materials planning and scheduling from collection points to final destinations. Associated sales revenue and purchasing costs for ‘line-level’ profitability provide transparency on operational costs.

Raw materials can be traced from source, throughout the supply chain (from bulking up to reprocessing or refurbishing production lines). The capture of value-added activities and management of asset lifecycles supports quality management and adherence to legislation for organic, man-made or hazardous materials.

Materials at any stage of the process can be stored in a designated warehouse. Goods are receipted and issued via weighbridge movements; batched and serial number tracked items create automated purchasing and sales accounting transactions for the designated trading partner.

The automatic transfer of the correct data from one organisation to another helps businesses within the supply chain that belong to different legal structures to manage operations resourcefully, sustainably and profitably.
Transactional data is available through ISB Global’s Resource Information Data Exchange (RiDx) portal. The RiDx links customers, suppliers, materials, activity and value through the supply chain; with or without integration to any software infrastructure, available as a “cloud” subscription service.

How can price volatility be more effectively controlled so it doesn’t have such a dramatic influence on operations and nationwide material flows?

The monitoring of movements, material value and price is controlled operationally by the broking entity (the council or local authority); who can administer individual customer and supplier item pricing on a contracted material and weight basis.

A margin can be placed on the job order transactions to facilitate funding for the materials movement process by the local authority and commodity pricing can be fed directly to SAP from external, online indexes.

Material flows are managed between multiple entities nationally (facilitated online by RiDx) and can be monitored for optimum supply, lead times, demand and capacities at a company and economic supply chain level.

The Business Intelligence (BI) platform can facilitate detailed analysis and insight into the national supply chain. This can aid in smoothing out supply and demand fluctuations by managing the circular supply chain more effectively; both at a company and economic level, where blockages can exist. In turn, this will offer greater material procurement stability through visibility of contracted supply, haulage costs and reprocessing capacity.

Pricing can be easily administered and controlled at individual customer, supplier, load, material and haulage levels within Waste & Recycling One (Customer & Supplier Pricing Master Data).

As feedstock supply, demand, quality and partner relationships become more stable, there will be less reliance on virgin raw materials. Control of these supply chain parameters will stabilise price volatility further and decrease the requirement for sourcing virgin materials from abroad.

The RiDx portal gives access to each trading entity within the supply chain, total visibility of order, traceability, invoice, charging and payments - regardless of whether they are using SAP, Waste & Recycling One.

Supply is optimised according to available capacity; which is achievable through the open architecture of the RiDx Portal with relevant order data (job order master data, WTN, batch, serial number and production planning) according to optimised collection, transport, pricing and demand for materials. Effective management and information on these points in the supply chain can help even-out fluctuations in supply and have a positive impact on price volatility.
A comprehensive Business Intelligence and reporting platform allows for budgeting, forecasting and predictive analysis to give greater insight into fluctuations in material flows, seasonal or regional supply and demand nuances.

It offers greater intelligence and supports further smoothing of erratic price behaviour in the national supply chain material network, both at individual organisational and economic levels.

How do materials, sales and purchasing information flow from one business partner to another in the supply chain, ‘cradle-to-cradle’?

SAP, Waste & Recycling One controls the core master data relating to customer, supplier, material, transfer, price, sales and purchasing transactions.

This data is made available to partner organisations in the supply chain via the RiDx Portal, providing ‘back-to-back’ sales and purchase order transactions, material flow and legal documentation system.

Work Orders are planned, scheduled and delivered; using time and weighbridge-triggered confirmations to complete the order. Data is made available by logging into the RiDx portal, or via email notifications. RiDx is available to any trading entity in the circular economy supply chain, on any device and any operating system, via the cloud.

How can a cohesive nationwide data transfer network be built from collaborating organisations within the circular economy?

Each council operates a service brokerage ‘hub’ for jobs; merging material streams and either managing internally or brokering services for the collection and transport of materials.

Services are allocated to business partners based on the relevant stage of the reprocessing cycle, according to supply and demand from the nationwide model. An administrative margin on the transaction would ensure value added services by the council were covered.

Information on operations transactions are easily shared between business partner entities, due to the integrated nature of SAP, WR1 and the RiDx Portal software, whilst sensitive data is kept securely in the back-office for each individual legal entity.

How would materials be traced, lifecycle managed, what auditability is there and how can resources be monitored to ensure quality?

Every movement of materials, regardless of commercial or industrial, is traceable by a number of methods: work order, work order row and material batch and asset serial numbering.
As the work order moves through the supply chain, so the traceability of the materials passes from schedule to collection, depot to bulk transferral to reprocessing plant; it can then be monitored through the production process.

Quality management can be maintained through a process of pre-built checks and quarantine warehouses. Reprocessing Assets and Equipment hierarchies can be administered and maintenance scheduled to ensure maximum uptime and continual reprocessing capacity.

The same methods can be applied to parts for leasing, refurbishment and reuse; with expiry dates on batches, serial numbers and warranties - managing parts lifecycle and the extraction of equipment for materials reprocessing when the part has reached end-of-life.

How is the ISB Global software architecture implemented and maintained?

SAP and Waste & Recycling One are implemented using a meticulous project methodology, designed alongside SAP’s ASAP’s methodology and PRINCE2. The project is divided into phases to ensure control and governance, with rigorous testing and training to deliver safe and confident cut-over to live operations.

SAP, Waste & Recycling One can be implemented on-premise or provided as a hosted service (like the RiDx Portal) for a monthly subscription.

The RiDx Portal is a platform that can be integrated to subsequent SAP and WR1 installations or used standalone, irrespective of device or operating system. It facilitates the easy transferral of critical business data to manage material, selling and purchasing transactions between trading entities in the supply chain, cradle to cradle.

The infrastructure portfolio is managed and maintained by ISB Global. The software solution set is implemented using an iterative training methodology to ensure quick and easy take up with on-going self sufficiency for continued use.

The system is backed by SAP as 3rd line support, with updates to technical infrastructure and continuous improvements to the core application.
Conclusion

ISB Global SAP, WR1 & RiDx provides a Networked Supply Chain with total visibility and control of cradle to cradle material and financial operations.

SAP, Waste & Recycling One and the RiDx Portal support total transactional clarity between operating entities in the new Circular Economy.

The use of Master Data through a single system, made available through the RiDx Portal to trading partners, ensures that operations are streamlined, sustainable and use internal resources efficiently; while material flows are traced and auditable from end of life to new life, irrespective of working on SAP and WR1.

Local Authority or Council Resource Management Teams and companies within the Circular Economy can manage collection operations easily. Work orders to collect and transfer the material and value can be administered from contract-to-supply, to first and second stage reprocessing; facilitating traceability and auditability of materials through the entire supply chain.

The SAP, WR1 work order also manages statutory documentation, purchasing and sales information from start to finish. As a single software solution it can create the necessary financial and accounting transactions automatically in SAP, WR1 to further increase speed, efficiency and accuracy. Ensuring both sustainability on current resources and profitability of operations.
Sources: