

Employment and the circular economy

Job creation in a more resource efficient Britain



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by Julian Morgan* and Peter Mitchell**

Green Alliance

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Summary

Britain faces huge economic challenges in its use of labour and scarce natural resources. Although unemployment is now falling, the risk of being out of work is higher in some regions and for some types of occupations. While Britain has significantly increased its resource efficiency in recent years, supply risks in an increasingly competitive global economy mean that we need to get better at using natural resources.¹ The analysis in this study shows that these challenges are linked, as improving our resource efficiency can make a valuable contribution to improving Britain's labour market situation.

One route to improving resource efficiency is to develop what is known as a 'circular economy'. This involves keeping products and resources in use for as long as possible through recovery, reuse, repair, remanufacturing and recycling.² In addition to protecting the environment, this potentially offers substantial economic benefits.³ These include greater economic stability through increased resource security and new business and employment opportunities from an expanding sector. This study focuses on the latter aspect and aims to identify the scope for the growth of the circular economy to offer new jobs.

Britain is already experiencing significant labour market challenges, such as persistent high unemployment in some regions and declining employment in mid-level occupations. The labour market exhibits significant regional and occupational mismatch, meaning that available employment opportunities are often not well aligned, either with where the unemployed live, or with the experience they have from their previous occupations. Labour market mismatches are thought to account for around three percentage points of the unemployment rate and are likely to have played a significant role in the rise in unemployment since the start of the financial crisis.⁴

Unlike many studies in this area, we have not limited our analysis to a simple quantification of the number of jobs that could be created in an expanded circular economy. Although such calculations are useful to give a sense of the employment needs of a growing sector, they are not informative about the opportunity for improving the national labour market situation. They tend to ignore how the growth will interact with other parts of the economy, ie whether new jobs will be genuinely additional and reduce unemployment, or whether they will simply displace existing ones.

Instead, we place the growth of circular economy employment in the broader context of the British labour market. We have considered the regional and occupational patterns of employment in recycling, reuse and remanufacturing activities and how they may develop in the future. We ask, what is the potential to create jobs in high unemployment regions, or in occupations that correspond with the skills of the unemployed? And, what contribution can a growing circular economy make to the phenomenon of declining mid-level occupations?

To answer these questions, we have looked at British labour market trends and drivers and developed three distinct scenarios for the potential expansion of the circular economy to 2030.

The first scenario involves no new initiatives and a very limited increase in the ‘circularity’ of the economy. The second envisages a continuation on the current trajectory, with significant further increases in recycling and remanufacturing likely. Our third scenario is really transformational, with substantial progress in recycling and remanufacturing, but also major development of the reuse, servitisation and biorefining sectors.

We discussed these scenarios with a group of experts and sought their qualitative assessment of likely labour market impacts, although we retain responsibility for our conclusions.

“Growth in the circular economy can be expected to have lasting beneficial effects on the labour market.”

To illustrate each scenario we undertook quantitative analysis that suggests that growth in the circular economy can be expected to have lasting beneficial effects on the labour market. This is because, whilst these activities tend to be efficient in their use of natural resources, they can be relatively intensive in their use of labour, compared with the activities they replace. They have the capacity to create dispersed employment that could potentially be undertaken by those currently unemployed, or those losing mid-level skilled positions due to industrial change.

Our calculations are based on assumptions, and are illustrative rather than definitive, but we have erred on the side of caution in deriving them. They suggest that by 2030, on the basis of the current development path, the circular economy could create over 200,000 gross jobs and reduce unemployment by about 54,000. It could also have the potential to offset around seven per cent of the expected decline in skilled employment to the year 2022.

More extensive expansion of circular economy activities could more than double these figures, creating around half a million jobs (gross), reducing unemployment by around 102,000, and potentially offsetting around 18 per cent of the expected loss in skilled employment over the next decade.

This publication gives an overview of our findings. A more detailed report of this work is available, providing full information on the analysis, calculations and data sources.⁵

	Scenario one No new initiatives	Scenario two Current development rate	Scenario three Transformation
Gross jobs growth ⁶	31, 000	205, 000	517, 000
Net job creation ⁷	10, 000	54, 000	102, 000
Unemployment rate fall	0.02%	0.15%	0.28%
% offset of predicted decline in skilled employment over the next decade ⁸	1.3%	6.8%	17.7%

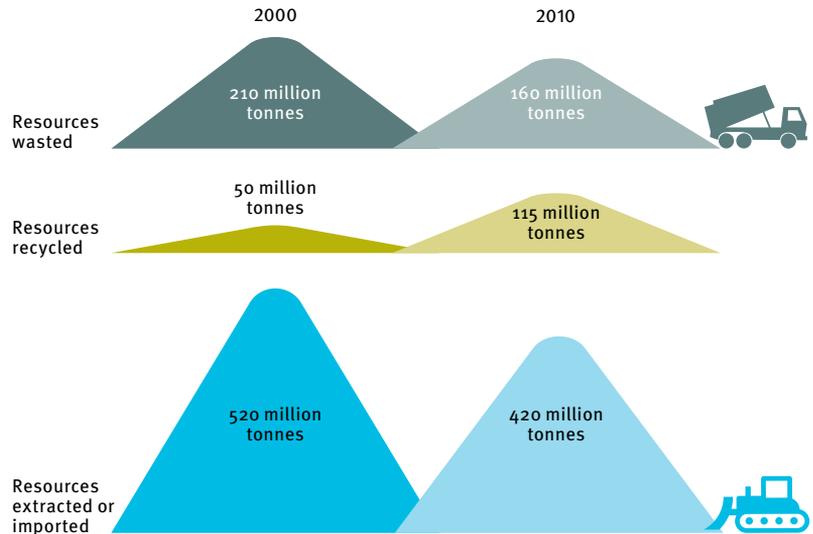
Note: Jobs figures are rounded to the nearest 1,000

The growth of the circular economy

The UK is becoming more resource efficient.

In 2000, we used 570 million tonnes of materials (biomass, metals and minerals, but excluding fossil fuels) in economic activity, with around 40 per cent ending up as waste; fewer than 50 million tonnes came from recovery and recycling activities. The amount of imported materials was also more than double the amount being recycled. The waste and recycling industry generated sales revenue of more than £6.5 billion from collection, treatment, disposal, recycling and wholesale of recovered materials, and it employed around 75,000 people.

The UK is becoming more efficient at using resources



By 2010, although the economy had expanded by 20 per cent, and the population had increased by six per cent, the UK was using fewer resources, at 540 million tonnes, with around 30 per cent ending up as waste. The amount of material recycled had more than doubled to around 115 million tonnes, and was similar to the amount of materials imported. Sales turnover in the waste and recycling sector had nearly tripled, to over £19 billion, and the industry employed around 130,000 people.

The parameters of our analysis

For the scope of our analysis, we have assumed that the following activities, excluding energy inputs, comprise the circular economy:⁹

1 Reuse

Finished products are worth much more than the raw materials they are composed of and direct reuse preserves the most value and embodied energy in products. For example, a reused iPhone retains around 48 per cent of its original value, whereas its value as recyclate is just 0.24 per cent of its original value.¹⁰

2 Closed loop recycling

This involves using waste to make new products without changing the inherent properties of the material being recycled. Examples include bottle to bottle or speciality alloy to speciality alloy recycling. It can also cover recycling where the product changes but the quality of the material is maintained, eg a plastic bottle made of polyethylene terephthalate (PET) to a toy made of the same.

3 Open loop recycling

Otherwise known as downcycling, this uses recovered materials to create products that have lower value compared to those produced in closed loop recycling, for example turning glass containers into aggregate.

4 Biorefining

For industries creating biowaste, biorefining extracts small quantities of valuable materials (such as proteins or speciality chemicals) or converts waste into energy.

5 Repair and remanufacturing

Where a product needs repair or reconditioning before it can be used again, remanufacturing preserves the most value. Analysis suggests remanufacturing saves at least 70 per cent of the materials required to manufacture new goods.¹¹

6 Servitisation

This refers to any system which increases the effective use of assets. It can include leasing and moving from providing products to services instead, thereby deferring consumption of new assets. Many examples are B2B (business to business), such as Xerox leasing photocopiers and printers, Interface's carpet business or Philips 'pay per Lux', but there are also B2C (business to customer) or even C2C (customer to customer) examples, such as Airbnb, Streetcar and Campinmygarden.com.¹²

“Between 2000 and 2010, sales turnover in the waste and recycling sector had nearly tripled, to over £19 billion.”

Analysis of the circular economy is inevitably hampered by the fact that economic statistics are still adapting to the growth of these new activities. For this reason we have carried out the best possible mapping we could with official ONS data. This approach is set out in very broad terms below. Such a mapping has its limitations as, for instance, no direct links can be found for biorefining, and the coverage of reuse and servitisation is far from ideal.

While the nature of circular economy activities is likely to evolve, employment in businesses currently operating in repair, reuse, recycling and rental and leasing sectors can be seen as providing useful proxies for the scale of the circular economy as it currently stands.

Mapping circular economy activities to official data

Circular economy activity	Best proxies in current ONS data
Reuse	Retail of second hand goods in store
Closed and open loop recycling	Waste and recycling Wholesale of waste and scrap
Repair and remanufacturing	Repair of machinery equipment Repair of electronics and household goods
Servitisation	Renting and leasing

The labour market in Britain

There have been a significant number of studies which report the potential for the circular economy to create employment.¹³ Using the definition set out in the previous section, in 2013 overall employment in the rental and leasing, repair and waste and recycling sectors was around 460,000.¹⁴ Employment in waste and recycling activities amounted to 134,000, repair activities had 180,000 and rental and leasing had 148,000. Jobs in waste and recycling and reuse have been rising strongly in recent years, even at a time of considerable weakness in the overall economy. By contrast, employment in rental and leasing activities has been falling.

But if we only focus on the numbers employed (gross jobs), we cannot say much about whether growth in the circular economy creates additional (net) jobs or simply replaces or displaces existing ones. A new and growing sector will inevitably displace some employment in other sectors, either via the product market, with purchasing power shifted away from other products, or via the labour market, with the new sector out competing other sectors for the limited pool of suitably qualified labour. As a consequence, net job creation in a growing sector will be lower than gross job creation and can even be non-existent or negative.¹⁵

Such labour market interactions are typically given less consideration and raise important issues about how the jobs market works. However, they are important for our analysis in determining the likely economic impacts of circular economy growth.

Unemployment

To create net jobs, there must be people unemployed who can take the new jobs. So the number of people who are unemployed provides an upper limit. Unemployment is very unlikely to fall to zero, as some degree of labour market slack is seen as inevitable for two reasons. The first is that, even in boom times, there is always some 'frictional unemployment' when people shift between jobs. The second is a more economic concept, in that low levels of unemployment may be linked with upward pressure on wages and thereby, also inflation. This latter aspect is behind the neoclassical economic concept of a 'natural rate' of unemployment, or 'non-accelerating inflation rate of unemployment' (NAIRU) which we will use from now on. This is intended to represent the lowest sustainable rate of unemployment.

In the summer of 2014, the average unemployment rate in Britain was six per cent of the labour force.¹⁶ Typical estimates of the NAIRU are around five per cent, albeit with large uncertainty, and this is what unemployment had been for much of the decade before the recent financial crisis. The idea behind the NAIRU is that it would be possible to cut unemployment to about five per cent but, reducing unemployment further might encounter inflationary pressure. This would require the Bank of England to tighten monetary policy to cool the economy and return unemployment to the NAIRU.

The notion of a NAIKU is challenged by some economists who see the economy as potentially stuck with a permanent lack of demand and high unemployment. If this is the case, then there may be considerable scope for a growing sector, such as the circular economy, to contribute to reducing unemployment and creating net jobs. However, many mainstream economists, while recognising the potential for some persistence in high unemployment following recessions, would question how long an economy can remain demand deficient; they believe that market forces would ultimately drive unemployment to its NAIKU. And, if the NAIKU is fixed, there would appear to be little scope for a growing, or shrinking, sector to have any lasting impacts on overall employment.

“Structural mismatch has had a significant effect on unemployment in Britain and its increase since the start of the financial crisis.”

Structural mismatch

While there is significant debate about the determinants of the NAIKU, the notion of ‘structural mismatch’ is often cited; it occurs if there are differences in the characteristics of the unemployed and available jobs.¹⁷ There can be a number of dimensions to this, with particular emphasis on geographical mismatch, eg unemployment in the north, vacancies in the south; or skills mismatch, eg high skill vacancies and low skill unemployed.

And the data suggest that such mismatches may be important in Britain:

- There is substantial variation in the unemployment rate across British regions. It remains substantially higher in the former industrial heartlands of the North East (9.3 per cent), West Midlands (7.5 per cent), Yorkshire and the Humber (seven per cent), and the North West (6.7 per cent). It is also above the national average in London (6.6 per cent).¹⁸
- There is considerable variation in the unemployment rate depending on last occupation, ranging from 1.6 per cent for professionals to 9.7 per cent for elementary occupations. By and large, managers and professional occupations exhibit the lowest unemployment rates, whilst lower skilled positions, for instance in sales and customer services and plant and machinery operatives, tend to have the highest unemployment rates.^{19,20}
- Low skilled occupations also make up the bulk of the long term unemployed, although there is also a significant share of the long term unemployed (12.6 per cent) coming from those with a background in skilled trades.

Some research has found that structural mismatch has had a significant effect on unemployment in Britain and its increase since the start of the financial crisis. One study finds that around three percentage points of the unemployment rate can be related to mismatch, while another finds that up to a third of the rise in unemployment since the start of the crisis could be down to this factor.^{21,22}

“Changes in the nature of work are leading to losses of mid-level jobs, such as those in skilled trades or plant and machinery operatives.”

Changing occupational characteristics of the labour market

Occupational mismatch may also be exacerbated by the decline of some mid-level occupations. The importance of the changing composition of jobs has been given considerable attention by the Resolution Foundation.²³ Its analysis suggests that changes in the nature of work are leading to losses of mid-level jobs, such as those in skilled trades or plant and machinery operatives, and a polarisation of the labour market into low skilled and low paying, and high skilled and high paying jobs such as managerial or professional posts. This effect is often referred to as a ‘hollowing out’ of the labour market. A variety of factors may be at work, including technological developments and competition from developing countries removing mid-level jobs.

Future trends

The future of the labour market is the subject of much discussion in the media, covering the roles of technological development, demographics, competition from emerging economies and general societal trends. The UK Commission on Employment and Skills (UKCES) carries out regular comprehensive assessments of the prospects for the UK labour market. In its assessment of the prospects for the period 2012-2022, the UKCES indicated that it expected the fastest growth in occupations for senior managers and professional occupations. Rapid growth was also expected for caring and personal service occupations, reflecting an ageing population. Large falls were expected for some mid-level administrative occupations and some skilled trades and semi-skilled occupations, such as machine operatives.

Employment patterns in the circular economy

In this chapter we examine the evidence on employment patterns in the circular economy in terms of location, pay and occupation. This draws together the patterns that we have seen in the data for the circular economy proxy activities, identified at the start of this report, and also evidence from other studies.²⁴ In addition, drawing on the findings of an expert workshop, we have looked ahead to consider how labour market requirements may develop over time.

Regional patterns of employment

Data evidence

Analysis of the data shows that employment in circular economy activities is distributed across Britain, roughly in line with the spread of overall employment. For the waste and recycling sector, as a cross check, one can also look at the location of facilities for collection, sorting and processing of recovered materials, including organic materials. These activities show a somewhat higher concentration in the North East, including Yorkshire and the Humber, and the North West, than is seen in the employment figures.²⁵

As there is a lack of employment data for biorefining, we looked at the dispersion of these activities across Britain. Overall, there appears to be a broad geographical spread of biorefining facilities, with the North East (including Yorkshire and the Humber) well represented when compared with its share of overall employment.²⁶

Study evidence

Limited evidence from other studies also suggests that circular economy activities tend to offer dispersed employment across the country.²⁷ An interesting example is provided by WRAP Cymru's Accelerating Reprocessing Infrastructure Development (ARID) project, funded by the European Regional Development Fund through the Welsh government. WRAP Cymru has collected evidence of around 60 gross jobs created to date and there is a spread of employment across Wales.²⁸

Expert evidence

With a group of experts we considered possible future developments and the extent to which jobs are likely to be concentrated geographically and the possible nature of this concentration. Our main findings are summarised in the table on page 11.

Reuse and open loop recycling are expected to remain the least geographically concentrated, followed by closed loop recycling, servitisation and biorefining, requiring activity across the country. By contrast, remanufacturing is likely to be somewhat more concentrated, for instance located near to existing manufacturing facilities. Most activities may lead to some displacement of activity in other areas, such as a move away from the production of virgin materials or original manufacturing. However, given existing patterns of trade, most of these impacts are actually more likely to be felt by overseas suppliers.²⁹

“Remanufacturing is likely to be located near to existing manufacturing facilities.”

Potential geographical dispersion of jobs by circular economy activity

Activity	Job concentration	Areas of concentration
Reuse		Dispersed throughout the country
Closed loop recycling		Near manufacturing sites, logistics and supply chains
Open loop recycling		Near feedstock and markets, close to major ports
Biorefining		Near major ports, consuming industries, manufacturing sites, population centres and sources of domestic feedstock
Remanufacturing		Near manufacturing sites, transport hubs and population centres, with some overseas plants
Servitisation		Head office jobs may be in South East and London; back office and servicing jobs may go abroad

Scale from low     to high concentration

Types of jobs

Data evidence

According to the data, in 2013 average gross hourly pay across circular economy activities was around £14.50, ranging from £12.60 per hour in rental and leasing activities, to £17.70 for repair of machinery and equipment.³⁰ In general, these pay rates are in the mid-wage range and, therefore, it is quite likely that growth in the circular economy has the potential to create employment in mid-range posts.

Regarding the occupations involved in the circular economy, the available data suggests that waste and recycling tends to require a comparatively high proportion of lower paid occupations (41 per cent, compared with an average of 21 per cent across all workers). Repair activities require comparatively mid-waged occupations: mainly skilled workers (61-67 per cent compared with an average of 31 per cent across all workers). Many occupations in rental and leasing are also mid-waged (45 per cent).

Jobs in the biorefinery sector are likely to offer a very broad mix of occupations with low to high skill requirements, ranging from plant and crop development, cultivation and harvesting, transport, distribution and storage of feedstock, plant design, deployment, maintenance and repair through to higher skilled work in development, testing and marketing.³¹

“The circular economy can generate jobs for a range of skill types.”

Study evidence

A number of studies confirm that the circular economy can generate jobs for a range of skill types.³² They have found that the recycling and waste management sector offers a larger proportion of low and intermediate skilled employment in the area of collection, handling and processing materials. The ARID project in Wales, previously referred to, also found that the jobs created were primarily low to intermediate skill types. Perhaps not surprisingly, remanufacturing, in common with original manufacturing, tends to require more skilled workers. Indeed, supporting the growth of remanufacturing is likely to require significant investment in training to develop the right skills for the workforce.

Expert evidence

The experts we consulted were asked to consider the extent to which circular economy activities are likely to continue requiring differing skill levels from the labour force. Drawing on their input, it seems likely that low skilled labour would continue to be a significant proportion for reuse and recycling. Remanufacturing, closed loop recycling and biorefining would continue to require more mid-level skilled employment. Biorefining and, to a lesser extent, servitisation were also thought to need some higher end professional and technical skills. The table below illustrates the likely range of skills needed for open loop recycling, remanufacturing and biorefining.

Potential skill needs by circular economy activity

Activity	Low skilled	Skilled	Professional
Closed loop recycling			
Open loop recycling			
Servitisation			
Remanufacturing			
Reuse			
Biorefining			

The potential impact of circular economy growth on jobs

We have developed three scenarios representing differing development trajectories for the circular economy and considered which activities might arise under each, and their implications for the labour market. These scenarios relate to the extent of recycling, remanufacturing, reuse, servitisation and biorefining. We consider the potential qualitative impacts on regional and occupational employment and provide an illustrative quantification of the effects.

The scenarios were partly informed by other studies and discussed with our expert panel.³³ A recent European Environment Bureau report also discusses some of the factors driving possible future developments.³⁴ Our scenarios link directly with the circular economy activities identified for this analysis, and their associated labour market impacts.

The first scenario involves no new initiatives and a very limited increase in the ‘circularity’ of the economy. The second envisages a continuation on the current trajectory, with significant further increases in recycling and remanufacturing. Our third scenario is really transformational, with substantial progress in recycling and remanufacturing, but also major development of the reuse, servitisation and biorefining sectors.

Our quantifications are based on a number of assumptions, outlined in our associated technical report, and are illustrative rather than definitive.³⁵ They imply the potential for lasting beneficial effects on the labour market from growth in Britain’s circular economy. These stem from the capacity of the circular economy to create dispersed employment that could be undertaken by the unemployed, or those losing mid-level skilled positions through industrial change.

We based our calculations on current best estimates of the employment patterns of the main circular economy activities, adjusted in line with the assumed growth in the circular economy under the three scenarios.³⁶

We derived estimates for the labour requirements of a growing circular economy and then, where appropriate, subtracted estimates of jobs they are replacing elsewhere in the economy, for instance in the production of virgin materials or new products. We have not explicitly allowed for any changes in employment emerging indirectly in the supply chain, or induced through changes in demand.

According to these calculations, growth of circular economy activities could create 31,000 gross jobs in scenario one, 205,000 in scenario two and 517,000 in scenario three. We describe these as ‘gross’ in the sense that they are the jobs created before we consider interactions with the rest of the labour market.

The three circular economy development scenarios to 2030: characteristics and potential labour market impacts

Assumptions

Recycling rate (all waste streams) ³⁷

Remanufacturing rate (in relevant sectors) ³⁸

Reuse

Servitisation

Biorefining

Jobs market impacts

Overall

Geographical dispersion

Occupations and skills

Potential gross jobs

“An additional job in a circular economy activity in the North East is most likely to be a net job rather than displacing an existing one.”

New or displaced jobs?

To get a sense of whether such growth would involve expanding overall employment, or would come through displacement of existing employment, we have put it in the context of the current dispersion of unemployment along the regional and occupational dimensions described earlier.

What we found is that job creation in a growing circular economy might amount to only a very small proportion of available labour supply in high unemployment regions such as the North East, so it is much less likely that this growth would put any pressure on the local labour market. In other words, an additional job in a circular economy activity in the North East is most likely to be a net job rather than displacing an existing one. Other regions, including the North West, Yorkshire and the Humber, West

Scenario one No new initiatives	Scenario two Current development rate	Scenario three Transformation
55%	70%	85%
1%	20%	50%
Slight growth	Slight growth	Significant growth
Limited	Modest growth	Substantial growth
Limited	Expansion, from fuel to bioplastics/ biomaterials	Expansion, to pharma and chemicals
Very limited	More significant impacts	Largest impacts
Dispersed, but limited in number	Dispersed, but more around manufacturing sites, transport hubs and population centres	Dispersed, but more around manufacturing sites, transport hubs and population centres
Low skilled jobs in waste management and higher skilled jobs in biorefining	A range including lower skilled waste collection, skilled remanufacturing and high skilled biorefining jobs	A range including lower skilled reuse activities, skilled remanufacturing and high skilled biorefining jobs
31,000	205,000	517,000

Midlands and, perhaps surprisingly, London, also seem to offer substantial scope for net employment growth from the circular economy.

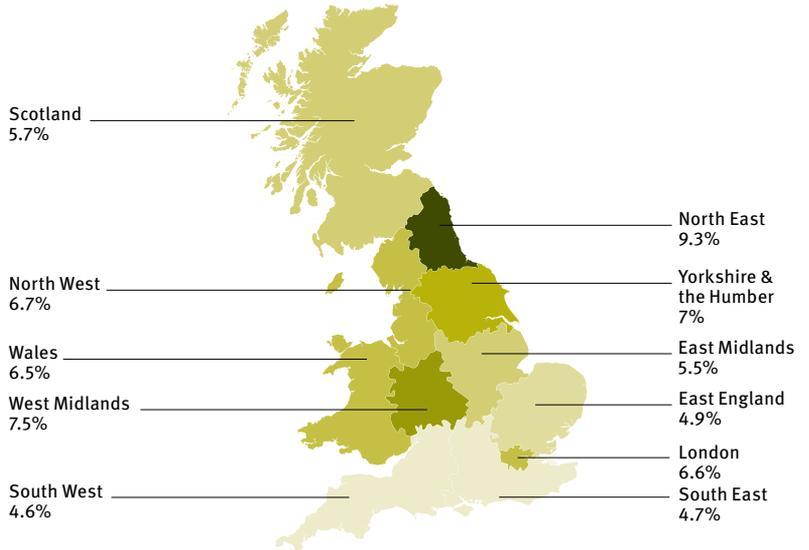
By contrast, in the South East and South West regions, being at or close to the lowest unemployment rate, it is more likely that a significant proportion of the employment growth in the circular economy would displace jobs in other activities. Although, even in these regions, it is possible that some employment growth may still be achieved through encouraging currently inactive workers with the right skills back into the labour market.

If we assume that regions with high unemployment have the greatest potential for net job creation, we can illustrate what this might imply for overall employment. We estimate that the net jobs created under scenarios one, two and three would be 8,000, 47,000 and 88,000 respectively.

The maps below show the current regional unemployment rates and the extent to which they may be reduced by the growth of the circular economy under our scenario two, with development at the current level. They show that the greatest potential to reduce regional unemployment rates is in the areas which currently have the highest unemployment rates.

The circular economy can create jobs where unemployment is higher

Unemployment rate in UK regions, June-August 2014



Net job creation in circular economy activity to 2030 at current growth rate, as a percentage of labour force



Tackling occupational mismatch

A similar approach can be taken with the occupational dimension to unemployment, which is an alternative approach to the one outlined above (the two are not additive). We looked at the extent to which job creation by occupational type could correspond with the apparent available workforce for each group, measured with respect to the lowest unemployment rate, ie that of professionals.

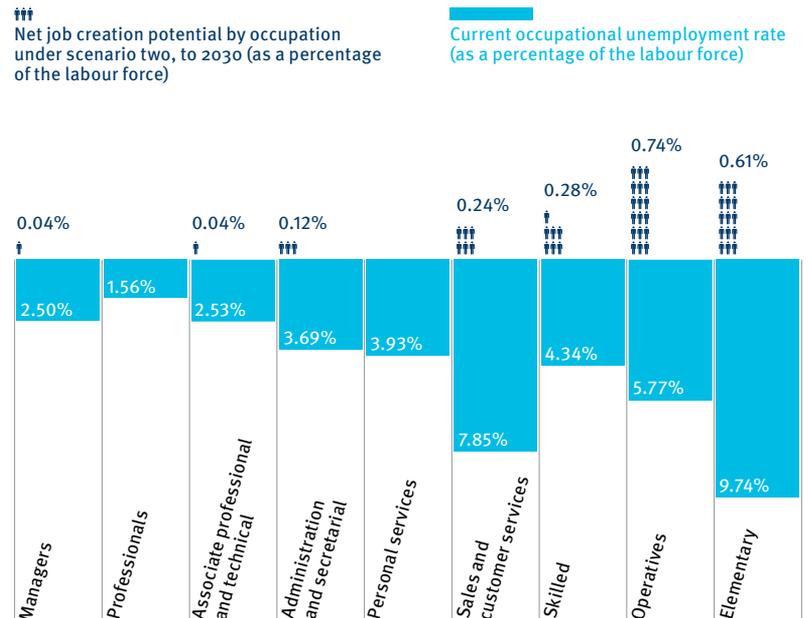
Our analysis showed that there is scope in a growing circular economy to create employment at the lower end of the occupational scale, for elementary occupations. There is also significant scope for job creation in sales, customer services, administration and secretarial occupations.

Our calculations suggest substantial scope for net job creation, with 12,000, 62,000 and 115,000 new jobs created in scenarios one, two and three respectively.³⁹ These figures are somewhat higher than those obtained in the regional mismatch calculations and can therefore serve to illustrate a range of estimated impacts.

The current occupational unemployment rates and the extent to which they may be reduced by the growth of the circular economy under scenario two are shown below. As can be seen, the greatest net job creation could be in occupations which currently have the highest unemployment.

“The greatest net job creation could be in occupations which currently have the highest unemployment.”

Jobs created by the circular economy could match the previous experience of the unemployed



“Growth of the circular economy could make a useful contribution to moderating the projected decline in mid-level occupations.”

Potential to offset the expected future decline in skilled jobs

Our analysis shows that, although there is potential to create jobs for unemployed skilled workers, the significant growth anticipated under scenario three would require nearly all the skilled workers who are currently unemployed to be employed in circular economy activities. As it is unlikely all these workers would be exactly suitable for the new jobs, it would appear that part of the growth would have to come from displacing skilled workers employed elsewhere in the economy or retraining lower skilled workers for higher skilled positions.

These calculations are based on current patterns in the labour market but, according to projections by the UKCES, there are expected to be ongoing losses of low and particularly mid-level occupations. Substantial further declines in mid-level jobs are anticipated for the categories ‘administrative and secretarial’, ‘skilled’ and ‘plant and machinery operatives’. These declines in employment are much larger than the expansion in employment predicted under any of our scenarios, implying that there could be sufficient mid-level workers to take the new jobs without significant displacement.

In this way the growth of the circular economy could make a useful contribution to moderating the projected decline in mid-level occupations. The proportion of the projected decline in mid-level occupational employment from 2012-22 that could potentially be offset by job creation in the circular economy under scenario two is relatively modest, at around two per cent for administrative and secretarial occupations. But it is more significant, at around seven per cent, for sales and customer services and skilled occupations. In addition, there is the potential for 11 per cent of the decline in the lower skilled ‘operatives’ occupations to be offset by the growth of the circular economy. Under scenario three, these potential offsets to declining occupations could be two to three times larger. In this case, growth in the circular economy could potentially offset around 18 per cent of the expected loss in skilled employment over the next decade.⁴⁰

Summary of impacts

We have taken an average of the regional and occupational mismatch approaches to summarise the possible size of the impacts of the scenarios. These calculations are purely for illustrative purposes only and are based on conservative assumptions regarding the labour market impacts of a growing circular economy.

Under scenario two, where growth continues on its current trajectory, and where over 200,000 jobs (gross) could be created and unemployment could be cut by about 54,000, the national average unemployment rate would be reduced by around 0.1-0.2 percentage points. More substantial falls in unemployment would be expected for high unemployment regions or for those occupations with higher unemployment rates. This could also have the potential to offset around seven per cent of the expected decline in skilled employment to the year 2022.

“More extensive development of the circular economy could create around half a million additional jobs (gross) and reduce unemployment by around 102,000.”

More extensive development of the circular economy, as envisaged in our scenario three, could create around half a million additional jobs (gross) and reduce unemployment by around 102,000, reducing the unemployment rate by close to 0.3 percentage points. Once again, more substantial falls in unemployment would be expected for high unemployment regions or for those occupations with higher unemployment rates. In this scenario, growth in the circular economy could potentially offset around 18 per cent of the expected loss in skilled employment over the next decade.

Conclusion

The British labour market faces a number of important challenges. It exhibits significant regional and occupational mismatch in employment, meaning that available opportunities are not necessarily well aligned, either with where the unemployed live, or with the skills they acquired in previous occupations. Labour market mismatches are thought to account for around three percentage points of the unemployment rate and are likely to have played a significant role in the rise in unemployment since the start of the financial crisis.⁴¹

Our analysis suggests that dealing with structural mismatch will require new employment opportunities in high unemployment regions, such as the north of England, that are suitable for low to intermediate skilled workers, perhaps with previous experience in manufacturing, retail or service industries. In addition, Britain, in common with many other countries, faces a significant challenge with the trend of declining mid-level occupations, through a combination of technological progress and competition from emerging economies.

Growth in the circular economy, whether modest or transformational, can create a wide variety of employment opportunities which directly tackle these challenges in the following ways:

- Regional unemployment disparities may be reduced by a broad geographical spread of employment opportunities in circular economy activities, which will be of particular benefit in higher unemployment regions.
- Occupational mismatch may be reduced by new opportunities across all skill levels.
- More extensive development of the circular economy, involving more remanufacturing, servitisation and repair, could create employment near existing manufacturing sites where unemployment tends to be higher. This may also draw on the large pool of unemployed, former employees of manufacturing industries in these areas.

The circular economy can also contribute to offsetting the disappearance of mid-level occupations. Sectors which provide mid-level employment, such as remanufacturing and closed loop recycling, offer potential routes to addressing the disappearance of mid-level occupations.

Furthermore, if the circular economy were to be developed extensively, as in our scenario three, there could be a significant need for some types of higher skilled employment.

As our illustrative, quantitative analysis has shown, circular economy activity has important economic implications, with distinctive characteristics, to help address Britain's labour market issues, both now and in the future. On the current development path, it has the potential to create over 200,000 gross jobs and reduce unemployment by about 54,000 by 2030. It could also offset around seven per cent of the expected decline in skilled employment to the year 2022. But, a more rapid development of circular economy activity could create around half a million jobs (gross) and reduce unemployment by around 102,000. It may also offset up to 18 per cent of the expected loss in skilled employment over the next decade.

Endnotes

- ¹ Overviews of these issues are provided by: B Lee, F Preston, J Kooroshy, R Bailey and G Lahn, 2012, *Resource futures*, Chatham House; and R Dobbs, J Oppenheim, F Thompson, M Brinkman and M Zornes, 2012, *Resource revolution: meeting the world's energy, material, food and water needs*, McKinsey & Company
- ² An early example of the concept of a circular economy originates from Walter R Stahel's pioneering work on sustainability; see, for example, Walter R Stahel, 1982, 'The product-life factor', The Product-Life Institute, Geneva, which describes a closed loop economy, now referred to as a circular economy.
- ³ 2020C, 2014, *Sweating our assets: productivity and efficiency across the UK economy*, 2020 Conservatives; M Rowney, 2014, *The wasteline: redefining 'waste' and improving resource management policy*, IPPR; D Benton, J Hazell and J Hill, 2013, *Resource resilient UK*, Green Alliance
- ⁴ J Smith, 2012, 'Unemployment and mismatch in the UK' from the Bank of England/Institute of Macroeconomics Conference on 'Unemployment, productivity and potential output: the aftermath of the crisis', October 2012; and C Patterson, A Sahin, G Topa and G L Violante, 2013, *Mismatch unemployment in the UK*, mimeo Federal Reserve Bank of New York website.
- ⁵ J Morgan and P Mitchell, 2015, *Opportunities to tackle Britain's labour market challenges through growth in the circular economy*, Green Alliance/WRAP
- ⁶ Estimated increase in labour demand from the growth in the circular economy (total jobs created directly less any jobs lost in displaced activities). No indirect or induced employment is included.
- ⁷ Estimated change in the number of people unemployed as a result of the gross job creation, after taking into account labour market interactions. No indirect or induced employment is included. These figures are the average of the net job creation estimates under the regional and occupational mismatch approaches.
- ⁸ Projections taken from: UKCES, March 2014, *Working futures, evidence report*
- ⁸³, UK Commission for Employment and Skills.
- ⁹ Many definitions of the circular economy are possible. See, for instance: communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2014, *Towards a circular economy: a zero waste programme for Europe*.
- ¹⁰ D Benton, J Hazell and J Hill, 2013, *Resource resilient UK*, Green Alliance
- ¹¹ Dr G Lavery, N Pennell, S Brown and Professor S Evans, 2013, *The next manufacturing revolution: non-labour resource productivity and its potential for UK manufacturing*, Next Manufacturing Revolution
- ¹² www.wrap.org.uk/content/innovative-business-models-1
- ¹³ European Environment Bureau, 2014, *Advancing resource efficiency in Europe*; Scottish Government, 2009, 'Analysis of potential jobs created by Zero Waste' from *Scotland's zero waste plan: consultation* (Annex O); or Friends of the Earth, 2010, *More jobs less waste: potential for job creation through higher rates of recycling in the UK and EU*
- ¹⁴ Based on our analysis of 2013 data from ONS *Business register and employment survey* (BRES).
- ¹⁵ An overview of these issues, albeit in the context of renewable energy and energy efficiency, is provided by UKERC, 2014, *Low carbon jobs: the evidence for net job creation from policy support for energy efficiency and renewable energy*.
- ¹⁶ The unemployment rate can only provide limited information on the extent to which there is under-utilised labour available; it only captures people who were not working in a given period, but were available and actively seeking work, according to a standard definition from the International Labour Organisation. It will exclude people who have given up looking for work, as they perceive a lack of opportunities (discouraged workers). In June to August 2014, around 22 per cent of the working age population were neither employed or unemployed and are said to be 'economically inactive': around a quarter of these are thought to want to work.

- ¹⁷ For a discussion on the determinants of the NAIRU see, for instance: R Layard, S Nickell and R Jackman, 1991, *Unemployment: macroeconomic performance and the labour market*, Oxford University Press; O Blanchard, and J Wolfers, March 2000, 'The role of shocks and institutions in the rise of European unemployment: the aggregate evidence', *Economic Journal*, Royal Economic Society, vol 110(462), pages C1-33.
- ¹⁸ Data refer to June-August 2014. Source: ONS, *Labour force survey*, data retrieved October 2014. Rates calculated with respect to the labour force aged 16-64.
- ¹⁹ These occupational categories are from the Standard Occupation Classification 2010. We use this classification throughout the report.
- ²⁰ Data refer to April-June 2014. Source: ONS, *Labour force survey*, retrieved October 2014
- ²¹ J Smith, 2012, 'Unemployment and mismatch in the UK' from the Bank of England/Institute of Macroeconomics Conference on 'Unemployment, productivity and potential output: the aftermath of the crisis' in October 2012.
- ²² C Patterson, A Sahin, G Topa and G L Violante, 2013, *Mismatch unemployment in the UK*, mimeo Federal Reserve Bank of New York website.
- ²³ J Plunkett, and J P Pessoa, 2013, *A polarising crisis? The changing shape of the UK and US labour markets from 2008 to 2012*, Resolution Foundation
- ²⁴ Most studies look at total job creation, but there are a few exceptions and the technical report behind this work (see endnote 5) summarises some of the key findings of these studies. See: European Environment Bureau, 2014, *Advancing resource efficiency in Europe*; Scottish Government, 2009, 'Analysis of potential jobs created by Zero Waste', from *Scotland's zero waste plan: consultation* (Annex O); or Friends of the Earth, 2010, *More jobs less waste: potential for job creation through higher rates of recycling in the UK and EU*
- ²⁵ See figures cited in: J Morgan and P Mitchell, 2015, op cit
- ²⁶ Ecofys, 2014, *Overview of UK biofuel producers*, for the Department for Transport
- ²⁷ For example: Eunomia, 2011, *From waste to work: the potential for a deposit refund system to create jobs in the UK*
- ²⁸ www.wrapcymru.org.uk/content/arid-accelerating-reprocessing-infrastructure-development
- ²⁹ Papers which look at the economics of reuse include: K James, K Pratt, P Maddox, 2013, *Understanding the economic and environmental impacts of re-use*; proceedings of the ISWA 2013 World Solid Waste Congress 7-9 October, Vienna, Austria; E Kletzer, H Pils, H Hutterer, 2004, *Reparieren im Dienste der Nachhaltigkeit Kosten-Nutzen-Analyse und Untersuchung der Auswirkung auf Ressourcenverbrauch, Energiebedarf und Beschäftigung anhand von drei Fallbeispielen*, Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Wien; I Rüdener and C O Gensch, 2005, *Eco-efficiency analysis of washing machines - further use versus substitution of washing machines in stock*, Öko-Institut e V, Freiburg, Germany; I Rüdener, C O Gensch and D Quack, 2005, *Eco-efficiency analysis of washing machines - further use versus substitution of washing machines in life cycle assessment and determination of optimal life span*, Öko-Institut e V, Freiburg, Germany; and, WRAP, 2011, *A methodology for quantifying the environmental and economic impacts of re-use*, www.wrap.org.uk/content/environmental-and-economic-benefits-re-use.
- ³⁰ Source: ONS, *Annual survey of hours and employment 2013*, WRAP calculations
- ³¹ NNFC, 2012, *UK jobs in the bioenergy sectors by 2020*, report for DECC

- ³² For example: EEA, 2011, *Earnings, jobs and innovation: the role of recycling in a green economy*, EEA report no 8/2011; ILO, 2011, *Skills for green jobs: a global view*; Ecotec, 2002, *Analysis of the EU eco-industries, their employment and export potential*, a report to DG Environment; All Party Parliamentary Sustainable Resource Group, 2014, *Remanufacturing – towards a resource efficient economy*; SITA UK, 2012, *Driving green growth*; Eunomia, 2011, *From waste to work: the potential for a deposit refund system to create jobs in the UK*; R W Beck inc, 2001, *U.S. recycling*
- ³³ Such as: European Environment Bureau, 2014, *Advancing resource efficiency in Europe*; Friends of the Earth, 2010, *More jobs less waste: potential for job creation through higher rates of recycling in the UK and EU*
- ³⁴ European Environment Bureau, 2014, *Advancing resource efficiency in Europe*
- ³⁵ J Morgan and P Mitchell, 2015, op cit
- ³⁶ We do not include biorefining in these calculations due to a lack of suitable figures on employment by occupation and region.
- ³⁷ This recycling rate refers to all waste streams and is, therefore, higher than the UK household recycling rate, given that around 70 per cent of UK construction waste (the largest of all the waste streams) is currently recycled, compared to around 45 per cent of household waste.
- ³⁸ In those sectors most amenable to remanufacturing, broadly corresponding to Standard Industrial Classification divisions 26-30 (representing around a quarter of manufacturing employment), from: Dr G Lavery, N Pennell, S Brown and Professor S Evans, 2013, *The next manufacturing revolution: non-labour resource productivity and its potential for UK manufacturing*, Next Manufacturing Revolution.
- ³⁹ As a robustness check we tested a scenario that did not assume that a full convergence in the occupational unemployment rates was feasible, on the basis that some differentials are likely to be permanent. Instead we assumed that the overall excess unemployment would be the same as in the regional calculations and scaled down the excess unemployment estimates accordingly. With such an assumption, the net job creation under scenarios one, two and three would be 8,000, 56,000 and 92,000 respectively.
- ⁴⁰ The comparison was made possible by assuming that the circular economy grows in a linear manner up to 2030 and by estimating growth in the first ten years.
- ⁴¹ J Smith, 2013; and C Patterson, et al, 2013, op cit

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