ECONOMIC GROWTH POTENTIAL OF MORE CIRCULAR ECONOMIES

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Purpose: The paper outlines how the growth of the circular economy can deliver economic benefits such as increased material productivity and lower structural unemployment and how indicators can be constructed with examples from the UK and Europe. It discusses possible indicators to assess trends, progress and economic potential of more circular economies based on available information on materials & resource flows, waste management, industry economics and labour market performance. It highlights the importance of linking growth in circular economy to broader economic outcomes such as labour market impacts with an indicative quantification of the potential for job creation in Europe to 2030 and emphasises the potential opportunities from developing indicators focussing on material productivity to encourage a range of improvements in material use.

EXECUTIVE SUMMARY

The paper outlines how the growth of the circular economy can potentially deliver economic benefits such as increased material productivity and lower structural unemployment and how indicators to support a developing circular economy can be constructed from available information with examples from the UK and Europe; it also presents results from an indicative quantification of scenarios illustrating the labour market potential of an expansion in circular economy activities in Europe to 2030.

The importance of an expansion in circular economy activity stems from the observation that across Europe there are substantial economic and environmental challenges in the way its economies utilise labour and scarce natural resources. In 2014, unemployment had risen in every single European country apart from Germany compared to 2008 when the financial crisis began. There are signs that employment is recovering and unemployment is starting to show signs of stabilisation (or is falling in some countries across Europe), but unemployment remains sharply higher in many countries, particularly for certain occupational types and age groups.

Together with substantial environmental benefits, a growing circular economy offers the potential to create jobs through lowering structural mismatch in high unemployment regions in Europe. Development of a circular economy is of itself a major industrial transformation, but while past industrial transitions have focused on labour productivity and have often involved using less labour and the creation of high unemployment, growth of the circular economy involves using more labour and fewer resources to increase efficiency in economic activity. Therefore, integrating the labour market impacts of a growing circular economy into the overall labour market is important, and it also allows a distinction to be made between

net or additional job creation and gross jobs where vacancies are filled by people moving from existing posts.

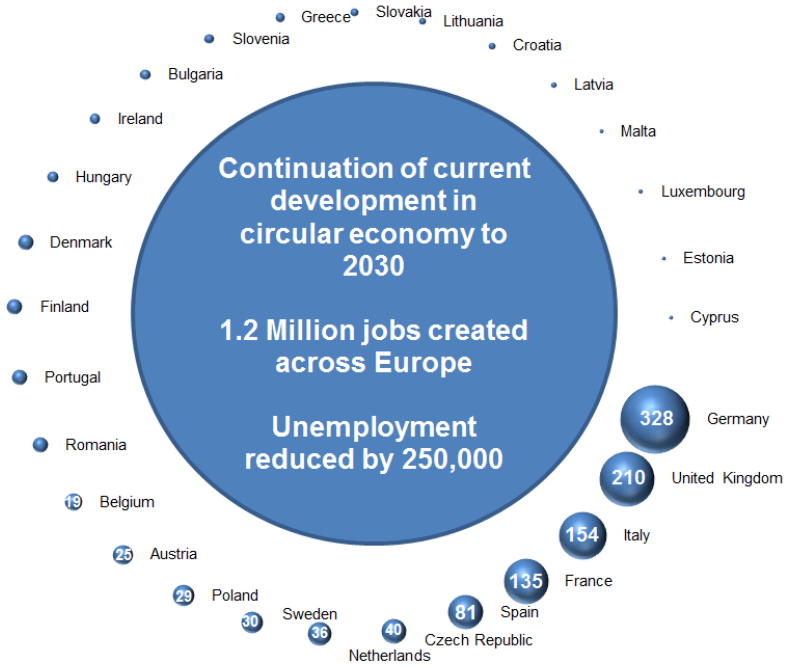
A substantial degree of spare capacity exists in Europe's labour markets as evidenced by the level of unemployment and inactivity, unemployment is distributed unevenly across (and within) countries, low to mid skill occupations are more likely to experience higher unemployment compared to high skilled occupations, and the analysis in this paper of trends in the occupational composition of jobs is suggestive of a polarisation, with an increase in the share of employment at the top end and the bottom end of the labour market and a decline in jobs in the middle segment of the labour market.

Current employment in circular economy activities (in the repair, waste and recycling, rental & leasing sectors) is estimated to be at least 3.4 million across Europe. Of this total 1.2 million jobs are in repair of machinery & equipment, 0.4 million jobs are in repair of computers, personal and other household goods, 0.7 million jobs are in waste collection, treatment & disposal activities, 0.3 million are employed in recovery of sorted materials and wholesale of waste and scrap, 0.1 million jobs are in in-store retail of second hand goods and 0.6 million people are employed in rental & leasing activities.

An expansion in circular economy activity appears to offer the potential to create jobs across Europe through reducing cross country differences in unemployment: indicators of current employment in circular economy activities are broadly in line with the distribution of total employment across Europe and other measures of the propensity for countries to specialise in 'circular economy' activities together with patterns in the geographical distribution of these activities illustrates a reasonable potential for European countries to benefit from expansion in circular economy. And there is a strong potential for an expansion in circular economy to offer jobs in mid-level occupations for which there has been a structural decline.

As an illustration of this potential, an indicative quantification from the analysis in this paper, which envisages a continuation of the current development path towards circular economy, shows that the potential labour market impact in Europe to 2030 is to create 1.2 million jobs with long lasting benefits from a reduction in unemployment by around 250,000 (Figure E1). Inevitably there are considerable uncertainties around such estimates; in particular future advancement in technology could substantially change this picture.

Figure E1 Potential jobs in Europe created through expansion in circular economy activity to 2030



Source: WRAP calculations
(gross jobs estimates by country are in thousands)

In terms of economic benefits from increased material productivity through a more circular economy several indicators are discussed that could aid a better understanding of the potential for growth in circular economy by developing metrics that measure economic productivity relative to material inputs in addition to conventional measures such as labour productivity or energy. Such measures better reflect the economic and environmental benefits of adopting circular economy principles which, as a consequence, are perhaps more likely to become embedded in business thinking.

INTRODUCTION

Together with environmental benefits, a growing circular economy offers substantial potential to create jobs through lowering structural mismatch in high unemployment regions in Europe. Development of a circular economy[1] involves a major industrial transformation. Past industrial transitions and the focus on labour productivity have often involved using less labour, creating high unemployment in some regions and countries or for some categories of workers. By contrast, the growth of the circular economy can involve using more labour and fewer resources to increase the efficiency of economic activity.

Therefore, integrating the labour market impacts of a growing circular economy into the overall labour market is important as it also allows a distinction between net or additional job creation and gross jobs where vacancies are filled by people moving from existing posts. The paper also discusses developing metrics that measure economic productivity relative to material inputs, rather than solely focussing on labour or energy, so that circular economy principles are more likely to become embedded in business thinking.

[1] A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extracting the maximum value from them whilst in use, then recovering and reusing products and materials. Examples of circular business models include; designing products to last longer, which can lead to greater reuse and greater ability to repair/refurbish and re-sell products to support growth in the remanufacturing industry; and allow for easy recovery of materials when a product is eventually recycled. Service models, which could include product maintenance and take back schemes as well as rent/lease and peer-to-peer sharing models, also hold much potential.

Europe faces substantial economic and environmental challenges in its use of labour and scarce natural resources. In 2014, unemployment had risen in every single European country apart from Germany compared to 2008 when the financial crisis began. There are signs that employment is recovering and unemployment is starting to show signs of stabilisation (or is falling in some countries across Europe), but unemployment remains sharply higher in many countries, particularly for certain occupational types and age groups.

WRAP/GA (2015a) explores the impact of increasing resource efficiency on jobs and the labour market in Great Britain. This analysis for Europe builds on this approach to integrate the labour market impacts of a growing circular economy into the overall labour market, so allowing a distinction between the creation of net or additional jobs and gross jobs. Linking increasing resource efficiency and growth in circular economy offers a potential for the creation of net jobs that can reduce unemployment and offer long lasting benefits to the performance of labour markets in Europe.

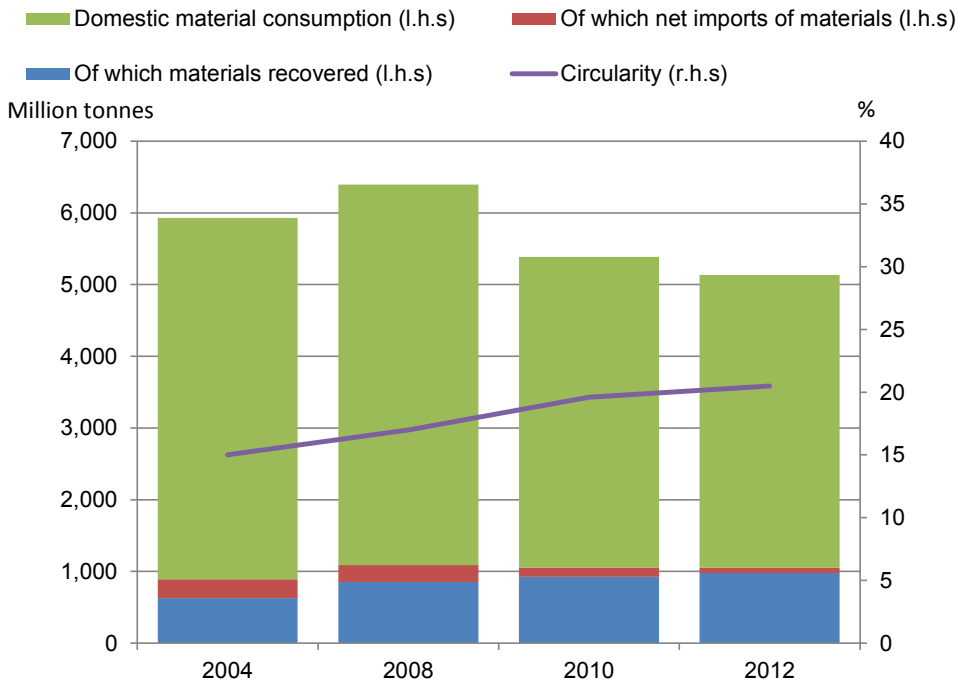
The rest of the paper is structured as follows. First, trends in resource efficiency in Europe are discussed, followed by a review of economic arguments around job creation and expansion in circular economy activity. Building on this, it then reviews key characteristics of unemployment in Europe's labour market, identifying the job creation potential of an expansion in circular economy. It then assesses the extent to which circular economy activities are already established (through a mapping of available data) and then reports indicative results from scenario analysis on the potential labour market impacts in Europe from a growing circular economy to 2030. Next the paper considers the potential of material productivity as a means of measuring economic performance and discusses how these measures could encourage a range of improvements and highlight possible areas of intervention to improve material efficiency. The final section draws some conclusions.

TRENDS IN RESOURCE EFFICIENCY IN EUROPE

The proportion of recovered materials (biomass, metals & minerals and excluding fossil fuels) in use in the European economy has been increasing over time. Between 2004 and 2012 material consumption reduced by around 800 million tonnes (biomass, metals & minerals and excluding fossil fuels), the amount of material recycled increased by 163 million tonnes and net imports of materials reduced. Over the same period the economy expanded by 8% and the population grew by around 3%. Figure 1 suggests that while domestic material consumption and net imports have fallen since 2008, the proportion of materials recovered from waste in total has increased. An indicator of circularity (the amount of materials recovered from all waste streams relative to the domestic consumption of materials) suggests that Europe is currently around 20% 'circular' in its materials use compared to 15% in 2004. A similar trend is also apparent in measures of raw material consumption (Eurostat 2014)

There's a growing evidence base documenting the evolution of resource efficiency and recycling in Europe and the associated expansion of jobs in the recycling sector as recycling rates have increased. The economy has become more circular as it has expanded, it is using fewer extracted or imported resources and more resources from materials recovered from its waste streams. Fischer et al (2011) discuss the extent to which the increase in recycling has led to the creation of permanent jobs across the European economy. In 2007 there were 301,000 people in Europe employed in the recycling sector compared with 177,000 in 2000 - an increase of 70% - and which equates to an annual increase of 8% with many of the jobs created being for people with relatively low skills.

Figure 1 Domestic material consumption and an indicator of circularity for the EU



Source: Eurostat, WRAP calculations

ECONOMIC ARGUMENTS - JOB CREATION

WRAP/GA (2015b) provides a comprehensive discussion of economic issues relating to job creation and unemployment from the perspective of the UK. From economic theory, the natural rate of unemployment or NAIRU ("Non Accelerating Inflation Rate of Unemployment") is the lowest level of unemployment which can be sustained over a long period of time in any economy. Most mainstream economists, while recognising the potential for cyclical unemployment in the short run, would question how long an economy can remain demand deficient and believe that market forces would ultimately drive unemployment to its NAIRU. This would appear to leave little scope for any growing (or shrinking) sector to have any lasting impacts on overall employment and net job creation.

In the short run, if unemployment in any country is above the NAIRU then a growing sector might help speed the adjustment towards it through creating additional jobs, at least for a period of time. However, it would not permanently raise or lower unemployment as market forces would eventually have returned unemployment to its NAIRU level anyway ie its equilibrium level. So if market forces driving the return to the NAIRU are strong, then the short term may not be a very long time – perhaps up to one to two years. By contrast, if these equilibrating mechanisms are weak, then it may take many more years before unemployment returns to the NAIRU. Hence, even short term net job creation may offer significant benefits for a substantial period of time.

However, in the long run, the only way a growing sector can permanently create net or additional jobs is if it can lower the NAIRU itself. There is a wide literature on the determinants of the NAIRU, see Layard et al (1991) for a summary of arguments, with economists emphasising the importance of factors such as collective bargaining, employment regulations, social security and the terms of trade.

The focus in this paper is therefore on the extent to which mismatch is a determinant of the NAIRU in European labour markets. Mismatch of jobs relative to available vacancies can

arise either because of regional mismatch, where people looking for work don't live in the places where jobs are offered, and/or occupational mismatch, where the skills and employment experience of people looking for work don't match the jobs on offer.

So the key question is the extent to which an expansion in circular economy activity in Europe is able to reduce such mismatches (either regional or occupational) and the NAIRU so that lasting improvements in the functioning of labour markets can be gained.

Recent evidence for Europe shows that skills mismatch is a significant explanatory factor contributing to a worsening in labour market performance, and moreover the explanatory power of skills mismatch has increased since the financial crisis, European Commission (2013). Another important factor appears to be a lack of redeployment opportunities for displaced low-skilled workers, as evidenced by the growing disparity between the skills of the labour force and the skills required by employers at a regional, country and Euro area level where job losses have been strongly concentrated among low skilled workers, Draghi (2014).

Evidence for the UK, cited in WRAP/GA (2015a & 2015b) indicates that labour market mismatch is estimated to account for around 3 percentage points of the unemployment rate, Smith (2012), and a study by Patterson et al (2013) finds that as much as a third of the rise in UK unemployment since the start if the financial crisis could be down to mismatch, Patterson et al (2013).

DEVELOPMENTS IN EUROPEAN LABOUR MARKETS

Since the financial crisis that began in 2008 there has been a great deal of attention to the impact on employment and unemployment across Europe. Currently, the unemployment rate in Europe is around 10% of the labour force and there are 25 million people out of work (Figure 2). At the same time the experience of unemployment is (and has been) very different across European countries. There are substantial variations in the level of economic activity, and in employment and in unemployment levels across Europe (Table 1). Following the financial crisis that began in 2008 unemployment increased in all countries across Europe, and in most countries it remains substantially higher, Germany is the only country where unemployment today is below its level in 2008.

The highest unemployment rates are in Greece (26%) Spain (24%) and followed by Croatia (17%), Cyprus (16%), and Portugal (14%). Countries with the lowest unemployment rates are Germany (5%), Austria (6%), Malta (6%), the Czech Republic (6%), and the United Kingdom (6%).

Figure 2 Dispersion of unemployment rates across Europe

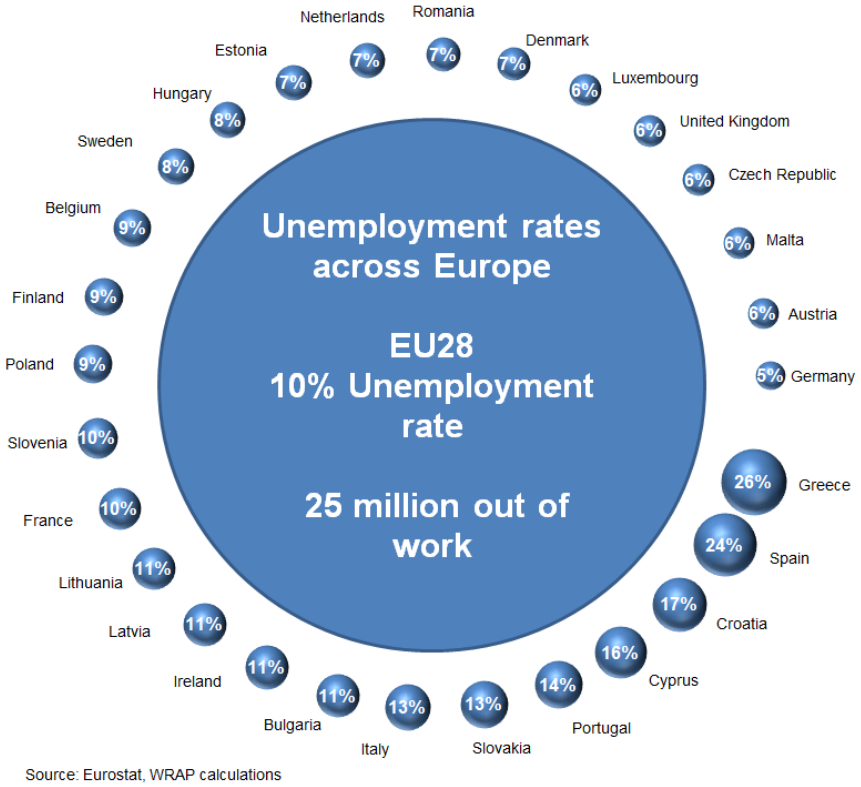


Table 1 Dispersion of labour market activity employment and unemployment by European nation, 2014

	Economically active		Employment		Unemployment		Economically inactive	
	000s	%	000s	%	000s	%	000s	%
Austria	4,357	76.8	4,113	72.5	245	6%	1,318	23.2
Belgium	4,967	68.4	4,544	62.5	423	9%	2,299	31.6
Bulgaria	3,366	70.2	2,981	62.2	385	11%	1,430	29.8
Croatia	1,893	67.0	1,566	55.4	327	17%	933	33.0
Cyprus	435	75.7	365	63.5	70	16%	140	24.3
Czech Republic	5,298	74.8	4,974	70.2	324	6%	1,783	25.2
Denmark	2,906	80.1	2,714	74.8	192	7%	720	19.9
Estonia	675	78.3	625	72.5	50	7%	187	21.7
Finland	2,680	77.2	2,447	70.5	232	9%	792	22.8
France	28,784	72.4	25,769	64.8	3,015	10%	10,954	27.6
Germany	41,969	79.6	39,879	75.6	2,090	5%	10,769	20.4
Greece	4,809	68.3	3,536	50.2	1,273	26%	2,231	31.7

Hungary	4,444	67.5	4,101	62.2	343	8%	2,144	32.5
Ireland	2,157	71.7	1,914	63.6	243	11%	850	28.3
Italy	25,515	65.2	22,279	56.9	3,236	13%	13,646	34.8
Latvia	992	76.6	885	68.3	108	11%	303	23.4
Lithuania	1,477	75.3	1,319	67.3	158	11%	484	24.7
Luxembourg	261	71.7	246	67.4	16	6%	103	28.3
Malta	192	67.5	181	63.7	11	6%	93	32.5
Netherlands	8,978	81.8	8,318	75.8	660	7%	2,003	18.2
Poland	17,428	68.9	15,862	62.7	1,567	9%	7,850	31.1
Portugal	5,226	76.9	4,500	66.2	726	14%	1,569	23.1
Romania	9,242	68.3	8,614	63.7	629	7%	4,285	31.7
Slovakia	2,722	70.6	2,363	61.3	359	13%	1,131	29.4
Slovenia	1,015	72.6	917	65.6	98	10%	382	27.4
Spain	22,955	74.6	17,344	56.4	5,611	24%	7,795	25.4
Sweden	5,183	84.4	4,772	77.7	411	8%	958	15.6
United Kingdom	32,637	79.5	30,642	74.6	1,996	6%	8,436	20.5
EU28	**242,562**	**73.9**	**217,768**	**66.4**	**24,794**	**10%**	**85,587**	**26.1**

Source: Eurostat Labour Force Survey, WRAP calculations

The probability of being unemployed is also very different across occupational and skill types. Table 2 summarises evidence developed in this analysis from across European labour markets on unemployment by previous occupation across Europe. It shows that the higher skill groups (managers & senior officials and professional occupations) are more likely to have low unemployment rates: these groups have the lowest unemployment rates at around 1.2% and 3.8% on average for the EU28. However, the analysis here also illustrates that even within specific occupational groups there's substantial variation across countries, for example the unemployment rate of managers & senior officials in Estonia is 4% and in Iceland for professional occupations the unemployment rate is around 11%.

For skilled jobs associate professional & technical and admin & secretarial grades have unemployment rates around 5% but for skilled trades and craftsmen the unemployment rate is almost double this at 9.7%. And again there is substantial variation across European economies.

The highest unemployment rates are in the semi-skilled and unskilled occupational categories where unemployment rates are 17.2% (range 4% to 30%) for sales & customer services & personal services, and around 11% (range 1.5% to 28%) for elementary occupations.

Table 2 The level and dispersion unemployment by previous occupation across Europe, 2014

		All unemployed		Range	
		000s	*Rate %*	*Min rate %*	*Max rate %*
Highly Skilled	Managers & senior officials	299	1.2	0.4	4.0
	Professional occupations	941	3.8	1.5	11.0
Skilled	Associate professional & technical	1,176	4.8	1.6	10.1
	Admin & secretarial	1,194	4.9	1.5	10.3
	Skilled trades	2,392	9.7	1.7	19.6
Semi-Skilled	Sales & customer services & personal services	4,219	17.2	3.9	29.9
	Process, plant & machine operatives	1,066	4.3	0.7	11.3
Unskilled	Elementary occupations	2,656	10.8	1.5	28.4

Source: Eurostat, WRAP calculations (figures exclude armed forces, non response and unknown)

A key trend observed in many European labour markets is a decline in the employment share in jobs that are mid-range in terms of their occupation and skills. Table 3 summarises evidence on the change in employment shares by occupation between 2000 and 2014 for European countries. Over this period the employment share for managers & senior officials increased by 4.5% points with an increase observed in 27 out of 30 countries.

Between 2000 and 2014 the employment share for associated professionals & technical jobs increased by 1.5% points although for 13 out of the 30 countries in this analysis it declined over this period. For admin & secretarial jobs and for skilled trades the employment shares declined by 2.1% points and 6.6% points with all but two countries experiencing a decline in the employment share of skilled trades. Plant & machinery operators saw a decline in their employment share in 22 countries and for elementary occupations the employment share increased by 0.5% on average with an increase in 10 out of the 30 countries.

Table 3 Summary of employment by occupation and changes in employment share by occupation in Europe, 2000 – 2014

	Highly skilled	Skilled			Semi-skilled		Unskilled
	Managers & senior officials	Associate professional & technical	Admin & secretarial	Skilled trades	Sales, customer & personal services	Plant & machine operators & assemblers	Elementary occupations
Employment share 2014 (%)	25	16	10	16	17	7	9
Change in employment share (% points)	4.5	1.5	-2.1	-6.6	4	-1.8	0.5
Number of countries with an increase in employment share	27	17	8	2	29	8	10
Number of countries with a decrease in employment share	3	13	22	28	1	22	20

Source: Eurostat Labour Force Survey, WRAP calculations (figures exclude armed forces, non response and unknown)

To sum up, the key points emerging from the discussion in this section are;

- a substantial degree of spare capacity exists in Europe's labour markets as evidenced by the levels of unemployment and inactivity,
- unemployment across Europe is distributed unevenly across (and within) countries,
- low to mid skill occupations are more likely to experience higher unemployment compared to high skilled occupations, and
- a comparison of trends across European countries is suggestive of a polarisation in the structure of employment, with an increase in the share of employment in jobs at the top end and the bottom end of the labour market, and with a decline in jobs in the middle segment of labour market.

MAPPING JOBS IN CIRCULAR ECONOMY ACTIVITIES

To get an idea of the current size of the circular economy across Europe a proxy indicator of employment is constructed using official employment data from Eurostat disaggregated to the level of detailed business activities (NACE Rev. 2). The mapping is based on WRAP/GA (2015a) and is outlined in Table 4 which also describes the circular economy activities that are in scope for this paper, note that employment in biorefinery activities are not in scope for this analysis because of a lack of data.

In terms of the mapping for this employment indicator, re-use employment is proxied by employment in the retail of second hand goods sector, employment in repair activities by employment in the repair of machinery and equipment sectors and the repair of electronic and household products sector, closed & open loop recycling activity is proxied by employment in the wholesale of waste and scrap sectors and the waste and recycling sector,

and for circular economy activity relating to servitisation jobs are proxied by employment in the rental & leasing sectors.

While this approach clearly has its limitations, for example it is not really possible to separately identify remanufacturing or servitisation with any precision, it is an approach which uses the best available information and is useful in that, given a lack of any alternatives, it is an attempt to quantify the current level of employment in circular economy activities. It also serves as an indicator to establish broad trends and track progress in employment in businesses currently operating in sectors with a high propensity towards circular economy activities, namely the repair, reuse, remanufacturing, recycling and rental & leasing sectors.

Table 4 Mapping employment in circular economy activities to official data

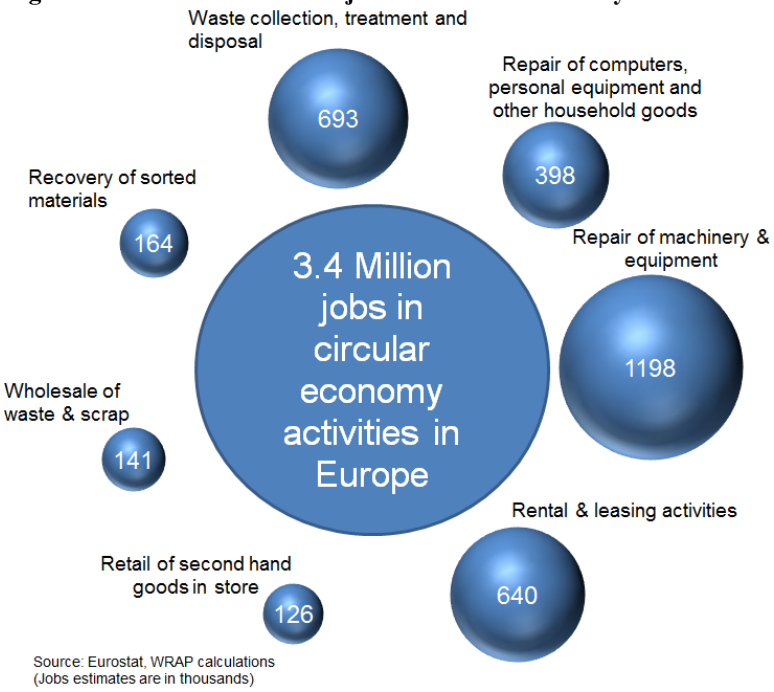
Circular economy activity	Sector proxies in official data
Closed and open loop recycling – processes that create new products from waste without changing the inherent properties of the material. For example recovering PET from bottles for use in other PET applications. Open loop recycling – also referred to as downcycling, is where recovered materials are used to create products with lower value, for example use of glass containers an aggregate	Wholesale of waste & scrap Waste & recycling
Repair/remanufacturing - where products need repair or reconditioning before going back into use remanufacturing preserves most value.	Repair of machinery & equipment Repair of electronics & household goods
Reuse - examples included are electrical & electronic goods and textiles. These products are worth more than the raw materials they are made up from. A re-used iPhone retains around 48 per cent of its original value compared to just 0.24 per cent of its original value as recyclate.	In-store retail of second hand goods
Servitisation – examples are systems and business models that make more effective use of assets including include leasing of products and provision of products as services thereby deferring consumption of new assets. Many examples are B2B (business to business) such as Xerox and Ricoh leasing photocopiers and printers, Interface's carpet business or Philips 'pay per Lux' but there are B2C (business to consumer) and C2C (customer to customer) examples such as Airbnb or Streetcar.	Renting & leasing activities

Source: WRAP/GA (2015a)

The results of applying this approach to European economies are summarised in Figure 3 which reports proxy indicators of employment levels (in aggregate) in each of the broad areas of employment in circular economy activities aggregated for the EU28 countries (Table A1 in the annex to this paper reports the figures in more detail for each of the countries and circular economy activities). In total, European employment in repair, waste and recycling and rental & leasing activities is estimated to be around 3.4 million across Europe, with 1.2 million of these jobs located in the repair of machinery & equipment sectors. Of the remainder 0.4 million jobs are in repair of computers, personal and other household goods, 0.7 million jobs are in waste collection, treatment & disposal activities, 0.3 million are employed in recovery of sorted materials and wholesale of waste and scrap, 0.1 million jobs

are located in in-store retail of second hand goods and 0.6 million people are employed in rental & leasing activities.

Figure 3 Estimates of current jobs in circular economy activities across Europe



In terms of the dispersion of employment in circular economy activities relative to overall employment Figure 4 demonstrates that jobs in circular economy activities across countries are distributed broadly in line with the distribution of overall employment by country. This finding is indicative of the potential for a growing circular economy in Europe to create opportunities for employment across all countries, in particular in countries (and sub-regions) where regional mismatch has contributed to persistently high levels of unemployment.

To get an idea of the potential that exists in each country Figure 5 shows an indicator of 'circular economy' specialism (constructed here as the share of jobs in circular economy activity by country relative to Europe wide jobs in circular economy activity as a proportion of each countries total employment share relative to total European employment). Note that this measure is likely to depend on the point in the economic cycle. On this measure a unit score means that a country is no more or less likely than the average to have an economic structure specialised towards circular economy activities. A score greater than one means the country has a greater than average propensity towards circular economy activity.

Figure 4 Distribution of jobs in circular economy activities and total jobs by country

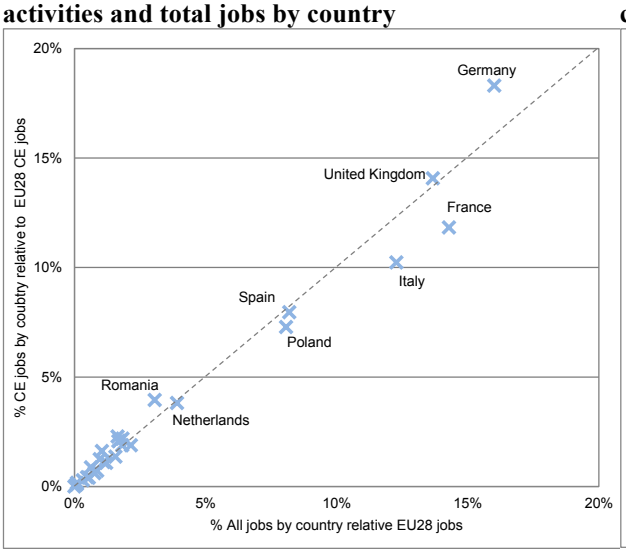
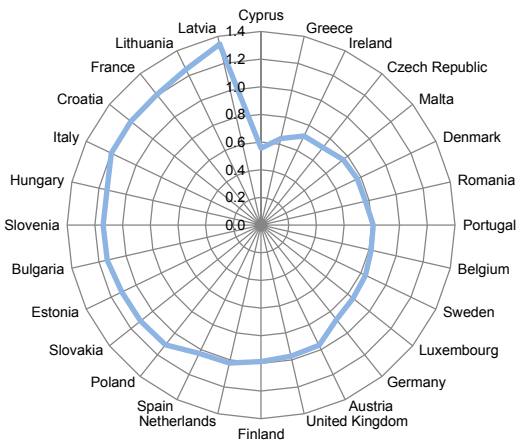


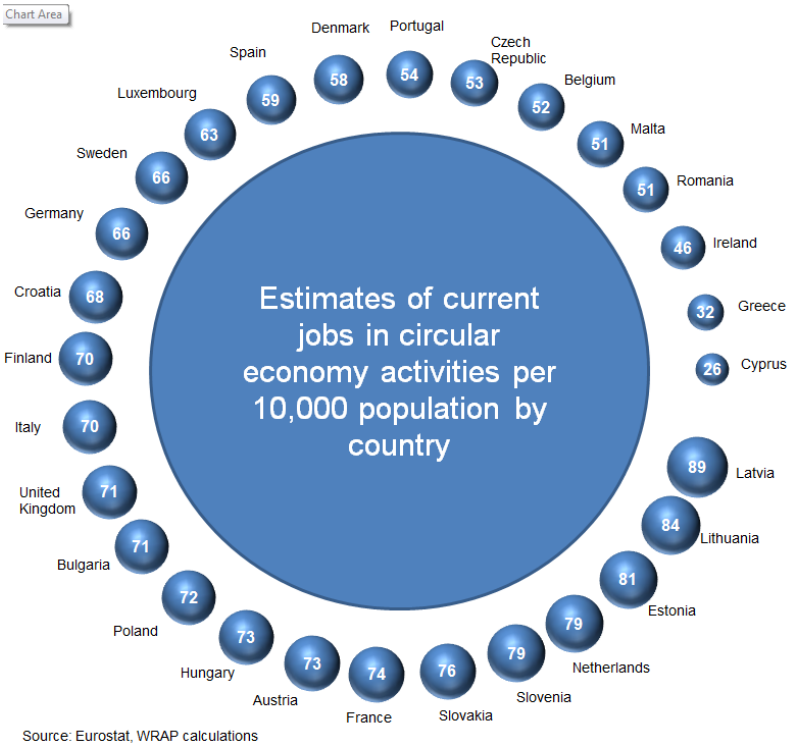
Figure 5 Indicator of potential specialism in circular economy activities by country



Source: Eurostat, WRAP calculations

It is also useful to look at the proportion of employment in circular economy activities by country relative to a measure of the size of the economy, such as the size of the population. Figure 6 reports estimates of the proportion of employment in circular economy activities per 10,000 population by country. On this measure many of the smaller Eastern countries have relatively high proportions (but comparatively low absolute levels of employment) of their populations employed in circular economy activities as measured by the mapping exercise described above.

Figure 6 Estimates of jobs per 10,000 population in circular economy activities by country

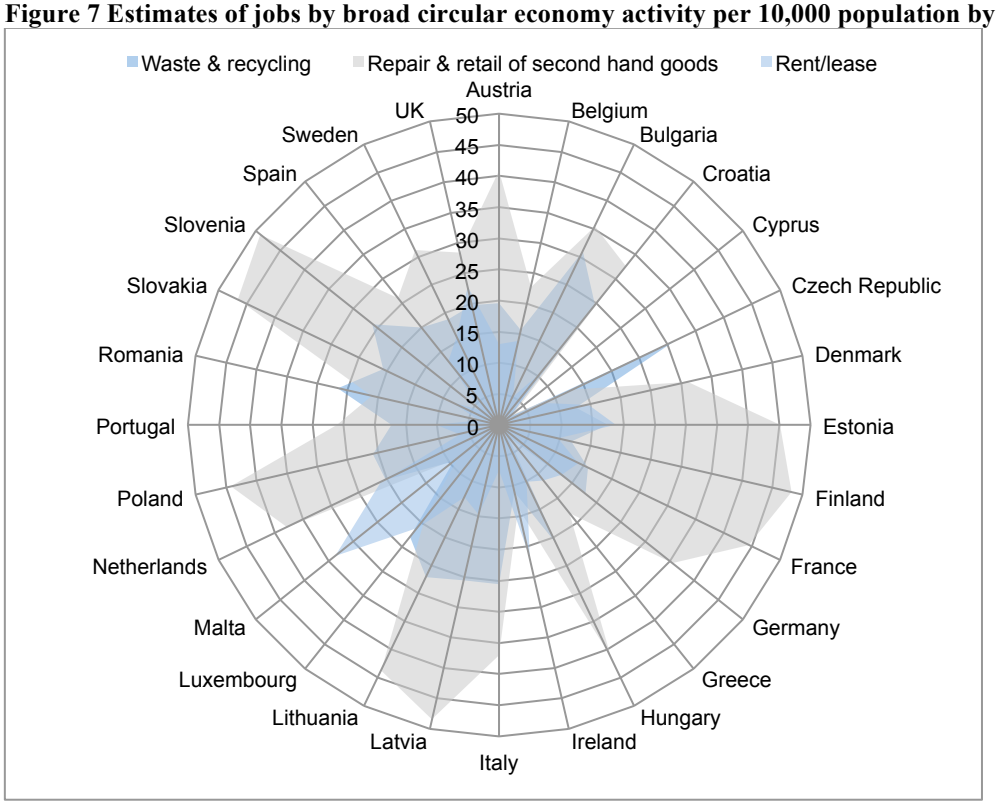


Breaking these estimates down further by broad circular economy activity (Figure 7) shows the relative importance by country of employment in the waste & recycling, repair and rental & leasing sectors.

For waste collection, treatment and disposal activities Bulgaria, Croatia, Czech Republic, Italy & Romania have the highest proportions of employment. Austria, Estonia, Finland, Slovakia, Sweden, Czech Republic, France, Hungary, Lithuania and Spain have the highest proportions of employment in repair activities (repair of machinery & equipment and repair of computers, personal and other household goods). In store retail of second hand goods is proportionately the highest in Estonia, Hungary, Latvia, Lithuania and the United Kingdom.

For recovery of sorted materials France, Lithuania, Luxembourg, Romania & Slovenia have comparatively higher proportions of their populations employed while for wholesale of waste and scrap the top 5 countries are Bulgaria, Latvia, Lithuania, Poland and Spain. Countries for which rental and leasing activities have the highest proportion per 10,000 population are Ireland, Luxembourg, Malta, the Netherlands and the United Kingdom.

Figure 7 Estimates of jobs by broad circular economy activity per 10,000 population by country



Source: Eurostat, WRAP calculations

In summary, the key points arising from the mapping of current employment patterns in circular economy activities are as follows;

- employment in these circular economy activities is distributed across Europe and broadly in line with the distribution of total employment
- the circular economy activities in scope for this analysis would appear to offer the potential to create jobs across Europe by reducing regional mismatches in unemployment
- there are currently an estimated 3.4 million people employed in the repair, waste & recycling and rental & leasing sectors across Europe
- measures of the propensity to specialise in 'circular economy' activities and patterns in the geographical distribution of broad circular economy activities illustrates a reasonable potential for all countries in Europe to benefit from an expansion in circular economy

SCENARIO ANALYSIS

WRAP/GA (2015a) discusses the potential for an expansion in circular economy to offer jobs that are distributed across regions and occupations. Key conclusions drawn from the analysis are that;

- a growing circular economy can offer geographically dispersed employment a range of occupations.
- Reuse and open loop recycling activities are likely to be the least geographically concentrated, requiring activity at a local and regional level across countries with remanufacturing activity likely to be relatively more concentrated and located near existing OEM manufacturing facilities.
- For both open/closed loop recycling and reuse activities there's a strong potential to offer some lower skilled jobs with remanufacturing and recycling activities requiring a greater proportion of mid-level skilled jobs.

The three indicative scenarios for Great Britain in WRAP/GA (2015a) are adapted in this analysis for European economies. In this analysis, for the quantification of these scenarios the EU28 countries are first divided into three groups based on IEEP et al (2011) in order to recognise the heterogeneity across countries in terms of their economic structures, waste management systems and differences in the rate of current progress in resource efficiency and recycling across countries (Table 5).

Table 5 Country grouping for the purpose of quantifying the scenario analysis

Group	Member states	Economic characteristics	Waste characteristics
Yellow	Bulgaria, Croatia*, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia	Predominantly very fast evolving, currently with low GDP per capita (up until the recent economic crisis)	Characterised by a negative decoupling of waste, with predominantly a poorly established waste treatment and recycling capacity
Turquoise	Cyprus, Czech Republic, Greece, Malta, Portugal, Slovenia	Moderate GDP per capita and fast to very fast growing economies (up until the recent economic crisis)	Characterised by an emerging waste treatment and recycling capacity which is still not fully developed
Lavender	Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, UK	High GDP per capita, predominantly moderate growth (up until the recent financial crisis)	Evolving towards decoupling for municipal waste, and usually with a developed waste treatment and some recycling heritage

Source: IEEP et al (2011), *for this analysis Croatia is allocated to the 'Yellow' category

The scenario baseline estimates of employment in the circular economy are taken from the mapping discussed above. In terms of gross job creation the analysis allows for some possible job offsets in other sectors of the economy in the modelling of the scenarios, however it is important to note that the impacts here are assumed to be direct labour market impacts and so do not include indirect or induced impacts.

To demonstrate the potential for an expansion in circular economy to offer net job creation through reducing regional mismatch in unemployment the analysis assumes that the

probability of job displacement (where new vacancies are filled by people moving from existing posts) is proportional to the degree of spare capacity in the labour market. So for example in areas where there is relatively limited spare capacity the probability of job displacement is likely to approach one quite rapidly. The key assumptions on parameters in the scenarios developed here are summarised in Table 6.

Table 6 Key parameters in the three circular economy scenarios to 2030

Scenario parameters	Scenario 1	Scenario 2	Scenario 3
% change from baseline	No new initiatives	Current development	Transformation
Recycling rate* (all waste streams) - EU	9	21	34
Yellow	10	20	32
Turquoise	12	33	47
Lavender	9	26	37
Remanufacturing rate - EU	No progress	Moderate	Substantial
Yellow	0%	0%	50%
Turquoise	0%	15%	50%
Lavender	0%	20%	50%
Repair/reuse - EU	Modest	Moderate	Moderate
Yellow	5%	10%	10%
Turquoise	2%	10%	10%
Lavender	10%	15%	15%
Servitisation - EU	Limited	Moderate	Substantial
Yellow	5%	10%	100%
Turquoise	5%	20%	100%
Lavender	5%	30%	100%

*percentage point difference from baseline

The first scenario assumes that there are no new initiatives undertaken but that there is some further advancement in circular economy activities, which are mostly located in the recycling sector (on average, the recycling rate increases by 9 percentage points) and the repair & reuse sectors with limited development in adoption of servitisation approaches. It suggests an increase by 2030 in employment of around 250,000 jobs (gross) in circular economy activities in Europe and a reduction in unemployment of around 64,000 (Table 7).

The second scenario considered envisages a continuation of current trends in the development of the circular economy, in which further advances are made in recycling (on average, the recycling rate increases by 21 percentage points) and there is moderate progress in remanufacturing, repair & reuse and servitisation. The estimates in this scenario indicate that by 2030 there is a potential to create over 1.2 million jobs (gross) and reduce unemployment by about 250,000 (Table 7).

In the third scenario it is assumed that there is a much more extensive development of circular economy activity with recycling increasing to high levels (on average , the recycling rate increases by 34 percentage points) with still moderate progress in repair and reuse but with substantial advancement in remanufacturing and servitisation activity. The indicative results in this scenario suggest that there could by 2030 potentially be around 3 million jobs (gross) created by 2030 and a reduction in unemployment across Europe by around 520,000 (Table 7).

Figure 8 shows the geographical distribution of gross jobs in the second scenario, and Table A2 provides further details on a country by country basis for all three of the scenarios modelled in this analysis. Inevitably there are considerable uncertainties around such estimates; in particular future advancements in technology could substantially change this picture. As a cross check on the plausibility of the magnitude of job creation potential in the three scenarios for Europe quantified in this analysis it is useful to compare with estimates from other studies.

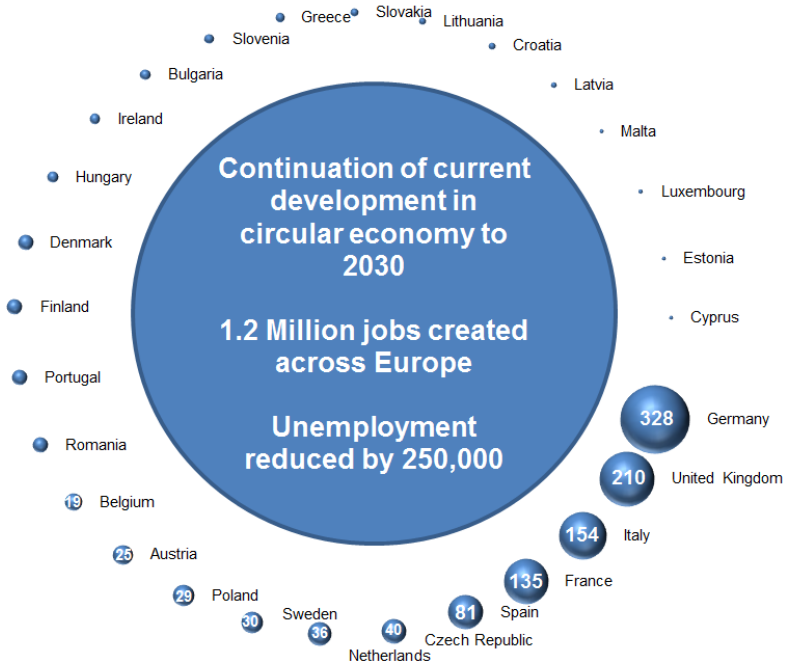
EMF (2015) summarises selected literature on the macroeconomic impacts of the circular economy, including the impact on jobs (gross). For the Netherlands one study reports job creation of 54,000 jobs, in another for Sweden 100,000 jobs are estimated to come from an expansion of circular economy, and for the EU-28 as a whole another study reports that 2 million jobs could follow from resource productivity improvements across Europe. The results from these studies compare well with the estimates in this analysis which finds 30,000 to 70,000 jobs from an expansion in circular economy jobs in Sweden, with 36,000 to 74,000 jobs in the Netherlands and 1.2 to 3 million jobs across the EU28 countries by 2030.

Table 7 Potential labour market impacts from expanding circular economy activity to 2030 across Europe

	Scenario 1	Scenario 2	Scenario 3
	No new initiatives	Current development	Transformation
Gross jobs growth*	250,000	1,200,000	3,000,000
Net job creation*	64,000	250,000	520,000
Fall in unemployment rate (% points)	0.02	0.09	0.31

*Figures are rounded to the nearest thousand

Figure 8 Potential jobs created from an expansion in circular economy activity to 2030 across Europe



Source: WRAP calculations
(gross jobs estimates by country are in thousands)

INDICATORS TO SUPPORT GROWTH THROUGH A MORE CIRCULAR ECONOMY

As emphasised in the preceding discussion, a more circular economy can require the use of more labour and fewer resources. Use of labour productivity indicators in isolation from other indicators would therefore potentially not reflect the overall economic benefits of a transition to a more circular economy. Other measures are therefore required to reveal and recognise these benefits. The following section of the paper discusses issues relating to possible indicators of resource and/or materials productivity.

Jackson (2009) highlights the significant dilemmas of economic growth and the historic emphasis on labour productivity as a means of increasing the output of economies for a given input of labour. Businesses and countries around the world measure their health by measuring the amount of Gross Value Added (GVA) per unit of labour. However, the more efficiently labour is used, "the fewer people are needed to produce the same goods from one year to the next. As long as the economy expands fast enough to offset labour productivity there isn't a problem. But if the economy doesn't grow, there is a downward pressure on employment. People lose their jobs. With less money in the economy, output falls, public spending is curtailed and the ability to service public debt is diminished."

There is also a lost opportunity through focussing on labour productivity. Hepburn (2012) identifies that while step changes in efficiency can be achieved through technology, productivity gains can be quicker with low mechanisation levels because people are able to learn, adapt and improve in way in which mechanised processes cannot. As identified in this paper, a more circular economy has the potential to create economic growth through using more labour and fewer materials.

Baptist and Hepburn (2013) identify that many models of economic growth exclude materials, energy and other intermediate inputs. While energy productivity is measured by many businesses and countries (e.g. US Department of Energy 2013), its role in growth has only recently been considered (Blok et al 2015). Similarly, material productivity has been the

subject of less focus. Though there is a long history of recording material consumption in national environmental accounts, this tends to be on a domestic consumption basis, and the actual productivity of material use is masked by the composition of the economy. For example, Eurostat (2015) highlights the high material productivity of a range of countries with relatively large financial sectors, and low dependency on manufacturing and extractive industries, while a range of countries where manufacturing and extraction are relatively more important are identified as having low material productivity. Using a consumption based indicator at a national level can in part address this but still does not aid in identifying the material productivity of systems of individual organisations.

Although labour and energy tend to be the primary focus of efforts to increase efficiency because of their high cost, the greatest opportunities for business efficiency gains for improvement are all in the way we use materials (DEFRA 2011). This may be reflected either by measuring material use per unit of GVA or in Total Factor Productivity (TFP). TFP "is the portion of output not explained by the amount of inputs used in production [i.e. capital and labour]. As such, its level is determined by how efficiently and intensely all inputs are utilized in production" Comin (2006). Baptist and Hepburn (2013) identify that businesses in the USA and South Korea with lower intermediate input intensity have higher Total Factor Productivity (TFP). "In other words, firms and industries that employ modes of production that use more labour and fewer intermediate inputs appear to have overall higher TFP." This suggests that improvements in material productivity have the potential to deliver microeconomic and macroeconomic benefits.

In order to overcome the shortcomings in measurement and take advantage of opportunities for gains in material productivity, it is necessary to consider material productivity at a system, sector or organization level. At its simplest level, measuring material productivity for commercial and industrial sectors can reveal overall trends (e.g. are businesses becoming more productive in their use of materials?). Below this, its use within similar manufacturing activities allows for the potential to benchmark performance and for businesses to identify where their performance is below the sector average. This could be used at a national or regional level, and could incentivize lean production. This is in line with the stated aims of the European Parliament (2015) to achieve a 30% improvement in resource efficiency at an EU level, and to do it in such a way that manufacturing is encouraged through lean production and waste reduction.

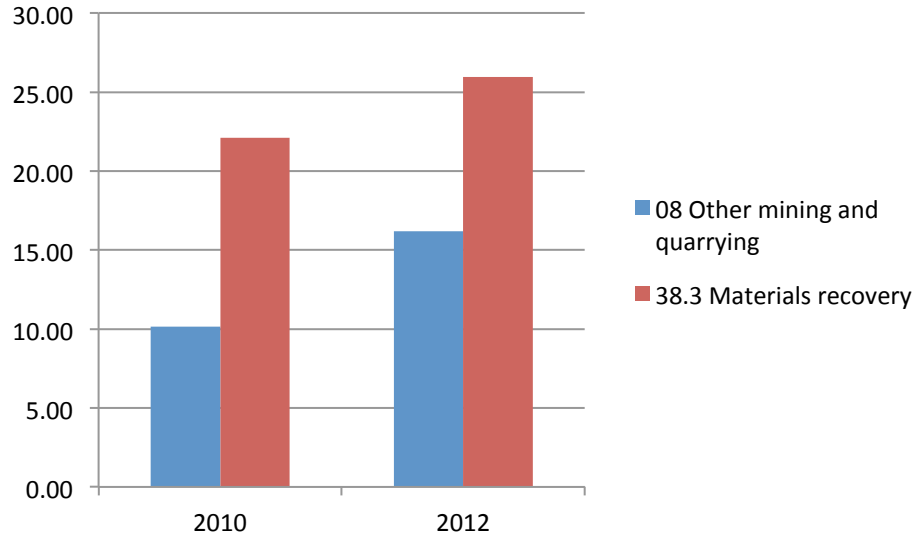
Measures of productivity relate an input to the amount of GVA added by economic activity at a specified scale of activity (e.g. sector, region or nation). However, GVA measures may be calculated and reported in national accounts in a number of ways, including in Current Prices (CP), as Chained Volume Measures (CVM) and 'approximate' GVA (aGVA)[2]. In the following discussion it is argued that all three concepts are of use but only because the measures are not all made available to the same degree of granularity. Ideally, any consideration of indicators of material productivity using GVA concepts should be constructed using a consistent accounting convention.

Material productivity may also encourage the adoption of other parts of a more circular economy. For example, considering the current price GVA per unit of material for "other mining and quarrying" (SIC Code 08 and the waste sector SIC Code 38) for the UK suggests that more value is added processing secondary materials than extracting comparable primary raw materials (DEFRA 2015). Analysis of the sub-sectors of the waste sector using

[2] Approximate GVA at basic prices is a measure of the income generated by businesses less their expenditure as estimated in the Annual Business Survey. Alternate measures of GVA such as current price or chained volume measures may be more appropriate for comparing over time or between sectors. However, the aGVA measure is the only measure available for 3 digit SIC codes.

information on approximate GVA (aGVA) identifies that the majority of the value per unit of material is added by the materials recovery sector (SIC 38.3), see Figure 9. In 2012 materials recovery added more value in its own right than 'other mining and quarrying'. Extending this concept, a materials productivity indicator could be used to distinguish between primary and recycled content to identify the productivity of use of materials from each source.

Figure 9 aGVA per tonne of material output from other mining and quarrying and material handled by the materials recovery sector in the UK



Source: ONS Annual Business Survey, WRAP calculations

Perhaps the most far-reaching opportunity from use of material productivity is at a system level. This could, for example, consider the GVA of all relevant sectors relating to the life cycle of specific products or product groups. For example, for clothing this system would include, but may not be limited to, textile mills, clothing manufacture, specialised retail of clothing, repair services, reuse and second hand retail of clothing and recycling. The GVA associated with the product group over its whole life cycle could then be estimated and monitored over time.

The calculation of materials productivity indicators should also allow meaningful comparisons to be made. Whilst at the level of "manufacturing" it may be appropriate to only consider virgin material use per unit of GDP, at a sub-sector level it may be appropriate to treat all material equally to allow for comparisons to be made (e.g. of repair versus manufacture from new). By considering the material productivity of consumption patterns, an indicator of material productivity can encourage the adoption of business models which seek to extend the life of products, such as increased product durability, leasing, repair, remanufacturing and reuse.

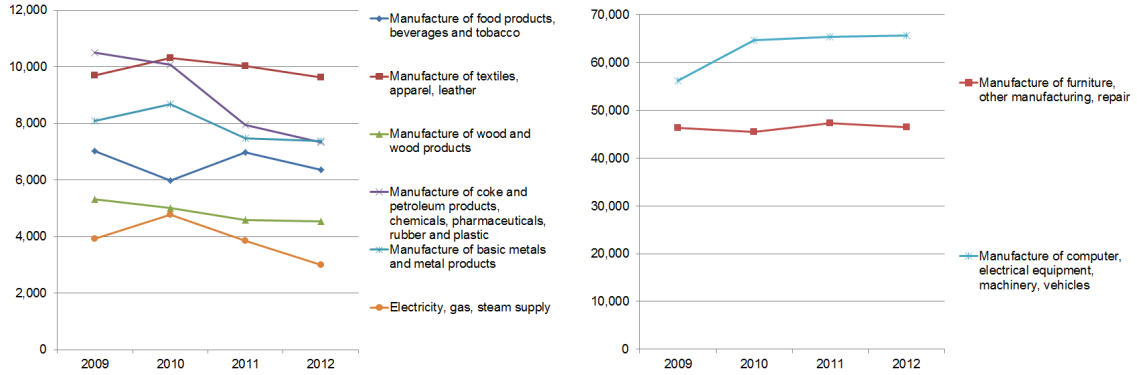
MEASURING MATERIAL PRODUCTIVITY

Data on material inputs and outputs is not routinely collected and disseminated at a business level, and so the approach described above cannot currently be implemented. However, a number of different approaches are available to develop indicators of material productivity.

First, as a proxy, the amount of waste per unit of GVA for a sector can be identified using national data sources on economics and waste. DEFRA (2015) identifies the GVA of key commercial and industrial sectors per tonne of waste arisings, see Figure 10. This shows the relative value added per unit of waste generated over time within a sector, and also

across sectors. For these manufacturing sectors as a whole the amount of GVA added per unit of waste produced has increased over this period. However, this is driven by gains in the manufacture of computer, electrical equipment, machinery and vehicles. All other sectors in the comparison have either similar levels of GVA per tonne of waste, or a decline in GVA per tonne of waste in 2012 compared to 2009. This highlights the need to use productivity indicators at a sub-national level to identify issues and potential opportunities to focus on for improvements.

Figure 10 GVA of key commercial and industrial sectors per tonne of waste arisings for the same sectors, UK, 2009 – 2012, Chained Volume Measure of GVA



Source: adapted from DEFRA (2015)

The approach could be applied across EU Member States using existing data to identify trends, the relative performance across member states and identify sector-specific actions.

Second, data on material use and waste arising could be collated to generate a bottom up Material Flow Analysis. This could use data collected under Directive 2010/75/EU on industrial emissions, with benchmarks published in existing guidance on Best Available Techniques. While information on the quantity and nature of raw materials consumed and waste generated are collated for the purposes of applying for a permit, it is not commonly put in the public domain, and so it is not possible to track sector performance at a national level against best-in-class benchmarks. In addition, this information is only available to regulated plant, and so while it would reflect the performance of large production activities, it could not be used to track the performance of other sectors of the economy, or changes other than lean production and waste reduction. Because of the challenges and gaps in data availability, the opportunity for application of this approach therefore appears limited.

Finally, Economic Input-Output Tables could be used to infer material flows between sectors, or Physical Input-Output Tables developed to track the quantities of materials, and the productivity of their use. This would require more sophisticated modelling and could be applied at a national or sector level, though may not be feasible at a regional level due to data limitations. Data collected in this manner also inherently assumes a relationship between flows of material and financial transactions. Further exploration of possibilities would therefore be required.

CONCLUSIONS

This paper argues that increasing resource efficiency through growth in circular economy can help address structural mismatch in European labour markets. By offering a good geographical spread of job opportunities higher unemployment regions can benefit from employment at or near to existing manufacturing industry. Growth in recycling, re-use, repair and remanufacturing also offers the potential to create jobs suitable for employees displaced

from traditional manufacturing. Expanding circular economy activity offers the potential to reduce regional and/or occupational mismatch with a reasonable chance that net jobs can be created and unemployment reductions sustained.

As circular economy activity expands its labour needs are likely to be recruited from the existing stock of unemployed for occupations where unemployment is higher. In other words if you want to hire a low skilled worker, there is a greater chance that you could find someone who is currently unemployed than would be the case for hiring an experienced professional. So there's a reasonable chance that a growing circular economy in Europe will offer opportunities for a range of occupations across regions and countries.

The exploitation of the growth potential of a more circular economy requires use of indicators which will recognise its contribution. Focussing solely on labour productivity indicators and excluding other indicators of materials or resource productivity may not fully reflect the economic potential of moving towards a more circular economy. An indicator of material productivity would recognise the potential of a range of more circular business models which have the potential to make both significant contributions to economic growth, employment and social wellbeing. A range of options exist at present. Whilst proxies such as Total Factor Productivity and waste per unit GVA may be available for use now, over time more sophisticated indicators would enable further insights and focus on the positive economic impacts of a more circular economy.

REFERENCES

Baptist, S., and Hepburn, C., (2013) Intermediate inputs and economic productivity Phil. Trans. R. Soc. A 2013 371, 20110565, published online 28 January 2013

Blok, K., Hofheinz, P., and Kerkhoven, J. (2015) The 2015 Energy Productivity and Economic Productivity Index, The Lisbon Council for Economic Competitiveness and Social Renewal, Brussels www.lisboncouncil.net/index.php?option=com_downloads&id=1118

Comin, D., (2006) Total Factor Productivity In C.R. Braun & J. Segura (Eds.), An Eponymous Dictionary of Economics. Elgar Publishers, Ltd

Draghi (2014) Unemployment in the euro area, Speech by the President of the European Central Bank, Annual central bank symposium in Jackson Hole, 22 August 2014

DEFRA (2011) The Further Benefits of Resource Efficiency http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=2&ProjectID=16943

DEFRA (2015) Digest of Waste and Resource Statistics DEFRA UK https://www.gov.uk/government/statistics/digest-of-waste-and-resource-statistics-2015-edition

EMF (2015) "Growth Within: A Circular Economy Vision for a Competitive Europe", EMF, SUN, McKinsey Center for Business and Environment

European Commission (2010) Directive 2010/75/EU on industrial emissions http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075

European Commission (2013) Labour Market Developments in Europe 2013, European Economy 6, 2013, European Commission

European Parliament (2015) Draft report on resource efficiency: moving towards a circular economy European Parliament Committee on the Environment, Public Health and Food Safety, Brussels http://www.europarl.europa.eu/meetdocs/2014_2019/documents/envi/pr/1055/1055309/1055309en.pdf

Eurostat (2014) Material flow accounts - flows in raw material equivalents http://ec.europa.eu/eurostat/statistics-explained/index.php/Material_flow_accounts_-_flows_in_raw_material_equivalents

Eurostat (2015) Resource Productivity Statistics http://ec.europa.eu/eurostat/statistics-explained/index.php/Resource_productivity_statistics

Fischer et al (2011) Green economy and recycling in Europe, ETC/SCP working paper 5/2011, Christian Fischer, Ioannis Bakas, Anders Bjørn, Naoko Tojo and Christian Löwe

Hepburn, C., (2012) Material Efficiency in Economic and Climate Policy Conference on Material efficiency: providing material services with less material production The Royal Society 30th January 2012 – 31st January 2012 https://royalsociety.org/events/2012/material-efficiency/

IEEP et al (2010) "Supporting the Thematic Strategy on Waste Prevention and Recycling", IEEP, ECOLOGIC, ARCAADIS UMWELTBUNDESAMT, BIO INTELLIGENCE SERVICES & VITO

Jackson, T (2009) Prosperity Without Growth? The transition to a sustainable economy, Sustainable Development Commission, UK

Layard, R., Nickell, S. & Jackman, R. (1991) Unemployment: Macroeconomic Performance and the Labour Market, Oxford University Press.

Patterson et al (2013) Mismatch Unemployment in the U.K, mimeo Federal Reserve Bank of New York website, Patterson, C., Sahin, A., Topa, G. & Violante G.L.

Smith (2012) "Unemployment and mismatch in the UK" Bank of England/Institute of Macroeconomics Conference on Unemployment, productivity and potential output: the aftermath of the crisis, October 2012

U.S. Department of Energy, the Council on Competitiveness, and the Alliance to Save Energy (2013) Accelerate Energy Productivity 2030 http://energy.gov/epsa/accelerate-energy-productivity-2030

WRAP/GA (2015a) Employment and the circular economy – job creation in a more resource efficient Britain, Julian Morgan (Green Alliance) and Peter Mitchell (WRAP)

WRAP/GA (2015b) Opportunities to tackle Britain's labour market challenges through growth in the circular economy, Julian Morgan (Green Alliance) and Peter Mitchell (WRAP)

ANNEX

Table A1 Distribution of employment by circular economy activity and by nation across Europe, 2012

	Repair of machinery & equipment	Repair of computers, personal and other household goods	Waste collection, treatment and disposal	Recovery of sorted materials	Wholesale of waste and scrap	Retail of second hand goods in store	Rental and Leasing Activities	Employment in circular economy activities
	Jobs per 10,000 population							000s
Austria	33	5	14	3	3	2	13	**62**
Belgium	15	5	10	3	2	3	14	**57**
Bulgaria	24	8	18	3	10	3	5	**53**
Croatia	23	9	19	4	1	0	11	**29**
Cyprus	2	1	9	1	0.3	1	12	**3**
Czech Republic	-	13	31	-	-	-	8	**55**
Denmark	23	8	7	3	3	1	15	**32**
Estonia	34	6	10	4	3	5	19	**11**
Finland	37	8	7	2	2	3	10	**37**
France	31	11	11	5	1	3	14	**483**
Germany	29	4	13	2	3	2	13	**541**
Greece	9	9	0.4	0.3	2	1	11	**35**
Hungary	24	11	16	2	3	6	10	**73**
Ireland	9	5	11	-	-	-	22	**21**
Italy	28	8	19	4	2	1	7	**415**
Latvia	29	9	16	3	7	11	15	**18**
Lithuania	25	10	17	5	6	8	13	**26**
Luxembourg	13	6	14	6	3	1	21	**3**
Malta	-	8	9	-	-	-	34	**2**
Netherlands	26	8	12	4	4	4	21	**132**

Poland	31	9	13	2	6	4	7	**273**
Portugal	16	8	11	3	3	1	10	**57**
Romania	14	5	18	6	2	2	3	**103**
Slovakia	34	8	13	4	4	4	8	**41**
Slovenia	40	9	16	9	0.5	0.3	4	**16**
Spain	15	11	14	1	5	1	13	**277**
Sweden	24	6	12	5	2	1	16	**62**
United Kingdom	17	7	14	4	2	4	23	**462**
EU28 total jobs in circular economy activities (000s)	**1,198**	**398**	**693**	**164**	**141**	**126**	**640**	**3,379**

Source: WRAP calculations

Table A2 Distribution of jobs (gross) from expanding circular economy activity to 2030 across Europe

	Scenario 1		Scenario 2		Scenario 3	
	No new initiatives		Current development		Transformation	
	Total	% labour force	Total	% labour force	Total	% labour force
Austria	5,000	0.11%	25,000	0.58%	55,000	1.27%
Belgium	5,000	0.09%	19,000	0.39%	41,000	0.83%
Bulgaria	3,000	0.10%	7,000	0.20%	29,000	0.85%
Croatia	2,000	0.09%	3,000	0.18%	13,000	0.71%
Cyprus	<1,000	0.05%	1,000	0.13%	2,000	0.35%
Czech Republic	7,000	0.14%	40,000	0.76%	116,000	2.19%
Denmark	2,000	0.08%	15,000	0.52%	34,000	1.18%
Estonia	1,000	0.08%	1,000	0.15%	7,000	1.01%
Finland	3,000	0.10%	15,000	0.54%	32,000	1.19%
France	35,000	0.12%	135,000	0.47%	276,000	0.96%

Germany	42,000	0.10%	328,000	0.78%	759,000	1.81%
Greece	1,000	0.02%	5,000	0.10%	16,000	0.34%
Hungary	4,000	0.09%	8,000	0.18%	67,000	1.50%
Ireland	1,000	0.07%	7,000	0.30%	15,000	0.71%
Italy	37,000	0.14%	154,000	0.60%	309,000	1.21%
Latvia	1,000	0.10%	2,000	0.20%	7,000	0.66%
Lithuania	1,000	0.10%	3,000	0.19%	10,000	0.66%
Luxembourg	<1,000	0.10%	1,000	0.41%	2,000	0.86%
Malta	<1,000	0.05%	<1000	0.15%	1,000	0.62%
Netherlands	10,000	0.11%	36,000	0.40%	74,000	0.82%
Poland	15,000	0.08%	29,000	0.17%	154,000	0.88%
Portugal	4,000	0.08%	15,000	0.28%	36,000	0.69%
Romania	7,000	0.08%	15,000	0.16%	84,000	0.91%
Slovakia	2,000	0.08%	4,000	0.16%	41,000	1.51%
Slovenia	1,000	0.12%	6,000	0.61%	16,000	1.57%
Spain	23,000	0.10%	81,000	0.35%	160,000	0.70%
Sweden	5,000	0.09%	30,000	0.58%	68,000	1.31%
United Kingdom	31,000	0.10%	205,000	0.64%	517,000	1.62%

Source: WRAP calculations