Effects of the Circular Economy on Jobs

IISD & SITRA LITERATURE REVIEW

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Objective

This report summarizes current literature addressing the relationships between a circular economy and its net impacts on jobs.

Introduction

With the growth in GDP and real wages across the world, inequality, greenhouse gas (GHG) emissions and material extractions have increased at an even higher rate. The resource- and carbon-intensive model of "development" and the linear economic model of "take, make, waste" fails both people and the planet (Circle Economy, 2018).

The economic growth in many countries in Africa, Asia and the Pacific, and the Americas remains tied to GHG emissions, material extraction, water and land use (International Labour Organization [ILO], 2018). Pioneers have been forging a different path in understanding the economy. According to the ILO, 23 countries,[1] mainly in Europe, have decoupled economic growth from GHG emissions by increasing the use of renewable energy, carbon pricing, green product subsidies and policies to promote green jobs (ILO, 2018b). European organizations, corporations and governments have written reports and done preliminary pilots to advance an understanding of job impacts in the circular economy in which prosperity and growth are decoupled from material use and GHG

[1] Decoupling here refers to "absolute," as opposed to "relative" decoupling: a drop in GHG emissions per capita accompanied by a growth in GDP per capita. These countries are Azerbaijan, Bulgaria, Cyprus, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Malta, Republic of Moldova, Poland, Romania, Serbia, Spain, Suriname, Sweden, Switzerland, Ukraine, the United Kingdom, the United States and Uzbekistan.

emissions. Though early reports and legislation on the circular economy date back over a decade, there is still little cohesion on concrete definitions of what a circular economy looks like in practice, including what kinds of jobs fit the description and which ones are affected by a transition toward a circular economy. This means that analysis of job impacts and trade-related effects still differ widely across current publications and approaches.

This literature review seeks to enunciate the different understandings of the term "circular economy" and the baselines that have been used for projections on job impacts and growth. It introduces some of the targets for European countries that are championing the transformation from a linear to a circular economy. The report also outlines the current literature's understanding of job sectors that might change in the future.

Definitions of the Circular Economy

The circular economy contrasts with the prevalent linear economic system in which we make, use and then dispose of products, components and materials. Elements of circular economy classifications include a focus on improving material efficiency (i.e., reducing waste through material reuse and recycling), broader resource efficiency and industrial ecology approaches, durable consumer goods, renewable energy, increased energy efficiency and elements of the shared economy. The most prevalent definitions for the circular economy are classifications by the Finnish Innovation Fund Sitra and the Ellen MacArthur Foundation.

The Finnish Innovation Fund Sitra has been positioning Finland as one of the global leaders in the transition toward a circular economy and explains that, in a circular economy, "production and consumption create the smallest possible amount of loss and waste" (Sitra, 2016). For entities oriented towards sustainable development, it is important to decrease consumption by using materials more efficiently (Sitra, 2016). In a closed-loop system, materials are not disposed and continue to be of value, without incurring costs for their management.

The Ellen MacArthur Foundation, created in 2010 with the mission to accelerate the transition to a circular economy, describes a circular economy as one that "aims to redefine growth, focusing on positive society-wide benefits. It entails gradually decoupling economic activity from the consumption of finite resources, and designing waste out of the system." The Ellen MacArthur Foundation explains that it is based on three principles: "design out waste and pollution, keep products and materials in use, regenerate natural systems" (Ellen MacArthur Foundation & McKinsey, 2015). Circular economy strategies can be instrumental in the mitigation of climate impacts caused by the linear economy.

The Club of Rome suggests that the concept of "the circular economy is restorative by intention and by design and that it is part of the emergence of a performance economy… where the main interest of customers will be high-quality services rather than owning products" (Wijkman & Skånberg, 2016, p. 36).

A recent study by Circle Economy (2020) further defines the circular economy according to a DISRUPT framework. According to this framework, circular jobs with increased material efficiency are designed for the future: they incorporate digital technology to optimize and track resource use, rethink business models, use waste as a resource, and enable teams to create joint value through collaborations with the public sector and new forms of circular procurement.

There are similarities between the circular economy and the green economy. While both promote sectors including renewable energy and green buildings, the difference lies in the philosophy behind the concepts. The green economy aims to lessen environmental impacts and generally to improve equality within the linear economy by introducing new institutional reforms and economic tools. The circular economy, however, calls for an evolution from the linear economic model and more of a shift in paradigm. The circular economy contrasts with most climate and pollution avoidance/abatement policies in the green economy, which focus on industrial–manufacturing–production processes.

An important additional consideration of circular economy jobs is reference to the ILO definition of green jobs (of which circular economy jobs is a sub-category), which places equal importance on environmental sustainability and social well-being. This fits under the ILO *Guidelines for a Just Transition Towards Environmentally Sustainable Economics and Societies for All*, which explains that transitioning to environmentally and socially sustainable economies can become a strong driver of job creation, job upgrading, social justice and poverty eradication (ILO, 2015).

Concept of Green and Decent Jobs

UN Environment, the ILO, the Organisation for Economic Co-operation and Development (OECD) and Eurostat all describe green jobs as activities that produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems.

The ILO describes that green jobs must fit within the Decent Work Agenda, which is

> a globally recognized framework for poverty reduction and inclusive development. …A decent job involves opportunities for work that is productive and delivers a fair income; provides security in the workplace and social protection for workers and their families; offers better prospects for personal development and encourages social integration; gives people the freedom to express their concerns, to organize and to participate in decisions that affect their lives; and guarantees equal opportunities and equal treatment for all. (ILO, 2018a, p. 1).

Jobs in a circular economy will be beneficial to the environment and should also be decent for workers. For example, many jobs in Europe linked to waste management and recycling are often low-wage and raise worker safety issues due to exposure to harmful substances (European Public Service Union, 2017). Similarly, in certain circular economy sectors, such as the construction sector, both developed and developing countries are seeing an increasing trend of hiring contract workers, without the necessary levels of unionization or regulation that go along with decent work principles (Circle Economy, 2020). While these jobs might fit into the broader framework for a circular economy, they are not sustainable for workers. Including a gender dimension within circular economy policies is also crucial, as men might benefit from higher wages or be disproportionately represented in certain occupations. The use of digital technologies for circular products might also crowd out the participation of women in certain countries. In African countries, for example, only about 12 per cent of women use such technologies, in contrast to 18 per cent of men, on average (Wellesley et al., 2020). Defining the concept of a circular economy provides an opportunity to redesign labour markets. This offers opportunities to address pre-existing employment challenges and to create decent work opportunities for all, including women, youth and people who live in urban and rural areas.

Links Between Environmental Protection, Climate Mitigation, Circular Economy and Job Generation

The World Bank estimates that climate change results in GDP losses of 7.5 per cent in East Asia, the Pacific and South Asia. It limits the right to work and widens inequalities, particularly for women and vulnerable workers like migrants, people in poverty, and Indigenous and tribal peoples (ILO, 2018b).

For example, air pollution reduces short- and long-term productivity by decreasing working hours and by deteriorating the health of workers. It increases gender inequality, as women typically act as caregivers for dependent children who have been adversely affected. The ILO documents that "between 2000 and 2015, 23 million working-life years were lost annually as a result of different environmentally related hazards caused or exacerbated by human activity" (ILO, 2018b).

Meanwhile, "labour productivity has increased by a factor of twenty or more since the middle of the 19th century, the productivity gains with regard to the use of natural resources have been modest" (Wijkman & Skånberg, 2016, p. 17). Research indicates that production in a circular economy is more labour-intensive than it is in a linear economy (Wijkman & Skånberg, 2016).

The ILO finds that changes in energy production—including the generation of renewable energy, greater efficiency, adoption of electric vehicles and increasing efficiency in buildings—can create a net gain of 18 million jobs[2] throughout the world economy (ILO, 2018b). Renewable energy sources are more labour-intensive than electricity produced from fossil fuel sources. The ILO green jobs scenario, which is based on the International Energy Agency 2-Degree Scenario, finds that overall net job benefits also come with a 41 per cent reduction in GHG emissions by 2030 (ILO, 2018b, p. 42). The Club of Rome found that full adoption of a circular economy would create more than 75,000 jobs in Finland, 100,000 in Sweden, 200,000 in the Netherlands, 400,000 in Spain and 500,000 in France by 2030 (Wijkman & Skånberg, 2016, p. 38).

While the labour share of income has fallen for all countries, it has declined more slowly in countries that decoupled both production- and consumption-based emissions (ILO, 2018). Growth in female labour participation and labour share is usually associated with sectors with low emissions, such as the service sector.

[2] This includes the creation of 24 million jobs and loss of 6 million jobs.

True decoupling of GDP and GHG emissions requires reducing emissions without relocating carbon-intensive production to other countries. In a study by the ILO, 41 countries experienced GDP growth and a reduction in their production-based emissions, yet only 23 of the countries had actually reduced their carbon footprint because they did not export their emissions elsewhere (ILO, 2018b, p. 13).

Sectors Where Jobs Are Expected to Significantly Change in the Transition Towards a Circular Economy

Box 1. Ex-ante and ex-post studies on circular economy job creation

While there are numerous ex-ante macro-economic modelling studies that show how a circular economy can lead to net job creation, there are still very few such ex-post studies, apart for those looking at green job creation in the renewable energy sector (Liu et al., 2020). This is mainly due to the lack of robust circular economy employment data in the solid waste management and recycling sector (Liu et al., 2020; OECD, 2017).

In one exception, Liu et al. (2020) use a fixed effects regression model to examine the employment impact of recycling programs in the U.S. State of Florida's 67 counties from 2000 to 2011. Liu et al. (2020) show that a 1 per cent increase in the state's recycling rate leads to a 0.4 per cent increase in direct circular economy job gain, with most jobs concentrated in the recycling processing stage rather than in the solid waste collection or scrap material business stages. One of the important findings of this study is that direct job creation is linked not only to higher recycling rates but also to other factors, such as the unemployment rate in a particular region, the presence of environmental organizations and the size of the labour force. The authors find that a 1% increase in the number of environmental non-governmental organizations increases the number of circular economy jobs by 0.146 per cent. In contrast, a 1 per cent increase in the unemployment rate leads to a 0.18% decrease in circular economy jobs.

At the European Union level, a study by the European Commission (2014) examined 21 cases of companies that adopted circular economy measures and showed that all of these companies witnessed net job creation. Net job creation ranged from 1.3 per cent for some larger companies (such as Braskem) to 8.4 per cent for smaller ones (such as Ecocem) (European Commission, 2014). By increasing their material efficiency, these companies also increased their savings. Gypsum Recycling International, for example, has enabled the plasterboard companies it serves to save up to EUR 2.5 million per year since its creation in 2001 (30 per cent of a plasterboard plant's purchasing costs) by recycling gypsum from landfill to use as a raw material (European Commission, 2014).

Most ex-post studies cannot easily be compared. In Australia, the findings of Davis (2013) are consistent with those of Liu et al. (2020) and reveal that factors such as the total size of the labour force, the number of locally created jobs and whether a region is economically depressed all play a role in determining whether circular economy measures will lead to local economic multiplier effects.

The European Commission (EC) estimates that jobs directly associated with the circular economy employed 3.9 million people (EC, 2018). The ILO projects the net creation of 18 million green jobs by 2030, while the Global Climate Action Summit estimated the creation of over 65 million new low-carbon jobs in 2030 (Global Commission on the Economy and Climate, 2018). Of 163 economic sectors analyzed by the ILO, 14 show employment losses of more than 10,000 jobs worldwide, and only two (petroleum refinery and extraction of crude petroleum) show losses of 1 million or more jobs (ILO, 2018b, p. 43).

Popp et al. (2020) examine the job impacts of the American Recovery and Reinvestment Act (ARRA) using an event study regression model. They show that each USD 1 million of investment created 15 new jobs, especially during the 2013–2017 period. Interestingly, over half of the jobs created as a result of AARA green stimulus were in construction and waste management. Yet, the authors caution that green investments should be accompanied by just transition policies, as post-AARA green investments in the United States benefited mostly regions with pre-existing green skills. However, by using a novel data-driven methodology for identifying green skills, Vona et al. (2018) have shown that such skills are yet more important for carrying out "brown" jobs than other types of jobs. This suggests that, in many cases, workers displaced from brown jobs may be re-employed in new green jobs more easily than other workers might (Vona et al., 2018, p. 731).

Table 1. Sectors most affected by the transition to a circular economy

Industries set to experience the highest job demand growth (absolute)		Industries set to experience the strongest job demand decline (absolute)	
Sector	**Jobs (millions)**	**Sector**	**Jobs (millions)**
Reprocessing of secondary steel into new steel	30.8	Manufacture of basic iron and steel and of ferro-alloys and first products thereof	-28.2
Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	21.5	Mining of copper ores and concentrates	-20.8
Production of electricity by solar photovoltaics	14.7	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	-10.2
Wholesale trade and commission trade, except of motor vehicles and motorcycles	12.2	Mining of iron ores	-8.0
Reprocessing of secondary wood material into new wood material	5.0	Manufacture of glass and glass products	-7.6
Sale, maintenance, repair of motor vehicles, motor vehicle parts, motorcycles, motorcycle parts and accessories	4.7	Mining of coal and lignite; peat extraction	-4.9
Research and development	3.5	Mining of nickel ores and concentrates	-4.3

Industries set to experience the highest job demand growth (percentage)		Industries set to experience the strongest job demand decline (percentage)	
Sector	**Job growth (%) vs. BAU**	**Sector**	**Jobs (%)**
Reprocessing of secondary lead into new lead, zinc and tin	15.0	Production of electricty by coal	-0.9
Reprocessing of secondary precious metals into new precious metals	11.2	Extraction of crude petroleum and services related to crude oil extraction, excluding surveying	-0.9
Production of electricty by solar photovoltaics	4.9	Extraction, liquefaction, and regasification of other petroleum and gaseous materials	-0.9
Reprocessing of secondary copper into new copper	4.3	Petroleum refinery	-0.8
Reprocessing of secondary wood material into new wood material	4.2	Manufacture of gas; distribution of gaseous fuels through mains	-0.8
Reprocessing of secondary steel into new steel	3.1	Mining of coal and lignite; peat extraction	-0.8
Reprocessing of secondary aluminum into new aluminum	2.7	Extraction of natural gas and services related to natural gas extraction, excluding surveying	-0.8

Notes: Percentage difference in employment between the circular economy scenario and the IEA 6ºC (business-as-usual) scenario by 2030.

Source: ILO, 2018b.

The ILO created a circular economy scenario that assumes a 5 per cent annual increase in recycling rates replaces the direct extraction of primary resources for recycled products and sees growth in the service economy, which promotes rental and repair services to reduce ownership of goods at an annual rate of 1 per cent. Under this scenario, "worldwide employment would grow by 0.1 % by 2030 in comparison with a business-as-usual scenario and services and waste management sectors would grow by 50 and 45 million jobs, respectively" (ILO, 2018b p. 52).

In the 2-degree scenario, job creation from the renewable energy sector (hydro,[3] biomass, solar thermal, solar photovoltaic, tide and wave and geothermal) is expected to be higher by around 11 per cent (ILO, 2018b, p. 42). Net job growth is also expected in manufacturing (0.5 per cent) and construction (1.7 per cent). This growth is equivalent to around 4 million jobs in manufacturing and 9 million in renewables and construction combined (ILO, 2018b, p. 42).

A study by the Ellen MacArthur Foundation and McKinsey (2015) suggests that resource productivity is a hugely underexploited source of possible future wealth, competiveness and business revival. The report predicts that there are many opportunities in recycling, producing longer lasting products and offering maintenance services from the manufacturer. According to calculations in the

[3] Note that hydro projects are often controversial due to their environmental and social footprint and lack of resiliency in the face of climate change.

report, only about 5 per cent of the remaining value of most material goods is captured and made use of when the products are disposed (Ellen MacArthur Foundation & McKinsey, 2015, p.12).

With the increase in speed and use of broadband, platforms to share resources such as homes, cars, clothing, books and other belongings are creating tremendous economic opportunities. The platforms connect prospective guests or clients to hosts or vendors while also providing a system to verify the legitimacy and rate both parties. The mayor of Seoul set up a program in 2012 to support sharing initiatives and to promote public participation in these forms, transforming and branding Seoul into a leading "sharing city" (WEF, 2016, p. 11).

These new ways to share resources decrease material resources that would otherwise have to be used in order to meet the demand. A study by the World Economic Forum (WEF) and Massachusetts Institute of Technology found that, during the 2016 Olympics in Rio, the city was spared from building 257 average sized hotels because the platform Airbnb housed 85,000 of the city's estimated 500,000 visitors (WEF, 2016, p. 6).

Policies Promoting a Shift Towards Employment in a Circular Economy at the International and National Levels

Shifting jobs toward a circular economy requires translating global targets[4] into local strategies and incentivizing sectors, supply chains, regions and cities to reach these objectives (Circle Economy, 2018). The transition requires global collaboration across countries, enterprises and workers. The interconnectedness of global supply chains means that consumption and production in one country embed the emissions and materials used in others (OECD, 2016).

The ILO's International Labour Standards (ILS) provide a regulatory framework for the social pillar of the circular economy and help to ensure decent work practices in sectors affected by such a transition (ILO, 2018b, p. 71). Other tools include the Sustainable Stock Exchange Initiative and organizations like the World Business Council for Sustainable Development.

In 2009, China passed a law on promoting the circular economy that focuses on reducing resource use, reuse and recycling with a circular economy development strategy and action plan between 2011 and 2015. The law does not mention employment or job impacts and, according to experts, the circular economy in China is more a topic of interest than a target of action (Sitra, 2016, p. 43). In 2015, the European Commission presented a circular economy with a holistic, system-level approach of emphasizing ecodesign rather than merely setting recycling targets (Sitra, 2016, p. 41). Stimulus spending in response to an economic crisis can also help promote employment in circular economy-related areas. The ARRA from 2009, for example, included investments in energy efficiency and renewable energy to support high-tech and green manufacturing, which resulted in positive employment effects in this sector (Wilson, 2012, p. 272).

Twenty-six countries reviewed by ILO include labour aspects in their national climate change policies. At the national level, many of the social protection systems in place are the first line of protection against the negative effects of different risks on income, including those stemming from climate change and local environmental degradation. The ILO recommends four policy areas that link social protection and environmental sustainability: unemployment protection, cash transfer programs, public employment programs and payments for ecosystem services (ILO, 2018b, p. 3).

[4] Such as Agenda 2030, the Paris Agreement, Nationally Determined Contributions and Sustainable Development Goals (especially SDG 8 to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; and SDG 12 to ensure sustainable consumption and production patterns).

Sitra recognizes that knowledge, skills and training will be challenges in moving towards a circular economy (Sitra, 2016, p. 46). Countries such as Denmark, Estonia, France, Germany, India, the Republic of Korea, the Philippines and South Africa have environmental policies and national development strategies that reference skills development for the green transition (ILO, 2018b, p. 133). Many countries have not identified the skills required for a transition towards a circular economy, as they lack capacity to collect this data (ILO, 2018b, p. 4), and training to upgrade skills tends to be short term and fragmented (ILO, 2018b).

In order to further promote a shift toward circular jobs, it is important that policy-makers build an understanding of what jobs contribute to a circular economy and what skill set is needed to fulfill these jobs across different sectors and regions. In turn, this will ensure training programs are tailored to the demands of employers. As such, both formal and informal learning opportunities should be made available to workers eager to enter the circular economy market (Circle Economy, 2020). The closure of polluting and carbon-intensive industries and some response measures to reduce GHG emissions may have an adverse impact on people whose livelihoods or consumption patterns are tied to unsustainable practices. For example, when China introduced a ban on unsustainable logging, nearly 1 million state forest workers lost their jobs as a result, and the livelihoods of 120 million other rural workers were affected. However, thanks to the introduction of cash transfers and other social protection measures to supplement existing protection, four years later, two thirds of the nearly 1 million workers affected had either found other jobs or retired, and these measures resulted in the afforestation of nearly 27 million hectares (ILO, 2018b, p. 109).

The Netherlands has decades of experience in managing transitions for workers. From 1963 to 1974, the country decided to close 12 coal mines and was committed to finding fair and just solutions for the 50,000 workers affected (IISD, 2017). Today, an estimated 8 per cent of the Dutch workforce is employed in circular economy jobs (Circle Economy, 2017). The biggest concentration of circular economy jobs in the Netherlands is in activities that preserve and extend what is already made (reuse, recycling), comprising 42 per cent of total Dutch circular economy jobs, and circular economy jobs that incorporate digital technology, comprising 24 per cent (Circle Economy, 2017).

Local governments also play a key role in integrating skills and environmental policy. In countries such as China, France, the Republic of Korea, the United Kingdom and the United States, local governments integrate skills needs into policy formulation and implementation, due to their familiarity with the regional economy and labour market (ILO, 2018, p. 134). Some countries have been successful in integrating skills development with environmental policy, particularly in key priority sectors such as renewable energy and energy efficiency. Policies and programs on skills for the green transition tend to adopt a sectoral approach (ILO, 2018b, p. 129).

Conclusion: Links between just transition, circular economy and job creation

It now takes the Earth almost 1.5 years to regenerate what we use in a year (Wijkman & Skånberg, 2016, p. 5). We still do not know enough about the risks caused by the deterioration of ecosystem services. Loss of biodiversity means that ecosystems will be less capable of responding to climate change or pollution and may have dramatic impacts on people's livelihoods, income, health and well-being (Sitra, 2018).

The Club of Rome explains that the transition towards a circular economy is a major prerequisite to staying within the planetary boundaries.[5] It is urgent, both for the environment and the world of work, and must be made sustainable by providing workers with decent work and their communities with better lives (ILO, 2018b, p. 92).

Our world economy is only 9.1 per cent circular, leaving a massive "circularity gap" (Circle Economy, 2018). Studies by Sitra indicate that, though transitioning to a circular economy is a large business opportunity, the world does not yet have a clear circular economy champion that is able to create national road maps that comprehensively link system-level change visions with practical actions (Sitra, 2016, p. 38). A circular economy supports competitiveness and a reduced dependence on imports. "The transition will require a new kind of open-minded co-operation, the desire to take policy and economic risks, and the boldness to export successes to the world" (Sitra, 2016, p. 9).

As a "multi-stakeholder system including corporations, trade unions, workers and governments, a circular economy has the ability to unite a global community behind an action agenda, engaged and empowered both collectively and individually. It serves societal needs, by embracing the power of entrepreneurship, innovation and collaboration" (Sitra, 2016, p. 39).

So far, most studies on the circular and green economies have focused primarily on the environmental and business cases for enhanced resource efficiency. The circular economy offers an unprecedented opportunity to transition toward a thoughtful, planned, just and socially inclusive model.

[5] The planetary boundaries were identified by the Stockholm Resilience Center in 2009 and are a set of nine planetary boundaries within which humanity can continue to safely operate, develop and thrive for generations to come.

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