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Finland
2020**

Regional Circular Economy Status Quo

REDUCES – Rethinking Sustainable Development in
European Regions by Using Circular Economy
Business Models



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Content

1 Background and context.....	4
2 Definitions and methods	6
2.1 Circular Economy.....	6
2.1 Circular economy business models	6
2.3 Multi-stakeholder governance model.....	7
2.4 Policy instrument	7
3 Status quo of the regional circular economy: Southwest Finland	9
3.1 Main features of the region.....	9
3.2 Sustainable growth and jobs 2014–2020 - Finland's structural funds programme.....	10
3.3 Regional circular economy profile.....	12
3.3.1 Regional circular economy drivers, strengths and opportunities	17
3.3.2 Regional obstacles, weaknesses and threats to the circular economy	22
3.3.3 Development prospects of the circular economy in the region.....	25
4 Conclusion: Southwest Finland	27
References	29

1 Background and context

Circular economy changes the methods and revenue models of business. Instead of traditional ownership, consumption is based on the use of services: sharing, leasing and reusing. The new method challenges countries and regions to develop and construct new business models that can be used to respond to the global climate crisis, among other things.

REDUCES contributes to the EU2020 strategy by advocating the priorities of Sustainable, Inclusive and Smart Growth. In addition, improving resource efficiency by sharing experiences on circular economy practices will translate into lower GHG emissions and give a much-needed boost to economic growth in the regional context. The project will also contribute to the vision of “Resource-efficient Europe” via inter- and intraregional cooperation and learning processes. This kind of interaction is vital in order to reach the EU2020 strategy goals. REDUCES also supports the fundamental objectives of decoupling economic growth from the use of resources and increasing the use of renewable energy sources which are underlying themes in the EU2020 strategy. The EU action plan of the circular economy also accentuates the need to create the conditions under which a circular economy can flourish and resources be mobilised. It is recognised in the plan that new business models are needed to enable us to rethink our ways of producing and consuming.

REDUCES brings together six European regions:

- Southwest Finland
- Utrecht, Netherlands
- Greater Manchester, UK
- Valencia, Spain
- Bulgaria
- Maramures, Romania



The overall objective of the project is to improve the implementation of regional policies in order to enable regions to adopt more environmentally sustainable ways of production and to reduce the negative environmental impacts of economic development. Circular business models can be used to help companies achieve resource efficiency and subsequent net revenue gains, and by doing so help regions achieve a more innovative, resilient and productive economy. Although circular

business models are often viewed as sustainable by nature, it is recognised that there are uncertainties about their potential impacts, such as externalities and rebound effects. REDUCES results will facilitate and better enable the adoption of environmentally sustainable circular business models with the support of improved regional policies.

Sub-objectives of the REDUCES project are:

1. To increase the knowledge and capacity of regional and European policymakers and stakeholders on circular economy business models
2. To improve the competence of partners and involved stakeholders to make informed decisions on promoting the transition to the circular economy in regions
3. To discover innovative and the most feasible circular economy business models in each region, which are instrumental to transforming production value chains towards environmental sustainability

4. To improve the competence of regional actors to assess the environmental impacts of circular economy business models in order to choose the most feasible and environmentally sustainable models recognizing regional assets, barriers, needs and strengths necessary for the circular economy transition
5. To improve policy instruments (4 ERDF policies and 2 regional plans) via 6 action plans to better introduce or integrate circular economy business models into the policy instruments and supporting the theme by proposing new project ideas or funding.

The purpose of this Status Quo report is to summarize the results of the studies carried out about the existing circular economy business and actions, strengths, opportunities, threats and weaknesses in Southwest Finland. The Status Quo report provides the basis for the development work planned in the REDUCES project.



2 Definitions and methods



2.1 Circular Economy

“Circular economy” can mean a lot of different things in different sectors. Common denominators include designing out waste and pollution (reduction of waste), keeping products and materials in use (quality improvement and value retention), regenerating natural systems (loops, transition) and social aspects, such as creating well-being. (Ellen MacArthur Foundation 2017b.)

A circular economy refers to an economic system that is based on business models that replace the current linear economic model. These business models replace the conventional model with reuse, recycling and alternative production, distribution and consumption processes. A new business context aiming at sustainable development requires extensive action at several levels, ranging from the micro-level (products, businesses and consumers) to the meso-level (eco-industrial parks) and even up to the macro-level (cities, regions, states and even more extensive entities). All of these share a common view and goal of more sustainable business that takes into account the environment, economic well-being and social justice at different operational levels. (Kirchherr et al. 2017, 224–225.)

According to the Ellen MacArthur Foundation, the aim of a circular economy is to look beyond

the current take-make-waste extractive industrial model. The idea is to gradually decouple economic activity from the consumption of finite natural resources. At the same time, the amount of waste is reduced and finally it is designed out of the entire system. The focus is on positive, society-wide benefits. The circular economy builds economic, natural and social capital, supported by the transition to renewable energy sources. (Ellen MacArthur Foundation 2017b.) The Finnish Innovation Fund Sitra defines the circular economy as a future economic model in which natural resources are used within the Earth’s carrying capacity. (Sitra 2019a).

Based on the knowledge and understanding of the REDUCES project partners, the circular economy refers to socially sustainable business that creates well-being. The objective of the economy is to maintain and restore the value of our natural resources. Even though the objective is full circulation, the number and level of loops can vary. The transition to a circular economy, as well as business in a circular economy, requires extensive co-operation between different parties.



2.1 Circular economy business models

The corporate world is shifting from the traditional model of a linear economy towards a circular economy. In the circular economy, production and consumption are increasingly based on services instead of owning. The operating methods and

earning models of companies change, and operations need to be updated so that they will support the mitigation of climate change. (Sitra 2019b.)

The themes of the circular economy business models investigated in the REDUCES project are based on the definitions of the Finnish Innovation Fund Sitra. The themes are renewability, sharing platforms, product as a service, product-life extension and resource efficiency and recycling. (Sitra 2019a.)

The circular economy business model is an economic model in which business is largely based on the forms of business mentioned above, i.e. consumption is based on the use of services – sharing, renting and recycling – instead of owning and increasing production of goods. Materials are not destroyed at the end but used over and over again for making new products. (Sitra 2019a.)

Design plays a crucial role in ensuring that products are durable and environmentally friendly and that the materials can be reused at the end of the product life cycle. The circular economy requires us to redesign our ways of working: our products, business models, cities and the linear systems that have lasted for the past centuries. Choices made at the start of the life cycle have impacts on each phase during the product life cycle. (Ellen MacArthur Foundation 2020a.)



2.3 Multi-stakeholder governance model

The multi-stakeholder governance model is a governance structure that comprises institutional ways of involving non-governmental actors, i.e.

internal and external stakeholders in the dialogue, decision-making and implementation of solutions to common problems or goals. It relies on the principle that if enough input is provided by all actors involved in a question, the eventual consensual decisions gain more legitimacy and therefore better reflect the set of perspectives rather than a single source of validation. Unlike in multilateralism, in which governments, as representative of their citizens, take the final decisions on global issues and direct international organizations to implement them, in multi-stakeholderism stakeholders become the central actors. Multi-stakeholderism often disconnects decision-making and the implementation of these decisions from the intergovernmental sphere, having no obligation to either report to or take instructions from the intergovernmental community. (Lin 2018, Gleckman 2018, Szuppinger & Kállay 2017)

In the REDUCES project, the multi-stakeholder governance model appears in involvement and engagement of the stakeholders from the different sectors and levels in all the regions in the project. Circular economy is not an individual game, and this gives a crucial role to wide cooperation between different stakeholders. Involvement appears in different ways for different project regions depending on the policy instrument and its role and activities in the field of business and circular economy activities.



2.4 Policy instrument

In general, a policy instrument is a means for public intervention in local, national or international economies, referring to any policy, strategy, instrument or law developed by government/public

authorities and applied on the ground in order to improve a specific territorial situation. Policy instruments are linkages between policy formulation and policy implementation, intended to achieve outcomes which conform to the objectives of public policy. They can take many forms, ranging from regulatory régimes to the provision of services to help improve the performance of businesses, and in most cases, financial resources are associated. However, an instrument can sometimes refer to a legislative framework with no specific funding. (Interreg Europe 2020, Saublens 2012.)

Policy instruments are often known as governing tools as well, particularly when they are applied to all conditions associated with them. The implementation of governing tools is usually meant to achieve policy targets of resource management but adjusted to social, political, economic, and administrative concerns. Concerns of sustainability

largely depend not only on what instruments are selected but also on how they have been applied. Assessment of policy instruments can therefore be an important component of policy sustainability. (Ali 2013)

In the context of Interreg Europe, “operational programmes for Investment for Growth and Jobs as well as Cooperation Programmes from European Territorial Cooperation are considered policy instruments. Beyond EU Cohesion policy, local, regional or national public authorities also develop their own policy instruments. Macroregional strategies can also be considered policy instruments in the context of Interreg Europe. However, considering the characteristics of these strategies, it may be easier for projects to influence the corresponding transnational cooperation programmes than the macroregional strategy itself.” (Interreg Europe 2020.)

3 Status quo of the regional circular economy: Southwest Finland

3.1 Main features of the region

Kaskinen 2019, 24; Statistics Finland 2019.)

Southwest Finland is one of Finland's growth centres characterised by increasing employment rates and migration to the area. With its population of more than 500,000, Southwest Finland is the third-largest region in Finland by population. (EURES 2019). Southwest Finland is comprised of 27 municipalities, and close to one-half of the region's area is water. There are 22,000 islands in Southwest Finland, the region has the highest number of holiday homes in Finland. The region plays a significant role in food production and tourism, both nature tourism and urban culture tourism. (Regional Council of Southwest Finland 2020.) With regard to production, the region is exports-oriented, as approximately one-half of the region's industrial production is exported, mainly to Europe. Southwest Finland is a service-oriented region: the service industry employs 70% of all those employed. (EURES 2019.)

The economy of Southwest Finland is very diverse. The main industry sectors in the region are bio and ICT industry, marine industry, metal industry, construction, logistics and creative industry. (Silvonon & Kaskinen 2019, 24). The technology industry provides 62,000 jobs, which accounts for over one in four of all persons employed in Southwest Finland. (The Federation of Finnish Technology Industries 2019). Regarding bioeconomy, the region features a lot of chemical, pharmaceutical and food industry, as well as agriculture and agricultural research. Southwest Finland is home to a total of 30,000 companies (approx. 10% of all companies in Finland) and a strong educational sector that includes two universities and four universities of applied sciences. (Silvonon &

Turku is the oldest city in the country, established in the 13th century when Finland was still part of the kingdom of Sweden. (Guénard et al. 2020, 12). As a former Hanseatic town, Turku has traditionally had a lot of European contacts. The city being international is illustrated by the fact that non-Finnish-speakers account for more than 15% of the entire population, and Swedish-speakers more than 5%. (EURES 2019).



3.2 Sustainable growth and jobs 2014–2020 - Finland's structural funds programme.

The *Sustainable growth and jobs 2014–2020 structural funds programme*, with a transcending theme of promoting a low-carbon economy, is viewed as a policy instrument in Southwest Finland. The structural funds programme implements the objectives of the Europe 2020 strategy and is thereby linked to Europe's shared objectives.

One of the key principles guiding structural funds activities is sustainable development. The aim is to ensure that the development activity funded by the programme supports the achievement of the society's sustainable social, ecological, cultural and economic objectives and that the overall impact on the environment, climate and people's well-being is positive. Ecological sustainability is promoted by enhancing the environmental expertise and responsibility and energy-efficiency of SMEs and by investing in materials research and technology, production technology, functional logistics and

activities making use of side streams and the energy content of waste. Economic sustainability is influenced by developing new green economy business opportunities provided by e.g. cleantech and bioeconomy, and by promoting longer working careers. Social and cultural sustainability is influenced by increasing engagement and promoting the capabilities of those at risk of marginalisation to work and function, by promoting diversity management at Finnish workplaces and strengthening community-driven development at the local level. (European Union 2019; Ministry of Employment and the Economy 2020a.)

The structural funds programme (2014–2020) has five priority axes, two of which are directly linked to regional development measures:

1. Competitiveness of SMEs (ERDF funding EUR 328 million / 42% of ERDF funding)
2. Producing and using the latest information and knowledge (ERDF funding EUR 435 million / 55%).



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Southern and Western Finland account for 29.1% of the regional funding. Eastern and Northern Finland account for 70.9%. (Ministry of Employment and the Economy 2020b.) Southwest Finland is included in the region of Southern and Western Finland. The other three priority axes are priority axes of the European Social Fund, and they are linked to the development of employment and labour mobility: development of education, skills and lifelong learning and development of social inclusion and combating poverty.

Of the ERDF funding measures (priority axes 1 and 2), a minimum of 25% are aimed at launching and developing low-carbon business activity. Promoting research and innovation relating to low-carbon technology and its deployment is an investment priority. Achieving a low-carbon society requires structural changes, new operating methods and models, product development, investments and multidisciplinary development of skills. New business opportunities exist in energy and material efficiency in particular. An example of this is the circular economy, in which companies can establish industrial symbioses by increasing the efficiency of mutual resource utilisation, such as technology, competence, services, side streams and waste. New and expanding business opportunities provide an opportunity for developing new jobs. (Ministry of Employment and the Economy 2020c.)

The funded projects support the start-up of new enterprises and development of new business that promote the low-carbon concept and productisation and commercialisation of low-carbon, resource-wise ideas, products and services of SMEs. In addition, market entry is supported, taking into account demand and user orientation and the environmental impacts and costs over the life cycle of the products. The business expertise and resources for internationalisation of low-carbon, growth-oriented SMEs aiming at the international market are strengthened. Low-carbon

regional business clusters, business networks and other forms of business cooperation that support the utilisation of local material and energy flows are developed. In addition, the funding develops low-carbon traffic systems and modes of transport and innovations and technologies that improve the energy efficiency of housing. (European Union 2019.)

Sustainable growth has been understood as an important means of promoting a more resource-efficient, green and competitive economy. Prioritised themes include achieving the EU's climate and energy objectives and transition towards a more resource-efficient economy. Promoting energy and material efficiency and increasing the use of renewable energy sources is a key action. (Ministry of Employment and the Economy 2020a.)

Businesses can also apply for direct subsidies for diverse development and investment projects. The projects can concern production, internationalisation or expertise, among other things. They must have a significant impact on the company's operations, renewal, growth and competitiveness. Employment-related aspects are also taken into account in granting funding. A maximum of 50% of subsidies is granted to development measures. In investment projects, the subsidies account for 10–35%. The share of subsidies can vary based on the project content, location and other relevant factors. (Ministry of Employment and the Economy 2020d.)

In Southwest Finland, approximately 50% of the region's ERDF funding, or approximately EUR 900,000, is reserved for corporate subsidies. Funding is granted to business development projects and development of the business environment, not for subsidising investments. The key focus areas in development projects are promoting the internationalisation of SMEs, creating and developing new business, low carbon and new emerging industries, such as bioeconomy and

REDUCES

creative industries. (Mäkelä 2015.)

Grants for the development of the operating environment are strongly directed at projects with immediate effects on SME activities, such as investigations necessary for business, development of services needed by SMEs, promoting business co-operation and other projects that improve SMEs' development resources. Funding can be granted to non-profit organisations for capital investment projects. In addition, infrastructure projects that directly support the operations of SMEs can be funded. (Mäkelä 2015.)

In the structural fund's specific objective 3.1 linked to the circular economy, *Promoting energy efficiency in SMEs*, a total of 60 companies have received funding in the programme period 2014–2020, and the public funding granted to these businesses' development projects totals approximately EUR 5.5 million, including both EU and national government funding. (Structural fund information service 2020.)

3.3 Regional circular economy profile

There is significant activity compliant with and promoting the principles of the circular economy in Southwest Finland. Different parties, such as the City of Turku and its strategic entities, Regional Council of Southwest Finland and under it the regional cooperation group and Valonia, the region's universities and other regional and nationwide organisations have actively promoted the circular economy in the region. However, a lot remains to be done in all sectors before the circular economy is the primary model of production and operations. (Silvonen & Kaskinen 2019, 46.) One of the aims of the above-mentioned public-sector operators is to support the development of businesses in a direction that promotes a circular economy. In fact, businesses play a key role in the development

of the business model compliant with a circular economy.

Several extensive studies concerning the status quo, future opportunities and challenges of the circular economy have been conducted in Southwest Finland in 2019. Existing materials, supplemented by interviewing circular economy parties and experts in the region, have been used in compiling this status quo report. In creating the circular economy road map for Southwest Finland, the University of Turku together with the international ICLEI Local Governments for Sustainability network conducted the study "Toteutettavuustutkimus aktiivisen kiertotaloustoimijaverkoston rakentamiseksi Turun seudulla" ("Feasibility study of building an active circular economy operator network in the Turku region"; ICLEI report). The report specifies the industries in which circular economy-compliant activity and potential has been identified. Identified industries and fields that facilitate the development of a circular economy include city planning and administration, public procurement, industrial symbioses, municipal waste management, buildings and construction, water-food-energy nexus and circular economy education in the Turku region. (Silvonen & Kaskinen 2019.)



Another comprehensive regional study was prepared in the OHKE project (environmental administration's steering and development project, *Kiertotalous ja materiaalitehokkuus maakunnassa* (Circular economy and material efficiency in the region), 2019). According to the study, as many as three out of five industrial companies in the region report that circular economy is part of their business, and one in two companies sell their waste or side streams to other operators for use. Waste or side streams of others are only utilised by one in five of the interviewed companies. The data of the study is based on the businesses' own estimates. The biggest companies use others' side streams and sell their own more than small companies, and to them, the circular economy is already part of day-to-day life, and recorded in the strategies of many. Smaller businesses suffer from a lack of resources for promoting the circular economy, while some micro- and small enterprises were created to respond to the challenges and opportunities provided by the circular economy. (Silvonon & Kaskinen 2019, 24).

A third extensive study is "*Lisäarvoa kalasta ja maatalouden sivuvirroista Varsinais-Suomessa*" (Added value from fish and agricultural side streams in Southwest Finland), prepared as part of the Blue Adapt project (2019). The study compiles the results of the bioeconomy transformation arena and specifies opportunities for blue bioeconomy in the Southwest Finland region. Blue growth and blue resources refer to aquatic sustainable growth opportunities in food and energy production and the business that can be sustainably built around them. (Valve et al. 2019.)

In addition to the above-mentioned reports, 10 persons acting in development duties in the region, as municipal or city civil servants, members of the municipal or city council or rural area agent in the Southwest Finland region were contacted. Differences and similarities regarding the state and direction of development of the circular

economy within Southwest Finland were surveyed through discussions.

Project activity relating to the development of the circular economy is characteristic of the profile of the region's circular economy. There are several project funding opportunities, seeking synergy benefits for development activities in the region. One funding programme is the European Regional Development Fund, treated as a policy tool in this report. In fact, the ERDF programme has supported a total of 296 projects of businesses, cities and other parties in Southwest Finland during the 2014–2020 programme period, of which some 80 have promoted activities compliant with the circular economy in the Southwest Finland region. Promotion of low carbon, which is strongly linked to the circular economy, is a transcending theme of the ERDF programme on the whole.

Next, we will briefly review the industries and functions in which measures in line with the circular economy can already be identified.

Key industries of the regional circular economy profile

Industrial symbioses play a significant role in circular economy in the Turku region and Southwest Finland on the whole. The ICLEI report (Silvonon & Kaskinen 2019, 23–24) uses "industrial symbiosis" to refer to circular economy implemented in industry, i.e. cooperation between closely located businesses in making use of resources and side streams. The industrial symbioses talked about in the region also includes the **bioeconomy, covering the forest, chemical, pharmaceutical, fishing and food industries and agriculture**. The bioeconomy is associated with the circular economy on account of its nature-based, renewable materials. Not all bioeconomy is directly circular economy, but all bioeconomy has potential to develop in the direction of the circular economy and develop circular economy solutions. With

regard to bioeconomy, the region is home to a lot of chemical industry, pharmaceutical industry, agriculture and food production and businesses in these sectors that implement the circular economy at least to some extent. (Silvonen & Kaskinen 2019, 23–24.)

In addition to the bioeconomy, companies identifying themselves as cleantech businesses are widespread in the region. The core of the business operations of such companies is about producing and developing technologies, processes, products and services that can promote the sustainable use of natural resources and reduce negative environmental impacts. Businesses can develop cleantech solutions for their own use or for sale. In industrial symbioses, the efficiency of production includes the idea of a circular economy aiming at cost efficiency, and the environmental perspective is often a secondary factor. (Silvonen & Kaskinen 2019, 23–24.)

Southwest Finland is a significant **producer of food and foodstuffs**, and many agricultural and horticultural lines of production account for the highest or among the highest shares of the entire country's overall production. Moreover, there is a desire to increasingly profile Southwest Finland as a resource-rich source of fish. Southwest Finland provides apt conditions for promoting the bioeconomy transformation because, in addition to natural resources, the region features expertise and traditions in utilising blue resources and promoting conservation of seas. (Valve et al. 2019, 4–8, 16.)

The preparation of the status quo report included discussions with operators in the Southwest Finland region. Based on the discussion, one can say that the circular economy is at the core of bioeconomy operations. Utilising side streams and surplus from agriculture and food production as fertiliser or refined further into biofuels has



traditionally been important in the industry. It was, in fact, stated in the discussions that one cannot afford not to make use of “secondary streams”. Operations that do not generate side streams for use cannot be maintained.

In preparing the road map for a circular economy, it was noted that **construction** is one of the themes where the rate of development and discussion on the topic lag behind other industries. The importance of the circular economy with regard to construction is reviewed throughout the process from the construction of new buildings and areas and city planning to the completion of construction processes. A review of buildings from the point of view of the circular economy also applies to the existing property base, its maintenance, renovations and ultimate demolition. Construction is very raw material-intensive and causes a significant share of nationwide emissions. In addition, the building base renews slowly, so the choices and solutions have far-reaching impacts for decades. Prolonging the life cycle of a building often also requires changing its purpose of use, which is easier if it is taken into account already in the design phase. In addition to construction, renovation and purpose of use, the occupancy rate of premises can be reviewed as part of the region’s circular economy activities. Therefore, choices compliant with the circular economy should be commonplace in the design, construction and renovation of buildings. The purchasers of buildings play an important role in promoting the circular economy, and public procurements are a significant factor here, as public construction projects alone amount to some EUR 7 billion each year in Finland. (Silvonen & Kaskinen 2019, 31–33; Leskinen & Lahtela 2020).

The circular economy in construction in the region is associated with the **treatment of soil masses** in accordance with the circular economy. In the treatment of soil masses a distinction is drawn between clean excess masses, slightly contaminated

“threshold soil” and dredging masses. The decontamination, treatment and utilisation of soil masses is carried out locally and close to the final disposal location, where possible. (Silvonen & Kaskinen 2019, 33.) The utilisation of demolition waste as landfill in construction projects also emerged in the discussions. This, however, requires a permit process due to the heterogeneity of the material.

Important city planning-related projects in the Turku region include areas being planned and zoned by the City of Turku, such as the development of the Linnakaupunki district, Skanssi, Itäharju and VR GROUP’s (state railways) workshop area. Important themes in the development of pilot areas include electric and low-carbon mobility solutions, use of green areas in city planning, energy efficiency of buildings and development of renewable energy solutions. (Silvonen & Kaskinen 2019, 13.) In addition, the discussions brought up the Metsäjaanu circular economy park and Meriniitty industrial park in Salo, where there is potential for industrial symbioses in particular from the point of view of a circular economy.

The steering effect of **zoning** has emerged in conjunction with city planning and administration. An example of this is the Skanssi district in Turku, where the starting point of planning has been sustainable area development. It is a pilot area of planning in compliance with the circular economy. Proactive city planning and city modelling and development of electricity-powered traffic are interesting areas from the point of view of the circular economy. Engagement is emphasised in the administration theme; going forward, it is seen as an increasingly significant resource, both in decision-making and developing residents’ activities. With regard to zoning, it is important that the regulations of the plan can be implemented now or in the near future with market parties. The Linnafält district in Turku is a good example of this: The construction of this area of timber high-rise buildings was delayed because no party was found

to implement the city plan regulations. The plan and location were, however, interesting enough and the city had a strong view of timber construction in the area, so developers were found among businesses, the timber industry, construction industry and building supervision authorities of the City of Turku. In this case, planning functioned as a driver of the circular economy, as there was the will to drive the matter through and the project on the whole promoted the development of timber-based construction in the area. (Silvonen & Kaskinen 2019, 14, 48.)

Public procurements play a significant role as a theme throughout the road map for a circular economy in Southwest Finland. Public-sector procurements are primarily large units under long-term contracts, which makes them interesting to businesses. This provides public-sector operators with leverage to promote the things considered important through their procurement activities. In addition, the public sector has a strong impact as an example. There are several projects underway in the Turku region, assessing e.g. the life cycle impacts of public procurements in investments and acquisitions, reviewing municipalities' impact opportunities through procurements and procurement criteria and investigating resource-efficient public procurement through a circular economy

service centre. There are several trailblazer organisations within the Concern of the City of Turku that develop circular economy solutions and their implementation: Turku Science Park Oy actively cooperates with cleantech spearhead businesses in developing the circular economy. Turku Energia Oy develops lower-carbon energy production methods for heating and aims to procure electricity from renewable sources. Lounais-Suomen Jätehuolto Oy takes care of regional municipal waste management and actively develops practical circular economy and use of waste as resources. Turun Seudun Vesihuolto Oy and Turun Seudun Puhdistamo Oy cooperate with a circular economy operational model for wastewater collection and treatment. (Silvonen & Kaskinen 2019, 19–20.)

Lounais-Suomen Jätehuolto Oy (LSJH) is a waste management company owned by 17 Southwest Finland municipalities, taking care of residents' and municipal properties' **waste management**. Currently, all burnable waste (i.e. mixed waste) is collected from all properties in Southwest Finland. In addition, properties with a minimum of four dwellings have separate metal collection, as well as biowaste and glass packaging from properties with a minimum of 10 dwellings, while properties with a minimum of 20 dwellings have plastic and



REDUCES

cardboard packaging collected. Furthermore, the Waste Act prescribes separate collection for paper waste. The obligation to separately collect bio-waste does not apply to properties that compost it themselves. In addition to waste fractions collected separately from properties, LSJH collects electronic waste, end-of-life textiles, different construction waste fractions, porcelain and ceramics and hazardous waste at its sorting stations. (Lounais-Suomen Jätehuolto Oy 2020).

In accordance with the Finnish Waste Act, all operations that generate waste must comply with an order of priority for waste, in which the first priority is to reduce the amount and harmfulness of waste generated. However, if waste is generated, the waste holder must primarily prepare the waste for reuse or secondarily recycle it. If recycling is not possible, the waste holder must make use of the waste in other ways, including use for energy. If utilisation is not possible, the waste must be disposed of. With regard to businesses, their technical and financial resources for complying with the order of priority are taken into consideration. (Waste Act 646/2011, section 6.) Therefore, the sorting of waste for recycling is business-specific.

The Turku **wastewater treatment plant** promotes the implementation of the principles of circular economy through its operations. The plant itself generates more energy than it consumes, and the waste heat from wastewater treatment is used for producing district heat, or in the summer district cold, to 15,000 dwellings in the city. Biogas is made from the treatment plant sludge, and developing the end use of the sludge with soil masses or in agriculture is a regional opportunity for promoting the circular economy. Significant investments have been made in Gasum Oy's Topinoja biogas plant, making adding bio-streams, producing traffic biogas and increasing the number of biogas refueling points in the area possible. (Silvonon & Kaskinen 2019, 39.)

3.3.1 Regional circular economy drivers, strengths and opportunities

Strengths and drivers in the regional circular economy profile of Southwest Finland

The strengths of Southwest Finland in industrial symbioses include operators connecting several enterprises, functioning as a link for reaching businesses and creating connections between businesses. Such operators include Varsinais-Suomen Yrittäjät (organization for small and medium-sized enterprises and their owners), Turku Chamber of Commerce, Federation of Finnish Technology Industries, Confederation of Finnish Construction Industries RT, Chemical Industry Federation of Finland, Turku City Centre Association and Finnish Forest Centre. In addition to these, the region's directors of economic development and business development specialists are a link to companies when wanting to survey or promote the industrial symbioses of businesses. Furthermore, the region's universities play an important role in promoting industrial symbioses; they have a regionally comprehensive view of the industrial symbioses of businesses and connections to the region's businesses. For example, the Smart Chemistry Park and functions entwined around it or the development of the Blue Industry Park could be industrial symbioses suitable to the theme of a circular economy to develop. (Silvonon & Kaskinen 2019, 24, 48–49.) There are also other active parties operating in the business interface in the Southwest Finland region, such as Ukipolis Oy, whose operating area covers the Vakka-Suomi sub-region, and Yrityssalo, covering almost the entire Salo region. In addition, the region's municipalities actively co-operate with the region's businesses.

In addition to business cooperation, the region's universities have a significant role in research activities, which is a driver that strongly promotes the circular economy. There are two universities

in Southwest Finland, both of them located in Turku, that conduct research promoting the circular economy in diverse fields of bio, food and material chemistry. In addition, there is research in fields connected to the circular economy in the region, even if the focal point was not directly on the circular economy. Such areas include bioeconomy and sustainable energy economics, as well as the marine and maritime industries. (Silvonen & Kaskinen 2019, 24–25.)

In addition to universities, there are three universities of applied sciences in the region, in which the circular economy is linked to studies and operational strategy. At the Turku University of Applied Sciences, for example, the circular economy is strongly present in different research groups' RDI activities. (Silvonen & Kaskinen 2019, 24–25.) Based on the discussions, the role of educational institutions and research was considered important in the development of a circular economy and the level of education and expertise in Southwest Finland was considered good.

Blue growth and innovative food chains have been recorded as focus points of the region's smart specialisation in Southwest Finland's regional strategic programme for 2018–2021. Blue growth refers to the resources provided by water systems and their sustainable use. Smart specialisation plays an even stronger role during the EU's future programme period 2021–2027, which means increasingly strong allocation of development resources and structural funds funding to the strong areas of excellence identified by the regions. The Southwest Finland region wants to invest in blue growth and innovative food chains, bringing up related special expertise and regional operators. (Valve et al. 2019, 4–8, 16.)

Measures promoting the circular economy in buildings and construction are strongly linked to the design and construction phase. The buildings' life cycle impacts can be taken into account in

these phases. Private construction companies are often responsible for the final solutions, but cities can steer their operations through zoning. In addition to zoning, terms regarding plot conveyance can be used as a steering method with regard to land areas owned by the city. For example, regarding the circular economy, the city plan can specify regulations or framework conditions concerning e.g. construction materials, height of buildings, direction of roof faces or generation of renewable energy. In addition, regulations can be specified for shared use facilities, bicycle storage facilities, electric vehicle charging stations and provisions for electric vehicle sharing points. Cities do have an important guiding impact, as they drive the development of construction companies' operations and concrete solutions in a direction that supports the circular economy. In addition to cities, consumers can impact the choices made by construction companies through demand, too. Environmentally-conscious requirements from both city planners and customers effectively guide the operations of construction companies towards implementing circular economy solutions. (Silvonen & Kaskinen 2019, 32–33.)

In addition to actual construction and renovation, cities can influence the development of and increase in operations compliant with the circular economy through both zoning and public procurements. The City of Turku, for example, makes a significant share of its purchases from businesses over which it exerts either control or influence. The companies of the Concern of the City of Turku are committed to implementing the climate plan, and they are accordingly obligated to emphasise climate, environment and life cycle impacts in their operations. This will promote the implementation of circular economy-compliant solutions in these companies and procurements. (Silvonen & Kaskinen 2019, 20.)

With regard to **waste management**, opportunities identified in the region include, besides the

REDUCES

Topinpuisto circular economy centre, car recycling, ship recycling, reuse and recycling of packaging materials and influence through waste management regulations. Lounais-Suomen Jätehuolto Oy is planning a pilot end-of-life textile processing plant, intended to be operational during 2020 – the aim is for there to be a plant in Southwest Finland where textile waste from the entire country and the nearby regions could be processed. In addition, Turku has made it easier for consumers to recycle diverse materials by developing the sorting stations. (Silvonon & Kaskinen 2019, 29–30.) In addition to waste management, wastewater treatment in the Turku region is an internationally interesting example of a circular economy in water and energy. Artificial groundwater is also an interesting concept as a clean water solution. In the Southwest Finland region, conservation of the Baltic Sea is a theme important in many ways, and there is a lot of related research and activity. The circular economy is strongly linked to it through the collection and recycling of nutrients, among other things. (Silvonon & Kaskinen 2019, 49.)

Identified opportunities in the regional circular economy profile of Southwest Finland

Blue bioeconomy is part of blue growth. Blue bioeconomy refers to business that sustainably utilises renewable water resources. In Southwest Finland, this potential can be found in the fishing industry and aquaculture. Reducing the nutrient load, especially nutrient load from agriculture, in the Archipelago Sea area is important, and the region's blue bioeconomy is built around it. In addition to the nutrient load burdening the environment, it is an indication of a wasted resource: side streams from food production, for example, are not optimally used. In fact, the focus of the blue bioeconomy is on finding ways of turning underused side streams into added value-generating business. The development of sustainable food systems is at the core of the blue bioeconomy and

its transformation. A more plant-based diet is increasingly strongly the trend, while taking into account the development opportunities and needs of animal protein production. This is to ensure that good sources of protein are not utilised because of bypassing the opportunities for sustainability of production methods. (Valve et al. 2019, 4–8.)

In order for the blue bioeconomy to develop, government must create prerequisites for the required investments and guide business operations in a sustainable direction. The required practical measures include offering fixed-term public support, such as tax subsidies, to improve the profitability of deploying underused resources. The region also needs regional coordination and location guidance to promote investments in the blue bioeconomy. Public procurement should also be allocated so that public demand would support the emergence of new markets. (Valve et al. 2019, 4–8.)



During the survey, the fishing industry was a topic often brought up in the discussions. A lot of potential is seen in aquaculture in the region, and there has been a lot of development work around it. Aquaculture is connected to both food production and e.g. biofuel refining.

From the point of view of food production, the region has potential for finding operators to implement the entire food chain from agriculture to foodstuff production, utilisation of side streams, recovery of nutrients and production of energy from biowaste. This naturally requires a strong cooperation network and supporting industrial symbioses. Foodtech Platform Finland has started operations in the region, connecting foodstuff producers with technology companies with a strong environmental perspective in the solutions. (Silvonon & Kaskinen 2019, 49.) Food production was present as a significant line of business in the discussions, and a lot of opportunities were seen around it. In the Vakka-Suomi sub-region in particular, the circular economy was considered to be focused on foodstuffs, such as aquaculture, soy plant, agriculture and foodstuff processing.

The transformation of food production in an environmentally sustainable direction is focused on considerably more efficient utilisation of agricultural side streams. The processing of domesticated animals' manure, for example, should be developed so that the manure can be effectively dewatered, nutrients separated into different fractions and the energy content of the manure recovered. Underused resources or side streams include domesticated animals' manure and herring and cyprinids, which it has not been possible to convert efficiently into food and raw material for food production. Underused "trash fish" is used as fodder for fur animals, for example, but this way they do not provide the desired added value. In addition, fur farming is becoming obsolete throughout the country, and it is not a significant industry in the Southwest Finland region in the first place. The processing of domesticated animals' manure, on the other hand, should be developed so that the manure can be effectively dewatered, nutrients separated into different fractions and the energy content of the manure recovered. (Valve et al. 2019, 5, 8.)

Processing side streams is not enough alone; the demand for the final products must be strengthened as well. Income from recycled fertilisers, for example, is low, at least for the time being, and one cannot rely on it. The increasing demand for traffic biogas plays an important role in the transformation of sustainable food production in Southwest Finland, as the highest added value is achieved from biogas by processing it into traffic fuel. Biogas production can support sustainable food production when the biogas is produced in connection with the production of recycled nutrients. The production of traffic biogas could be supported in diverse ways, such as with tax subsidies or other benefits that could support growth in the biogas vehicle base. In addition, the use of liquefied biogas as a fuel for heavy vehicles could be increased. Traffic biogas could be guided towards being used as a fuel for public and service traffic in the municipalities of Southwest Finland. This way, public procurements can influence the use of the fuel. In addition, it is important to develop the filling station network, as there were three gas filling stations in Southwest Finland in 2019. In general, government needs to take measures that support both the demand for biogas vehicles and ensuring the raw material base and sustainability of the production of recycled nutrients. The environmental compensation system and regulations on fertilisation should be revised so that regulations encourage the processing of manure in domesticated animal hubs where too much manure is generated in proportion to arable area, and sustainable fertiliser use of recycled nutrients throughout the region. The development of biogas-fuelled traffic could be supported with fixed-term subsidies as long as the market is still in an emerging phase. (Valve et al. 2019, 5, 24.)

The circular economy of construction and buildings can be promoted in several ways in the Southwest Finland region. For example, combining the databases of the construction and maintenance phases would assist in the flow of information.

REDUCES

The development of pilot areas, aiming for a pilot area focused on e.g. sustainable mobility, ecological design and smart community services, such as the Skanssi district in Turku, would increase the evolution of other similar areas. Construction should also focus on sustainable construction so as to avoid future problems with moisture and indoor climate. There are also opportunities in the regional recycling and use of soil and rock material and the stabilisation of soil masses using industrial side streams. In addition to these, a way to increase the use of ash in infrastructure construction has not been found yet. (Silvonen & Kaskinen 2019, 35.)

Diverse potential approaches have been identified in the construction theme in the area; of these, the treatment of soil masses offers strong potential. In actual construction activity, Southwest Finland could be a pioneer in piloting and implementing the method for assessing the carbon footprint of buildings developed by the Ministry of the Environment. The criteria of the method for assessing the carbon footprint of buildings could be combined with the city planning of a suitable construction area of interest. At the same time, the construction innovation platform mindset could be developed further; it has already been strongly present in the Skanssi pilot area. Waste heat and its recovery is an interesting sub-area and a climate theme that also has global significance. (Silvonen & Kaskinen 2019, 49.)

Developing a construction life cycle steering model for construction activity would provide the construction industry with more circular economy-complaint activity, and building, infrastructure and premises information models would assist in simulation and creation of use scenarios. In addition, cooperation between cities and large construction companies to promote timber construction and cooperation with construction companies should be developed through stakeholder forums. In addition to these, increasing the

occupancy rate of premises would decrease the need for constructing new, and developing energy storage in new buildings would reduce the need for energy. (Silvonen & Kaskinen 2019, 35.)



The discussions had for this report brought up the circular economy-compliant opportunities associated with timber construction. In timber construction, the building material is more homogeneous than in construction using prefabricated concrete, for example. In addition, well-maintained timber is a durable and healthy building material. In addition, it is renewable. The profile of timber construction was expected to strengthen in the near future.

Opportunities related to the circular economy exist in e.g. energy solutions in construction, such as recovery and use of renewable energy and waste heat and maximisation of energy efficiency, i.e. minimising the need for energy for heating and building systems. The difficulty of storage is a challenge to related development, but the region has pursued solutions from e.g. storing heat in the soil with energy piles and building a two-way district heating network that also functions as an energy storage. (Silvonen & Kaskinen 2019, 33.)

Proactive city planning plays an important role in promoting the circular economy. Potential opportunities in the Turku region include area development sites in which it is possible to design entities as example sites of circular economy solutions on the whole. These include the Science Park, railway, Blue Industry Park and the Itäharju district. Itäharju, for example, could be designed as an urban circular economy platform, or district, that collects people together. The city could therefore offer suitable platform sites and support entrepreneurs in developing platforms. City planning can thus increase the flexible use of premises for diverse purposes and open pop-up facilities. Traffic planning and the development of mobility are also significant in city planning. For example, subsidies for the use of shared-used cars besides public transport would be a step towards a circular economy. The development of the municipality structure is also strongly linked to mobility, and together with energy solutions, they play a significant role in promoting carbon neutrality. (Silvonon & Kaskinen 2019, 14.)

There is huge potential for promoting the circular economy in public procurements, as the procurements of the City of Turku, for example, amount to more than EUR 500 million per year, and investments are added on top. If the procurement criteria and competitive bidding guided procurements to emphasise small carbon footprints in purchases, for example, large spending power would be more strongly allocated to circular economy. Carbon footprint calculation favours solutions that use recycled or recyclable materials or are otherwise low-carbon, and thereby carbon footprint calculation and its standardisation as part of public procurement would promote the circulation of materials. (Silvonon & Kaskinen 2019, 22, 48.)

Within the theme of public procurements, new opportunities could open up by increasing cooperation with a more extensive network of cities in developing, experimenting with and implementing

best practices. For example, more centralised competitive bidding in public procurements could open up new opportunities for promoting the circular economy. In addition to cities, the Association of Finnish Local and Regional Authorities could be an active player, starting to demand reforms of the Public Procurement Act and competition legislation so as to take climate criteria into account in procurement. One concrete measure is linked to transports. In Turku, electric taxis have a 30-second advantage over accepting rides before they are made publicly available to all taxis. In accordance with this example, benefits could be offered to parties that have prioritised ecological or circular economy-compliant choices in their own operations. The public sector should thereby play an even stronger role in promoting the circular economy, and the weight of quality criteria should be strengthened in competitive bidding. (Silvonon & Kaskinen 2019, 22, 48.)

3.3.2 Regional obstacles, weaknesses and threats to the circular economy

Challenges in the development of industrial symbioses include the difficulty and price of industrial processes; in addition, investments are required to establish a foundation for operations. Many waste streams are too small and uncertain for high-volume production to utilise and to base investments on. (Silvonon & Kaskinen 2019, 26.) Also, according to the OHKE project (Hakala 2019), lack of time and resources, among other things, are an obstacle to selling one's own waste or side streams. Unreliable availability or quality are an obstacle to using other operators' waste and side streams. In addition, use might require initial investments and special expertise. The challenges, obstacles and impediments to selling one's own waste and side streams include the lack of time and resources, legislation, amount of labour required in proportion to benefits, the companies not being aware of buyers, it being deemed a cost, and it not being

financially feasible. According to the OHKE project, the challenges, obstacles and impediments to using other operators' waste and side streams include the complexity of utilisation, equipment investments, quality and price of the materials, as well as lack of supply. In addition, there being several small streams is considered challenging and laborious.

Resolving the challenges could be helped if e.g. collection of waste would be free to the company providing them, or if regional transports were combined with other businesses. According to Silvonen and Kaskinen (2019, 26), businesses are interested in investment projects and strong research projects that provide them with relatively direct benefits. Universities' focus is more on developing the theme, and these conflicts of interests cause challenges. In general, the early stage of the circular economy chain from planning on the whole needs more attention from different parties.

According to the OHKE project (Hakala 2019), businesses believe that the circular economy provides image-related benefits, but do not believe it to have effects on cash flows. This is because not all companies believe in growth in their industry or the revenue of their own company through the circular economy. Large companies have considerably more faith in the opportunities for business growth from circular economy than small and medium-sized enterprises. Moreover, companies are more interested in selling their waste or side streams than utilising those of others. In order to increase sales of their side streams, businesses need information about potential users. Information about the possible uses of waste and side streams, on the other hand, could increase the willingness to use them instead of virgin raw materials.

According to the OHKE project (Hakala 2019), based on companies' views, measures that would

concretely promote the circular economy in the region would include e.g. information about parties accepting or buying waste or side streams, information about the possible uses of materials, more efficient waste management, assistance in organising storage or logistics, tax benefits, networking, counselling, financing, new research-based information and methods, training of personnel and availability of labour and adding clarity to zoning or other decisions of the authorities.

Based on discussions had during the survey, it is possible to say that materials are used and the links between companies exist in agriculture and the bioeconomy. There are also experiences of material banks, but they have proven to be rigid and difficult to use. Side streams and surplus materials move when companies have direct contacts with each other.

Key uncertainties associated with environmentally sustainable food production are connected to the nationwide and regional strategic intent and implementation of essential policy measures. Uncertainty is caused by how well the policy measures will specifically concern the production of manure biogas. In the Southwest Finland, there is uncertainty associated with the development of the demand for traffic biogas. If the demand does not increase fast enough, this will lead to a delay in, or even failure of the transformation. Another challenge concerns whether an investor will be found for a centralised plant. (Valve et al. 2019, 27.)

A major challenge connected to food production is that even though plant-based food is purchased more and more, the consumption of meat is also increasing, which translates into an increasing amount of biowaste. In addition, with regard to food, there is a shortage of activities in line with the circular economy on which the future should be based in the region. (Silvonen & Kaskinen 2019, 40.) On the other hand, it emerged in the

discussions that food production and processing play a significant role in the Southwest Finland region, which is why its potential from the point of view of the circular economy should be emphasised and supported.

The choice of building materials can influence the development of construction-related circular economy. It is a challenge that currently, the recycling of materials from demolished buildings is not prioritised in choices of materials. Therefore, the treatment and recycling of demolition waste is challenging. In fact, tools are needed in the project planning phase of construction projects for promoting the objectives of the circular economy and supporting decision-making regarding building materials, for example. Construction on the whole needs more understanding of the choices of materials and recyclability of materials. The value chains of construction should be addressed at an earlier phase. In addition to the choice of materials, the product development of materials is an important area, but influencing it is difficult. Also, the specification of competitive bidding criteria in construction need to be developed, which in practice means more detailed specification of

the criteria. With regard to planning, on the other hand, more confirmed information and concrete operational models for promoting carbon neutrality in planning work are needed. (Silvonon & Kaskinen 2019, 34.)

Criteria for the circular economy, or actually lack thereof, emerged in the discussions. Making the circular economy a significant part of construction and public procurement requires creating clear, unambiguous and transparent criteria for circular economy-compliant construction. Work on the development of materials is also important so that safe, healthy and sustainable construction can be ensured.

Taking the circular economy into account in public procurements has increased, but the challenge is that there is not enough information about the products subjected to competitive bidding to take their environmental footprint into account. Therefore, creating criteria has also been challenging. Moreover, legislation imposes strict limits and makes operators cautious in procurement. The progress of the circular economy is also slowed down by the fact that products or services



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in line with the circular economy are not necessarily available yet in the market, existing only at a conceptual or experimental level. Preparing and using procurement criteria in line with the circular economy is challenging, as the purchasers often do not have time or the ability to obtain information about the newest ways of acting from businesses before the competitive bidding. Therefore, setting new innovations as selection criteria in bidding is impossible. Quality and price criteria can be subjected to bidding and scored in procurements, but the criteria must not limit competition too much or favour any party. Even if the quality criteria were specified in detail, the price must be reasonable. Public procurements should have clear criteria for the amount of recycled materials or recycling solutions. These should be guided by legislation. Carbon footprint calculation could promote climate issues being taken into account in public procurements, but the development and standardisation of measurement methods is currently a significant impediment to progress. A follow-up system for maintaining and measuring commitments is also needed to bring transparency concerning the climate impact of procurements. In addition, the competitive bidding process is too heavy for smaller companies, as a result of which they rarely get to offer their products. Supporting small companies in this matter is important. (Silvonon & Kaskinen 2019, 20–22.)

The total amount of waste is increasing. Too much of the responsibility for sorting waste for recycling has been given to residents, and the collection points are located so far away for many that they do not bother to take their sorted fractions to them. The locations of collection points and housing companies' sorting and collection obligations can be influenced through waste management regulations. The sorting of waste also requires a sufficient volume of fractions to be collected, so it needs to be developed in regional cooperation. Energy waste is not processed in Southwest Finland for the time being but it is transported

away from the region, and even out of Finland. An eco-power plant is under construction in Salo to rectify this, and it is supposed to become operational in 2021. (Silvonon & Kaskinen 2019, 6, 30.)

3.3.3 Development prospects of the circular economy in the region

There is a lot of business activity linked to the circular economy in the Southwest Finland region, but no clear circular economy spearhead has been strategically defined for the region. The bioeconomy and construction industry are fields with obvious potential in terms of both expertise and volume. On the other hand, there is a lot of other industry in the region whose potential has not been put into use, such as the automotive and marine industries. Several circular economy opportunities have been identified in industrial symbioses, such as shipbuilding, which is an interesting and significant line of business from the point of view of promoting the circular economy in Southwest Finland. Furthermore, opportunities for a circular economy could be promoted by optimising the transports and logistics of businesses, promoting the service economy, increasing bio-based solutions and increasing companies' awareness. (Hakala 2020). In general, it can be said that in addition to cities' visions, the region needs an industrial vision that systematically involves businesses in the circular economy and its development measures. (Silvonon & Kaskinen 2019, 27). The construction-related thought of extending life cycles and development of the product-as-a-service concept was one of the themes that emerged in the discussions. Construction methods and choices of materials would gain more importance if the developer's liability for the maintenance of the building would continue for a significantly longer period.

With regard to aquatic bioeconomy, there is a desire to have Southwest Finland seen as a trailblazer

region. This means that food production, nutrient recycling and blue bioeconomy innovations create sustainable well-being and business operations in line with the circular economy in the region. The region aims to support activities that improve the state of the Archipelago Sea, generate added value from fish, underused biomasses and bioeconomy innovations. Furthermore, the aim is to increase the volume of aquaculture and revise its production methods and create solutions that support the development towards a carbon- and nutrient-neutral region. (Valve et al. 2019, 10.)

On the scale of Southwest Finland, strong potential is seen in integrated aquaculture technologies and aquaculture-related expertise. Increasing the use of underused resources, such as herring and manure, requires the development of new markets and demand. Investments in production play a key role in these development processes, because without new production activity, the transformations will not take place, as sustainable food production depends on products and technologies that are new but known and proven. New ways of using resources need to be actively studied, tested and developed going forward. (Valve et al. 2019, 34, 37.) It emerged in the discussions that marine areas and water systems should be seen as platforms on which circular economy-compliant business activity can be built. Water areas should therefore be developed just like city areas are developed towards activity compliant with the circular economy.

Going forward, a shortage of experts may turn out to be a challenge to the progress of the circular economy. Even though practically all technology universities offer studies based on which one can get to know circular economy functions, understanding the circular economy and finding new kinds of solutions requires multidisciplinary and multi-layered thinking and understanding. Finding expert services will become difficult even if the companies wanted to develop solutions in

line with the circular economy. A lot of opportunities are seen in the corporate circular economy field, but there is a shortage of doers who are skilled and ready to act. In addition, it is difficult to get information about what companies are doing. (Silvonon & Kaskinen 2019, 26.)

Diverse parties play a significant role in promoting the circular economy. Cities and municipalities play a very significant role, as do businesses. Cities and municipalities provide the operating environment and framework that support the development of companies' operations in line with the circular economy. National government is also important through diverse steering methods. In addition, research and educational institutions are important, conducting research and development work and educating future specialists, experts and workers. Consumers, on the other hand, can guide the direction of the development of the circular economy with their own consumption and behaviour. The EU also plays a significant role through its instruments. The media also strongly influences the mental images created and discussion maintained in society. (Järvinen et al. 2019)



4 Conclusion: Southwest Finland

This status quo report is primarily based on previous studies, such as the ICLEI report, Blue Adapt report and investigations of the OHKE project. In Southwest Finland, the instrument for policy is the ERDF funding programme. Developing business activity and responding to the objectives of sustainable development are a significant objective of it.

There is a lot of business activity linked to the circular economy in the Southwest Finland region, but no clear circular economy spearhead has been strategically defined for the region. The bioeconomy and construction industry are fields with obvious potential in terms of both expertise and volume. On the other hand, there is a lot of other industry in the region whose potential has not been put into use, such as the automotive and marine industries. (Hakala 2019.) In general, it can be said that in addition to cities' visions, the region needs an industrial vision that systematically involves businesses in the circular economy and its development measures. (Silvonon & Kaskinen 2019, 27).

According to reports, for larger enterprises in particular, operating in accordance with the circular economy is part of day-to-day business operations. Larger companies in particular sell their side streams to others. There are considerably fewer users. Unreliable availability or quality are an obstacle to using others' waste and side streams. For smaller enterprises, shortage of resources is among the most common factors affecting the promotion of activities in line with the circular economy. On the other hand, a lot of micro- and small enterprises have been established as a reaction to the challenges and opportunities of the circular

economy. Based on companies' views, measures that would concretely promote the circular economy in the region would include e.g. information about parties accepting or buying waste or side streams, information about the possible uses of materials, more efficient waste management, assistance in organising storage or logistics, tax benefits, networking, counseling, financing, new research-based information and methods, training of personnel and availability of labour and adding clarity to zoning or other decisions of the authorities. (Hakala 2019.)

In the Southwest Finland region, one of the most important factors promoting the circular economy are industrial symbioses. They also include the bioeconomy, covering the forest, chemical, pharmaceutical, fishing and food industries and agriculture. The strengths of the region in industrial symbioses include operators connecting several enterprises, functioning as a link for reaching businesses and creating connections between businesses. Challenges in the development of industrial symbioses include the difficulty and price of industrial processes; in addition, investments are required to establish a foundation for operations. Many waste streams are too small and uncertain for high-volume production to utilise and to base investments on. In general, the early stage of the circular economy chain from planning on the whole needs more attention from different parties. (Silvonon & Kaskinen 2019, 26–27.)

Measures promoting the circular economy in buildings and construction are strongly linked to the design and construction phase. The buildings' life cycle impacts can be taken into account in these phases. Private construction companies are

often responsible for the final solutions, but cities can steer their operations through zoning and criteria for public procurements. Developing a construction life cycle steering model for construction activity would provide the construction industry with more circular economy-complaint activity, and building, infrastructure and premises information models would assist in simulation and creation of use scenarios. In addition, cooperation between cities and large construction companies to promote timber construction and cooperation with construction companies should be developed through stakeholder forums. In addition to these, increasing the occupancy rate of premises would decrease the need for constructing new, and developing energy storage in new buildings would reduce the need for energy. (Silvonen & Kaskinen 2019, 35.)

Proactive city planning plays an important role in promoting the circular economy. Potential opportunities include area development sites in which it is possible to design entities as example sites of circular economy solutions on the whole. The city could therefore offer suitable platform sites and support entrepreneurs in developing platforms. Engagement is emphasised in the administration theme; going forward, it is seen as an increasingly significant resource, both in decision-making and developing residents' activities. With regard to zoning, it is important that the regulations of the plan can be implemented now or in the near future with market parties.



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