



Destination: A circular tourism economy

A handbook for transitioning toward a circular economy within the tourism and hospitality sectors in the South Baltic Region



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Title:

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List of abbreviations

CE	Circular Economy
EMS	Environmental management system
EU	European Union
GDP	Gross Domestic Product
HWMI	Hotel Water Measurement Initiative
IE	Industrial Ecology
OECD	Organisation for Economic Co-operation and Development
SB	South Baltic
SME	Small and Medium-sized Enterprise
UN	United Nations
UNWTO	United Nations World Tourism Organisation
WRAP	Waste and Resources Action Programme (UK)

1. Introduction

1.1 The purpose, target group and background of the report

This Handbook is the result of work carried out in Work Package 3 in the Interreg South Baltic innovation project, CIRTOINNO. The CIRTOINNO project aims to increase the innovativeness of small and medium-sized enterprises (SMEs) within the tourism sector by supporting the integration of *circular economy* elements into their services, products and business models. The project results are to be implemented by project partners in the participating South Baltic regions: Pomerania (Poland), Klaipeda (Lithuania), Blekinge and Kalmar (Sweden) and Bornholm¹ (Denmark). The partners are:

1. Pomerania Development Agency (Pomerania/Poland) – Lead Partner
2. Klaipeda Chamber of Commerce, Industry and Crafts (Klaipeda/Lithuania)
3. Public Institution Strategic Self-Management Institute (Klaipeda/Lithuania)
4. Energy Agency for Southeast Sweden (Kronoberg, Blekinge, Kalmar/Sweden)
5. Institute of Fluid-Flow Machinery Polish Academy of Sciences (Pomerania/Poland)
6. Centre for Regional and Tourism Research (Bornholm/Denmark)
7. Linnaeus University School of Business and Economics (Kalmar/Sweden).

As part of preparing the activities and outputs of later project phases, it has been a main purpose of the WP3 to build a common understanding among partners of the concept of the Circular Economy, especially regarding its possible implications for tourism small and medium-sized businesses (SMEs). As stated in the CIRTOINNO Project Application:

"As the circular economy is still a new concept in the PPs regions, the project will start with joint research activities (WP3), in order to identify existing CE solutions being in use in services sector, search for those practiced in tourism and collect best practices. On this basis recommendation for Project Partners relating to their further work will be defined. Solutions mapped under WP3 will be assessed in terms of their possibility to be applied in tourism SMEs. This will be the starting point for development of a self-assessment tool (WP4), which is one of the project's main outputs. The tool aims to help entrepreneurs review their currently business practices, compare them with provisions/principles of the CE and identify areas where new/improved solutions may be developed and introduced (...) In the next step, PPs will cooperate to create a model of cross-border training programme for tourism SMEs (WP5); aimed at

¹ The region of Bornholm has a different status in the CIRTOINNO project than the other regions, as there is no partner responsible for implementing the project results in this region.

improving innovation capacity of tourism SMEs from the South Baltic area and preparing them to develop and implement circular solutions into their daily business operations." (Pomerania Development Agency et al, 2016, p.3)

The final version of this CIRTOINNO Handbook will be presented at the end of the project in 2019, taking into account the experiences made during the later practice-orientated project activities.

Hence, the primary target group for this handbook is the CIRTOINNO project partners but to fulfil the goal of making a Handbook and due to the novelty of the topic of circular economy we also include in the primary target group other advisors, consultants and knowledge-institutions that promote, advise or generate new knowledge for tourism SMEs in or outside the South Baltic Region. Hopefully, these actors will broker the information in this report in order to support businesses to develop and engage in innovative and circular business models and activities. While major parts of the report supply contextual knowledge and understanding, a central section (chapter 4) provides real-world examples of business cases and concrete information of direct relevance for individual tourism SMEs as well as other actors in search of inspiration and examples of CE solutions, which may be adoptable in their organizations.

1.2 The Circular Economy – a new development paradigm

During the past three decades, many concepts and approaches such as ‘sustainable development’ and ‘green growth’ have been introduced to tackle the serious, global problems connected with the prevailing growth-based production and consumption model, such as resource scarcity, climate change, and pollution of land and oceans. The Circular Economy (CE) has many similarities with other concepts and approaches which address the relationship between humans and their environment. It does, however, have a distinctive usage and does generally have more radical implications than, for instance, the concept of sustainability, as defined and used in seminal Brundtland Report reported to the United Nations (Brundtland, 1987).

The concept of CE defines a set of principles for production and consumption, radically different from the linear ‘take-make-dispose’ regime prevailing in today’s market economies, based on continuous economic growth and increasing resource throughput. The CE goes further than calling for implementation of ‘sustainable’, ‘green’, resource-effective and environment-friendly technologies in isolated links of production systems. It requires a broader and more comprehensive design of radically alternative solutions over the entire life cycle of products and adoption of closing-the-loop production and consumption patterns within the entire economic system. The CE relies on value creation through restoration, regeneration and re-use of resources, enabled by new types of business

models and forms of consumption that discard ownership and rely on active ‘users’ rather than passive ‘consumers’. Thus, the CE concept introduces an agenda for radical change, which involves and integrates the production and consumption sides of our societies.

The CE holds big potentials for tourism businesses in reaching higher sustainability and profitability, not least related to the provision of accommodation, food and spa services and the related material flows of energy, foodstuffs, water etc. However, for obvious reasons, the manufacturing industries with their heavy flows of material resources have been and still are the pioneers in the CE. The tourism sector has hitherto not been given much attention as a possible context for CE initiatives and analyses. Hence, the CIRTOINNO project and its CE approach is in many ways pioneering and explorative, as it moves over unfamiliar territory and tries to lay down the first steppingstones and possible future paths for tourism businesses’ uptake of circular economy ideas.

Today, the precise content and implications of the concept of CE is contested and still subject to conceptual development as well as practical exploration among businesses, citizens and policy makers, especially within the tourism sector. Hence, the demanded task of creating a ‘Handbook of the Circular Economy for the tourism sector’ including identification of a set of ‘best/good practices’ for businesses, as defined for the Working Package 3 in the CIRTOINNO project plan and expressed in the sub-title of this report, certainly has been difficult to achieve at this point in time. Furthermore, the writing of the report has not only been complicated by its moving target, but also had to deal with a moving and changing point of departure for analysis. From a formal point of view, the report is only the initial draft of the Handbook to be revised at the end of the project by integrating the experiences of the later more practical activities. Accordingly, the report balances two divergent goals: on the one hand, providing a basic and enduring understanding of the concept of CE and, on the other hand, to show its highly open-ended and evolving nature.

As said before, the CIRTOINNO project aims to address how tourism SMEs may adopt and apply the CE in innovations and development activities, and thus has a clear *business-level (micro) perspective*. Presently, and exemplified with numerous real-world cases throughout the report, CE principles are applied mainly at the level of individual organizations and certain restricted areas of economic and human activity and not at the full-scale level of entire economies and social systems. Yet, it follows from an overall societal perspective that truly circular business models cannot be conceived as involving only a single firm and cannot be implemented by individual businesses without interaction with external actors, primarily through the supply chain (or ‘value cycle’).

Thus, fully understanding the CE and the economic and social dynamics through which businesses create and implement circular economy solutions requires a larger *transition system perspective*. The possible but still only embryonic and open-ended development towards a circular economy implies a transition of the dominant ‘technological’ – or ‘socio-technical’ systems of the linear economy. This encompasses major transformations in the

way societal functions such as dominant business models, financing, transportation, communication, education systems, housing, energy provision etc., are fulfilled. This involves not only technological changes, but also changes in regulation, laws and infrastructures, industrial networks, consumption cultures, etc.

In this sense, the subtitle 'handbook' may be misleading. There is no 'handy' path toward a more circular economy seen from a theoretical systems perspective. Without this context, however, merely conceptualising the circular economy as a new trendy type of business model, would be misleading.

1.3 Toward a circular economy within tourism in the Baltic Sea Region

Tourism plays an important role in the EU because of its economic and employment potential as well as its social and environmental implications. According to Eurostat, one in ten enterprises in the European non-financial business economy in 2014 belonged to the tourism industries. These 2.3 million enterprises employed an estimated 12.3 million persons. Enterprises in industries with tourism-related activities accounted for 9.1% of the persons employed in the entire non-financial business economy and 21.5% of persons employed in the services sector. The tourism industries' shares in total turnover and value added at factor cost were relatively lower, with the tourism industries accounting for 3.7% of the turnover and 5.6% of the value added of the non-financial business economy (Eurostat, 2017).

According to a United Nations World Tourism Organisation (UNWTO) publication titled "Tourism highlights", the EU is a major tourist destination, with five of its Member States were among the world's top 10 destinations in 2015 (World Tourism Organization, 2017). Tourism has the potential to contribute towards employment and economic growth, as well as to development in rural, peripheral or less-developed areas. Tourism can play a significant role in the development of European regions, and certainly does so in the Baltic Sea region. Infrastructure created for tourism purposes contributes to local development, while jobs that are created or maintained can help counteract industrial or rural decline.

Tourism in general, and coastal tourism around the Baltic Sea in particular, depends strongly upon the attractiveness of the destination and its natural resources. Nature is one of the most valuable assets for the Baltic Sea region, characterized by its natural surroundings, sandy beaches, nature parks and biosphere reserves. The Baltic Sea region also has a rich cultural heritage, which contributes to its growing attraction as a destination for domestic as well as international tourism. It is a region that has experienced much growth in the tourism sector, and some projections expect more than 20% growth in the sector over the next two decades (WWF Baltic Ecoregion Programme, 2010).

However, it is important to note that tourism has a major environmental impact and can create great pressure on local resources. Besides land use, it extensively demands resources

such as water, energy and food. Moreover, tourism activities result in increased waste generation (solid waste and wastewater), as well as noise and air pollution. These problems are exacerbated by the concentration of visitors in time and space, combined with the fact that some destinations may not be geared to withstand such pressures.

The tourism industry largely reflects the linear take-make-dispose model as it relies on large quantities of cheap and easily accessible resources. However, acknowledging that the resources are limited and that the prevailing consumption-oriented linear economic model is not viable any longer, the CIRTOINNO project has set the goal to support the transitioning towards a more circular tourism economy - and the present handbook should be seen as an initial small step towards reaching this goal.

There has, to our knowledge, not been any previous studies identifying the specific opportunities for a transition towards a more circular economy within tourism. Despite this, the CIRTOINNO project is not alone in such endeavours but framed by other initiatives at varying scales. The material flows within the tourism sector intersect with other sectors and therefore studies that take their point of departure outside tourism are relevant here as well. For example, the Ellen MacArthur Foundation analysed the consumer goods sector to identify priority goods where the most substantial and underexploited opportunities for circularity lie, finding that products such as furniture and washing machines are priorities within consumer goods. As accommodation and laundry are central aspects of the tourism product, consumer goods within the tourism sector are also a priority for moving toward a more circular economy (Ellen MacArthur Foundation, 2013).

Moreover, an EU scoping study has identified priority product sectors in need of and with a scope for greater circularity based on their exploitation of multiple materials and high environmental impacts of transitioning actions. The study prioritised the packaging, food, electronic and electrical equipment, transport, furniture, and building and construction sectors (Vanner et al., 2014). Out of these, food, transport as well as building/construction and furniture are product sectors related to the tourism industry (Hislop & Hill, 2011). The scoping study also analysed the cleaning and cosmetics product sector, which includes soaps, detergents, makeup etc. It found that this sector was not a priority as it did not share cross-linkages with as many priority material groups as the other sectors (Vanner et al., 2014).

Therefore, the CIRTOINNO project and its actions to enhance circular economic initiatives within the tourism sector in the South Baltic area is both a timely and necessary activity.

1.4 The aims and methodology of the handbook

The specific aims of this handbook are three-fold:

1. To provide an overall understanding of the concept of the circular economy (including how to distinguish it from related concepts within the 'green' economy concerning sustainable growth and development) and of the societal dynamics through which innovations and transitioning processes towards a circular economy are realised.
2. To describe and discuss the specificities of tourism and the South Baltic partner regions as the economic and political context for applying and developing the circular economy in the CIRTOINNO project.
3. To investigate and discuss the opportunities for small and medium-sized tourism businesses to adopt circular economy ideas, and to identify possible 'good practices' among tourism SMEs in developing and applying circular economy solutions, especially in relation to the fields of foci of the CIRTOINNO project: accommodation, food and spas services.

These three aims have been addressed through three different types of inputs and methodologies.

1. Search and review of research literature and other materials via the internet

In order to build on previous scientific knowledge on the circular economy within tourism and the hospitality sector, the author team initially carried out a literature search within the scientific databases Web of Science and Scopus. Surprisingly, as of spring 2017, when searching for the terms 'circular economy' and 'tourism', no useful hits were found. This is a clear indication that the CIRTOINNO project is one among the earlier movers within this field of study. It means that there is not much academic literature to build upon, targeting CE in the tourism sector. A positive interpretation is, that there is a large potential for the CIRTOINNO partners and the South Baltic tourism SMEs to become first-movers in the field, with the potential benefits and attention that this can bring.

As a consequence of the first literature search, the team formulated a search string that was a bit broader, retrieving academic literature from the past two decades in the databases containing one of the terms 'circular economy' or 'cradle-to-cradle'. These were combined with the sector in focus (expressed through terms such as tourism, tourist, accommodation, hotel, hospitality, recreation, recreational, experience economy, wellness or restaurant). Yet, even broadening the search string to include different terms, only a small number of hits came up (28 on Web of Science, 36 on SCOPUS). A complementary search was made on Google Scholar, retrieving 59 hits. After having eliminated duplicates, we had 73 unique publications. For each of these, we reviewed the abstract, and, if necessary, also the article, to assess whether it was relevant for the Handbook. The vast majority of the identified publications were based on Chinese cases,

which were short and written in poor English. Consequently, most of these were irrelevant and discarded. This second step of screening left us with only 11 relevant academic articles or books regarding circular economy in the tourism sector.

These 11 scientific publications were combined with a number of other core publications that collectively functioned as the point of departure of the ensuing snowball approach. The other core literature consisted of documents within the internal CIRTOINNO project database, publications and websites of central actors within CE in a European context, such as the Ellen MacArthur Foundation, The European Commission, the Nordic Council of Ministers, the UK based Waste and Resources Action Program (WRAP), as well as initiatives within national and international tourism organisations. All publications were searched and read, relevant information was extracted and snowballing lead to further publications. Potentially relevant references in the identified documents to other documents, programs, websites, actors and initiatives, were followed up, and so forth. This process also led to identification of studies and experiences that do not target the tourism sector as such, but where lessons learned or implications can be applied to the tourism sector.

The authors would like to bring attention to the fact that due to the rapid development and increasing level of interest in the circular economy, the result of the literature searches in the spring of 2017 represent a 'snap shot' of accumulated academic and so-called 'grey' literature (more technical reports published without a peer-review process). The picture of what the circular economy is and who its primary actors are, is likely to change rapidly, as the CE is an area of accelerating development, and initiatives are likely to move rapidly into service sectors including the tourism sector.

The consequence of working within a relatively new and unexplored field, can be witnessed by the number and types of tourism business cases included in the report. Initially, the CIRTOINNO project intended to deliver a number of 'best practise cases' on circular economy business cases within the tourism sector. However, the definition of a good practice, not to say 'best practice' must be taken into account.

"A good practice is not only a practice that is good, but a practice that has been proven to work well and produce good results, and is therefore recommended as a model. It is a successful experience, which has been tested and validated, in the broad sense, which has been repeated and deserves to be shared so that a greater number of people can adopt it"
(FAO, 2014).

As there were only very few fully developed and well-documented CE business cases from the tourism sector, it stands to reason that the authors have been unable to produce validated 'good practice' cases. Instead, the authors have broadened the search for such real-world examples by including also a number of available circular technologies from outside the tourism sector as well as initiatives that are not entirely circular but represent

certain CE opportunities for tourism SMEs. These business cases are presented in orange text boxes in Chapter 4.

It should be stressed however, that the resources available for the research has not allowed for critically checking the validity of the presented business initiatives, for instance through study visits, personal interviews with managers or other business representatives, or critical evaluation and control of data, provided by the presented company - or even better, neutral third parties. Hence, many of the included business cases are described solely on the basis of diverse marketing and information materials. Thus, they have not been critically reviewed.

Therefore, the authors of this report as well as the publishers and project partners do not accept liability for any of the products or companies included in the report. They are included merely as examples of businesses or products transitioning toward a more circular economy and by mentioning their firm names, brand names or services, this report in no way takes responsibility or is liable for the mentioned products.

2. Information and data from partners

Project partners have provided data and information for this report. Data and statistics on energy infrastructures, on energy production and consumption, on tourism organizations and development strategies, on environmental regulation, planning and authorities in the participating South Baltic regions and countries was collected by the author team through the generous help of the project partners (spring 2017).

On the basis of their collected data, partners also made a short SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis regarding transitioning towards circular economy in their particular regions. Since the detail and quality of the provided statistics, information and analyses from the individual partners varied heavily, this set of 'contextual data' has not been applied at its full potentials. However, the section 3.2 is based primarily on data provided by the partners.

3. Study visits

As part of Work Package 3 in the CIRTOINNO project, a number of visits to businesses, institutions and project organizations with relevant CE activities has been organised for the partner institutions. The visits included a presentation about the activities, and a guided tour around the facilities by the hosting manager/keyperson. The following businesses and organizations have been visited:

- The "EcoGrid 2.0 project" ², Bornholm March 22, 2017
- Green Solution Hotel, Bornholm, March 23, 2017 (See Case textbox section 4.2.3.)
- Hotel Guldsmøden, Aarhus/Denmark, June 26, 2017 (see Case textbox section 4.3.3.)
- The Energy Academy, Samsø/Denmark, June 27, 2017 (see textbox section 3.2.3.)
- The district heating plant in Brøndby, Samsø/Denmark, June 27, 2017
- The municipality of Samsø/Denmark, June 27, 2017 (see Case textbox section 3.2.3.)
- Samsø Golf Club, Samsø/Denmark, June 27, 2017

Although some of the visited actors and development activities are described in the report, their main purpose has been to contribute to the establishment of a common basic vocabulary and understanding of the CE concept amongst partners.

1.5 The structure of the handbook

The remaining part of the handbook is organized into three main chapters, each addressing one of the above-mentioned three aims respectively.

Chapter 2 provides a basic definition of the circular economy concept including how to distinguish the concept from related concepts within the 'green' economy concerning sustainable growth and development. The chapter further defines, from the perspective of businesses, the core CE elements and business models as well as the enabling and constraining factors for applying and diffusing CE solutions among SMEs. One central aspect is the systems approach to CE transitioning, meaning that at its full potential, the CE has the capacity to be transformative of the society as a whole. Accordingly, we also outline a multi-level transition perspective on how to understand the societal dynamics by which circular economy innovations and transitioning are realised. Finally, the chapter presents the analytical framework that has been developed for the analysis of CE in tourism SMEs.

In **Chapter 3**, the contextual settings for the application of circular economy solutions in the CIRTOINNO project are described. This contextual analysis is focussed on defining tourism as a distinct economic activity, in order to invite reflection upon the specificities of the sector in relation to identifying untapped CE potentials. The chapter also presents and maps the tourism sectors in the South Baltic partner regions of Pomerania, Klaipėda, Kronoberg and Bornholm, including the tourism industry structures, strategies and policies in the regions.

Chapter 4 in many ways forms the core chapter in terms of fulfilling the overall goal of a 'Handbook' with practically useful information, inspirational examples, references to further information etc. It analyses the specific implications of the circular economy for tourism SMEs and goes into detail about possible actions for developing and applying CE elements. This is structured along the three thematic fields that are the focus of the CIRTOINNO project.

² See <http://ecogridbornholm.dk/>.

These are accommodation services (4.2), food services (4.3), and spas (4.4). It should be clarified, that food and spa services are considered as hospitality operations within hotels and other accommodation forms. Thus, we only analyse material flows related to buildings and furniture in the section on accommodation. A fourth sector - that of energy - is also in focus. Due to the nature of energy production and consumption, it is included as a central resource in each of the three priority fields instead of as an independent field. We use the elaborated analytical framework (chapter 2) to present different possible business models or activities that can potentially be included in the realization of the circular economy. The framework is used for identifying possible firm-internal, firm-external, respectively sector-external opportunities and strategies within the three priority fields. These are then analysed in terms of whether they are possible to implement in the near future and the not-so-near future. As mentioned, chapter 4 also contains a number of business cases on selected, real-world circular economy initiatives. These case studies are intended to exemplify and further describe the theorized and conceptualized CE models and action frameworks, and thus provide crucial empirical evidence regarding CE solutions for tourism SMEs. They include examples that can give inspiration on how a tourism SME can get started with the first, possibly small CE steps, as well as examples that are more likely to help stimulate ideas and ambitions for where to aim towards in a longer-term transition process.

Finally, in [Chapter 5](#) we sum up the findings and discuss their further perspectives, not least in terms of possible recommendations for the further work of partners in the CIRTOINNO project.

2. An introduction to the Circular Economy

This chapter introduces the concept of the Circular Economy (CE), gives a brief presentation of schools of thoughts that has been sources of inspiration for the CE, and discusses how the circular economy is distinct from the current linear economic regime. This is followed by a presentation of a few key principles used CE literature, which are closely tied to so-called circular economy business models, which are also introduced. It discusses the involvement of consumers in the CE, introducing the concept of collaborative consumption. In order to address the challenges that SMEs will face in taking steps towards the CE, which often will require innovative processes and approaches, the chapter also discusses the CE as a regime transition, a shift that has implications for actors at many different levels, from the individual business, to public agencies and decision makers. This multi-level transition perspective helps position innovation processes and socio-technological innovation processes as socially and contextually embedded processes, which include far more than 'technological fixes'.

The chapter thus provides the theoretical discussion of the circular economy and the regime transition that a shift towards the CE will require. It is based on academic literature, as well as key CE reports, and responds to Aim # 1 (as listed in Section 1.3).

2.1 The history of the Circular Economy concept

Circular Economy as a concept has grown over a few decades to receive attention worldwide. It aims to provide solutions to overcome a number of the current environmental, climatic, economic and scarcity related problems that are becoming more and more apparent.

The Circular Economy concept does not have a single origin or originator. Contributions from several sources are noted, including the work of architect and economist, Walter Stahel (Ellen MacArthur Foundation, 2012; Walter R. Stahel, 2015; Winans, Kendall, & Deng, 2017), and the 'spaceship earth' metaphor presented by Barbara Ward and Kenneth Boulding in 1969, as well as the work of eco-economist Herman Daly on steady-state economy. Boulding's idea of economy as a circular system is seen as a prerequisite for maintaining the sustainability of human life on Earth, i.e. a closed system with practically no exchanges of matter with the outside environment (Ghisellini, Cialani, & Ulgiati, 2015). Pearce and Turner (1990) also contributed with conceptual frameworks for the CE concept such as the resource-products-pollution mode approach.

Theoretically, the CE concept is mainly rooted in ecological and environmental economics and Industrial Ecology (IE). Since its very beginning, CE presented itself as an alternative model to the neoclassical economics both from a theoretical and practical point of view

as it acknowledges the fundamental role of environment, including its functions and the interplay between the environment and the economic system. Moreover, CE looks at the environment as a system to imitate when redesigning production activities, in particular industrial or development patterns (Ghisellini et al., 2015).³

The following textbox briefly introduces six key schools of thought that have inspired the CE concept, as they are presented by Smolder & Sneider (2012, p. 2):

³ According to Ghisellini et al (2015), who have done a review of the research literature on CE, the roots of the concept can also be found in General Systems Theory as conceptualised by Von Bertalanffy in 1950 and 1968 as well as on Industrial Ecology, defined by Preston in 2012 (Ghisellini et al., 2015). General Systems Theory and CE both promote holism, system thinking, complexity, organizational learning and human resource development as important premises.

Schools of thought underlying the CE concept

- **Regenerative design**

Processes within all systems must renew or regenerate the sources of energy and materials that they consume, in order to stay within the limits of nature.

- **Performance Economy**

A vision of an economy in loops. This included the principles of product-life extension, long-life goods, reconditioning activities, and waste prevention. Selling services instead of goods was a cornerstone, proposing payment for the performance that products deliver rather than its materiality. This resulted in the notion of 'performance economy'.

- **Cradle to cradle**

A vision of material flows as loops. Technical nutrients should not have components that harm the environment, while biological nutrients should be biodegradable. The materials flow through an entire cycle from production over use to re-use or disassembly and refurbishment should be considered from the design. It also includes a cross-sector approach in order to allow for so-called industrial symbiosis.

- **Industrial Ecology**

Production processes are designed, organized and localized so that they function in ways that allow for synergies, and thereby mimicking the living systems.

- **Biomimicry**

Inspired by nature, this approach tries to imitate nature's designs and processes to find solutions in human society.

- **Blue Economy**

Blue economy gains knowledge from the way in which organisms are formed and stresses that the purpose of finding solutions for the challenges that we face should be determined by their local environment combined with their physical or ecological characteristics.

2.2 Distinction between linear and circular economy

The EU's scoping study to identify potential circular economy actions, priority sectors, material flows and value chains (Vanner et al., 2014) stresses the break from the traditional linear economy ('take-make-use-dispose'). Vanner et al. understand the circular economy as primarily "... a development strategy that enables economic growth while aiming to optimize the chain of consumption of biological and technical materials. A deep transformation of production and consumption patterns is envisaged to keep materials

circulating in the economy for longer, re-designing industrial systems and encouraging cascading use of materials and waste” (Vanner et al., 2014, p. iv).

The scope of the circular economy is a systemic transformation and therefore has the potential to transform production, services and consumption within entire value chains and across different value chains, thus closing resource loops in all economic activities (Hislop & Hill, 2011). A circular economy goes beyond the pursuit of waste prevention and waste reduction and aims at technological, organisational, and social innovation throughout the value chain in order to ‘design-out’ waste from the beginning (Ellen MacArthur Foundation, 2013).

The circular economy encourages the development of strategies, which ensure that upstream decisions in the value chain are coordinated with downstream activities and actors. CE strategies connect producers, distributors, consumers and recyclers, link incentives for each of these actors, and encourages distribution of costs and benefits across actors in the value chain.

A central theme of the CE concept is the valuation of materials within a closed-looped system with the aim to allow for natural resource use while reducing pollution or avoiding resource constraints and sustaining economic growth. The main point of the CE concept is to capitalize on the recycling of material flows and to balance economic growth and development with environmental and resource use (Winans et al., 2017).

The Ellen MacArthur Foundation is currently seen as the leading, global organisation on circular economy (Renswoude, Wolde, & Joustra, 2015a). For the Ellen MacArthur Foundation, the concept of the circular economy is ingrained in a continued economic growth paradigm. The CE is understood as *“a potential way for our society to increase prosperity, while reducing dependence on primary materials and energy” (Ellen MacArthur Foundation; McKinsey Center for Business and Environment, 2015, p. 4).*

In line with this vision, circular economy is defined by Charonis (2012) as a system that is designed to be restorative and regenerative. The Ellen MacArthur Foundation stresses that this is ‘by intention and design’. Thus, CE can be considered as an ‘alternative growth discourse’ and not as an ‘alternative to growth discourse’ (Charonis, 2012). However, it should be mentioned, that much of the conceptual work on which CE is based (such as the ‘Spaceship Earth’ concept) advocates for alternatives to growth discourses, at least if growth is understood as growth in material throughput.

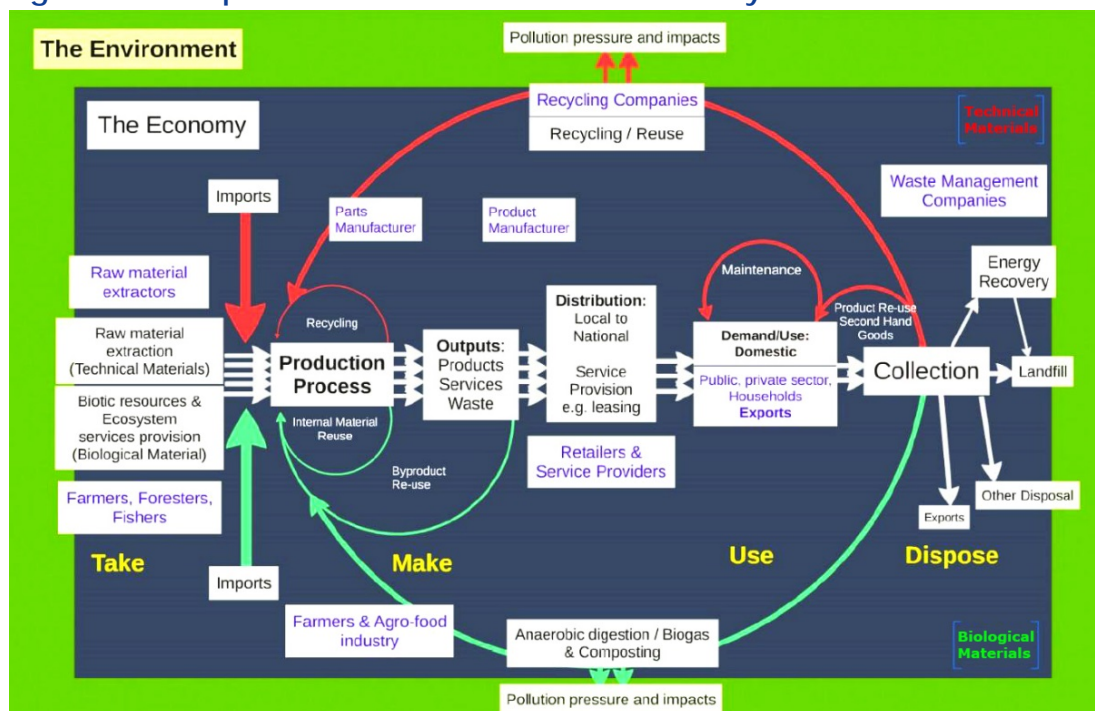
Key CE principles as formulated by the Ellen MacArthur Foundation

The Ellen MacArthur Foundation has formulated three key principles for their CE approach: 1) Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows; 2) Optimize resources yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles, and 3) Foster system effectiveness by revealing and designing out negative externalities" (Ellen MacArthur Foundation & McKinsey Center for Business and Environment, 2015, p. 25). The overall principles converge between the different leading CE actors.

The EU scoping study has provided relatively simplified illustrations of the linear and the circular economy concept (see Figures 1 and 2 below), based on work by Brink and colleagues for the Institute for European Environmental Policy (2014). The figures show the shift from a linear economy (of take, make, use and dispose) to a circular economy in terms of lifecycle, material flows, impacts, actors and instruments (Vanner et al., 2014).

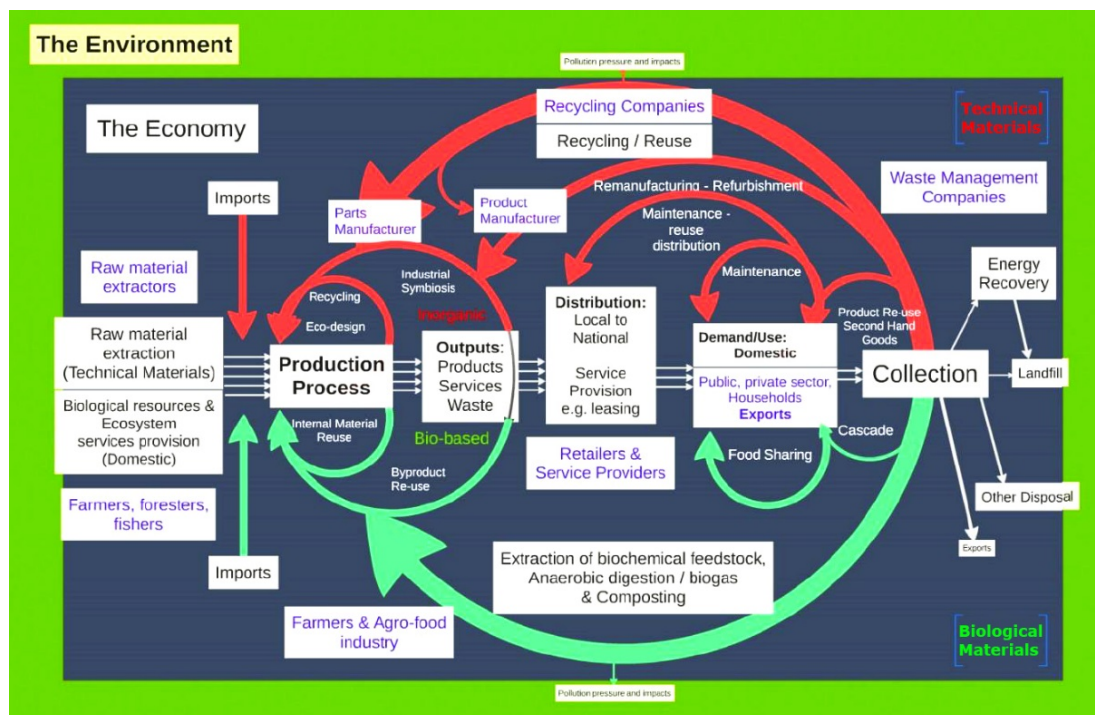
It is important to note that today's linear market economies includes some circular aspects such as recycling, maintenance, composting etc. and also – maybe even better than other economic systems - is geared to optimize and economize the use of (any) production resource. Yet, while production and value creation in the linear model mainly take place along unidirectional input/output supply chains, value creation in a circular economy relates to continuous cascades of related activities and resource flows, totally obscuring the upstream/downstream direction of linear supply chains. Figures 1 and 2 indicate that a circular economy can be taken forward with different approaches including product design for durability, disassembly, refurbishment and reuse; cascading components, material recycling, biochemical extraction, composting and anaerobic digestion, circular/regenerative forms of consumption, and industrial symbiosis.

Figure 1: A 'simplified' illustration of a linear economy model



Source: Vanner et al. (2014, p. 5)

Figure 2: A 'simplified' illustration of a circular economic model



Source: Vanner et al. (2014, p. 5)

When applying circular economy ideas, including the founding principle that waste should be minimized or virtually eliminated as it is 'designed out' of economic activities (Ellen MacArthur Foundation, 2013), resources in general can be distinguished into two overall categories: Technical materials and biological materials.

- **Technical materials** include minerals, metals, polymers, alloys and hydrocarbon derivatives (plastics), which are not biodegradable and are based on finite resources.
- **Biological materials** include all materials of biological origin such as agricultural and forestry goods/commodities, bio-based wastes and residues, which are generally non-toxic and renewable to an extent as they are limited by the availability of land, water and nutrients and can be returned to the biosphere, where they act as nutrients.

Varying CE approaches in different parts of the world

The CE concept does not have a common usage. It has evolved differently depending on diverse cultural, social and political systems. In China, CE is promoted as a top-down national policy, while in other areas and countries like the European Union, Japan and USA, it is a tool to design bottom-up environmental and waste management policies (Ghisellini et al., 2015; Su et al., 2013). In the early 1990's in Germany, for example, the CE concept was introduced into environmental policy in order to address issues concerning raw material and natural resource use for sustained economic growth. In China, in the late-1990's, the focus was on creating symbiotic types of interaction across varying industries through co-location in special industrial parks, whilst in the mid-2000's emphasis shifted to the development of waste-based closed loops within a company or across different producer and consumer groups. In China, the concept is also used as a mechanism for profitable product development, new technology development, upgrading equipment, and improving industry management objective (Winans et al., 2017).

The CE concept's primarily application in the UK, Denmark, Switzerland, and Portugal is within waste management although there are also business models that apply material circular reuse concepts. Some CE-related initiatives, evident in Korea and Japan, aim to increase consumers' responsibility for material use and waste. In North America and Europe, corporations mainly apply the CE concept with the aim to enhance reduce, reuse, and recycle programs, as well as to conduct product-level life cycle studies (Winans et al., 2017).

The distinction between technical and biological materials is not always clear (as is for example the case with biodegradable plastics). The management of energy and water

resources can often be seen as both biological and technical materials, to be included within a closed loop economy.

2.3 CE principles as basis for (business) action

Because CE is still a new field of study, and because of its cross-sectorial nature, several (different, competing) operationalisations or organizing principles exist. This can be confusing for non-CE-specialists. In the following, we present some key operationalisations within the CE literature, as they look in mid-2017, for the CIRTOINNO partners to be able to recognize these as CE-concepts, when or if they meet them elsewhere.

According to Ghisellini et al. (2015) who have done an extensive review on the CE literature produced since the late 1990s, the circular economy mainly emerges through three main 'actions', i.e. the so-called **3R principles: Reduction, Reuse and Recycle**.

- The **Reduction principle** aims to minimize the input of primary energy, raw materials and waste through the improvement of efficiency in production consumption processes. This can take place thanks to, for example, introducing better technologies, or more compact and lightweight products, simplified packaging, more efficient household appliances, a simpler lifestyle, etc. The related concept of resource efficiency implies resource reduction and increasing economic and social well-being at the same time (Ghisellini et al., 2015).
- The **Reuse principle** refers to *"any operation by which products or components that are not waste are used again for the same purpose for which they were conceived"* (Vanner et al., 2014, p. 8). The reuse of products is very appealing in terms of environmental benefits as it requires fewer resources, less energy, and less labour, compared with the manufacture of new products from virgin materials or through recycling or disposal (Castellani, Sala, & Mirabella, 2015; WRAP, 2011). Reuse of products avoids the emission of environmentally dangerous substances. The diffusion of reuse involves a consumer demand for reused and remanufactured products; the design of durable products for multiple cycles; combined with incentives for companies to choose business models based on take-back or remanufactured products (Prendeville et al., 2014, here from Ghisellini et al., 2015).
- The **Recycle principle** refers to *"any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations"* (Vanner et al., 2014, p. 8). Recycling of waste offers the opportunity to benefit from still usable resources and reduce the quantity of waste that needs to be treated and or/disposed of, thus also decreasing the related environmental impact. However, if a company or the society is able to recycle all its waste, it may be less

interested in reducing the amount of waste (Gwehenberger et al., 2003 in Ghisellini et al., 2015).

Stahel (2013, here in Ghisellini et al. 2015) argues that in terms of resource efficiency and profitability, reduction and reuse are more circular and sustainable than recycling. This could be an important prioritisation to guide possible CE steps in the tourism sector.

The 3Rs have later been expanded to **the 6Rs**, formulated as **Reuse, Recycle, Redesign, Remanufacture, Reduce, and Recover** (Jawahir & Bradley (2016), here from Winans et al., 2017). However, the Ellen MacArthur Foundation use slightly different concepts, when they present the three additional principles, namely **appropriate design**, which stresses the importance of the design stage in finding new solutions in order to avoid waste discharge, hence products should be designed for a cycle of use, disassembly and reuse **reclassification of materials** into technical materials and nutrients, and **renewability** which places renewable energy as the primary energy source for circular economy in order to reduce fossil energy dependence and enhance the resilience of the economic system against the negative effects of fossil fuel source (Ellen MacArthur Foundation, 2012). We consider that such differences in terms are mainly of academic interest and does not have major practical implications for, for example, the CE transition for tourism SMEs.

In the below textbox, we present an alternative framework with the same purpose, a so-called 'business action framework', developed by the Ellen MacArthur Foundation, to guide businesses on a conceptual level in their search for where and how to start taking steps towards circular economy.

ReSOLVE - An alternative CE business action framework

A "business action framework" has been developed by the Ellen MacArthur Foundation, based on three fundamental CE principles. It involves 6 guiding actions (here from Ellen MacArthur Foundation & McKinsey Center for Business and Environment, 2015, p. 25ff).

Regenerate	Shift to renewable energy and materials; reclaim, retain, and regenerate health of ecosystems; and return recovered biological resources to the biosphere.
Share	Share assets (e.g. cars, rooms, appliances); Reuse or use second-hand; prolong life through maintenance, design for durability, upgradability, etc.
Optimise	Increase performance/efficiency of product; remove waste in production and supply chain; leverage big data, automation, remote sensing and steering.
Loop	Remanufacture products or components; recycle materials; digest anaerobically; extract biochemicals from organic waste.
Virtualise	Books, music, travel, online shopping, autonomous vehicles, etc.
Exchange	Replace old non-renewable with advanced renewable materials; apply new technologies (e.g. 3D printing); choose new product/service (e.g. multimodal transport).

2.4 Circular business models

A central aspect of a transition toward a circular economy is the innovation of circular business models. A business model is a conceptual tool used in order to depict how an organisation creates, delivers and captures value (Renswoude et al., 2015a; Renswoude, Wolde, & Joustra, 2015b). In order to obtain a circular business model, a business does not need to close all its resource loops within the firm. A circular business model can also be one in which the company operates as part of a larger system and adds to other companies' circular business models, which together create a closed loop system.

Business model innovation offers an approach to transitioning toward a new socio-techno-economic system through a re-conceptualisation of the purpose of the firm, the logic that drive its value-creation and by rethinking its perceptions of value. This is difficult as the transition towards a circular economy within a firm requires or prerequisites systematic change because the current system does not allow for the required behavioural change. An example is the idea to shift the consumer from being owner to being user, meaning that value creation in the firm is not generated through production, sales and service of products, but through production and service of products. Such a shift works against vested interests by companies with linear business models, and external supply chains that rely on companies with linear business models. Consumers, who may be deeply ingrained in cultural perceptions that product ownership is needed, may also work against this. Supply chains may also be difficult to affect as they may be dispersed geographically or there may be low levels of trust between companies. Recovery infrastructure also needs to be developed and may depend on non-existent business partners (Renswoude et al., 2015a).

Cycles of circular value creation and related business models

The Ellen MacArthur Foundation (2013) has described four [cycles of circular value creation](#) and Renswoude et al. (2015a, p. 6 ff) have pointed out additional two. These six value-creating cycles are presented below.

1. [The power of short cycle](#)⁴

Maintenance, repair and adjustment of existing products and services. Business models based on short cycle material flows include: Pay by use (payment to use product or service), repair (product life extension through repair services), waste reduction (primarily in the production process), sharing platforms (facilitating that products and services are shared among consumers), and progressive purchase (paying small amounts periodically before purchase).

2. [The power of long cycle](#)

Extending lifetime of existing products and processes. Business models based on long cycle material flows include: Performance based contracting (long-term contract and responsibility with producer), take back management (incentive to ensure the product gets back to the producer), next life sales (product gets a next life), and refurbishment and resale (product gets a next life after adjustments).

3. [The power of cascades](#)

Creating new combinations of resources and material components, and the purchasing of upcycled waste streams. Business models based on cascading of material resources include: Upcycling (materials are reused and its value is upgraded), recycling (waste handling and repurpose, where materials are cascaded and reused, recycled or disposed), and collaborative production (cooperation in the production value chain leading to of closing material loops).

⁴ The short cycle is also sometimes called "the inner cycle".

4. The power of pure circles

100% reusing resources and materials. Business models based on pure circles of material resources include: Cradle to cradle (product redesign to 100% closed material loops), and circular sourcing (only sourcing circular products or materials).

5. The power of dematerialized service

Shifting physical products to virtual services. This implies resource savings and productivity gains. Business models based on dematerialised services include: Physical to virtual products (shifting physical activity to virtual, where possible), and subscription based rental (consumers can use a product of a service against a low periodic fee).

6. Produce on demand

Only produce when demand is present. Business models in this category include: Produce on order (only producing when demand is present), 3D printing (using 3D printing to produce what is needed), and customer vote (making customers vote which product to make). (Renswoude et al., 2015b).

As has been presented above, transitioning into a more circular economy may lead to serious disruption of current business models, whilst it may also be perceived as a new innovative potential, leading to the development of new business models. In the following, we briefly introduce a number of circularly based business models that may be of relevance for SMEs in the tourism sector.

2.4.1 Waste as a resource business model

In a linear economy, waste management is considered simply as a way to get rid of waste materials through landfilling or incinerating. As this continues to be the dominant disposal pattern worldwide, it generates a huge loss of valuable resources as well as has very heavy environmental impacts. A new perspective on waste is emerging. One that recognizes waste management as a recovery of resources process – as well as environmental impact prevention. In so doing, waste management becomes an important sub-sector of the circular economy, with the emergence of new business models and types of operators. Some of these are called ‘scavengers’ and ‘de-composers’ and refer to companies that are capable of extracting resources out of waste by applying innovative recovery technologies (Ghisellini et al., 2015).

Business models that aim to use waste as a resource can promote cross-sector and cross-cycle links by creating links for secondary raw materials.

Waste management business models relevant for tourism SMEs

Within the three tourism-based fields of activity that will be treated more in depth in this report - hotel accommodation, hotel restaurants and spas (see Chapter 4) - it is perceivable that businesses can potentially adopt waste management business models as part of their product line. Hotels may sell used textiles and linens, hotel restaurants may sell food waste, grease from their drainage sludge and other kitchen-based resources, while spas may sell greywaters with specific qualities as well as chemicals.

2.4.2 Eco-design

Eco-design business models are based on products that are made with fewer resources, using recycled and renewable resources and using components that last longer and are easier to maintain, repair, upgrade and recycle. We can distinguish between two overall types. Business models based on product redesign by way of incremental improvements to existing products and business models based on new product design based on the development of new resource-efficient products that can be repaired, upgraded and recycled (EEA, 2016).

Economically and socially, eco-design can reduce production costs, which theoretically can lead to increased purchasing power for consumers, which in turn can improve their welfare (Ellen MacArthur Foundation, 2013). Products that are designed to last longer and that can be repaired or upgraded easily by product owners or repair service facilities, can retain their value in society for much longer than if the product were discarded, even if the product had been made from recycled materials. Thus, the CE adds more value than business models merely based on recycling. The social effects of eco-design-based business models include job creation and increased consumer trust in sustainable products and services (EEA, 2016).

Environmentally, eco-design can contribute to the decoupling of economic growth from continued resource consumption. This is possible through a decrease in the use of materials and of energy, through higher recycling rates and through the reduction of waste production (Ellen MacArthur Foundation, 2013). There is a risk of so-called environmental rebound effects, i.e. that the new business models are more environmentally straining than the processes they seek to alleviate, for example the longer use of relatively inefficient products. These processes, however, depend strongly on patterns of use (Gutowski et al. (2011) in EEA, 2016).

Eco-design business models relevant for tourism SMEs

Eco-design as a business model can be applied in all furniture and energy-related products and devices. Eco-design in refurbishing of hotels and in new constructions are treated in more detail when we analyse CE potentials in accommodation services (Chapter 4).

2.4.3 Other examples of circular business models

Finally, the Ellen MacArthur Foundation provides a number of examples of other circular business models and organizational strategies, including:

- **Leasing** products from current high-value examples such as (industrial) equipment to cars and clothes. In a sense, the tourism industry already provides such kind of leasing services for tourists, who leave everything but what can fit into a suitcase/car at home and rely on provision frames at their place of accommodation or destination. This may be a prosperous opportunity for the tourism industry to step forward. Leasing creates an incentive for companies to recover the products and materials and get repeated value from them, while offering consumers the service they want, and assuring them of minimal waste.
- **Reuse**: A most obvious but also most neglected strategy. It may encompass re-use centres for diverse sorts of equipment and facility management companies.
- **Remanufacturing**: This involves restoring a product to a like-new or better status. It is especially relevant for companies that produce complex, higher value products and thus not so much for SMEs further down the value chain. Tourism SMEs can however conceptualise themselves as an important consumer group that can drive product innovation.

Other circular business models relevant for tourism SMEs

Tourism SMEs can be important consumers of remanufactured products, thereby helping create a demand for such products. They may consider leasing laundry or kitchen equipment, and thereby get the top-of-the-line technology and make savings on related running costs (for water, electricity, etc.). The reuse of equipment, furniture, cutlery etc., may be taken into account in a redesign of a hotel or restaurant. See more in Chapter 4.

2.5 Consumers in the circular economy

Most of the information and insights offered about the CE focus on the production side of transitioning. Transitioning, as argued earlier, takes place in a societal context where the entire landscape of how we produce and consume is affected. The CE is therefore as much a transition that takes place at consumption side, as well as in the interaction between producers and consumers. The promotion of consumers' co-responsibility is therefore crucial for enhancing the purchase and use of more sustainable products and services (Sauvé, Bernard, & Sloan, 2016; Su, Heshmati, Geng, & Yu, 2013).

However, consumers' responsibility should not be understood as individualised. Moreover, consumers' engagement in transition strategies expectedly will be enhanced through easy access to knowledge about product qualities and the circular resource flows that are embedded in all products and services. Functional instruments for 'green' consumers are specific information and labelling systems covering for example food, non-food products as well as services (Ghisellini et al., 2015). The proliferation of social sharing and consumer platforms in recent years is a testament to consumers' willingness and demand to engage in responsible consumer behaviour – and the need to do so as part of an engaged community.

2.5.1 Collaborative consumption

Collaborative consumption is based on sharing, swapping, bartering, trading or leasing products and other assets such as land or even time. This is often organised around consumer-to-consumer direct contacts based on online sharing market places. Airbnb is an example of a hugely popular and profitable service.

Possible environmental benefits include a decrease in the use of natural resources, energy and emissions in both production and consumption based on longer as well as more intensive use of existing products. However, there are also many challenges as hinted at above. Longer and more intensive use of products does not guarantee any positive environmental impacts if these are inefficient. Social effects can also be both positive and negative. Positive effects include social interaction and cohesion, perhaps job creation. Possible negative effects include unfair price competition against more traditional products and taxation practises (EEA, 2016).

As the ownership is at the core of our present consumption model, the loss of ownership is one of the strongest potential barriers that could limit the development of collaborative consumption. However, collaborative consumption models are recognized as one of the best available options for consumers to shift to CE from our current linear economy models (EEA, 2016).

Relevant tourism examples involving collaborative consumption

Peerby is an online platform that matches people in temporary need of a specific object with those who have the object and are willing to lend it, free of charge. It started in 2011, and *Peerby* has enabled 30,000 lending and borrowing transactions between its 100,000 members, leading to a net decrease in the need for new products (EEA, 2016). Within tourism, this can be borrowing of local campers and caravans, tents, hairdryers, canoes, bicycles, decreasing the amount of 'stuff' that tourists must transport from one destination to another. This online platform is based on trust and on increasing social interaction within neighbourhoods. There can be different barriers that make one hesitate to lend possessions to temporary visitors, including insurance issues.

The originally Dutch platform *Thuisafgehaald* (*Shareyourmeal*) makes it possible to share spare homemade food between people. Eight participating countries have shared approximately 133,000 meals (2015), reducing food waste and strengthening social ties between neighbours. This can perhaps be re-thought as a tourism product by which tourists are invited into the homes of local residents, exchanging cultures and food cultures.

2.6 The Circular Economy understood as a regime transition

As outlined above, the concept of CE defines a set of principles for production and consumption, radically different from the linear 'take-make-dispose' regime prevailing in today's market economies. In fact, much of the impetus for developing and applying CE principles relates to explicit interests – environmentally, economically and/or ideologically motivated – in transforming the fundamental modes of producing and consuming, for instance regarding the human-nature relationship. Presently, CE principles are applied mainly at the level of individual organizations and certain restricted areas of economic and human activity and not at the full-scale level of entire economies and social systems. In other words, the CE is still just an imaginary concept, contesting the dominant linear economic system. Accordingly, to fully understand the CE requires a *system transition perspective*.

In the following, we shall briefly discuss the CE in a transition theoretical perspective. The purpose of this is not to further complicate the already complex concept of CE. Rather the purpose is to provide a larger, overall perspective for understanding the dynamics through which the CE solutions are developed and diffused in societies. Moreover, introducing an overall multi-level transition perspective, describing how CE innovations are embedded in

larger socio-technological systems and processes, is useful for clarifying the specific 'niche' level of (tourism) firms and supply chains, which is in focus in the CIRTOINNO project.

2.6.1 Innovations – socially and contextually embedded processes

Before defining (system) transition let us first look at another social change process, namely (firm) innovation. Shortly, innovation can be defined as a new idea, device or method. In broader terms, innovation can be defined also as the creation and application of improved solutions that meet new requirements, unarticulated needs, or existing market needs, accomplished through more effective or otherwise advantaged products, processes, services, technologies, or business models. Further, we should distinguish between *radical* and *incremental* innovation:

"A radical or disruptive innovation is an innovation that has a significant impact on a market and on the economic activity of firms in that market. This concept focuses on the impact of innovations as opposed to their novelty. The innovation could, for example, change the structure of the market, create new markets or render existing products obsolete. Incremental innovation concerns an existing product, service, process, organization or method whose performance has been significantly enhanced or upgraded. This can take two forms: For example, a simple product may be improved (in terms of improved performance or lower cost) through use of higher performance components or materials, or a complex product comprising a number of integrated technical subsystems may be improved by partial changes to one of the subsystems." (Platform, 2016)

The circular economy can be considered a truly radical and disruptive innovation.

Traditionally, among researchers, as well as in broader public spheres, there has been a bias towards an understanding of innovations as (advanced) *technical/technological* change, progress and rationalization, while development of, for instance, the social organization of working and communication processes are less often considered as 'innovations'. Such high-tech bias in the understanding of innovations is in line with the so-called 'linear model of innovation'. According to this model, scientific discoveries and inventions, achieved through research carried out by universities, are taken up and applied by pioneering firms and then in turn diffused and commercialized in society at large.

In more recent years, more open-ended and social understandings of innovations, emphasizing the role of actors and knowledge creation at later stages of the innovation process (i.e. other than initial scientific processes) have gained popularity, such as the user-driven model of 'Open Innovation' (Chesbrough, 2003). Today, it is a widespread conception within the innovation research, that innovations are not realised through purely cognitive processes of university scientists and researchers. Rather, innovations are realized in distinct social systems, characterized by certain structural conditions (e.g. economic

resources, power relations, transport and communication infrastructures) and formal and informal institutions (e.g. laws and legislation, cultural values and habits), that all frame and influence the learning and knowledge of actors in the system (Wenger, 2010).

Thus, the knowledge and learning processes by which innovations are realized, *are situated in specific social and geographical contexts* and rely on social interaction among communities of actors who belong to particular domains of expertise, occupations and work tasks and thus share certain practices and values (e.g. IT-software programmers, mechanical engineers, sales and communication personnel, creative designers, and service craftsmen). Such contextual, practice-based forms of learning may be sourced from formalized research processes, conducted via internal research departments of firms or via interaction with researchers at universities. However, the majority of companies, especially among smaller tourism firms, do not conduct such kinds of formal research. Rather new knowledge is provided through what academic notions call 'learning-by-doing' (Rosenberg, 1976), 'learning-by-using' (Von Hippel, 1988) and 'learning-by-interacting' (Lundvall, 1988). These encompass, for example, exchange of knowledge and information with a supplier regarding the functionalities of products and technologies, or dialogue with consumers and users providing feedback about the experiences of using particular products and ideas for how to improve them.

This social perspective on learning and innovation seems highly relevant for the understanding of how the ideas and practical solutions of CE are developed and diffused, at least in European countries. The innovation and diffusion of CE solutions in Europe do not take the form as science-driven inventions, created at certain hot spots of top-ranked universities and from there adopted by companies and institutions. Rather, as appears from the varying literatures about the ongoing development and introduction of CE solutions throughout our economies (unlike in China, where the introduction of CE principles was basically a top-down process), such innovation processes are realized through bottom-up initiatives, driven by individual private companies in cooperation with their suppliers and customers, and targeted specific opportunities connected to particular activities and situations.

It should be stressed, however, that the capacity for absorbing new knowledge from the external environment and using it for the realization of innovations, i.e. what Cohen & Levinthal (1990) have called the "absorptive capacity", differs heavily between firms, depending on, for instance, their human resources and their positioning in markets and global production networks (do they operate on markets for standardized products and routinized productions, where prices are the main competition parameter, or do they operate on less stable, continuously shifting markets for high-end specialty products, requiring close interaction with customers, suppliers, research centres, etc.?)

Firms in the 'old', high-income market economies like Sweden and Denmark, would in general be expected to be more accustomed to operating in global, competitive markets,

characterized by complex, ever changing demands and needs of acquiring the latest state-of-the-art knowledge for continuous innovation of products and processes, than firms located in the post-communist, low-income market economies of Poland and Lithuania. That being said, it should be stressed that the companies that are the focus of the CIRTOINNO project, i.e. tourism SMEs often owned and run by a family, in all parts of the world are considered a business group with a low absorptive capacity and limited innovativeness. This is due to the relatively low educational level of their staff, lagging managerial professionalism, limited financial resources, reliance on widespread standard technologies etc. Hence, in Sweden and Denmark as well as in Poland and Lithuania, developing and diffusing CE solutions among tourism SMEs will fundamentally rely on the ideas and initiatives of business managers, varying sorts of skilled staff, networks of suppliers, customers and other stakeholders, including business advisors and sectorial organizations, rather than on research projects of universities or legislation and policy schemes of central agencies.

2.6.2 Socio-technological transition processes

The above definition of innovation and learning as socially embedded processes nicely introduces the subject of 'transition'. Coenen, Benneworth, & Truffer (2012) define transition *"as shifts or 'system innovations' between distinctive socio-technical configurations encompassing not only new technologies but also corresponding changes in markets, user practices, policy and cultural discourses as well as governing institutions"* (Coenen, Benneworth, & Truffer, 2012, p. 968). As indicated in this quotation, the kind of systems studied in transition studies, usually are designated as 'technological' – or 'socio-technical' systems:

"Technological Transitions (TT) are defined as major technological transformations in the way societal functions such as transportation, communication, housing, feeding, are fulfilled. TT do not only involve technological changes, but also changes in elements such as user practices, regulation, industrial networks, infrastructure, and symbolic meaning." (Geels, 2002, pp. 1257).

A core field of applying transition theory is 'sustainability transitions', for instance regarding the de-carbonization of energy and transport systems (Verbong & Geels, 2007), biodiversity and food security within agriculture (Spaargaren, Oosterveer, & Loeber, 2012), or waste or water management and urban development (Brown, 2008; Truffer, Störmer, Maurer, & Ruef, 2010). The transition in focus here, i.e. the transition from the linear economy to the circular economy, can be considered such a 'technological sustainability transition'.

Studies on technological transitions usually distinguish between three different levels (macro, meso and micro) at which change processes occur, using the terms of landscapes, regimes and niches, respectively. The conceptual inclusion of these three levels is the reason

for the term 'multi-level perspective', used in transition studies and adopted here. In order to introduce the main idea of such a multi-level transition perspective, let us start by defining the core concept of (technological) 'regimes':

"A technological regime is the rule-set or grammar embedded in a complex of engineering practices, production process technologies, product characteristics, skills and procedures, ways of handling relevant artefacts and persons, ways of defining problems; all of them embedded in institutions and infrastructures" (Rip & Kemp, 1998, p.340)

Thus, it is important to note that a technological/socio-technical *regime* does not only encompass distinct instrumental/technical devices for specific fields of application designed by scientists and engineers, but has a much broader meaning and also includes, for instance, the practices of users, the regulation schemes of policy makers, the industrial networks, financial and knowledge infrastructures, cultural values of consumers and varying civic groups, that frame and sustain the use and creation of a particular technology. (Geels, 2002) distinguishes seven dimensions in a socio-technical regime: technology, user practices and application domains (markets), symbolic meaning of technology, infrastructure, industry structure, policy and techno-scientific knowledge (see also Fig. 3).

To illustrate the possible implications of this understanding in relation to transition towards circular economy, the prevailing linear economy regime relies on, for instance, a set of policies and regulation schemes regarding (lagging) taxation and management of natural resources that allow firms to externalize the costs of the environmental impact of their productions in the pricing of products. The linear economy regime is also based upon certain cultural perceptions, which are deeply integrated in the curriculums of educational institutions, perceiving nature as 'something out there', something that is disconnected from the human society. The dominant linear regime thus constrains the diffusion of CE principles.

To further introduce the basic idea in a multi-level transition perspective, landscapes, regimes and niches are organized in a nested, hierarchical manner, meaning that regimes are embedded within landscapes and niches within regimes (see also Figure 3). The landscape-level of transition systems contains a set of heterogeneous factors, such as oil prices, economic growth, wars, emigration, globalization, political coalitions, cultural and normative values, environmental problems like climate change and resource scarcity. While regime refers to rules that enable and constrain activities within socio-technological communities, the landscape is an external structure or context for interactions of actors (Geels, 2002). The context of landscape is even harder to change than that of regimes. Landscapes do change, but more slowly than regimes that relatively often generate incremental innovations. In contrast, radical innovations are generated in 'niches', which offer some protection because the selection criteria are very different from those prevailing at the regime level. Geels (2002) mentions as an example of such 'protected niches' the army, which has stimulated many radical innovations in their early phases (e.g. digital

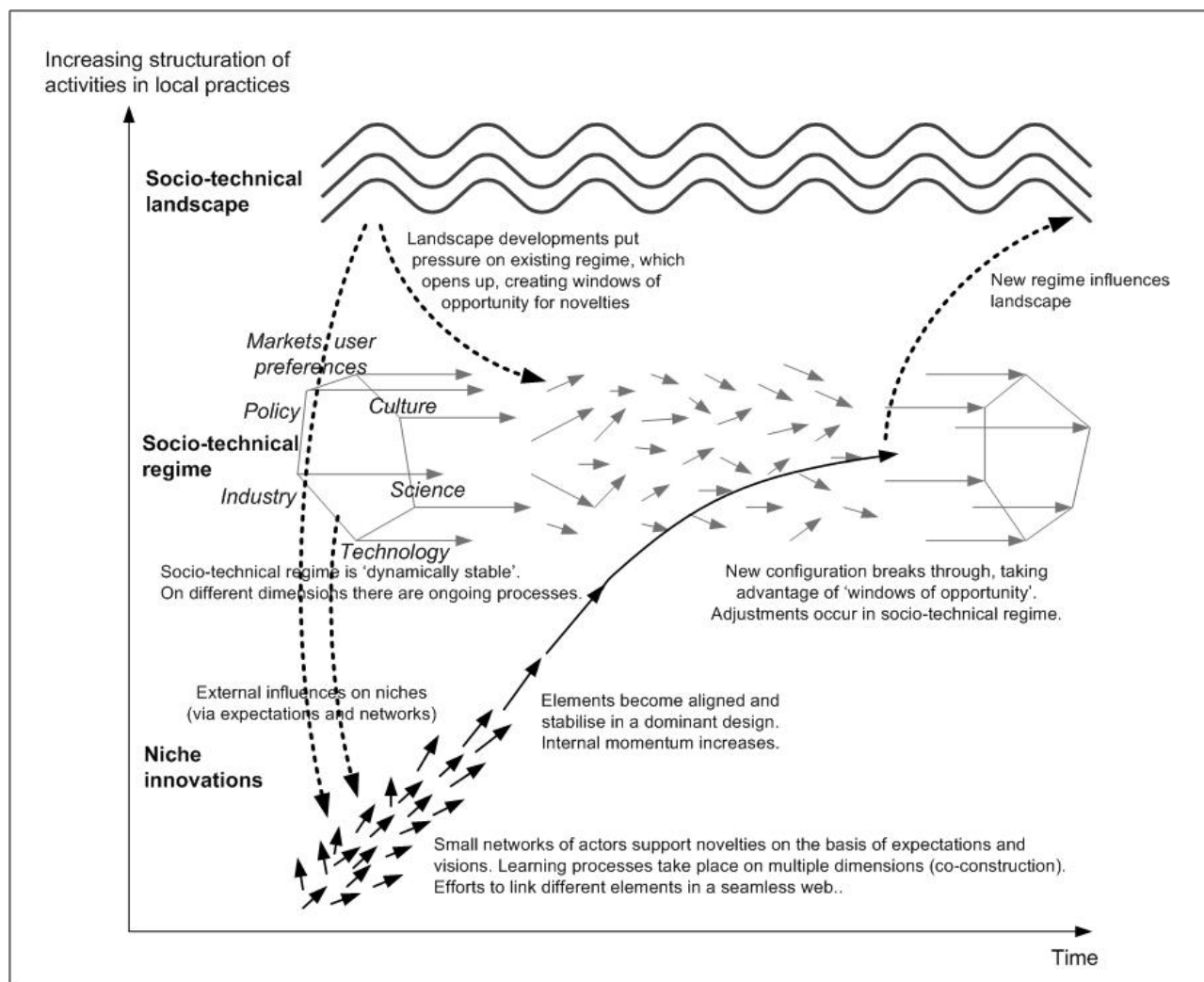
computer, jet engines, radar). The innovations created in niches emerge in the context of existing regimes and landscapes and as responses to their specific problems, rules and capabilities. Niches are important, because they provide locations for social learning processes like the above mentioned (i.e. learning by doing, learning by using and learning by interacting). Niches also provide platforms for building of the social networks, which support innovations, e.g. supply chains and user-producer relationships. Accordingly, niches are crucial for socio-technological transition because they provide *"the seeds for change"* (Geels, 2002, pp. 1260-61).

Geels (2002) further explains the ideas, encapsulated in Figure 3, in the following way:

"The major point is that Technology Transition occur as the outcome of linkages between developments at multiple levels, represented with vertical dotted arrows. Radical innovations break out of the niche-level when ongoing processes at the levels of regime and landscape create a 'window of opportunity'. These windows may be created by tensions in the ST-regime or by shifts in the landscape, which put pressure on the regime. (...) Once established, a new sociotechnical regime may contribute to changes on the landscape level" (Geels, 2002, pp. 1262).

Hence, the multi-level transition perspective can help clarify that the ongoing development and diffusion of innovations based on CE principles take place in multiple smaller niches of networking firms and supply chains within varying industries and fields of activities, which may - or may not – succeed in changing the prevailing linear regime in the years to come. We find that this theoretical multi-level transition perspective is important for the understanding of the dynamics by which CE are realized, as it helps draw attention to and explain that the implementation of CE is still in an incipient phase within the tourism sector, and that the process towards further implementation and development will require involvement of actors at many different levels, including the tourism SMEs and their advisors and sectorial organizations, but also will require inter-sector and inter-level collaboration.

Figure 3: A dynamic multi-level perspective on technology transition



Source: (Geels & Schot, 2007, pp. 401).

2.6.3 Enabling and constraining factors for circular business models

As argued above, transitioning toward a circular economy is a multi-level and multi-dimensional process that requires fundamental changes within both technical, economic, social, cultural and political domains of the current linear system. This entails interaction between different crucial elements combined with the construction of supporting frameworks that enable and push such a transition process forward.

In accordance with the transition system approach outlined above, we distinguish between enabling and constraining factors at the levels of landscape, regime and niches. At the landscape level, broader, slower paradigmatic change processes (such as global political agreements to reduce climate change, globalization of economies, and new consumer cultures based on new social medias) are emerging, pushing and enabling (niche level) innovations in businesses and industrial and technological networks. Such niche level innovations as well as the specific challenges and opportunities that SMEs face in this field will be analysed in more detail in Chapter 4, especially in the included 'Best Practices' case studies.

In response to landscape megatrends and niche innovations, the prevailing linear regime is pushed forward towards (still restricted) elements of circularity, for instance regarding recycling of waste, introduction of renewable energy systems and evolvement of new educations and learning sites, that frame the development of new skills and knowledges in the populations and reflect the requirements of a new socio-technological system. Moreover, niche level innovation of circular solutions are encouraged by regime level policies that frame and foster economic incentives targeting individual firms and markets (e.g. support to renewable energy and recycling in the construction sectors). At the interface between regime and niches, we can observe the virginal emergence of new circular markets and business models, new collaborative and industrial networks and supply chains, new presumptions and demands among consumers, etc.

One of the most powerful enablers of a circular economy transition is business model innovation. The successful incorporation of circular economy principles in business models is crucial for a transition of the economy as a whole. However, policy frameworks must also be changed and implemented if many innovative business models are to be able to compete with existing linear ones, or they might lose some or all of their benefits when scaling up.

In order to support, guide and accelerate the positive transition toward a more circular economy, several crucial areas within technological, economic and social domains are in need of change. These may be enabling factors but need to be activated simultaneously in order to create reinforcing effects. Critically, they all require the support of adequate policy frameworks and interventions. No matter the size of the company, the adoption of a circular economy program entails that a company carries out a number of different but related strategies in order to improve the circularity of its production system. It also involves

cooperation with other companies over the supply chain for the achievement of more effective circular patterns (Rizos et al., 2016).

A circular economy encourages even relatively small companies to look at their operations and their supply chains, and think about how resources are sourced, how they can be used more efficiently, where they can be more effectively recovered, and where the need for raw materials can be designed out of the business model altogether. Collectively these strategies can provide an increased understanding of the supply chain, reduce risks in accessing resources, create better brands and eliminate waste of resources (Benton et al., 2014).

However, as noted by (Ghisellini et al., 2015), much of the knowledge on CE implementation at firm level pertains to the production sectors of larger firms that have the capacity to engage in business transition strategies such as eco-design or green design, design for the environment and cleaner production.

Policies as enablers for circular business

In a scoping study of circular economy actions for the European Commission, Vanner and colleagues (2014) found that there is rarely only one driver in one sector or value chain. Typically, several factors are at play and often the factors influence each other. For instance, the infrastructure to support the efficient collection of products after use, the so-called 'reverse cycles' (Ellen MacArthur Foundation, 2012) can be heavily influenced by various levers including policy instruments (for example landfill taxes), extended producer responsibility (EPR), new business models and take-back schemes (Vanner et al., 2014).

The scoping study found that the policies, which enable business models and value chains to be more circular, in every sector and along any value chain, are the ones that:

- Encourage manufacturers to design products with resource recovery in mind and to take the true production costs, including environmental costs, into account.
- Encourage the development of products that don't waste resources.
- Give businesses incentives to source materials from within regenerative loops, rather than from linear flows.
- Enable businesses to develop income models that generate value at all stages of the value chain.
- Policies that encourage or give incentive to customers/ consumers to change their consumption and ownership patterns.

The EU scoping study identified the following gaps, which currently act as barriers to the development of a circular economy, which need to be overcome in the following years, and thereby outline areas where further policy action may be most beneficial in promoting the circular economy:

- The lack of policies, which encourage resource pricing, i.e. the cost of material or resource recovery in all products reflects the environmental cost at which they are produced. Such policies would encourage a much more efficient use of resources (i.e. as resources become more costly there are increased incentives to reuse/recycle materials).
- The lack of skills in circular product design and production as well as lack of investment in such product design.
- The lack of enablers to improve cross-cycle and cross-sector performance. This is related to a lack of incentives for transformation-initiatives that take place between actors within and across value chains.
- The lack of acceptance amongst both consumers and businesses of consumer-as user, and performance-based business and payment models.
- The lack of know-how and economic incentives for business models based on repair and reuse.
- The lack of consumer information on the true (environmental) production origins, material flows and costs of products.
- The lack of waste separation at the user level (this is especially the case for food waste and packaging).
- The lack of incentives that promote sustainable/ recyclable product use in the procurement process for public authorities.
- The lack of investment and innovation in the infrastructure and technologies for increased recycling and material recovery.
- The lack of harmonised transport flow systems.
- The lack of policy coherence for example within bioenergy and waste policies.
- The widespread approach to and organisation of planned obsolescence within product chains (Vanner et al., 2014).

The above list of policy-based enablers and barriers spans both the overall EU level, the regional level, markets, relations between related producers and incentives at the firm level.

2.7 Analytical framework for the CIRTOINNO Handbook

There are multiple strategies for developing and implementing innovative CE solutions amongst small and medium-sized tourism enterprises. After having explored the applicability of some of the other frameworks, such as the 6R or the ReSOLVE, we concluded that their content was unnecessarily complex while only partially relevant to the CIRTOINNO task at hand. We therefore suggest a simple analytical framework that is based on two overlying dimensions: one concerns the scale of innovations and the other concerns the scope of innovations.

The first dimension is *temporal scope*. The scope of an innovation addresses to what extent a new technology is immediately accessible or to what extent there are grave temporal barriers to the innovation of a new circular technology or service at the SME level. Is it an innovation that requires the development of new technologies or is it an innovation that is dependent on financial means way beyond the reach of SMES? Alternatively, is it an innovation that is reachable without insurmountable barriers?

The second dimension is *scale of innovations*, which addresses to what extent a SME depends on firm-external or up-stream value chain technologies and services. In other words, what is the scalar complexity of the innovation? Is it an innovation that can be implemented or developed within the individual firm or is it dependent on upstream suppliers and reverse chain innovation? Or does it depend on innovations outside the tourism sector, for example the implementation of new renewable energy sources in the region's energy grid?

The suggested framework for identifying various innovation strategies thus addresses the following five elements:

Short scope, limited scale innovation (strategies for the near future)

1. Firm internal; no or few barriers.
2. Upstream value chain dependent, but still no current barriers.

Long scope, higher scale innovation (strategies for the more distant future)

3. Firm internal; current barriers to be overcome (for example lack of capital or economic incentives).
4. Firm external; current barriers to be overcome (for example lack of new technologies upstream).
5. Sector external; current barriers to be overcome (for example lack of access to renewable energy or water treatment systems).

The resulting analytical framework, as a table, is presented below (Table 1). It is used in Chapter 4 for the analysis of potential circular economy activities to be implemented by the tourism sector within accommodation services, food and spa, respectively.

Table 1: Analytical framework

Material flows	Near future		More distant future		
	Firm internal; no or few current barriers	Dependent on other actors or sectors, no or few current barriers	Firm internal; current barriers to be overcome	Firm external, current barriers to be overcome	Sector external, current barriers to be overcome

Source: Developed by the authors, based on analysis of recent CE literature.

Comparing the linear, the green and the circular economies paradigms

In the table below (Table 2), we summarize the main characteristics of the different paradigms of the linear economy, the sustainable/green economy and the circular economy; however, we distinguish between two phases in the implementation of the circular economy. In The Circular Economy 1.0, we have included circular elements and innovations that are applicable at the firm level and in the immediate future. The Circular Economy 2.0 is the heading for a more systemic transition and expresses a shift toward a new socio- and techno-economic paradigm.

Table 2: The linear, the green and the circular economies paradigms in comparison

	Paradigm			
	Linear economy	Sustainable/ green economy	The circular economy 1.0	The circular economy 2.0
Motto	Take-make-use-dispose	Cradle-to-grave	Cradle-to-cradle	Spaceship earth
Economic value creation	Growth through extensive or intensive use of resources	Investments and innovations in sustainable technologies	Innovation of circular resource design at niche level	Competitive/Right positioning in an emerging circular resource regime
Tourism production economy	Increase number of tourists or the profit per guest	Strive to make business activities (environmentally, socially and economically) sustainable	Perceive all resource flows through tourism as opportunity for creating profitable circularised flows and value chains	Systemic transition and adaptation to a circular resource regime
Tourism consumption economy	Hedonistic, luxury experiences	Luxury 'back-pack' experiences of sustainable places and communities.	Hotels and tourism services are 'living CE labs' for exploring relations between culture/daily life and environment	To be seen
Energy technologies	Fossils-based. Continuous improvement of technological capacity and efficiency.	Shift to sustainable, non-carbon-based energy sources. Optimise energy use and minimise consumption.	Shift to sustainable, non-carbon-based energy sources. Optimise energy use and minimise consumption.	Transition of all energy systems through regeneration into perpetually circular energy sources.

Waste	Dispose as quickly and cheaply as possible	Create as little waste as possible and dispose it as environmentally friendly as possible	Waste is a 're-source out of place'	Use systems of all natural resources are designed to be circular (perpetually reusable).
Water	Extract-use-clean-dispose in streams and oceans and let eco-system regenerate 'naturally'	Extract-use-clean as much as possible through water treatment plants. Dispose of rest in streams and oceans and let eco-system regenerate 'naturally'	In-house grey-water systems	Circular water systems installed in all regions, designed with separate black, grey and potable water systems.
Dominant business models	Production/supply of goods and services	Development and delivery of high-tech green solutions and advices	Maintenance, repair and design for durability in current technology products	Integration of circular technologies and flows of material and immaterial resources

1) Stroebe (2015) distinguishes between a 'thin' and a 'thick' green economy by delineating between a growth paradigm where increasing number of tourists is combined with more environmentally friendly technologies (thin) and a shift to a new growth paradigm, that takes seriously the need to reduce the environmental footprint of tourism.

3. The Context of CE: Tourism and the South Baltic Region

This chapter provides a conceptual discussion of tourism, in order to help identify possible relative strengths and opportunities related to the characteristics of tourism, as well as to identify likely barriers related to the specificity of the sector. We define tourism and explore some fundamental challenges in relation to environmental sustainability. Then, we briefly discuss the potentials in digital, virtual reality tourism and augmented reality. We find that at this stage, there is no indication that digitalisation decreases the desire to travel, and argue that a guest-host relationship remains an integral component of tourism as well as a potential for social learning and circular economic innovations.

After dealing with tourism at the conceptual level, we move to the characteristics of tourism in the South Baltic CIRTOINNO partner regions in order to provide a geographical and economic context for the discussion of potentials for CE. Among these, significant differences are highlighted and discussed, including the institutional setup and tourism policies. However, both differences and similarities may form a fruitful starting point for inspiration with regards to how to become motivated to draw upon CE concepts in development activities within the SME tourism sector.

3.1 Characteristics of tourism as human activity

3.1.1 Tourism – by definition unsustainable?

According to the Oxford English Dictionary, tourism is defined as *"travel for pleasure or business; also the theory and practice of touring, the business of attracting, accommodating, and entertaining tourists, and the business of operating tours."* (Oxford English Dictionary, 2005). Tourism may be international, or within the traveller's country. The World Tourism Organization defines tourism more generally, in terms which go *"beyond the common perception of tourism as being limited to holiday activity only"*, as people *"traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes"* (World Tourism Organization, 1995).

Hence, the defining characteristic of tourism is the travelling of the tourist to a place different from his/her residence and his/her temporary staying in such an out-of-home natural, social and cultural environment for leisure, business or other purposes. The traveling activity of tourists is often considerable and connected to high CO₂ emissions and pollution as destinations often are distant from tourists' residence and traveling therefore often is done by airplane or car. When tourists arrive at the destination, in most cases they already have made a considerable CO₂ footprint, which will not disappear no matter how small the negative effects on the environment inflicted by their activities during their stay. Hence, at the very outset, the traveling component of tourism consumption and production challenges the environmental sustainability of tourism.

This sustainability issue is further accentuated by the general trend in recent years towards shorter but more holiday travels⁵ supported by among things a fast growth in low-priced international airlines, connecting increasing numbers of (city) destinations.

Reducing the negative environmental effects of tourism connected to its travelling component would entail the following basic options:

- fewer travels per year
- shorter distances travelled
- longer stays per travel (which in relative terms would reduce the share of the travelling component of the entire environmental impact of the holiday)
- travelling by use of transportation systems, which do not rely on fossil energy to the same degree.

3.1.2 Blue and green tourism

The expressions 'blue' and 'green' are used to loosely indicate different aspects of tourism. Here we briefly describe what the EU includes in these expressions, and discuss how they are of relevance to the CIRTOINNO target group. The aim is not to provide clear-cut definitions, as this would risk excluding SMEs from CIRTOINNO that might otherwise benefit from and contribute to the development of a circular economy.

The European Commission's long-term strategy to support the marine and maritime sectors list five domains of blue growth. These are aquaculture, coastal tourism, blue biotechnology, ocean energy and seabed mining. The Commission states that coastal and marine tourism is an important sector: *"Employing over 3.2 million people, this sector generates a total of € 183 billion in gross value added and representing over one third of the maritime economy [in the EU]. As much as 51% of bed capacity in hotels across Europe is concentrated in regions with a sea border."* (European Commission, 2017). This means that coastal and marine tourism is of particular importance, and the pressure on coastal areas created by tourism is often high. Therefore, and due to the geographical locations of CIRTOINNO implementation areas this sector is a particularly important target group. However, this does not mean that SMEs that do not consider themselves blue tourism companies should in any way be excluded from analyses or consider themselves ineligible for using CIRTOINNO. The notion of 'blue tourism' is merely an expression that points to coastal and maritime tourism as a sector that may benefit particularly well from a circular economy transition due to its current tourism pressures and expected growth.

Green tourism is a term that travels in more than one direction. Given the geographic focus of blue tourism on the coastal zone, one might think that green tourism signifies inland or land-based tourism. This is, however, not a commonly used categorization, and green

⁵ See e.g. the statistics about German tourism, provided by Deutsche ReiseVerband (2017).

tourism instead points to various forms of environmental or nature-concerned tourisms. In this respect, it is worth mentioning ecotourism, which has become one of the most used phrases related to green tourism. The definition is *"responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education"* (The International Ecotourism Society, 2015). It is thus clear that while ecotourism is an important aspect of green tourism, it only comprises a small part of the CIRTOINNO target group, and its principles are different from, though compatible with, circular economy.

Circular economy is relevant for all tourism SMEs, even if these do not consider themselves green, or blue, before setting out on the circular economy journey. It is thus not a prerequisite for considering circular economic initiatives that a given region, municipality or SME considers oneself part of blue tourism or nature-based ecotourism. That being said, the blue tourism sector is a particularly relevant target group, while green tourism, and especially ecotourism, provides some interesting cases and examples that CIRTOINNO partners and target groups can learn from. Some examples and case studies are provided in Chapter 4.

3.1.3 Real travels vs. virtual travels

The hospitality and tourism sector has been subjected to public criticism for failure to properly address environmental and global warming systems. This particularly pertains to the air travel industry (Smith, 2011).

By applying CE principles to the travelling component of tourism, a large part of it could (and maybe in future will) be avoided by introducing virtual 3-D and multi-sensuous technologies enabling persons to 'attend' and experience certain places and attractions from distant locations, i.e. without moving to the place. Replacing physical attendance with virtual attendance would mean however, that the activity - at consumption as well as production side - no longer is defined as tourism but as a service product of other industries, e.g. the leisure, entertainment, education, and Information Communication Technology (ICT) industries. Such kind of 'sector shifting' in which innovations advantage certain industries and disadvantage other industries, is often a consequence of introducing CE principles. For instance, the introduction of new business models within markets for consumer devices such as mobile phones and washing machines by which consumers lease rather than owe a specific device (in order to increase the incentives for its recycling and reusing), creates opportunities for new market players and potentially transfers power from manufacturers to service providers.

In an overall societal and environmental perspective, digital solutions for virtually visiting tourism attractions certainly hold promising potentials. Nevertheless, as the CIRTOINNO project targets CE innovations among tourism SMEs, it would be inappropriate to consider

the option of eroding the markets of this particular group of businesses by searching for market opportunities for electronics and software industries.

Besides, traditional travel-based tourism will without doubt prevail also in coming years, as even very advanced 3-D virtual products probably would be a less attractive surrogate to a touristic immersion in a real-world natural, social and cultural setting, and as the very act of leaving the everyday environment and physically experiencing 'foreign' places for most people today is a very strong and hardly replaceable demand. Hence, after a slow-down in the years after the financial crisis in 2008, travelling and tourism are fast growing activities worldwide and are expected to grow by 4% annually in coming years (World Tourism Organisation, 2017).

Hence, in the CIRTOINNO project the main focus will be on identifying possible CE solutions for attendance-based forms of tourism businesses. However, digitalisation represents an opportunity for circular economy in the sense that resource loops and other initiatives can be made visible, portrayed and explained through augmented reality, i.e. a digital layer of information or graphics that is added to or interacts with what the user sees. This means that guests, at their will, can make visible elements of their consumption and environmental footprint that were previously hidden. Digitalisation is thus a potential for participation, engagement and innovation that is likely to become much more widespread in the near future.

3.1.4 Tourism consumption

Tourism is part of the so-called 'Experience Economy' (Pine & Gilmore, 1998) in which the demands of consumers and the value-creation of producers do not relate primarily to the provision of tangible goods such as food or functional services such as cooking of meals, but to the staging of immaterial, personalized and memorable experiences such as the atmosphere in a restaurant (Hansen & Mossberg, 2013). According to an analysis by (Caru & Cova, 2007) one of the prerequisites for staging and providing attractive memorable consumer experiences is that they must be situated in an 'enclave' out of the ordinary and contrasting with the everyday life of the consumer. The consumers take a temporary excursion to an out-of-the-ordinary environment and step into an 'experiencescape' (O'Dell & Billing, 2005).

In fact, the demands for out-of-home tourism experiences may be considered as being closely intertwined with the forms of consumption and the 'reflexive modernity' (Beck, Giddens, & Lash, 1994) prevailing in developed countries. According to Consumer Culture Theory (see e.g. Arnould & Thompson (2005), often applied in the tourism research, tourism products (whatever these are) are understood as commodities that the consumer/tourist buy and use as part of shaping and showing his/her identity and for the social positioning in relation to other persons, both during the travel itself but also before and after, for instance

by uploading photos to his/her Facebook-profile. In such an identity-related social positioning perspective, 'virtual travels' in most cases would not be considered as attractive as 'real travels'.

3.1.5 The interpersonal host-guest relationship in tourism

As a direct consequence of the definition of tourism as the temporary staying of a person in a geographical place different from his home, tourism is defined as attendance-based consumption of services and experiences. Unlike, for instance, manufacturing of physical artefacts or provision of commodified experience products such as movies, electronic games or 3-D virtual reality experiences, which can be distributed in space and consumed far from the producer/distributor, tourism entails an interpersonal relationship between the host and the guest/consumer, i.e. some sort of interaction either physically face-to-face or mediated via the internet or other (analogue or digital) channels of communication, for instance related to the booking procedures, the arrival and inscription at the reception desk, room service, breakfasts etc.

This interpersonal relationship gives opportunity for the hosting accommodation venue of 'deep', value-based communication with the guests and thereby perhaps influencing their way of thinking and behaving not just during but also after the stay. This value-based communication can take all kinds of directions and shapes from sustaining and encouraging of indulgent, luxurious, and abundant consumption to the staging of the virtues of ascetic, environment-friendly life styles. Since the 1990s, a main trend in the hotel/accommodation sector has been the introduction of diverse green, resource-saving 'offerings' to their guests such as the option of choosing not to have daily laundry washing actions. Such actions are a good first step, but can be pushed further with a circular economy logic. Circular economy can become a central part of the guest-host relationship, and it can be a way to include and engage guests in ways that not only makes sense from an environmental perspective, but also to add to the **guest's experience by allowing them to contribute**.

While tourism does have inherent issues relating to sustainability, it also represents a unique opportunity to re-configure the way people live – if only for a brief period of time. The fact that as tourists, we carry very little with us, and let ourselves immerse in new surroundings and socio-technical setups, means that tourism has the capacity to experiment with the way daily life is organized. It presents an opportunity for tourists to enter into 'living labs', in which they can experience, play with and radically re-think the organization of daily life. This is not only interesting from a societal perspective, but represents a market opportunity for both businesses and operators as well as tourism destination organizations.

Enablers of a transformation for tourism markets and user practices from emphasizing spending, hedonism and unlimited resource use, to vacations as experiments in circularity

are many. There is an obvious selling point in advertising a destination as a window to the future, and also individual companies can distinguish themselves successfully.

The cultural understanding of what tourism should be is also likely to change towards a greater emphasis on personal responsibility for one's resource use. Mobility is a privilege that is often displayed on social media, and so is the ability to cope with everyday stress. One might guess that showing that you are capable of taking time off, reducing your footprints, holidaying the mindful way is likely to become a status symbol.

Such forms of tourism are much more suitable for rural and outdoor tourism, but may also affect the norms of city breaks. In outdoor and rural tourism, there is a potential for a much more direct involvement with the resources used and the way they are disposed of. In city breaks, infrastructure efficiently leads used resources away and the guest remains largely unaware of its disposal and possible recycling.

One specific way of changing this is through user engagements. Rather than designing e.g. hotel rooms as spaces of unlimited resource use, hotels can provide an aggregate scoring system for how the guest is doing in relation to resource use and reward guests either financially, with loyalty bonuses or simply with a good conscience.

A challenge, however, is that much of guests' interaction is with low-paid staff such as cleaners. These groups need to be included in circular economic practices and thinking, in order to create an environment of social learning and innovation among guests and staff.

3.2 The tourism sector in the partner regions

In this section, we will provide an overall picture of the tourism sector, the trends in this in recent years, and the political and regulative frameworks in place for innovation in tourism in the four South Baltic partner regions of Pomerania (Poland), Klaipeda (Lithuania), Kronoberg, Blekinge and Kalmar (Sweden),⁶ and the island of Bornholm (Denmark).⁷ First, however we shall briefly present some key statistical figures about the socio-economic situation in the regions and the countries in which they are located. The aim of the sector is to investigate and characterise the economic and governance conditions for CE within tourism in the South Baltic partner regions.

⁶ For practical data availability reasons, in this section we include the regions of Blekinge and Kalmar, neighbouring to the Kronoberg region formally involved in the CIRTOINNO project, as part of the Swedish South Baltic partner region.

⁷ It should be mentioned that the region of Bornholm has a different status in the CIRTOINNO project than the other regions, as there is no Bornholm partner responsible for implementing the project results regionally. Despite this, Bornholm is included in the analysis here.

3.2.1 The socio-economic background

The regions differ in their size of population, from Pomerania's 2.2 million inhabitants, over Kronoberg/Kalmar/Blekinge's 585,000 and Klaipeda's 325,000, to Bornholm's 40,000 inhabitants (Table 3). This basic fact obviously makes the regions very different in almost all aspect, such as economic complexity and political-administrative structures (for instance, Bornholm constitutes one single municipality while Pomerania comprises a hierarchy of governance levels).

Pomerania is the most urbanized region with a relatively high density of population, while Kronoberg/Kalmar/Blekinge represent the opposite: a sparsely populated region with large rural areas. Klaipeda and Bornholm are positioned in-between these two extremes. Bornholm is the only region with a lower population density than at national level and is in its national context a rural and peripherally located area.

The demographic trends are rather different in the four partner regions and countries. In Poland and mainly Lithuania, the population has decreased in recent years (2011-16) mainly due to emigration, while in Sweden and Denmark the population has grown at country level (mainly due to immigration). However, at regional level the trends have been positive in Pomerania and to a smaller degree in Kronoberg/Blekinge/Kalmar, while Klaipeda and Bornholm has experienced a considerable decline in the population.

Economically, however, Klaipeda has experienced the fastest growth (27%) in gross domestic product (GDP) compared to the other partner regions. Klaipeda is also the only region in which the GDP per capita is higher than at national level. Pomerania however, is the only region in which the economy has grown faster than at national level and thus the region plays a role as a growth centre in the national economy.

The economic growth rates in Poland and Lithuania, nationally as well as regionally, are much higher than in Sweden and Denmark. On the other hand, the GDP per capita in Sweden and Denmark is far above the EU-28 average while the GDP per capita in Poland and Lithuania lies far below the EU average. Everything else being equal, these key economic figures constitute better demand conditions for domestic as well as international tourism in Pomerania and Klaipeda as compared to Kronoberg/Kalmar/Blekinge and Bornholm.

Table 3. Key socio-economic figures about the partner regions

	Total population 2016	Population growth 2011- 2016	Population density 2016 (persons per km ²)	GDP per capita - 2015 - EUR	Growth in GDP 2010- 2015
Poland:					
Entire country	37,967,209	-0.3%	121.4	11,315	18.9%
Pomerania	2,277,059	1.4%	126.0	10,877	20.7%
Lithuania:					
Entire country	2,888,558	-5.4%	44.2	12,779	33.2%
Klaipeda	324,618	-4.5%	62.7	13,410	27.4%
Sweden:					
Entire country	9,851,017	4.6%	22.5	45,860	21.1%
Kronoberg, Kalmar, Blekinge	585,301	2.6%	24.1	37,950	15.2%
Denmark:					
Entire country	5,707,251	2.6%	133.0	48,021	11.8%
Bornholm	39,756	-4.9%	67.7	34,348	9.0%
EU-28	510,284,430	1.5%	114.0	28,964	14.9%

Source: Eurostat.

3.2.2 Statistics on the regional tourism sectors

Tables 4-6 show some key statistical figures about the supplies and demands of tourism in the four Baltic regions⁸, while Table 7 shows basic statistics about transportation infrastructures and travelling activities in the regions. Tourism is defined both in rather narrow terms as only involving hotels and 'similar establishments' such as Bed & Breakfast and holiday centres (but not, for instance, camping sites), and in broader terms, as including all types of overnights (i.e. not only hotels but also camping sites, rental of summerhouses and apartments etc.) as well as all types of flight passengers to regional airports, i.e. local as well as international travellers and visitors with business and leisure purposes.

The statistical figures tell - especially Table 5 and the statistics on transportation infrastructures and travelling in Table 7 - that the Bornholm economy relies on tourism to a much higher degree than the other three regional economies. The number of hotels, (hotel)

⁸ Sources of statistics for hotel and other overnight statistics: Poland: Eurostat – supplemented by national statistics (Tourism in 2015 printed publication), ISSN 1425-8846, <http://www.stat.gov.pl/>, http://stat.gov.pl/download/gfx/portalinformacyjny/pl/defaultaktualnosci/5494/1/13/1/turystyka_w_2015.pdf. Sweden: National statistics. Statistics Sweden, <http://www.scb.se/en/> - Accommodation statistics. Denmark: National statistics. Statistics Denmark. StatBank Denmark - <http://www.statistikbanken.dk/> Lithuania: National statistics, <https://osp.stat.gov.lt/statistiniu-rodikliu-analize#/> Number of overnight stays in accommodation establishments.

rooms and (hotel) beds per capita is more than three times bigger on Bornholm than in the three other regions. Also the developed transportation infrastructures with ferry connections to Denmark, Sweden, Germany and Poland (Table 7) as well as the high number of flight passengers per capita (not to mention the high number of visitors to Bornholm that use ferries) are indications of an economy heavily relying on tourism and travelling⁹. This is not surprising as Bornholm since the 1950s has been an important destination for Danish and international (primarily German) tourists and has longstanding experiences mainly in coastal (sun and beach) tourism.

Thus, for many years, Bornholm has had a big capacity within the hotel sector but primarily within other types of accommodation such as summerhouses for rental, which are widespread on Bornholm, like in all other coastal tourism destinations in Denmark. Interestingly, despite Bornholm's dependence on tourism it is the region in which hotels and similar establishments account for the lowest share of total overnights (only 25.5%, see Table 6). In recent years, as a response to a declining number of hotel overnights (Table 6) and shifts in demands from standard mass-tourism to more exclusive products and shorter stays, main strategic efforts of the Bornholm hotel sector have focussed on (besides innovating and marketing new products and services) rationalizing and optimizing its operations through reducing the capacity and number of hotels, rooms and beds, resulting in smaller (average) hotel establishments in terms of number of rooms and beds per hotel. However, there are also examples of more innovative investment strategies and creation of new forms of upmarket tourism, for instance the Hotel Green Solution House described in Case Textbox in 4.2.

A similar market maturity and phase of industrial/economic optimization and renewal, i.e. increasing the efficiency and profitability of businesses by decreasing the number of hotels, rooms and beds, also seem to characterize the hotel sector in Kronoberg/Kalmar/Blekinge - though from a lower capacity level and in a market context of growing demand, i.e. increasing hotel overnights.

In contrast, starting from lower points of departure, the tourism demands and supplies are booming in both Pomerania and Klaipeda, which in the period 2010-15 have experienced growth in total overnights (i.e. all types of accommodation) of respectively 39% and 33%, and growth in overnights at hotels and similar establishment of 73% and 64% (Table 6). Accordingly, the number of new hotels and similar establishments has grown by about 10% in both regions and number of hotel rooms by 34% in Pomerania and 29% in Klaipeda (Table 4). These growth rates in the demands and supplies of hotel tourism in Pomerania and Klaipeda are mainly driven by foreign tourists, who use the regional airports and cause growth rates in international considerably significantly.

⁹ Note that local residents' flights are included in the number of flight passengers in Table 7 and that Bornholm's peripheral location, necessitating frequent flights of local residents, thus is part of the relatively high passenger/population ratio of Bornholm.

These very strong trends regarding growing demands for tourism in and travelling to Pomerania and Klaipeda create a very positive background for future investments in and construction of new tourism facilities such as hotels, other types of accommodation, transport infrastructures, food supplies, information systems, services centres, amusements etc. In front of such large-scale upgrading of the tourism capacity, the regional authorities will face major planning challenges regarding, for instance, protecting natural resources, provision of water and renewal energy, and reducing pollution.

Part of these future investments probably will be realized by big multinational hotel chains and travel operators, focused on large-scale constructions and infrastructures, which are not the target of the CIRTOINNO project, but are nonetheless highly relevant for circular economy solutions. Hence, CIRTOINNO partners may play an important role in their regions by advocating for the advantages of a systemic circular economy approach to the challenge of securing an environmental, social, and economic sustainable output of the expected growth in tourism in the coming years.

Table 4. Statistics on hotels and similar establishments in the regions ¹⁾

	Pomerania	Klaipeda	Kronoberg Kalmar Blekinge	Bornholm	Total/ Average of regions
No. of hotels ¹⁾ , 2015	319	106	164	35	624
Growth in no. of hotels ¹⁾ , 2012-2015	9.2%	9.3%	-1.2%	-5.4%	5.4%
No. of hotel rooms, 2016	9,236	3,184	6,124	1,716	20,260
Growth in hotel rooms, 2010-2015	34.0%	29.1%	-7.9%	-6.2%	13.7%
No. of hotel beds, 2015	26,166	4,946	12,455	5,000	48,567
Growth in hotel beds, 2012-2015	13.9	-	-8.5	-7.5	-
Average no. of rooms per hotel	29.0	30.0	37.3	49.0	32.5
Average no. of beds per hotel	82.0	46.7	75.9	142.9	77.8

Source: See footnote 8.

1) The precise definition of 'similar establishments' vary from country to country.

Table 5. Statistics on hotels by inhabitants in the regions

	Pomerania	Klaipeda	Kronoberg Kalmar Blekinge	Bornholm	Total/ Average of regions
Hotels & similar establishments ¹ per 1000 inhabitants, 2015	0.1	0.3	0.3	0.9	0.2
Hotel rooms per 1000 inhabitants, 2016	4.1	9.8	10.5	43.2	6.3
Hotel beds per 1000 inhabitants, 2015	11.5	15.2	21.3	125.8	15.1
Hotel overnights per capita, 2015	1.2	2.2	2.6	9.5	1.7
Total overnights per capita, 2015	3.5	4.7	7.8	37.2	4.8
Overnights by foreigners per capita, 2015	0.5	1.2	1.8	16.8	1.0

Source: See footnote 8.

1) The precise definition of 'similar establishments' vary from country to country.

Table 6. Statistics on overnights in the regions

	Pomerania	Klaipeda	Kronoberg Kalmar Blekinge	Bornholm	Total/ Average of regions
No. of overnights at & similar establishments ¹ , 2015	2,724,768	724,148	1,513,543	377,647	5,340,106
Growth in overnights at hotels & similar establishments ¹ , 2010- 2015	73.1%	64.1%	8.9%	-1.3%	41.0%
Share of overnights at hotels & similar establishments ¹ of all overnight types	34.6%	47.2%	33.3%	25.5%	34.6%
No. of overnights by foreigners at hotels & similar establishments ¹ 2015	984,161	302,164	363,250	114,679	1,764,254
Growth in overnights by foreigners at hotels & similar establishments ¹ 2010-2015	88.8	42.0	13.7	-1.2	50.9
Share of foreigners of total overnights at hotel & similar establishments ¹ , 2015	36.1	41.8	24.0	30.4	33.1
No. of overnights (all types) – 2015	7,880,472	1,530,400	4,551,171	1,479,089	15,441,132
Growth in overnights (all types) 2010-15	39.4%	33.3%	7.3%	18.6%	25.7%

Overnights by foreigners (all types) – 2015	1,122,055	405,421	1,081,927	667,848	3,277,251
Growth in overnights, foreigners 2010-15	75.3%	49.7%	9.9%	16.0%	32.6%
Share of foreigners of total overnights (all types)	14.2%	26.5%	23.8%	45.2%	21.2%

Source: See footnote 8.

1) The precise definition of 'similar establishments' vary from country to country.

Table 7. Key figures on transport infrastructures and travelling in the regions

	Pomerania	Klaipeda	Kronoberg Kalmar Blekinge	Bornholm	Total/ Average of regions
No. of ferry links	2	2	1	4	8
No. of airports	1	1	1	1	4
No. of passengers in airports, 2016	4,010,864	232,630	238,691	276,415	4,758,600
Growth in no. of passengers in airports, 2010-2016	79.7%	126.9%	42.9%	11.0%	73.0%
Number of passengers in airports per capita, 2016	1.8	0.7	0.4	7.0	1.5

Source: See footnote 8.

3.2.3 Tourism development strategies and plans

This section describes relevant tourism strategies for each country. This refers to both national policies, as well as tourism and/or eco-tourism plans and strategies on a regional and local level. We also provide an example of how certifications can help create awareness of initiatives and thus further the marketing potentials.

Kronoberg, Kalmar and Blekinge

The Swedish regions of Kronoberg, Kalmar and Blekinge report a situation with many potentials for new developments in tourism. There is an increasing focus on tourism among local authorities, with high expectations of the growth of the sector, up to a doubling of foreign tourism in Småland and on Öland over the next decade. Simultaneously, national strategies for eco-tourism are in place, and much of Sweden's tourism is nature-based, both in winter and summer seasons. It is thus not surprising that the initiatives that exist focus significantly on low impact and taking care of nature areas. As we discuss further in the example of the 'Nature's Best' ecotourism certification (see text box below), these ideas differ somewhat from circular economy, with its greater focus on systems in which nature and society are not so clearly separated.

One opportunity in this regard, is to connect ecotourism initiatives more tightly to national climate change goals and initiatives. This brings into focus the resource use, and creates incentives to think in terms of impacts and footprints not only in relation to local natural areas, but also environmental and resource issues at other scales. The challenge then will be to push further for circularity and closing loops, rather than simple reduction. Relating to this, Öland with its goal of becoming Sweden's holiday paradise, could potentially look towards the Danish island of Samsø (see Text Box below). Here, the potentials of being an island relate to tightly connected actors, and the opportunity to create a strong brand, community and local ownership of a circular economy strategy. Importantly, this does not mean that the island should be self-sufficient, but rather that local efforts can be coordinated and that working with ideas of circularity are well suited to the island setting, in particular when the rest of society is largely organized as a linear economy.

On the national level, the government of Sweden's tourism policy is that *"Sweden will have a high attractiveness as a tourist country and a long term competitive tourism industry that contributes to sustainable growth and increased employment across the country"*. It is unclear whether sustainable growth refers to continuing economic growth or a sustainability focus, but nevertheless, it is a mostly growth-focused policy. The national vision and strategy for Swedish tourism, called "Sustainable growth for business and destinations" aims at a doubling the sectors turnover from 2010 till 2020, which means that annual turnover should reach 500 billion SEK in 2020. To reach this aim, three focus areas and six main strategies were developed of which the sixth concerns a sustainable tourism industry. In 2020, tourism will be one of the most valuable sectors in the economy, employment and regional vitality, and a lead star of ecological, economic and social sustainability (AB, 2010). As is evident from a comparison of the strategies from the different countries, tourism strategies have clear economic goals, while sustainability, eco-tourism or 'green business' is considered a separate part of achieving such a goal, rather than a focus around which the strategy is organized. A change to a CE focus would thus entail bringing circular thinking into all aspects of the tourism strategy.

Nature's Best – an example of a certification

In Sweden, a number of certifications exist for tourism SMEs to make use of. None of these has a specific focus on circular economy, but their proliferation can still be seen as a sign that the sector is moving in the direction of sustainability and that there are market opportunities in standing out and pioneering. Most directly related to tourism is the 'Naturens Bästa'-certification. This certification is chance for tourism SMEs to show that their business and its operation is in line with eco-tourism principles. It also represents a unique marketing opportunity, as all certified businesses are accessible through an enticing website: www.naturesbestsweden.com

This portal thus directs eco-tourists to the operators who live up to the requirements, making the challenge of finding an operator with matching values an easy task for the tourist. The offers range from white water rafting to forest cabin retreats, making the website not only a place to find your operator, but also to explore the destination and find inspiration for one's holiday activities.

Nature's Best six basic principles:

1. Respect the limitations of the destination - the least possible impact on nature and culture.
2. Support the local economy.
3. Make all the operators activities environmentally sustainable.
4. Contribute actively to nature and cultural conservation.
5. Promote knowledge and respect as well as the joy of discovery.
6. Quality and safety all the way.

While Naturens Bästa is clearly focused on outdoor tourism, it is possible to draw inspiration from it for other kinds of tourism as well. Outdoor tourism often involves taking good care of 'nature', but urban and coastal tourism could create a similar story that revolves around resource use. Most tourists are very aware that when they visit cities, they visit 'hotspots of consumption'. There is likely to be a potential in creating a similar profile of a company or a region revolving around taking good care of resources. What is also worth noting about 'Naturens Bästa' is that its understanding of nature is somewhat different from the one implied in circular economy. This is partly due to its focus on outdoor tourism, in which tourists immerse themselves in nature, as it is traditionally understood, i.e. as something 'out there', separate from human society (see also section 2.6). It follows from such an understanding that the best practice is the one that causes the least, and ideally no impact on nature. The approach in circular economy is somewhat different. Based on systems thinking, nature is not understood as a separate place or domain from that of society. Rather, the two are seen as interconnected in complex systems that make it hard to distinguish one from the other. This means that the categories of nature and society are not used in the CE approach, and the ideal is not to reach zero impact, but rather to design solutions with a positive impact on the system.

Klaipeda

In Lithuania, a national tourism strategy exists: The Lithuanian Tourism Development Programme 2014-2020. The strategic objective of the programme is to increase the competitiveness of the tourism sector of Lithuania. It emphasises that to maintain tourist flows it is necessary to develop competitive tourism products, expand tourism infrastructure, promote the export of tourism services to foreign countries, take effective marketing and communication measures and increase awareness about Lithuania. The main objectives are thus to improve the development of tourism infrastructure and the quality of services in Lithuania as a tourism destination, as well as reduce the seasonality of tourism services. Furthermore, four priority tourism types have been identified in the Programme: cultural tourism, business tourism, health tourism and green (eco) tourism. This means that while ecotourism is considered a key priority, it is seen more as a type of tourism alongside e.g. business and cultural tourism. A shift from ecotourism to circular economy would entail thinking about all types of tourism with a focus on circularity. Such a focus is lacking in the main objectives, which focuses on the growth of the sector. However, it is possible to maintain such a focus and base it on circular thinking. Marketing, competitive tourism products and increasing tourism infrastructure can all be based on CE, and it can be argued that it is such a holistic approach to policy that can aid SMEs in making transitions.

It is worth mentioning that Lithuania's focus on eco-tourism is based on prioritizing protection of natural heritage, improving the sustainability of tourism offers, and as a secondary objective, to reduce climate change. A potential for Lithuania is to make use of its position as Europe's representative in the UNWTO Committee on Tourism and Sustainability and of the high-expected growth to think in terms of CE in this development period.

The objectives of the UNWTO International Year of Sustainable Tourism for Development thus align very well, and can be pushed further through a focus on CE. During the "World Travel Market" (WTM London) exhibition in 2013, Lithuania was nominated as the best destination for responsible tourism. In 2013, the "Ethical traveller" announced the world's 10 best ethical destinations, and Lithuania was one of them. The countries in this list are the leaders in developing countries, which encourage and promote eco-tourism. This goes to show that there is great exposure and marketing in leading the way in sustainability, and circular economy presents itself as a relevant next step.

Pomerania

Pomeranian Regional Development Strategy 2020 is a general strategy for the region that aims at a modern economy, active residents and attractive spaces. Tourism and culture feature as one of six main areas within this strategy, but there is no explicit focus on sustainability, let alone circular economy. Nonetheless, such strategies still present an opportunity for niche-level SMEs to affect the policy level. As has been seen in Sweden, if initiatives exist at the niche level, one of the ways they can affect the regime level is through inspiring and being integrated in new policies and development plans.

Specifically, a key action of the plan is to strengthen cooperation in the tourism industry, which is also an important component of a circular economy transition. Circular economy thus presents itself as an opportunity for something to unite around and focus cooperation on. The regional strategic program, "Pomeranian Journey", highlights issues in the coastal zone that have to be managed in the future and that the environmental and landscape impacts have to be reduced. Going forward, this is also an issue that could benefit from circular thinking in the strategic management of the area.

On the national level, Poland's 2020 Tourism Development Programme does not include ecotourism among its key objectives, but it does figure in an activity related to promoting eco-innovation in tourism services. There is also an explicit mention of sustainability in relation to rural tourism. Overall, though, the focus is on the development of the sector without a strategic and uniting focus on sustainability or circular economy. It is worth noting, however, that circular economy aligns well with some of the key objectives and could well be introduced into such plans.

Bornholm

In Denmark, the National Strategy for Tourism has the explicit goal of growth by one third in the number of overnights by 2025. It is thus a strategy focused on growth, and sustainability is mainly mentioned as a part of outdoor tourism, but not as a specific strategic concern. This shows that the tourism sector in Denmark is not as far as other sectors when it comes to working on sustainability issues. This is somewhat surprising given Denmark's general reputation of being environmentally ambitious. The strategy also mentions that this reputation is an opportunity in relation to tourism, but fails to make the connection that the tourism sector can contribute itself.

Moving away from tourism, there are however interesting developments in Denmark. Local organisations and networks that seek to promote circular economy solutions exist - see for example the text box about Samsø municipality. Moreover, the Danish government's advisory board on circular economy recently finished their recommendations for CE transitions in Denmark. Some of these are also relevant to the tourism sector. To mention a few examples, recommendations include a national circular economy building code, food waste prevention measures, including circular economy principles into existing green certifications, and increasing use of capacity through sharing economy platforms (Advisory Board for Cirkulær Økonomi, 2017).

Samsøe – The Circular Municipality

The small municipality of Samsøe in Denmark (approx. 4,000 inhabitants) has a policy vision to become an international role model by being the first local community where circular economy is implemented full scale.

In 1997, Samsøe won a prize as "Denmark's Sustainable Energy Island" and within the following 10 years achieved self-sufficiency in terms of sustainable energy. Today, 11 land-based windmills and 10 offshore windmills produce 160% of Samsøe's electricity needs, and 70% of its heat consumption comes from sustainable energy sources. The windmills are financed and owned partly by local citizens through special financial arrangements with a local bank, and in general a variety of leasing and loan arrangements have been made in order to enable local citizens to invest in renewable energy systems and to support their participation in local democratic decision processes. Thus, eco-heat, solar heat plants and heat pumps have replaced more than half of the private oil-fired boilers in the island's 2,000 households. More than 3.700 citizens have personally invested 70% of the total 58 million EURO needed to establish wind power technologies on Samsøe <https://www.samsøe.dk/politik/politikker-og-strategier>, <https://www.samsøe.dk/borger/energi-og-klima>.

The Energy Academy opened in 2007. The house is an exhibition/ demonstration and meeting place for local citizens, guests and visitors with an interest in sustainable energy, community power and sustainable development. The Academy is also an organization working on projects related to the continuous development of Samsøe and on Samsøe becoming a fossil free island by 2030. The Academy has an ongoing exhibition and arranges workshops, conferences and courses. Each year 5,000 scientists, companies, politicians, journalists, schoolchildren and energy tourists from all over the world visit Samsøe to see the sustainable energy island and learn from the local experiences <https://energiakademiet.dk/>.

The circular bio-economy. In the coming years, Samsøe municipality will work for the development and implementation of circular agricultural practices, which will involve many local farmers. In brief, the idea of the Bio Community project is to improve the cultivation methods of nitrogen-containing crops to prevent nitrogen from being absorbed into the atmosphere as CO₂, to achieve a higher self-sufficiency regarding local food produce and to transform local bio waste into fuel and fertilisers. Thereby the island's resources will be used repeatedly as part of a large circuit with a minimum loss <https://www.samsøe.dk/borger/energi-og-klima/biosamfund-samsøe>.

The most pivotal point of the project is a new biogas plant, which is scheduled to be completed in 2018. The plant can transform bio waste, such as scraps, plant residue, wastewater and slurry into renewable energy in the form of biogas. In the best circular style, this gas is to be used to power the ferry that runs between Samsøe and Jutland. It is important for the circularity of these activities that the feed for the biogas plant – and consequently the ferry – will come from the islanders' own fields and dustbins. A side benefit of the biogas plant is that the entire quantity of biological materials unused by the biogas plant will be returned to the fields as fertilisers, thus creating a perfect circuit. <https://www.youtube.com/watch?v=rCD67gxHALg>.

On Bornholm, the regional municipality in 2008 embarked on a sustained place branding initiative under the heading: Bright Green Island (see text box below). The brand stresses a 'smart' transition toward a sustainable and CO₂ neutral island community in 2025. Although the strategy has not involved the same strong commitment of local residents as the energy strategies on Samsøe (see textbox above), the Bright Green Island strategy has resulted in important steps forward for Bornholm, especially regarding renewable energy systems, first of all establishment of windmills, an electricity grid, and investments in distributed heating systems based on local wood chips.

A focus on innovations in food has been an important success in the tourism development on the island, much of which is focused on local foods and restaurants. While only a few local SME's today explicitly are engaged with CE ideas, there is a local development project under preparation based on CE principles, involving not only local food businesses but also local tourism SMEs. Already, much of the food sector and cross-sector collaboration is in place, or has good conditions for being initiated, due to the collaborative milieu among the island's food actors.

Finally, a new strategic focus on outdoor activities has emerged lately in Bornholm's tourism initiatives and this type of activities also looks promising in terms of creating circularity in its experiences offered to guests.

The Bright Green Island branding strategy of Bornholm

In 2008, the regional municipality of Bornholm launched a place branding initiative under the heading: Bright Green Island (BGI). The brand stresses a 'smart' transition toward a sustainable and CO2 neutral island community in 2025. The strategy is envisioned to be inclusive and involve many types of actors in a perpetual brand development process.

BGI focal points. The brand takes its point of departure in the energy-producing sector where all local energy production is fossil-free, i.e. harvested through wind, sun and biomass. The island's utility company, Bornholm's Energy and Utilities, can currently produce about 60% of the islands energy needs. The rest is purchased from Sweden and sent to the island via an underwater cable. The ambition is to increase production of fossil-free energy on Bornholm to cover 100% of local consumption <http://www.brightgreenisland.dk/Sider/default.aspx>.

Bornholm's Energy and Utilities is deeply vested in innovative research on how to best development smart green energy, so that periods of peak energy consumption can be supplied by fossil-free power. The project is called EcoGrid 2.0 and includes 2,000 households participating in flexible power consumption experiments <http://ecogridbornholm.dk/>, <https://beof.dk/>.

BGI is also about innovating local consumption and production forms. Local companies are setting focus on their production and operational practices including energy renovation in the built environment, development of new and more sustainable production methods, and the development of resource-utilizing solutions such as the cascaded reuse or recycling of waste from one production process to another.

BGI also focuses on wise utilization of the island's natural resources, including its nature-based potentials for outdoor activities and optimal conditions for leading active lifestyles – both for tourists and permanent residents. The Hotel Green Solution House (see case textbox in section 4.2.3.) showcases many of the circular solutions for sustainable and smart resource, which lie at the heart of the Bright Green Island brand.

3.2.4 Institutional and governance conditions for innovation in tourism

In all partner regions there are non-profit tourism organizations responsible for destination marketing and tourist information (though with different assortments and profiles). Affiliations of (national) tourism employer unions also exist, e.g. for hotels and restaurants, as well as broader orientated business and industry organizations and chambers of commerce in

support of the well-being and development of the local/regional business life including the tourism sector. Moreover, the complex and multifarious legislation and regulation on topics such as trade, industrial development, competition, nature and environment, cultural heritage, safety, health and consumer protection, set by EU, OECD, UN and other international organizations, lay down a common set of political goals and institutional conditions for the economic and environmental development of the partner regions and countries. A main example of this mutual political and institutional point of departure is the SB countries' signing in 2015 of the United Nations Framework Convention on Climate Change (the Paris climate agreement) and their commitment to set up and implement goals and strategies for limiting climate change.

This being said, the institutional and governance conditions for innovation and development within tourism in general and in relation to the topics of sustainability and environmental aspects in particular differ a lot among the CIRTOINNO partner regions. The practical frameworks for this report do not allow for describing in detail these varying regional conditions and thus the goal is more modest: to exemplify the role of regime-level characteristics for innovation and development within tourism in the regions with a special attention to the issues of sustainability and circular economy.

Overall, the political, legislative and regulative frameworks for development in tourism in the four partner regions reflect a traditional model in support of economic growth measured in terms of GDP and jobs, and an understanding of nature and economy/human activities as separated and complementary rather than interdependent and symbiotic. This, however, is not surprising considering the still virgin and contested character of the concept of circular economy.

What is more interesting to note from reading the materials and documents collected from partners regarding the national and regional regulative conditions, is that, except for Sweden, concerns for and action-oriented priorities on issues such as sustainability, environmental protection, renewable energy etc. are still hard to find in *national* development plans for tourism, although the topics may occur in rhetorical, introductory phrases of policy/industry strategic documents. Lithuania has a strong focus on ecotourism, but this appears to be limited to nature-based tourism.

The lack of sustainability-focus in tourism strategies in the cases of Pomerania and Klaipeda might be explained by the lower GDP per capita, the urge to create incomes and jobs, and the relatively short history in establishing and implementing policies, strategies and institutions for sustainable development, connected with their long-term transition to market economies. However, the Danish tourism industry and authorities' lack of such a strategic focus (see for instance the Danish government's national tourism strategy 2016, (Regeringen, 2016), certainly seems less justified.

Accordingly, circular or even green development initiatives in tourism in Denmark, Poland and Lithuania are not encouraged top-down from the regime level of national authorities

and institutions but mainly occur bottom-up at the level of niches of businesses or local communities, their supply chains and other intermediates. Among the partner regions, Bornholm seems to be the best example of such locally anchored strategies and initiatives, although 'green' and 'sustainable' rather than 'circular' are keywords. The location on Bornholm of the pioneering hotel Green Solution House (GSH) with a variety of circular tourism solutions (see Case textbox section 4.2) is not a coincident but reflects a long economic, social and political process through which local decision makers have been prepared for realizing such an investment.

On the other hand, many of the individual solutions developed and implemented in the GSH do not rely on specific Bornholm CE potentials but are immediately transferable to other contexts including the South Baltic partner regions and could be used for cross-regional learning among CIRTOINNO partner regions. Because of this, the expected future growth in tourism in Pomerania and Klaipeda and the related needs of increasing the overnight capacity and tourism infrastructures substantially certainly constitute advantageous conditions for investments in circular solutions in these regions. Interestingly, the high-income populations in the Swedish and Danish South Baltic regions paying attention to the issue of sustainability and (nonetheless) in perpetual search for new destinations providing 'authentic' experiences may be considered a main demand-side condition legitimizing the same type of investments in a high-profiled CE tourism sector. Hence, although the South Baltic partner regions maybe have only few structural commonalities to draw from in the development of a circular tourism industry, they may form important complementary supply and demand components in the creation of a future circular tourism economy.

4. The tourism and hospitality sectors in the circular economy

4.1 Introduction

In this chapter, the circular economy concepts that we have introduced in the previous chapters are applied to the three fields of focus in the tourism and hospitality sector as agreed by CIRTOINNO partners. These are accommodation, hotel restaurants and the spa sector. A fourth sector - that of energy - is also in focus. Due to the nature of energy production and consumption, it is included as a central resource in each of the tourism fields instead of as an independent field. In Figure 4 below, each of the decided fields of focus are placed in a classic tourism value chain representation. Please observe that pre-travel activities and travel value-chains are not included in the figure, which focuses on tourism consumption at the destination.

Figure 4: CIRTOINNO focus areas within the tourism value chain



Source: own depiction based on a classic tourism value chain structure.¹⁰

As explained in Chapter 3, tourism as a service sector holds a unique position, in that tourists by definition leave their homes and by this token, most of their accumulated possessions and amenities are left behind. The provision of basic livelihood amenities, i.e. food and accommodation is 'hosted' by the tourism sector, hence the term 'hospitality'. Thus, some of the primary barriers to a more circular economy, i.e. the distribution of a large number of individualised household goods to each household are by definition already overcome in tourism. In other words, some of the business models the circular economy promotes –

¹⁰ See for example: <https://www.slideshare.net/communwto/unwto-tourism-and-small-economies-2016>.

replacing ownership by access, sharing amenities between users – are already in place within the tourism and hospitality sector.

However, the tourism sector continues to be structured and conceptualised based on classic value chain relations, where focus is on the linear flow of money through each link in the chain. Thinking toward a systemic circular economy transition, the tourism sector should instead be depicted as a series of interrelated and more or less closed circular resource or material flows. Rather than ‘following the money’, CE value chains need to ‘follow the materials’. This also allows for inter-sectional cascades of materials to be visualised. The textbox below offers a brief introduction to the concept of circular economy, repeated from Chapter 1, for readers that are only interested in the tourism-oriented part of the CIRTOINNO handbook.

In our presentation of state-of-the-art as well as potential circular economy solutions among tourism firms, we therefore follow the material flows through the accommodation, hotel restaurant and spa application fields respectively. Within **accommodation** (Section 4.2), we have focussed on state-of-the-art in circular building and construction, circular refurbishing, accommodation operation and the implementation of circular management systems amongst management, staff and in interaction with guests. There is a focus on energy and water flows with a short section that specifically presents state-of-the-art within circular laundry strategies. Within **hotel restaurants** (Section 4.3), the focus is on describing state-of-the-art in biological material flows into foodstuffs, their packaging, transportation, food preparation, cleaning and storage flows. Finally, there is focus on circular food waste handling. The third field of focus is **spa and wellness** (Section 4.4), where energy and water flows as well as chemical flows are described with a focus on state-of-the-art of circular greywater handling. For each presented field, a number of existing and potential business models are briefly introduced or suggested.

In order to assess the potential of applying each of the depicted possible business models or activities in small and medium-sized enterprises, we have constructed a simple analytical framework. The framework consists of two elements: on the one hand, each business activity needs to be assessed based on whether it can be implemented in the near future or in the not-so-near future. Whether an innovation or business can be implemented now or later depends both on whether there are obvious barriers to their implementation such as lacking capital for investment or lack of technically viable solutions. On the other hand, each business activity needs to be assessed in terms of its value chain complexity. In other words, is it an innovation or activity that can be implemented or developed within the firm? Or is it dependent on upstream suppliers and reverse chain innovation? Or does it depend on innovations completely outside the influence of the tourism value chains and therefore awaiting more general transition systemic innovations to take place?

The analytical frame is presented in Table 7 below:

Table 7: Analytical framework

Material flows	Near future		More distant future		
	Firm internal; no or few current barriers	Dependent on other actors or sectors, no or few current barriers	Firm internal; current barriers to be overcome	Firm external, current barriers to be overcome	Sector external, current barriers to be overcome

Source: Developed by the authors, based on analysis of recent CE literature.

It is important to note, as explained in the methodology section (Chapter 1) that we found surprisingly few academic contributions regarding circular economy and tourism. Actually, only searching for the combination of these two key terms, no useful hits were found on recognized scholarly databases. The resulting analysis, presented in this chapter, is thus based *more* on reports and program initiatives, and less on academic, peer-reviewed literature, than what was expected at the outset. As there were also only very few fully developed and well-documented CE best practices cases from the tourism sector, we have also had to include studies and experiences that do not target the tourism sector, but where lessons learned or implications can be applied to the tourism sector.

This means that it is an only partially filled 'palette', pieced together from different sectors and studies that do not necessarily focus on the tourism sector, that we present in the following. However, on the positive side, this underscores the potential for interested actors to become part of the first-movers within CE tourism.

4.2 Accommodation

4.2.1 Introduction

Working toward a more circular economy within the field of tourism accommodation involves many aspects. This includes the following material flows:

- Building and construction
- Refurbishing and decorating
- Operation services
- Circular practices in accommodation (managers, staff and interaction with guests)

4.2.2 Building and construction

With the growth within tourism markets, circular models for the building and construction sector within tourism are highly relevant to take into account. However, building new hotels only indirectly pertains to the tourism sector and it is certainly beyond the reach of many hotel SMEs to function as entrepreneurs for the construction of new hotel buildings. Nevertheless there are several interesting new buildings based on circular technologies that are hotels and for this reason, the building and construction sector is included here, albeit briefly.

According to Ellen MacArthur Foundation, which has done a study on the potential for development of a circular economy in Denmark (Ellen MacArthur Foundation, 2015), the building and construction sector has special opportunities within several areas. This includes industrialised production and 3D printing of building models; reuse and high-value recycling of components and materials; and sharing and multi-purposing buildings. Some opportunities are already being addressed by firms today. These include the upgrading of waste materials for use in the building sector, including the use of secondary raw materials. It also includes designing for disassembly and waste prevention, whereby buildings and products are flexible and allow for components and products to be reused. Finally, some companies can provide the construction of non-toxic buildings and materials by offering fully declared products with little or no chemicals and toxic emissions. The sector is also developing through increased access to IT-knowledge about the material content and construction details and cooperation optimisation in order to scope the entire building and construction process through a reinvention of supply chains and business models (State of Green, 2016). The Danish company, Old Bricks, whose business model is to provide reused bricks for new buildings, is an example of such a new business opportunity. Old Bricks has developed from a small company into a large-scale patented clean-tech production company that collects and cleans used bricks with vibration technology. After manual checking the quality of bricks they are stacked by robots before being shipped to new construction sites, saving more than 95% of the energy otherwise used to manufacture new bricks (State of Green, 2016).

However, energy savings are not just made possible thanks to the use of higher quality building materials, but also relies on the technologies involved in improved energy performance of buildings (Winans et al., 2017, referring to Zhou et al).

CASE: Innovation in the built environmental and digitalisation at the Crowne Plaza

Crowne Plaza Copenhagen Towers is a large 25-story hotel with 366 rooms, built in 2009. It is part of the Intercontinental Hotels Group.

The hotel is a frontrunner in environmental building design, built with the purpose of using sustainability as a competitive edge over other hotels. The hotel's heating system, food waste disposal system, as well as procurement policies for furniture and disposables are highly ambitious.

Heating and cooling. Underneath the Crowne Plaza Copenhagen Towers hotel is Denmark's first ground water based climate system. Within the closed system, ground water meets with air and the temperature difference between the two elements allows for the cooling of the hotel during the summer, while heated energy is allowed to be stored underground and then reused to heat the hotel during the winter. Collectively the hotel uses 65% less energy than comparable hotels.

Smart booking. An engineering firm has delivered an intelligent building automation system that controls the climate in the hotel building. The advanced building climate control system is connected to the booking system so that room temperatures depend on their usage. Through such mechanisms heating, cooling and air ventilation is at an absolute minimum when the room is not booked, lowering the energy consumption levels markedly. The hotel also has systems to monitor the consumption of electricity, water and energy used for heating and cooling and is based on a close collaborated between hotel and engineering firm in order to develop a tailor-made intelligent building automation system (Siemens, 2016).

Electricity. On the outside, the hotel is covered in solar panels from the fifth to the 25th floor, totalling an area of 2500 m². This covers about 10% of the hotel's electricity needs, and the rest is sourced from other renewable energy sources, such as wind.

A smart system has also been installed to control lighting and water-saving devices have been installed throughout the hotel (Crowne Plaza Copenhagen Towers, 2017).

Reuse of food waste. All food waste is grinded and sucked into a 10,000-litre tank in the basement. When full this is delivered to a biogas plant, which produces biogas. The residue from this process is used in agricultural production in order to avoid chemically based fertilisers.

The building has been built according to the EU Green Building Standard. Crowne Plaza is Green Key certified (Green key, 2015). The hotel has been constructed according to the standards laid out in the EU Green Building Programme. With its photovoltaic-clad façade, the hotel has introduced a new form of sustainable energy source within the building and construction sector.

In relation to the analytical framework, the initiatives are driven inside firms, but are dependent on high-tech suppliers that are able to deliver innovative technological solutions. Through collaboration with a wider group of actors, the hotel could in the future integrate a more comprehensible and thereby circular waste-handling system, and ensure product afterlife, for example in the case of its furniture.

This case is an example of high-tech solutions that are designed into new buildings and thereby sets new standards for the built environment. It raises questions about how niche innovate circular solutions in the long term may affect other new builds. In other words, once such a building exists, it may support policy developments that drive a more broad transition.

In the present, such building and construction investments are beyond the capacities of small and medium-sized businesses (Rizos et al., 2015). However, there are examples of SME hotels built or refurbished on circular economy principles. A relevant case is the Green Solution House in Denmark, which is presented below.

The case is also an example of the increasing digitalisation within accommodation driving a development toward 'the paperless hotel'. Existing technologies such as the integrated climate control and booking system at the Crowne Plaza is also relevant for smaller hotels with climate control systems. Here, the case showcases the available of such smart systems and the primary barrier for implementation in small and medium-sized accommodation is limited financial capacities.

4.2.3 Refurbishing and decorating

This section refers to the material flows involved in furnishings – including carpets, wallpapers, electric appliances and devices as well as sanitary facilities in hotels. Business cases based on circular use of for example furniture, carpets, paints, wallpapers, appliances, electronic devices and plumbing/ sanitation facilities depend on access to such products upstream in the supply chain. Hospitality businesses should consider buying or leasing used or remanufactured furniture, fixtures and equipment. Typical remanufacturing operations performed by suppliers are replacement of worn parts, refinishing of metal or wooden surfaces, repairing of scratches, dents and holes, and reupholstering of cushions. Extending the life of furniture, fixtures and equipment through remanufacturing reduces the rate at which they are discarded (Legrand, Sloan, & Chen, 2016).

We can distinguish between two overall types of businesses: 1) those that remanufacture used products and re-sell them and 2) those that supply products with looping services, offering their consumers economically efficient end-of-life product returns and reuse/recycling practices. The type of relevant business model depends on the product type, where product-looping options often relate more to electronic devices and appliances, whereas furniture, paints and carpet more often are remanufactured and re-sold. Looping business models are more novel than remanufacturing and requires or prerequisites the enabling of supply chain coordination for redesign of products, disassembly methods and practices, as well as services (Kumar & Putnam, 2008).

The focus on re-constructing the way we think about supply chains is stressed by Sharma et al (2010). They argue that debates on ecological conservation and environmental practices have raged within marketing for over three decades, but most of the focus has been on identifying and targeting the environmentally conscious consumer. Less attention has been given to marketing's role in a green supply chain and its interface with environmentally friendly manufacturing and operations firms. They draw attention to the need to focus on business-to-business marketing in the supply chain to achieve environmental sustainability objectives (Sharma, Iyer, Mehrotra, & Krishnan, 2010).

This requires management resources to have the capacity to work with suppliers to procure such products. Analysing all the upstream activities such as the sourcing and supply chain to work with suppliers on the delivery and quantities required are important steps in working with the optimal amount of resources as well as questions pertaining to forms of distribution (Legrand et al., 2016).

There may also be in-house reuse options, which need to be explored. Reusing is better than recycling in most cases as recycling often means downcycling while reusing keeps the material in its original form and uses the item over and over again for the same or different purposes. Here are some examples of reuse in the hospitality industry:

- Reusing textiles: Converting damaged textiles into useful items is relatively simple. Reuse torn bedsheets, towels, aprons, banquet linens into laundry bags, aprons, children's linens, small covers etc. Replace single use items such as napkins, tablecloths and handtowels with reusable items.
- Reusing containers: Use less material in the first place, less recycling and less disposal. Implementing reusable container systems can reduce costs for freight etc.
- Reusing bottles and glasses. Beverages can be purchased in kegs or bottles intended for reuse rather than dispensable bottles, which must be recycled (Legrand et al., 2016).

Outside the business, a number of upstream firms that supply the tourism and hospitality sector with remanufactured goods as well as product looping business models are emerging. The following are examples of such businesses.

Questions concerning access to local business partners vis-à-vis more global distribution and re-distribution systems are not discussed here, but there is obviously a need to assess whether resources needed for transportation outweigh or exceed resource savings through remanufacturing.

CASE: Green Solution House: a showroom for Circular Hotel Solutions

Green Solution House (GSH) is a small, 4-star Danish hotel and conference centre with 20 employees and 92 rooms, established in 2009. GSH is a gently renovated and refurbished hotel building with newly built conference facilities and a large newly built green area. The hotel is based on a holistic approach to sustainability and circularity, integrated in almost all aspects of its operation. The environmental initiatives cover a variety of accommodation, food, energy and water-related aspects of hospitality services.

The hotel perceives itself to be a 'living lab' that not only embraces new green technologies, but seeks to demonstrate the latest technological, organisational and other sustainable and circular developments in the building industry. This is partly achieved through a regenerative business model, whereby monetary revenue from the hotel and conference centre is channelled into funding the ongoing integration of new solutions and assessing already installed systems and products. In this sense, the GSH is a demonstration product for advanced sustainability and circular solutions in the hospitality sector.

The environmental profile is thus a core selling point of the hotel and large parts of the hotel and conference space are used for visualizing and documenting the varying environmental solutions to guests and other visitors. In total, the GSH has adapted 75 new or adapted 'green solutions' encompassing circular energy and water systems, upcycled furniture, reusable carpets, curtains and paints, elimination of food waste, local supplies of foods and building materials, and interaction with the surrounding landscape and biotopes.

GSH produces energy. Solar cells integrated into the facades and glazed ceilings generate electricity and an on-site pyrolysis plant converts organic waste into electricity and heat. Additional hot water is generated with a solar thermal plant integrated into the landscape. A 30-year old swimming pool has been renovated and converted into a highly insulated energy storage system for excess heat. The solar thermal plant and excess heat from the pyrolysis plant heat and store water throughout the year, supplying in-floor heating and potable hot water for the hotel. Energy production and energy consumption correlated to individual building zones is monitored and displayed. If surplus energy is generated, it supplies the Bornholm electricity grid.

The Pyrolysis Plant produces energy from food leftovers. All food scraps and organic materials from the hotel restaurant are fed into a pyrolysis plant that uses carbon based waste. The pyrolysis process heats the waste, breaking it down to produce natural gas and char. A cyclone separates off the gas leaving biochar, which is valuable as an additive for the gardens. The gas is combusted and generates heat and electricity. Excess heat is stored onsite as hot water in a swimming pool, repurposed as a thermal energy storage system.

Energy Generating Skylights. The VELUX Modular Skylights provide modular windows that produce minimal material waste during production whilst the integrated photovoltaics generate energy. As a special option for Green Solution House, one third of the modular skylights have been fitted with integrated photovoltaics. The cells produce electricity equivalent to what is required for two homes per year. There are 196 VELUX Modular Skylights at Green Solution House, 68 of which have integrated PV cells. The 98 m² of photovoltaics produce approximately 7.077 kWh per year.

Water Cycle - Biological Water Purification. Water from the sinks and toilets in the main building is collected and flows through anaerobic, clarifying, and biological filtering stages to enable on-site reuse. Two earth lungs in the Green Footprint Park remove odorous gases with planting selected for this purpose. The first stages of purification are hidden below ground, after which the system emerges

into view and is assisted by sunlight and LED lighting. Here, the water flows through algae tubes that absorb CO₂ and continue the water cleansing process. 500 litres of water can be purified per day. The purified water is used for irrigating the gardens. The aim is to close the loop and use this water for the public toilets; however, this is currently unsupported by building laws. The hotel has applied for permission to function as an experimental lab. regarding reuse of wastewater and closed loop cycles.

Clean Air - Active Materials. A number of elements have been added in order to improve the indoor environment. This includes carpeting that absorbs dust particles, plasterboard covering on the walls to clean formaldehyde, and the roof membrane captures and neutralises pollution particles from traffic.

Upcycled Furniture - Gabriel Fabrics. In the refurbishing process of the GSH, the long loop model was applied to furnishings, meaning that much of the existing furniture from the original hotel stayed in place and was reupholstered with environmentally friendly fabrics from Gabriel's.

Intelligent Indoor Climate - Smart Room App. The GSH is experimenting with a small number of 'smart rooms' where a custom-built mobile app tracks resource consumption and controls the indoor environment. Energy, light, air and water are the four themes on which live feedback is provided for guests, helping to inform behaviour by increasing awareness at a personal level. Guests can access data, which informs them when low impact energy or heat is available for consumption. The experiment monitors how such information may enables guests' decisions on energy and other resource uses.

The building is certified by the Danish Green Building Council's criteria (DGNB), developed with a focus on hotel and offices.

- The hotel kitchen is certified with Eco-label 'Bronze' – higher rating can so far not be achieved because local Bornholm food supplies are prioritized over imported organic.

Stakeholders and Partners. Although realised and financed as a private, market-based initiative, the GSH has received crucially important support from local policy actors and development strategies on the island of Bornholm, where it is located. The hotel's high environmental profile is a direct result of a consultancy study, made in 2008 for the regional business development agency (Business Centre Bornholm) and aimed at investigating the opportunities for establishing a market-based conference centre on the island of Bornholm. The study con-

cluded that a sufficient customer basis for a conference centre on Bornholm existed but only if provided with a clear forerunner environmental profile, distinguishing it from other hotels and conference centres on the Danish market.

These potentials were underpinned by the 2008 launching of a branding strategy for the island of Bornholm, titled "Bright Green Island" (see section 3.2.3), which set goals for a broad transition towards renewable energy production including installation of windmills and supporting among other things the establishment of a smart energy grid. The prospect of a 'Green Solution House' fit perfectly with the Bright Green Island branding strategy. Accordingly, the hotel owner employed a central actor behind the Bright Green Island strategy as executive manager for the realization of the GSH and through a private trust provided the financial capital for the needed refurbishment investments. The realization and continued development of GSH has, however, also been supported by authorities and policy actors by provision of EU structural funds (Blindkilde, 2015; Green Solution House, 2016).

Most of the 'green solutions' implemented in GSH are known technologies slightly adapted to local conditions and needs, and only few (such as the energy generating skylights described above) are truly new solutions developed specifically on the demand of GSH by or in cooperation with strategic technology suppliers. However, the variegated palette of technological solutions in place makes the GSH a pioneering SME hotel. The front edge technology profile connects to the fact that the business as a whole, including buildings, facilities and material flows as well as business model and investment strategies, has been designed on the basis of circularity and sustainability thinking and state-of-the-art circular 1.0 technologies available for immediate implementation.

The development, adaption and implementation of the many green solutions has involved widespread technological communities and has been carried out through close interaction between GSH and its diverse technology and service suppliers. Some of these are local (e.g. food and building materials), others are national or international specialized companies within environmental product and technology niches such as architectural consultants or world-leading manufacturers of low energy windows, organic painting, non-toxic carpets and textiles. For these suppliers, the high environmental demands and priorities of GSH give an important contribution to product innovations useful in their marketing and strategic development.

The case thus clearly shows that being an environmental first-mover gives opportunities for not only changing internal business operations and resources flows but

also of providing an impact on a larger scale of supply chains and technology suppliers as well as the surrounding world including policy makers, industry associations, customers and citizens.

This case is an example of several aspects of circular economy transition processes within accommodation. First of all, the Green Solution House is an example of a unique business model and local development set up. The development of a municipally driven 'green' place brand has gone hand-in-hand with the development of a cradle-to-cradle business model, positioning the hotel as a showcase for the local place brand. Secondly, but related to the first element, the Green Solution House is an example of a business model based on partnerships between a hotel and a number of advanced technology firms that wish to experiment and test new technologies in a real environment. Thus, the GSH functions as a 'living lab' for a number of new technical solutions that need documentation through use. In other words, the green solution house is a test hotel for new technologies and can be studied both for the results of those technical tests, but also for the innovative partnerships that are an ingrained aspect of the GSH business model.

Finally, the GSH is an example of a traditional hotel, built in the 1960s that is transitioning into a refurbished cradle-to-cradle modern hotel. Thus, transitioning from linear resource thinking into circular resource use has not taken place on a white canvas. Rather it takes its point of departure in an existing building that in and of itself presents a series of opportunities and challenges. An example is the decision to keep the existing rather drab 1980s furniture rather than replace it with furniture that to a higher degree would represent the aesthetics of circularity. This is perhaps an important lesson: sometimes transitioning toward a circular economy means keeping what you already have (a long cycle business model, see section 2.4.).

4.2.4 Circular hotel operations

Within the day-to-day operating of hotels, the primary material flows are:

- Energy for heating, electricity needed to run hotels' appliances
- Water for guests' personal sanitation, cleaning, including laundry

Energy

Hotels are large consumers of energy – not only in building construction, but also as establishments with complex installations, which provide guests with high levels of multifaceted comfort and exclusive amenities, treatment and facilities. Many of the services

provided to hotel guests are highly resource-intensive whether it concerns energy, water or raw materials (Sloan, Legrand, & Chen, 2013).

There are substantial differences in energy use between different types of hotels depending on size, class/category, number of rooms, customer profile (i.e. business or vacation), location (rural/urban, climate zone) as well as the particular services, activities and amenities available to guests.

A hotel can be seen as the architectural combination of three distinct zones, all serving distinctly different purposes:

- The guest room area (bedrooms, bathrooms/showers, toilets), individual spaces often with extensive glazing, asynchronous utilization and varying energy loads.
- The public area (reception hall, lobby, bars, restaurants, meeting rooms, and perhaps spa-like facilities). These are spaces with a high rate of heat exchange with the outdoor environment (thermal losses) and high internal loads (occupants, appliances, equipment, lighting).
- The service area (kitchens, offices, storerooms, laundry, staff facilities, machine rooms and other technical areas). These are energy-intensive and may require advanced air handling (ventilation, cooling, heating) (Sloan et al., 2013).

According to the energy efficiency authorities in the United States, typically half the electrical energy is used for space conditioning purposes, (amounting to some 6% on all operating costs). Lighting accounts for approximately 20% of the electrical energy, while 15% is for hot water provision (in hotels where access to communal hot water grids is not available). Catering and other facilities are also significant energy use areas. On the other hand, operating elevators, pumps and other auxiliary equipment account only for a small percentage of total energy expenditure (Sloan et al., 2013).

Hotels that incorporate Building Energy Management Systems are widely recognised as a major driver for environmental sustainability in the hospitality industry (Gaglia et al., 2007; Pieper, 2015). Yet these pertain to increased sustainability activities and are not circular per se.

However, when hotels are located in regions where the public utility companies are not able to provide renewable energy sources, the most circular behaviour at the firm level is to reduce and optimise energy use within the firm. This is done through adoption of a strategic energy management plan and includes an energy audit, i.e. a systematic review of each fuel- and energy-consuming system in the establishment as well as the establishment of energy consumption goals.

Intelligent room functions are available through new technologies, promoting the rational use of energy and reducing power consumption as exemplified above. Sloan et al. (2013) argue that it is *"a widespread misconception in the hospitality industry that substantial reductions in energy used can only be achieved by installing advanced, high-maintenance*

and prohibitively expensive technologies” (Sloan et al., 2013, p. 52). Instead, they propose embarking on an energy management programme, involving an energy audit and changed energy consumptions practices.

CASE: Supply chain management at Martin's Hotels

Martin's Hotels is a Belgian chain of hotels. Their environmental initiatives cover accommodation, restaurant, energy and water. Martin's Hotels has 14 hotels in 9 cities in Belgium. The initiatives apply to all hotels, but some hotels are further in implementing CE products. Martin's Hotels unite their environmental efforts under the slogan "Tomorrow needs today". Their initiatives are primarily a waste and energy reduction scheme that aims to close resource loops and completely design out waste. The company collaborates with its suppliers in this transition.

Circular waste treatment focusses on separating different types of waste in order to increase their reuse value. An example is the separating and collection of used oils in the kitchen. Such an initiative depends on local expert collaborators and their further treatment of each material – i.e. whether their fate is reuse or upcycling. According to their environmental report, Martin's interact with five collaborators for different types of waste treatment. As an example, Recupel (www.recupel.be) handles all electronic waste and ensures that products are ideally reused or, if this is impossible, dismantled and the raw materials are recycled. Recupel exists as a result of Belgian legislation that electronics retailers must take back old electronics and handle their recycling. It is thus also an example that relatively simple legislation can initiate substantial changes.

Martin's Hotels' work with their suppliers to reach their environmental goals. Through this focus, collaborations with suppliers make more initiatives possible, and the initial sustainability focus is gradually extending to circular economic initiatives. The company has recently started working with Desso, a supplier of recyclable carpets, that make it possible to change only parts of the carpets as the most used tiles or sections wear out. Working with the supply chain is thus often a necessary step for switching from linear to circular products. In this case, the collaboration means that the carpet becomes both modular (so that individual parts can be exchanged) and the relationship with the supplier becomes an ongoing one as new tiles will be needed and old ones recycled. Martin's also collaborates with laundry supply services that offer to lease linens and include

environmentally friendly laundry services in the lease. Rather than purchasing price, the total cost of ownership is considered. <http://www.martinshotels.report/index.php/martins-hotels-milieuverklaring-2017/>, <http://www.martinshotels.com/configurator/en/index/tomorrow-needs-today-emas>

The current initiatives are mainly in-house. However, as initiatives develop from more sustainability focused toward circular business models, the dependency on supply chain actors increases. This is for example the case for linen and carpet suppliers that use the cradle-to-cradle model. Further initiatives in the future depend on cascading from external sectors, e.g. in transitioning the company's fleet of vehicles to a circular economic model, instead of purchasing fossil-fuelled vehicles.

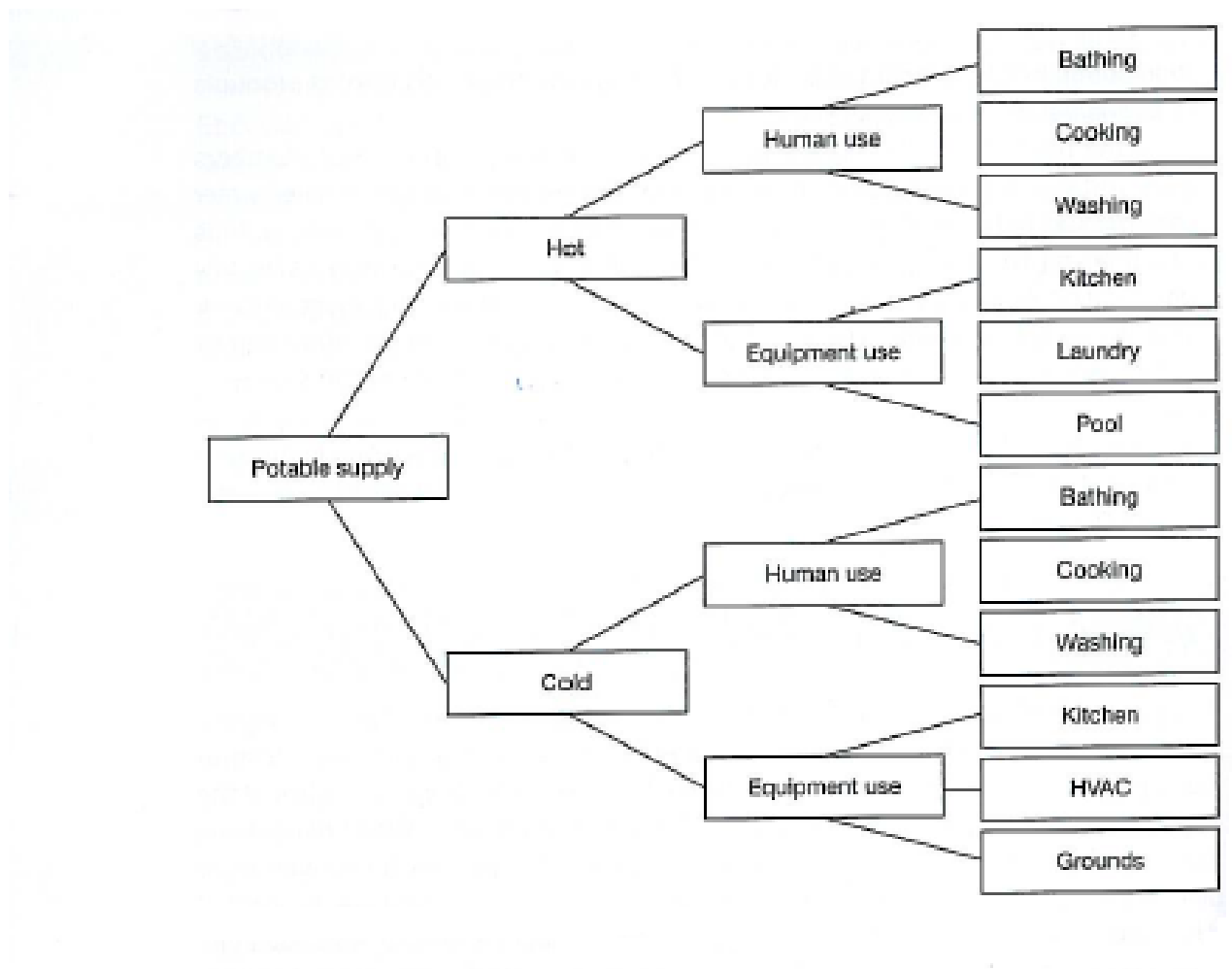
The hotel chain is a showcase for implementing ambitious reduction targets and measures in a medium sized hotel chain (13 hotels), and for carefully selecting suppliers and collaborating with them over a longer period in order to initiate substantial change. Martin's Hotels has received the EMAS award 2017. They also make use of external auditing in their Environmental Management System. http://ec.europa.eu/environment/emas/index_en.htm

This case makes the point that transitioning toward a circular economy takes place in steps and may require business plans that span several phases. A decisive shift from 'green' measures that take their point of departure in sustainability toward 'green' measures that are circular, occurs when the firm endeavours to change their value chains and interact with other firms to ensure truly circular resource flows. As long as business models only aim to control resource flows within the firm, it is difficult to move beyond sustainability. This again shows how important developing an ambitious circular business model is for firms. Although many initiatives may be beyond reach in the present the re-imagining of the hotel's 'green' efforts lies at the heart of real change.

Water

Water consumption in hotels is another area challenged by resource depletion. Often potable water, i.e. water of drinking quality, is used for all water purposes, even in systems that do not require potable water, such as in the plumbing system, heating, ventilation and air-conditioning and watering the grounds. Whereas access to sustainable energy sources to a great extent lies outside the abilities of the single firm, investing in more in-house circular water treatment systems is an option for some businesses.

Figure 5: Depiction of typical linear water system in a hotel



Source: (Sloan et al., 2013, p. 98)

The treatment of greywater, i.e. used water that is no longer potable, but which has been treated to remove potential disease-carrying microbes and redistributed to non-potable systems, is described under the spa section of this chapter (Section 4.4).

The laundering of hotels' linen, primarily from towels and bedding has long been outsourced to supply chain companies. Washing accounts for approximately 35% of the total energy consumed in a laundry, while 65% is used for drying and finishing. When evolving into more circular business models, it thus becomes important for hotels to be able to control the circularity of resources in the laundry business. On top of this, there are transportation resource costs. Many hotels rent their linens and the quality of linens determine their potential for reuse rather than recycling. The quality of linens is also determined by textile engineering to deliver energy and water reductions in laundering, without compromising on comfort and appearance. Thus, hotels need to choose supply chain partners that can provide a product and a service that aids a development toward a more circular resource

application (Green Hotelier, 2015). According to the Green Hotelier, the laundry business is one of the 'biggest culprits' for water waste as traditional machines often rely on potable water as the core ingredient for the washing process (Green Hotelier, 2017).

There may also be potentials in setting up interacting systems between a number of local hotels, their greywater production and local laundering firms.

CASE: Berendsen's sustainable and circular laundry services

Berendsen is a supplier of linen and laundry-services in 16 European countries. Berendsen works to improve the lifetime and reduce environmental impacts of linen and laundry services for hotels and spas. They do so by various means, such as reusing greywater, using materials with a longer life and retaining wastewater heat.

In their laundry operations, Berendsen are working with membrane water filtration technology, which allows for the recovery of wastewater for re-use. According to Berendsen, this reduces the water use by 20-25%, which in turn reduces energy use, as less water takes less energy to heat up. Additionally, the heat of the wastewater is retained, which further reduces energy needs. The materials of the linen also affect water and energy use, and Berendsen have switched from cotton to polycotton in order to achieve reduction and increase lifespan of the linen.

The Berendsen initiatives are thus mainly reduction initiatives, but they are based on ideas that resemble CE. Extending product life by working with new materials is an attempt to 'long-cycle', i.e. reduce the need for new materials by extending the lifetime of current ones. The re-use of water is also a significant step in the direction of CE operations (Green Hotelier, 2015; Ventress, 2013).

Applicability for tourism SMEs: The primary lesson from this case is that it is possible for suppliers of linen services to invest in energy and water-saving technologies that may be out of reach for SMEs. If one chooses to make use of a laundry service supplier, it is important to query them about their environmental efforts and set demands.

For tourism SMEs, this is an external initiative that depends mainly on the supplier of laundry services. However, choosing an ambitious supplier and making it clear that further work is expected can be an important motivator for the service provider.

Berendsen has been working with the Carbon Trust in the UK. Berendsen conducts internal monitoring. No external verification of these have been found. In 2013, Berendsen attained the Carbon Trust Water Standard, <https://www.carbontrust.com/home/>.

However, hotel firms that want to maximise their water reductions need to start by measuring their water footprint. The International Tourism Partnership, a membership-based organisation working to advance responsible business actions such as fair labour standards and minimising carbon emissions has instigated a programme to produce the first universal measurement and metric for water consumption. The Hotel Water Measurement Initiative (HWMI) brings consistency to the way hotels measure and record their water consumption, including laundry, producing a figure per guest stay or room, which allows benchmarking (ITP, 2015).

However, there are also new technologies on the way, which minimise the use of water in the laundering process. A relatively new technology, Xeros Technology Platform, has introduced recyclable polymer beads as the active cleaning medium in the washing process; reduce the amount of water used per wash by up to 80% (Green Hotelier, 2015, 2017). The beads are inserted into a special storage tray in the washer system where they stay until they are removed for recycling by the supplier company. The beads can be used for many hundreds of washes. The used polymer beads are sold to recycle stations, meaning that their recycling fate after this depends on local reuse systems for plastics. The polymer beads also deliver a relatively gentle wash than water-based washing, meaning that less linens need to be discarded (Green Hotelier, 2017).

CASE: Toward circularity at Victor Vask

Victor Vask is an industrial laundry services provider. Victor Vask is located on the island of Bornholm and operates in Denmark. The specific initiative under development is hoped to have global impact. In collaboration with Loland Green Solutions, Victor Vask is developing a biological water treatment system that will transform wastewater from the washing facilities into water of drinkable quality. This water can then be reintroduced into the washing facilities. The wastewater is supplemented by collected rainwater, as water inevitably exits the system through evaporation and in the clothes as they exit the washing process. The aim is thus to create a system that does not produce wastewater. It will however, be necessary to introduce some water due to evaporation. Depending on local conditions, the reductions in water consumption is around 80%, <http://loland-gs.com/2015/05/15/victor-vask-bornholm/>.

So far, the initiative has undergone a testing phase, but lab tests have shown zero bacteria in the treated water, and the system is therefore ready for full-scale installation. The initiative is included here as a case of an emergent technology that shows the prospects of a circular economy. The initiators estimate that 23,000 laundry facilities globally could make use of the technology, and that it will be particularly relevant in areas where water is scarce.

Applicability for tourism SMEs: The primary lesson from this case is that it is possible for suppliers of linen services to invest in energy and water-saving technologies that may be out of reach for SMEs. If one chooses to make use of a laundry service supplier, it is important to query them about their environmental efforts and set demands.

For tourism SMEs, this is an external initiative that depends mainly on the supplier of laundry services. However, choosing an ambitious supplier and making it clear that further work is expected can important motivator for the service provider <https://victorvask.dk/om-victor-vask/>.

4.2.5 Circular practices: management, staff and guest interaction

At the use stage, hospitality companies can consider how the present design of accommodation premises affects the management of resources and potential avoidance of waste along the way. Inefficient working space, task processes etc. creates a waste of time as well as resources. This includes small practices such as food left too long on tables etc. The way processes are performed when dealing with resources, including the standard operating procedures, must be revised to ensure optimal efficiency. Retraining team members on new processes as well as reporting progress to stakeholders are also necessary steps in a sustainable approach (Legrand et al., 2016).

A corporate environmental management system (EMS) already exists and embraces both technical and organisational activities aimed at reducing the environmental negative impacts caused by a company's operations. No 'circular management systems' exist as systemic access to 100% circular energy systems are not available. Nonetheless, as a management tool, the EMS can potentially be adopted toward a circular management system. The five principle objectives of the EMS can be modified to fit with a circular transition goal. The existing objectives are to:

- Identify and control the environmental impact of activities, products or services.
- Respect regulations and go beyond the initial objectives set out in the company's environmental policy.
- Implement a systematic approach to setting environmental objectives and targets.
- Continually improve environmental performance.
- Ensure transparent communication towards employees, communities and consumers.

The EMS is deeply embedded in a number of existing environmental management and audit schemes, underlining the importance of developing new policy frameworks on which to base circular management systems.

An EMS process consists of an initial review or audit (analysing resource waste streams) followed by a number of planning stages involving information and commitment to the EMS, setting up planning and organisational structures as well as data assessment audits. This is followed by more implementing stages including an accounting system. Finally, a management review and certification/registration system is put in place (Sloan et al 2013). Such well-planned systems are a workable point of departure, but the concept of transitioning into a completely new system must be taken seriously. Completely new, 'imagined' norm sets are impossible to plan at the beginning of a process. Instead, the change should be executed in stages, in which every position will be re-imaged, thus creating a new point of departure for CE transition management. Legrand et al also add specific points of engaging an activating 'the team' and suggest specific closing the loop approaches: considering how to approach problems and making decisions in a circular, cradle-to-cradle approach (Legrand et al., 2016).

CASE: Environmental Management at the Scandic Hotels

Scandic Hotels is a Scandinavian hotel group, with 230 hotels in seven countries. Scandic Hotels follow a general environmental policy, which covers multiple areas of resource use, waste handling, materials and procurement.

Scandic Hotels explain on their website that the possibility for guests to only have fresh towels if they leave the used ones on the ground was invented at Scandic and is now a standard environmental measure across the accommodation industry. This approach is mirrored in the first sentence of the guiding principles of the environmental policy: "Scandic works continually to reduce the company's negative impact on the environment". The implied understanding is thus that in a linear economy, the best a company can do is to limit its negative impact on the environment. This is not necessarily in opposition to CE, but thinking strictly in terms of reductions does mean that upcycling, reuse and designing for circularity are not likely initiatives to undertake.

Circular economy is mentioned in the Scandic environmental policy, not as an overall framework for the hotels' actions, but rather as a comment on how the hotel group handles building materials during renovations and the general minimizing of waste. Hence, this is a case of general environmental efforts that have not developed into or been based on CE. However, the initiatives do cover a wide range of the hotel group's activities, and they provide good examples of possible starting points for smaller accommodation providers.

Firstly, Scandic has a **monitoring scheme** that ensures carbon emission are measured and goals can be set for reductions, and the group is phasing out fossil energy in favour of renewable. However, the group does not provide information on the current levels and targets, which would have been favourable. One way emissions are reduced is through designing for energy efficiency.

In relation to waste, the group monitors how much waste is produced and analyses how it can best be minimized. While food waste is composted, waste recycling in general happens through external waste management facilities.

The group attempts to limit the use of chemicals and hazardous substances, and many of the hotels are either Nordic or EU ecolabel certified.

Finally, Scandic has **a code of conduct for suppliers**, which requires that products purchased by Scandic does not harm endangered species, and that suppliers undertake environmental efforts, including monitoring and goalsetting.

The current initiatives are mainly in-house, and mainly focus on reductions. The initiatives are thus fully implementable in the present, but this is perhaps also the weakness of the Scandic approach. Although suppliers are required to follow a code of conduct, overall the perspectives for significant improvements and transformation of the business model is limited and focuses on reducing negative impacts (DONG, 2015; Goodman, 2000; Hotels, 2017; Scandic Hotels, 2015).

Many Scandic Hotels are either EU or Nordic ecolabel certified. The company monitors their own resource use and environmental performance, but unfortunately these data are not available for benchmarking, <http://www.nordic-eco-label.org/>.

Comparing Martin's hotels with the Scandic Hotel case, a paradox becomes apparent. On the one hand, both hotel groups have taken the same first necessary step toward transitioning toward more sustainable resource use - i.e. implementing resource-monitoring measures and introducing resource management plans. On the other hand, each hotel has different goals. Martin's Hotels are working toward a business model based on circular resource management, while Scandic House is continuing their business model based on reducing their resource waste. On the surface, the monitoring and measuring management programmes both have implemented are very alike. However, under the surface, Martin's hotels are working toward becoming truly circular and this is affecting the way in which they interact with their supply chains and business partners. At the niche level, their business model is helping to transform the types of companies and products that are emerging, while the Scandic Hotel business model is 'more of the same'.

A word about guests

A pertinent question is whether hotel guests demand hotel and tourism products and services that are circular in their resource consumption. According to studies of customer satisfaction with environmental sustainability in the hospitality industry (Bruns-Smith, Choy, Chong, & Verma, 2015), the most widely used environmentally sustainable reuse program (towel and linen reuse) was well received by 79-88% of surveyed guests. Guests had also highly favourable positions towards hotels' use of water-saving fixtures. According to the study, this shows a strong link between the best practices that are already being utilized by hotels and those programs that are most preferred and used by guests. In other words, when asked, guests are satisfied with existing practices. However, when surveyed about the importance of access to environmental sustainability programmes for satisfaction, guests still favoured the more traditional drivers of satisfaction (room, facilities, and food and

beverage quality). Green programs do not diminish guest satisfaction and it seems that many green investments are now considered to be a more or less standard aspect of hotel operation, regardless of cost or satisfaction considerations (Bruns-Smith et al., 2015).

4.2.6 Opportunities for implementing CE elements in accommodation

In Table 8 below, the possible actions and business case opportunities based on CE principles for accommodation firms within the tourism sector are presented in the analytical framework developed for this handbook.

Table 8: Possible CE actions and business case opportunities within accommodation

Material flows	Near future		More distant future		
	Firm internal; no or few current barriers	Dependent on other actors or sectors, no or few current barriers	Firm internal; current barriers to be overcome	Firm external, current barriers to be overcome	Sector external, current barriers to be overcome
Building and constructing a CE-based hotel	Decision on a firm business model based on CE principles	Refurbishing existing hotel buildings into CE hotels:	Building new hotels using existing circular technologies	Building new CE hotels in collaboration with suppliers that innovate new state of the art circular technologies	Implementation of policies that demand circular materials use etc. in the built environment
Accessing remanufactured furniture, fixtures, etc.	Implementation of reverse supply chain management principles/ code of conduct for suppliers based on CE	Investing in and purchasing re-used and re-manufactured hotel accommodation products, forming alliances with sharing platforms	Expanding the supply chain management principles to include all suppliers	Expanding the types of products available as remanufactured or re-used.	Cascading systems for the design, use and treatment of many products are developed

Accessing high-end appliances etc. through leasing	Implementation of reverse supply chain management principles based on CE	Switching purchasing models to leasing and use-based service models		Expanding the types of products and services available through leasing and use services	General development of business models based on use rather than ownership models
Circular energy systems	Adoption of environmental management and monitoring systems	Accessing renewable energy sources and systems either in the individual hotel or through local energy companies	Investment in smart energy systems for monitoring energy consumption	Accessing renewable energy sources and systems through local energy companies	Access to 100% circular/ renewable energy supplies through local energy companies
Circular water systems	Adoption of environmental management systems for water	Access to environmentally responsible laundry services	Investment in greywater circular water systems	Developing new grey-water treatment systems with innovative partners	Access to regional circular water treatment including greywater handling
Circular management systems for staff and guests	Adopting and implementing a circular management system	Reverse supply chain management strategy	Advanced circular management systems based on imagined transition goals	Advanced circular management and supply chain management systems based on imagined transition goals	Advanced circular management systems based on imagined transition goals

Based on a study of the resource flows within the accommodation sector and the current state of implementation of circular business models, a large number of business opportunities for hotel SMEs emerge. As can be seen in the figure above, the current state of affairs concerning a transition toward a more circular economy amongst existing hotels primarily takes place within the firms and involves the implementation of new internal practices. Hotels are implementing monitoring systems for energy and water use, waste

treatment systems, and staff managing systems concerning use of amenities and waste handling. These practices are not in and of themselves circular, and indeed do not differentiate themselves clearly from sustainability practices.

In other words, actual circular business models seem difficult to implement without interaction outside the firm, primarily through the supply chain. Circular business models almost per definition demand interaction between firms and prerequisite long-term relationships between suppliers and users. This is the case for all types of resource flows in the accommodation field. Most prevalent, however, is the importance of circular energy and water production and treatment systems, which are highly relevant in regions where access to sustainable energy sources is limited.

For small and medium-sized hotels, the state of transitioning toward a more circular economy seems constrained. SMEs meet barriers pertaining to lack of capital to invest in new technologies that are not mass-produced and therefore costly. Their scope of actions is also limited by the lack of what we might term 'circular infrastructure', i.e. access to suppliers and business partners that are able to deliver remanufactured, reused and refurbished goods or down-stream businesses that are willing to buy their used mattresses, sorted waste etc.

However, the cases also show that time is an important factor. Many of the accommodation firms mentioned here have worked with sustainability activities for a number of years and are slowly transitioning toward more circular perspectives, moving from practices that primarily reduce their resource use, to models that are designed to be more circular. An example of this is Martin's Hotels and the primary lesson to learn from their case is the development of long-term business relations with external suppliers and brokers, for example businesses that redistribute their electronics waste. This again stresses SME dependence on 'circular infrastructure'.

It is notable that hotels primarily are active concerning the implementation of renewable and circular energy sources. For several decades, the general public has been very aware of the need to transition toward sustainable energy sources. It is therefore not surprising that hotels, depending on their capital investment capacities, are engaged in supplying their own sustainable energy sources such as photovoltaic panels, and thus becoming independent of publicly available energy grid sources. Circular water treatment systems seem less central – whether this is due to lack of access to knowledge about water treatment systems, lack of access to technologies, or lack of access to affordable circular water system technologies is unknown.

Business models that are more relevant in the long run concern the implementation of circular building and construction methods using materials and building practices that are designed to be regenerative and remanufacturable. This is outside the current capacities of small and medium-sized hotels, as it requires capital to invest in both new technologies as well as to drive further technological innovations. The large Crowne Plaza Hotel is a case

in point, as the building of this state-of-the-art hotel with many novel technological features requires considerable capital.

Again we must stress the dependence, even of the large accommodation firms, on 'circular infrastructure', including renewable energy sources in the public energy grid, access to circular water treatment systems, access to suppliers and users that base their business models on leasing forms, circular designs and sharing platforms for example. This is even more important for SMEs that are less able to develop such infrastructure and therefore rely on larger firms as well as policy infrastructure to support transitions.

4.3. Food services in hotel restaurants

4.3.1 Introduction

In this section, the restaurant and food sector is studied in order to understand the opportunities for small and medium-sized enterprises to develop more circular business models by applying the analytical framework presented in section 2.7. It should be mentioned, that we focus on food services and restaurants as part of hotel or other accommodation services. Therefore, this section will not deal with CE elements concerning the built environment in restaurants, as this has been addressed in the previous section.

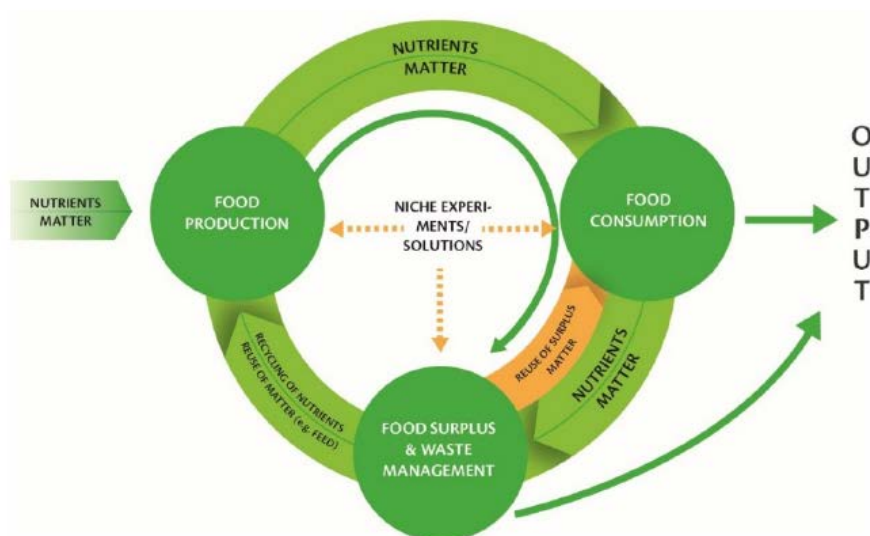
This section is based on broad studies on CE opportunities related to food production, food packaging and food waste (Ellen MacArthur Foundation, 2013; Ellen MacArthur Foundation & McKinsey Center for Business and Environment, 2015). This is complimented by a few identified studies on food as an element in sharing economy setups (e.g. Privitera, 2016) and some initiatives to reduce food-related waste (e.g. Alhola, Salmenperä, Ryding, & Busch, 2017). A wealth of sector specific reports related to the reduction of avoidable food waste, and cascaded handling of food waste exists, but these have not been included here as they are too specific for the purposes of this handbook.¹¹ During literature searches, no academic literature with a focus on CE opportunities regarding the hospitality/food sector was identified (see Section 1.3 for an explanation of the methodology used). The reason for this limited research attention is the complexity of the food supply chain (Genovese, Acquaye, Figueroa & Lenny Koh, 2017), as well as the still incipient development within CE that focuses on the tourism and hospitality sector. The consequence of this, as is also reflected in this sub-section, is that some CE opportunities related to food are further developed and explored than others. The identified studies and reports that focus on CE activities in kitchens in the hospitality sector almost entirely focus on food waste prevention, including food sharing, as well as food waste handling. The section presents possible CE-related initiatives that can involve both producers (SMEs) and consumers (guests), as well

¹¹ Interested readers may look up Sala, S., Anton, A., McLaren, S. J., Notarnicola, B., Saouter, E., & Sonesson, U. (2017). In quest of reducing the environmental impacts of food production and consumption. *Journal of Cleaner Production*, 140, 387–398. <https://doi.org/10.1016/j.jclepro.2016.09.054>.

as collaboration with government institutions, for example regarding waste collection. Many of the identified possible CE initiatives involve cross-sectorial collaboration, but other initiatives can be handled within individual businesses.

Many CE reports highlight food as a good that is characterised by an inefficient use of resources and with high levels of waste. This applies to the production stage, to consumers' waste of excess food, as well as to the handling of food waste. This pertains to producers (farmers, manufactures, retailers), and consumers (where households and kitchen operations in the hospitality sector are often not distinguished in the available reports) (Ellen MacArthur Foundation, 2013). It also pertains to waste management actors, typically involving municipal governments. Figure 6 illustrates that food waste and food surplus are generated at both the production and consumption stages. The figure also highlights the importance and potential of niche experiments to create innovative solutions (as also mentioned in Chapter 2).

Figure 6. Food surplus and waste management



Source: Jurgilevich et al. 2016, p. 3.

Several studies highlight the potential for using territorial, small-scale experiments during the CE transition-phase as part of the development of local and national CE policies (e.g. Jurgilevich et al., 2016). This approach could potentially be linked to and benefit from the successful evolvement of local/regional foods and the growing interest in bio-economy. Several Nordic rural destinations identify tourists as an ideal market for food products that contain specific local or regional qualities (Mikkola, Randall, & Hagberg, 2016). The

successful innovation and growth in regional food products is also reflected in many restaurants, including hotel restaurants, where local produce and local foods are presented as signature meals, and thus part of differentiating the hospitality product. Combining this with consumer demands for low ecological footprints for food products, some restaurants pursue business models that offer tourists local food products that not only contain special local taste qualities ('terroir'), but that are locally grown, produced and treated, with the ambition of leaving a minimal ecological footprint. Thus, the trend in local and regional foods, which has grown exponentially during the past decade in the Nordic countries, seems to fit well with CE principles. However, it should also be stressed, that there is no direct correlation between 'locally produced' food and environmentally sustainable food (i.e. food with a minimal negative ecological footprint) (Notarnicola et al., 2017). Therefore falling into 'the local trap' (Jurgilevich et al., 2016, with reference to Born and Purcell 2006) by a *priori* considering the local or regional scale of food production as more sustainable and virtuous than, for example, a global scale should generally be avoided.¹²

In a near future, it is possible to imagine that the intake of food can be reduced to the intake of relatively basic necessary calories and nutrients for bodily functions in the form of gels or powders much as astronauts, soldiers and mountain climbers do, while the mind simultaneously experiences the intake of elaborate gourmet meals through augmented reality. It is, however, questionable whether replacing the enjoyment of food with an augmented reality version would be ethically and aesthetically acceptable to consumers. Especially in the tourist and hospitality experience situation, where food is a central product of a given destination and where the experience surrounding the intake of food is a central hospitality service.

Instead, virtualisation as a business action within the hotel restaurant sector could be conceived of as adding or augmenting information about food qualities, including its circularity qualities to food products.

4.3.2 Material flows in hotel restaurants in a circular economic view

Working towards a more circular economy within food services and hotel restaurants involves many aspects. A majority of CE initiatives concerning food relate to physical food and beverage inputs such as raw biological materials and pre-fabricated and prepared products. These are not the only relevant material flows. By applying a systems-thinking

¹² Studies have compared energy-use for locally (proximate to consumption site) food production to non-local (typically in a climatically more favourable region) food production abroad including post-harvest transportation requirements for specific food items. Recently, these studies have also include other elements such as food production water-requirements in the production region. Due to their specificity and complexity, they are not included in this handbook.

approach to understand the circular economy, a number of other relevant material flows in hotel restaurants also emerge, as presented in the list below.

- **Biological material flows into foodstuffs and beverages** and their ecological footprint through their production process, processing and distribution. This is at the core of the biological materials cycle. For the hotel restaurant sector, this encompasses production of raw materials, the deselection of plant and animal parts deemed unfit for human consumption and their cascading into other sectors, for example into biological energy and the animal foodstuffs sectors.
- **Material flows involved in food and meal packaging**, including glass, paper, plastic and card box. It is not only the amount and type of wrapping that is relevant to take into account, but equally so the 'after-life' or possible re-use or recycling of these materials.
- **Energy use in relation to transport** of biological materials as well as processed and prepared goods. Here not only distance matters, but also the efficiency of the involved transportation technology including the consumption side.
- **Water use involved in food preparation**, cooling and cleaning. Here it is necessary to distinguish between direct and indirect water use, i.e. use in the hotel kitchen and indirect water use accumulated through the production and processing of food items.
- **Energy use in food preparation, cleaning and storage**. Like with water, it is possible to distinguish between the direct use in the hotel kitchen and the indirect energy content accumulated through the production and processing of food items. The accumulated energy-content is sometimes expressed as equivalent of tons of CO₂-emissions in order to relate it to climate change. The indirect energy content from food material transportation may be included in this calculation.
- **Technological kitchen appliances**. The in-house impact of the chosen technology such as refrigerators and freezers, ovens, pressure steamers, dishwashers etc., will directly influence the energy-consumption and water use of the hotel kitchen.
- **Cutlery, plates, glasses**, etc.: Hospitality restaurants use many plates, cups, glasses, cutlery and interior decorations. In a circular economic thinking, the energy and material content used in the production of these, as well as the after-use life of these are relevant to consider.

As mentioned above, food waste, i.e. the cycle of biological materials concerning human food, has been a major area of research and of circular actions. This particular material flow has received far more attention in research and reports than the other material flows listed above. Due to the available material, this sub-section therefore also devotes a detailed presentation regarding the prevention of food waste through more circular food production and consumption resource flows. The other relevant material flows are presented subsequently, but due to the available material, they are given much less weight. However,

as mentioned before, this is likely to change rapidly, with the increasing interest in CE within the hospitality sector, and CIRTOINNO actors can contribute positively as first-movers.

4.3.3 Food waste – biological material flows related to food and beverages

The sub-section starts with a general description of food waste at different stages in the food production, processing, distribution, consumption and waste process and then continues on to focus more narrowly on food waste in restaurants. This is a reflection of the limited available information on CE initiatives or studies within the hospitality sector.

The Ellen MacArthur Foundation considers food waste as an example of a ‘rough diamond’ (World Economic Forum, Ellen MacArthur Foundation, & McKinsey & Company, 2014, p. 43), characterized by relatively high volume, high collection rate, high quality of recovered materials and some emerging technologies to increase the value obtained from the by-products and reduce the use of virgin materials in (other) productions. On a global scale, the study estimates that global material savings of roughly 20% can be achieved in what they call ‘fast-moving consumer goods’ in which fresh food and packaged food account for more than half of the potential savings.

Different studies show that consumers are engaged in food waste prevention in the restaurant sector. A Danish survey shows that more than 4 out of 10 Danes prefer to visit restaurants that are engaged in reducing their food waste, and more than half prefer restaurants that offer visitors to take left-over food home (Erin-Madsen, 2014). Another sector-specific CE study showed that 22-42% of respondents from a global survey point to restaurant and canteen operators as those who should primarily take responsibility for ensuring greater transparency in securing sustainable practices in places to eat. Only ‘governments’ received a higher score, while much fewer respondents expected food suppliers, consumers and NGOs to take responsibility for ensuring more sustainable practices in places to eat (Unilever Food Solutions, 2011, p. 9).

Definition of terms: Food surplus & food waste

Food surplus: Edible, discarded food that is not consumed by the consumer (abandoned intentionally, removed from sale, forgotten).

Food waste: Previously edible food that is now inedible. Food waste can be avoided if food is prepared or preserved, or used otherwise. In high-income countries, studies estimate that food waste often surpasses 40% at the consumption stage (Ellen MacArthur Foundation & McKinsey Center for Business and Environment, 2015; Jurgilevich et al., 2016).

Different European studies indicate high levels of waste related to the hospitality food sector (and disproportionately high, compared to the number of meals served), but also that this is a highly contested field where caution of simplified results is advised. A French study concludes that although only 15% of meals in France are served in the restaurant sector, these meals account for 42% of the food waste (ADEME - INCOME Consulting AK2C, 2016). The hospitality sector itself contests this. Hotrec Hospitality Europe, says that *"the European hospitality industry is a small food waster compared to other components of the food chain"* (Hotrec Hospitality Europe, 2016, p. 8). This contention is based on results from a recent study for the EU on food waste as part of a CE initiative, which finds that the 'food service sector' only accounts for 12% of total food waste in Europe (Stenmarck, Jensen, Quedsted, & Moates, 2016). However, a study by Marthinsen et al (2012) cautions that available literature gives different results on food waste and avoidable food waste, which makes these two figures not directly comparable. Studies on food waste in the hospitality food sector reach quite different results ranging from around 750 to 3000 kg/employee/year (see for example Marthinsen et al., 2012, p. 56).

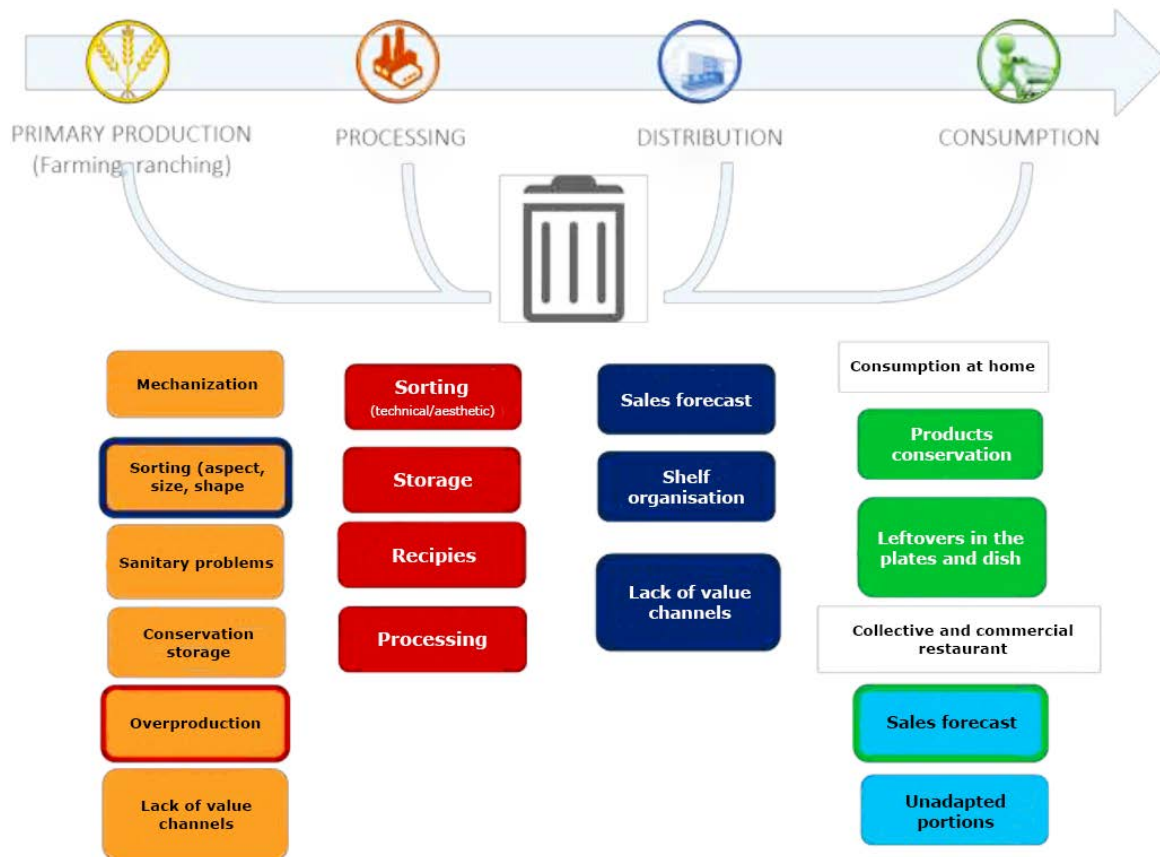
Politically, there is significant and growing attention towards prevention of food waste, partly related to the CE agenda in Europe, but also related to the UN global Sustainable Development Goals, where Goal #2 is to end hunger, achieve food security, and improve nutrition and promote sustainable agriculture by 2030. With a growing global population, it is a declared high priority to achieve a resource-smart food system (Notarnicola et al., 2017; Sala et al., 2017). Sustainable Development Goal #12 is even more relevant for the hospitality food sector, as it concerns responsible consumption, with a sub-goal to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses (United Nations, 2015). The EU targets a 50% reduction of avoidable food waste by 2025, and 2014 was declared as the European Year against Food Waste. Several countries have implemented economic, regulative and communicative instruments against avoidable food waste, including financial support. Relevant legislation is, however, mostly related to food safety. These rules might have simultaneous impacts on avoidable food waste, but may also clash with avoidable food waste prevention ambitions (Marthinsen et al., 2012).

Related to food safety, several studies point out that a more sustainable food system is required to prevent food intoxication (Notarnicola et al., 2017; Sala et al., 2017), a factor that increasingly motivates consumer-choices regarding organic produce, for example. Food waste also has environmental consequences, for example through greenhouse gas emissions from landfills, as well as higher-than-necessary pressure on agricultural land for food production, which again feeds back to negative effects on natural areas and biodiversity.

The main mechanisms that generate food waste and losses in different phases of the food chain, (here presented in a linear manner, from primary production and processing to distribution and consumption) are illustrated in Figure 7. The boxes circled by a colour

indicate influence from actors involved at a different phase of the food chain. Notice that restaurants have their own sub-group under consumption.

Figure 7. Main mechanisms generating food waste and losses in different phases in the food chain



Source: from ADEME, 2016, p.12

The Ellen MacArthur Foundation report on "Opportunities for the consumer goods sector" supplements the list above with packaging, transport, retail, preparation, and waste treatment and disposal. The reports' focus is on the consumers as private households, but it can be extended to include the hospitality sector (Ellen MacArthur Foundation, 2013, p. 41).

The same report presents estimates of significant potential profits created (at the level of society) by a shift to a circular food system (Ellen MacArthur Foundation, 2013, p. 47). A recent study on the benefit-cost ratio of food prevention initiatives in England has shown an impressive return to the investments made in reducing food loss and waste (Hanson & Mitchell, 2017). The study convincingly shows an important business case in investments into

these types of reductions. Looking specifically at food losses and wastes from kitchens in hotels, Hanson & Mitchell find that of the 74 studied entities, the median benefit-cost- ratio is 7.6, meaning that for each euro invested, the company gets 7.6 euro worth of benefits (ranging from 6.3 as the lowest to 38.2 as the highest) (Hanson & Mitchell, 2017, p. 15). The study shows that even from a purely economic point of view, it is interesting for hotel kitchens to engage in CE initiatives.

Likewise, a sectorial study on savings from preventing food waste in the UK shows that hotels in average lose 0.52 pound per serving through food waste (food that could have been eaten). If a hotel has 500 servings per week, this adds up to avoidable costs of 13.500 pounds per year (WRAP, n.d.-c).

Education of chefs as well as waiters and consumers on more plant-based diets, more healthy diets (and possibly also more local diets (e.g. 'Nordic diets' in (Jurgilevich et al., 2016)) are mentioned in several reports as an element in a future change. However, when dealing with changes in customs and perceptions, large and influential actors are often needed to break the ice. The role of public procurement to change perceptions of edible resources (from previously conceived as 'waste' to 'food') is mentioned by Alhola et al. (2017) as well as by Notarnicola et al (2017). On a more exotic note, openness to new sources of protein, which were previously not used, or not used for human consumption (for example insects or previously un-explored types of fish) are also new elements to consider within a CE transition.

Cross-sectorial food waste initiatives

The regeneration of food materials ideally pertains to the regeneration of the biological material cycles, whether plant or animal based, so that they may be returned safely and sustainably as nutrients to the biosphere. Due to the potentially closed loop resource flow for biological materials, regeneration is here closely linked to looping, and related to larger issues of ecosystem preservation. It is not possible for a single hotel restaurant to ensure biological regeneration and looping, but it may contribute to such cycles through several types of actions.

One way is to separate plant based food waste and compost, leading to anaerobic digestion and eventually returning nutrients to the agricultural land.

Example from Finland tourism involvement in landscape regeneration

A study from Northern Finland (Lapland) on the separation of biological waste and its reuse in regenerating eroded land show that tourists are willing to separate waste, as it is to a large extent the tourism activity in the area that erodes the landscape (Piippo, Juntunen, Kurppa, & Pongrácz, 2014). The study proposes a future co-digestion of waste from a municipal slaughterhouse, thereby obtaining some industrial symbiosis. It is worth noting that from the point of view of energy recovery alone, waste separation and collection would not be economically feasible. The study highlights the potential of such initiatives to create an improved image of Lapland as a sustainable tourist destination. This finding is relevant for SMEs in hospitality in other geographical areas, especially where nature

Another way, that the literature proposes that restaurants can help put less pressure on the ecosystem is, for example, by shifting towards a more plant-based diet, including offering more vegetarian options on menus. However, it should be recalled that the environmental impact of animal-based nutrition is highly dependent on the production system, which has often not been sufficiently taken into account in studies recommending vegetarian diets over dual diets, as some studies tend to neglect the positive impacts of combined plant and husbandry production systems (Notarnicola et al., 2017).

Example of regeneration requiring cross-sectorial collaboration

The report "Towards the Circular Economy: Accelerating the scale-up across global supply chains" by World Economic Forum in collaboration with Ellen MacArthur Foundation and McKinsey & Company gives the following example of regeneration: "Land productivity and soil health. Land degradation costs an estimated US\$ 40 billion annually worldwide, without taking into account the hidden costs of increased fertilizer use, loss of biodiversity and loss of unique landscapes. Higher land productivity, less waste in the food value chain and the return of nutrients to the soil will enhance the value of land and soil as assets. The circular economy, by moving much more biological material through the anaerobic digestion or composting process and back into the soil, will reduce the need for replenishment with additional nutrients. This is the principle of regeneration at work." (World Economic Forum et al., 2014, p. 19). If the hospitality restaurant sector were to contribute to regenerative land and soil processes, it requires cross-sectorial collaborations ensuring that the land is not overproduced and that biological food-based nutrients are returned to the land.

Recovery of phosphorous from food waste and crops as well as from human and animal excreta, is mentioned by some articles as an important activity in order to reuse this finite raw material (Jurgilevich et al., 2016; Notarnicola et al., 2017). Phosphorous is listed as one of the 20 most critical raw materials by the European Commission, and is considered one of the first elements where we will experience global scarcity. (Insert ref 6) In addition to future supply problems, the inefficient use of phosphor leads to negative environmental consequences, especially for the aquatic environment (ref 7).

Finally, the recycling of food waste for different purposes is mentioned. Food waste can be recycled as animal feed, as biodiesel in anaerobic digestion and as compost and fertilisers (Notarnicola et al., 2017), thus promoting industrial symbiosis collaborations. Several recent studies within Life Cycle Analysis find that a large part of the environmental impacts of food systems occur within the production phase. When animal feed is involved, this often represents a large environmental impact. This highlights the relevance of experimenting with looping resources through the recycling of food waste as animal feed (Sala et al., 2017) (ref 8).

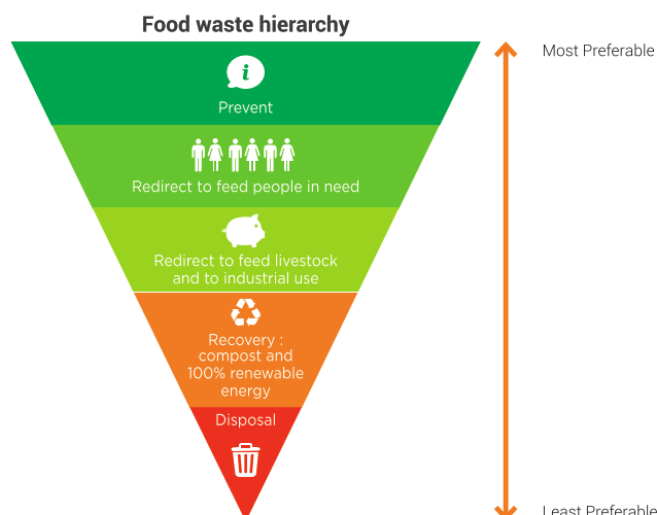
Example of food waste recovery and reuse

One example in the literature focuses on the recovery of oils from food production (waste cooking oil supply chain), and the reuse in another production (bio-fuel), through applying the concept of the reverse supply chain (Genovese et al., 2017). The case study highlights the short-term challenges of the economic attractiveness of the recovery and reuse of waste cooking oil, as it is dependent on a government subsidy in order to be economically competitive to petro-diesel. As such, the study illustrates challenges related to current price structure on raw materials (and lack of pricing of environmental externalities).

Food waste prevention

This subsection focuses on food waste prevention, which is the most studied and documented area within circular economy food issues. The food waste hierarchy triangle (Figure 8) indicates alternative ways to handle food waste, from the most to the least preferable, seen from a circular economy perspective.

Figure 8. The Food waste hierarchy



Source: Hotrec Hospitality Europe, 2016

Food waste prevention in a CE perspective is an area in vivid development. Over the past few years, a number of guidelines have been developed for the restaurant and hotel food sector¹³. A Nordic study on prevention of food waste in restaurants, hotels, canteens and catering (Marthinsen et al., 2012, p. 97) asked operators to identify the most important actions to reduce avoidable food waste. The resulting list of priorities is presented in Table 9 below.

Table 9: Actions to reduce avoidable food waste, identified by hospitality operators

Most important (30-45%)	Medium importance (20-30%)	Less important (<= 15%)
Fix targets for avoidable food waste reduction	Purchasing routines	Introduce incentives for reducing food waste
Routines for right portions	Freezing and storage routines	Review legislative requirements and routines
Internal education / training on costs	Reporting on costs	Routines for following recipes
Menu planning	Training on environment and sorting waste	Follow up buffet routines

¹³ To mention a few, see for example publications by (WRAP, n.d.-b), Hotrec Hospitality Europe (2016), and Nordisk Ministerråd (2012).

General awareness campaigns on avoidable food waste prevention	Access and measure food waste	Reuse of excess production and leftovers
Planning production		Routines for excess production for internal consumption
		Routines for excess production for distribution for other people with needs
		Better routines for waste sorting
		Introduce environmental certification
		Routines for reporting and follow up waste sorting

Source: Reproduced from Marthinsen et al. (2012, p. 97).

The same study indicated that key information needs amongst tourism operators centre around how to reduce avoidable food waste, the impact of avoidable food waste on the environment and society, how to motivate staff and organise the process and, finally, how to measure and sort avoidable food waste (Marthinsen et al., 2012, p. 99).

Prevention of food waste is an attractive starting point regarding CE activities for hotel restaurants as it can be handled predominantly within individual businesses, and thus in general does not have many entry barriers, as well as having many positive effects throughout the reverse supply chain through prevented demand. Initiatives could involve:

- Reducing and preventing food waste by improving the planning of menus, so that 'waste-pulp' from for example fresh juice can be put to use in cakes or sauces.
- Reducing waste by serving individual platters rather than buffets.
- Reducing food waste through educating staff on how to use food alternatively and use more of the food items (e.g. Alhola et al., 2017). Related to this, educating users regarding how to assess whether food is still good although the 'best before' date has passed, is also mentioned as a way to prevent food waste. This is less relevant in a restaurant setting.
- Reducing waste (in the food production chain) by planning menus according to what food items are in season.
- Cascading use of food – for example through re-use of excess food through distribution to feed poor people (using food redistribution networks or food banks (Jurgilevich et al., 2016)) or through recycling of excess food into animal feed

(provided it has no animal components) and composting. (See also Figure 8, “The Food Waste Hierarchy”).

- Preventing food waste by the use of biomass residues through the entire supply chain (Sala et al., 2017).
- Inter-sectorial initiatives to change national regulations that lead to food waste, for example allowing supermarkets to donate unsold food rather than having to destroy it, are also proposed (Privitera, 2016).
- Other initiatives involve attempts to popularize the use of ‘goodie bags’ for restaurant meal leftovers, <http://www.stopspildafmad.dk/doggybags.html>, and reports on how to reduce food waste in industrial kitchens (Jacobsen, Gram, Kindt-Larsen, & Boutrup, 2013).
- Going beyond the specificities of the cases mentioned above, there is an interesting recent report on mapping food waste in retail, restaurants and industrial kitchens. (See: Petersen, Kaysen, Manokaran, Tønning, & Hansen, 2014).

Examples of food waste prevention initiatives

An interesting initiative that aims to reduce and prevent food waste is called The Zero Waste International Alliance. It is a non-profit organization that provides a forum for those interested in zero waste strategies. Their work shows that a zero waste approach can increase efficiency, provide cost savings, reduce the burden of extraction from and waste to nature, and allow more resources to be available.

A study mentioned by Alexander et al (2002) examined solid waste from 25 hotels, finding that in the period 1991-1993, food waste represented 46% of solid waste. Looking at the food waste with a CE approach, this shows opportunities for resource recovery as well as waste reduction. Food waste from hotels and lodging facilities can be caused by over-preparation, table scraps, cooking losses, and packaging failures. While much of it can be prevented, the non-avoidable food waste can be composted and thus looped. At the same time, landfill fees may be saved (Alexander et al., 2002).

The EU is dedicating a website to initiatives in the member states that work to reduce or prevent food waste: http://ec.europa.eu/food/safety/food_waste.

There are many organizations and initiatives within food waste reduction in the hotel restaurant sector. They include WRAP, who have published results of a survey regarding barriers and opportunities for what they call ‘out of home food waste’ (WRAP, n.d.-a), Nordic Council of Ministers (Nordisk Ministerråd, 2012), HOTREC (Hotrec Hospitality Europe, 2016) and HORESTA.

CASE: Towards closed loop food circles at the Strattons Hotel

Strattons is a small, independent, family-run hotel in Norfolk, UK. It has 14 bedrooms, a 30-cover restaurant and a café. The Strattons Hotel showcases how small, independent hotels through commitment to waste reduction and circular practices in collaboration with national knowledge organisations and local partners, can prevent and reduce their food waste substantially.

The Strattons hotel owners have participated in a regional waste minimization project specifically targeting the food and drink industry and is currently (2016) a partner in WRAP (The Waste and Resources Action Programme). WRAP is a UK-based not-for-profit company that was established in 2000 and works in partnerships across the whole food sector to help cut food waste in a way that is both economically and environmentally sustainable. WRAP is backed by government funding from England, Northern Ireland, Scotland, and Wales.

They provide expert support, tools and guidance, to encourage the adoption of best practices. They provide expert support, tools and guidance, to encourage the adoption of best practices. In 2012, they launched the WRAP Hospitality and Food Service Agreement with more than 70 signatories, to support the sector in reducing waste.

At the Strattons Hotel all waste produced in the hotel is segregated, weighed and recorded. Where possible, the waste is taken to the 'recycling room' for storage prior to re-use or recycling. Less than 2% (149 kg) of the hotel's waste is sent to landfill. In just one year (2010-11), the hotel managed to save over £16,000 by reducing food and packaging waste, increasing recycling to 98% and making savings in other areas such as good housekeeping and water use.

Based on the project at Strattons and other hotels, the WRAP organization has come up with the following top tips to prevent and reduce waste:

Measurement and monitoring

- Measure kitchen and hotel waste to understand the scale of the opportunity for savings.
- Separate food waste into three bins; storage, preparation and plate waste.
- Measure and monitor food waste at each of these stages.

Purchasing and ordering – menu design

- Bulk-buy non-perishable items.
- Use core items across the menu. A good example is tomatoes that can be roasted, made into soups, used in salads and as a garnish. Consider what other items you can use in a similar way.
- A 'Special Dish of the Day' is a good way to use stock approaching its use-by date.
- Create menus that use fewer ingredients to reduce the risk of any going out of date.
- Use seasonal ingredients where possible.

Storage

- Handle stock carefully to avoid damage and unnecessary waste. Always send back any damaged goods received from suppliers.
- Continually rotate stock by putting the newest product at the back of the shelf so that the oldest automatically gets used first.
- Consider grouping items to correspond with supplier's purchasing list.
- Consider vacuum packing some items to extend shelf life.
- Revise shelf/storage plan frequently to ensure it reflects your menu.

Preparation

- Avoid excess trimming of fish, meat and vegetables and get creative with unavoidable trimmings and excess to make pates, soups and stocks.
- Consider offering vegetables with skin on so that no peelings are thrown away.
- Follow the 20/20 rule: 20% extra buffer on a busy day and another 20% frozen for contingencies.
- Freeze excess berries for coulis or smoothies.
- Make breadcrumbs or croutons from leftover bread.

Portioning and plate waste

- Keep portion sizes consistent - use standard spoons and measures.
- Offer different portion sizes to suit customer.

Reducing packaging

- Consider entering into partnerships with suppliers that take back empty containers such as egg boxes and trays.

- Ask suppliers to deliver produce in reusable packaging such as collapsible crates or trays that can be taken back and used again.

Re-use

- Use washable napkins, tablecloths and towels.
- Use refillable containers for cleaning products and buy them in bulk.
- Using reusable jugs, dishes and plastic plunger style dispensers can help to reduce waste from small single use portion packs, such as cream, milk, sugar, butter, jam and condiments.

Recycling

- Keep waste cooking oil separate and explore options for collection by partners who can redistribute oils for use in energy processes.
- Investigate options for food waste recycling (WRAP, 2012b).

Most of these initiatives are tips that transform day-to-day practices that are easily implemented without capital investment and partnering with upstream or down-stream supply firms. Exceptions are the initiatives involving recycling and reusing packaging, reusing cooking oils and food waste recycling in regions that mix biological waste with technological waste in landfills.

CASE: Smart meter food monitoring system at The Strathmore Hotel

The Strathmore Hotels operate a group of seven hotels throughout Scotland and the North of England, specialising in group tours. As an example of a medium-sized hotel, the Salutation Hotel, with 84 bedrooms, a bar/lounge and a restaurant catering for guests and events, is presented here. The Salutation Hotel took part in an eight-week trial to actively monitor and reduce food waste helped by WRAP.

Food waste monitoring system: A smart meter to measure food waste, from Winnow Solutions, was installed in the hotel's kitchen to track kitchen waste and customer plate waste. The system weights different types of foods put into the food

waste bin, to a tablet computer. Staff use a touchscreen that is fully customized to the individual restaurant menu, to identify the type of food thrown away and at what stage. This allowed food waste to be quickly weighed and categorised by selecting icons on the tablet touch screen.

This weight data was linked to cost information to calculate the 'true cost of waste' for the hotel. Data was transmitted to a remote server and analysis undertaken to produce daily and weekly reports for the hotel. While there were some WiFi connectivity problems, no data was lost as the system stored the data for later transmission.

The trial reports were used in staff meetings and quickly raised awareness of the actual cost of food waste to the business. The reports also helped to identify areas for focus, mainly related to buffet and plate waste from breakfasts, and restaurant and bar main dishes.

- Reduced plate sizes for buffet operations (from 10-inch to 9-inch diameter), with customers able to come back for more if they wanted it.
- More on-the-go preparation/cooking (rather than large batches in advance).
- Reductions in the quantity of toast 'automatically' offered for breakfast (with hot top-ups offered)
- Better use of trimmings and unused items, e.g. vegetables in soups etc.

Having made good progress and savings at The Salutation Hotel, the next stage is for the company to roll out this good practice to the other six hotels in the group. This is being done through:

- Developing new Key Performance Indicators (KPIs) and an associated action plan.
- Developing a waste procedure that captures food waste prevention initiatives, e.g. use of prepared and not served food, to ensure consistency across the group.
- Regular meetings of 'Green Team Champions' from each hotel to share good practice.

The trial at the Salutation Hotel successfully reduced the weight of food waste per cover by 36% and achieved financial savings worth approximately £10,900 per annum. Based on an average covers per week, this translates to an annual saving of an estimated 4.2 tonnes of prevented food waste (WRAP, 2012a).

The Strathmore hotel case is an example of how smart technologies not only make food waste prevention easier, but also function as a tool for teaching staff new practises and forms the basis for transferal of innovations from one hotel restaurant to the next within SME hotel chains. This is even more so the case for large hotel chains.

Learning from the big boys

In general, compared to large hotel groups SMEs do not have the same access to investment capital, they rarely function as entrepreneurs responsible for new buildings and they may not have the same innovative capacity (Rizos et al., 2016). However, they can lean on the shoulders of the larger hotels at two levels: firstly, they can learn from and partially mimic the actions and organisations of the larger hotels as far as some of the innovations concern new practices and approaches rather than large technological investments. Secondly, some of the circular actions will necessarily involve other actors up- and downstream in value chains. Most of this will take place at the local level, for example ‘nudging’ local laundry suppliers to use more sustainable and circular laundry methods, pushing toward greywater use partnerships in the local vicinity. In these instances, the businesses of even smaller hotels can add volume to such business models and thereby make them more sustainable financially.

Beyond in-house solutions

The sharing of surplus foods is another way to prevent it from becoming waste. The Italian researcher Privitera (2016) identifies three main types of food sharing: 1) Social dining marketplace that connects travellers/consumers with local hosts for home-dining experiences; 2) Non-profit food swaps or redistribution of goods or exchange of services or experiences; and 3) Sharing of productive assets as community gardens or collaborative lifestyles.¹⁴ The first type of food sharing may be integrated into a community tourism concept also by restaurants in the hospitality sector, through increased ties with households in the local community, whereas the second may be used by hospitality restaurants for surplus food. The third may be integrated into the sourcing policy of the restaurant or possibly could involve the shared use of storage space or kitchen appliances in off-season periods. All food-sharing initiatives help utilize food resources or related machinery more effectively and reduce waste. However, Privitera points out that businesses are likely to face regulatory challenges related to hygiene control, licensing laws and zoning policies.

¹⁴ According to Privitera (2016: 95), an aim of the food sharing platforms is “also to help people create walkable, healthy, economically vibrant neighbourhoods through the development of local food systems and to aggregate and market foods”.

CASE: Sharing of surplus food at Hotel Guldsmøden

The Guldsmøden Hotel in Aarhus/Denmark (www.guldsmødenhotels.com) is a small family run hotel certified by Green Globe, which is one of the most demanding certifications available within the hospitality sector (see textbox below). Green Globe's 360-degree sustainability management system ensures the best efforts in every aspect of the daily operations at the hotels. Green Globe audits its members once a year, and demands 5% annual improvements within all aspects of its certification. This ensures continued commitment to keeping it green (see more at www.greenglobe.com). Hotel Guldsmøden also has the Eco-Gold label, regulated by the Danish Ministry of Food & Agriculture, which is granted to restaurants that use more than 90% organic produce. The hotels are audited by a representative from the ministry three times per year, and the most recent Guldsmøden score was 98,6% organic <https://guldsmødenhotels.com/sustainability/>.

One truly circular initiative at Hotel Guldsmøden is the sharing of food surplus, mainly from the breakfast buffet, via the app/platform Too Good to Go, which operates in Denmark, Germany, UK and France. Too Good to Go is a platform for reducing food waste. Restaurants and caterers can advertise leftover food that customers can find and purchase via an app and then collect. This reduces food waste and allows companies to make money on what they previously threw out. It also carries a social benefit as low-income groups, e.g. students, can purchase food at a low cost <http://toogoodtogo.dk/>.

Reducing food waste is a very tangible environmental effort that seems to have great support in the general population. It is therefore also likely to be a good way to profile the company.

For hotel SMEs, this initiative is possible to initiate with no immediate barriers, although local food regulations must be considered. There may not be a similar initiative available in all countries and regions, but local advertising about food surplus for purchasing may also be an effective solution.

Examples of food sharing platforms (here based primarily on Privitera 2016):

- **BonAppetour** (<http://bonappetour.com>) is a social dining marketplace that connects travellers with local hosts for home-dining experiences, including dinner parties, cooking classes etc. Potential diners can see the menu in advance and read details of the venue and the host.
- **I Food Share** (www.ifoodshare.org), a web platform that allows users, retailers or manufacturers to offer free food surpluses. The forms in which swaps are manifested are based on the organizers' motivations and target participants' interests (Albinsson, Perera, 2009).
- **Grub Club** (<http://grubclub.com>), a pop-up restaurant platform which connects food lovers and creative gourmet chefs in temporary home/restaurant settings.
- **Landshare**, (www.landshare.net), which brings together people interested in home-grown food, connecting those who have land to share with those who need land for cultivating food.
- **Casserole Club**, (www.casseroleclub.com), a meal-sharing platform, aimed at helping tackle the growing social problems of loneliness and malnutrition among older people and at the same time helping connect people with their neighbours.
- Apps like **Karma**, <http://karma.life> and **Resq Clud**, <https://resq-club.com/which> are platforms that help reduce food waste from restaurants and cafés through allowing them to sell excess food to customers as take-away meals, thereby also partly recover costs.

4.3.4 Other material flows in the hotel restaurant sector

This subsection draws upon less empirical and academic material, not because it is considered less important, but because fewer initiatives and studies have been identified, that deal with material flows in the hotel restaurant sector, other than food, and excluding the material flows relevant in the building and refurbishing of hotel areas which have already been addressed in Section 4.2.

Food packaging

A primary CE business action concerning food packaging pertains to optimising food durability and performance through packaging as well as working toward improving the circularity of the materials that go into the packaging products.

Initiatives to make the biological material flows involved in packaging of food and meals more circular typically involve actors from across different sectors, as the hotel restaurants

typically purchase food items and beverages, which come with different kinds of packaging and wrapping. Hotel restaurants can through their procurement policies attempt to reduce the packaging to a minimum. However, engagement in this material flow will often involve some aspect of feedback into the production phase of the food chain, which is often termed "reverse supply chain management" in the CE literature. Reverse supply chain management is defined by Genovese et al. (2017, p. 5) as "*activities dealing with product design, operations and end-of-life management in order to maximize value creation over the entire lifecycle through value recovery of after-use products either by the original product manufacturer or by a third party*". It thus involves cooperation between sectors, or acting as a political consumer through ones' procurement policies. As a first step, a firm can adopt an active procurement policy.

Other ways that tourism SMEs can take steps towards more circularity with regards to food packaging is to use new biodegradable materials for food packaging (World Economic Forum et al., 2014), and to reduce material inputs into packaging and give it 'second life' through recycling (see Danone case, France, in Murphy & Rosenfield (2016). However, proposals like this is an example of a CE initiative that involves a long time frame as well as financing. As such, it is more viable for large-scale companies than for the typical tourism SME.¹⁵

Another possible early CE step for hotel restaurants can be to look at how they handle unavoidable waste, including from packaging: How are the different fractions of the waste handled by the restaurant? Are they separated? Are some recycled? Can some fractions be reused if correctly separated? Can other processes (such as incineration) perform better, if waste is separated differently? Part of the handling of waste involves inter-sectorial collaboration, for example with municipal governments responsible for waste collection, etc. An organisation based in the United Kingdom, Waste and Resources Action Programme (WRAP), has published brief-lets for companies how to get started with recycling of glass, plastic, etc. (WRAP, 2011).

When the public sector acts as a (politically conscientious) consumer, it can have an important and path-opening role. Alhola and colleagues mention this use of public procurement and its innovative effects based on cases from Finland (Alhola et al., 2017). Several Danish municipalities have witnessed a similar path-opening effect of public procurement of local and organic food for public sector canteens, which have had a decisive effect on the business models of local food producers (Danmarks Radio, 2015; Københavns Madhus, 2016).

¹⁵ Other similar examples of industrial food producers working within a CE agenda are Unilever and Arla Foods, mentioned in Notarnicola et al (2017). Unilever, 2016. Sustainable Living. The Unilever Global Company. <https://www.unilever.com/sustainable-living/> and Flysjö, A., Modin-Edman, A.-K., 2014. How to use LCA in a company context - the case of a dairy cooperative. In: Proceedings of the 9th International Conference on Life Cycle Assessment in the Agri-food Sector, San Francisco USA.

Energy - in food preparation, storage, cleaning, and transport

The direct use of energy in hotel kitchens can be addressed by the business itself without need for cooperation with others. However, the indirect energy content accumulated through the production and processing of for example food items, requires inter-sectorial cooperation for the hotel kitchen to influence. Environmental impact of food production and transportation may be reduced by applying new technologies that, for example, increase energy efficiency. Some authors highlight the role of education of how to use food alternatively (in order to use more of it and produce less waste), and how to use technological appliances to, for example, cook smarter, more locally, on-demand, and have long-term storage (between seasons) (e.g. Alhola et al., 2017).

Several authors propose that shifting to sourcing from local food productions with minimum waste in the supply chain, will also in many cases reduce environmental impacts, as local food systems are often associated with simpler solutions, higher food security and food safety and, thus, it is argued, sustainability (Jurgilevich et al., 2016). Alhola et al (2017) also propose shortening supply chains to keep the disposal of raw material in the food chain at a minimum. However, it should be noted that there may not be a straightforward relationship between distance (from production site to consumption site) and environmental impact (Notarnicola et al., 2017).¹⁶ The complex and differentiated results of different production forms and distribution chains for different environmental and health-related outcomes are further highlighted by Tasca et al (2017), who find that while organic production in the researched Italian locations scores higher on some indicators, integrated farming scores higher on other indicators, when the entire production chain is taken into account.

Notarnicola and colleagues (2017) draw attention to the importance of labelling and information, so that users can make better informed and more environmentally friendly choices. This goes for users as SMEs in the hospitality sector, as well as for users as guests. Notarnicola and colleagues (Notarnicola, Curran, Hayashi, & Huisin, 2012; Notarnicola, Tassielli, & Renzulli, 2012) discuss a number of initiative where food retailers have evaluated the carbon footprint of their products (for example as Casino and Leclerc (France), Migros (Switzerland), and Tesco (UK). Sala et al (2017) highlight survey as a way to identify consumer behaviours and information needs.¹⁷

¹⁶ For an overview article on food waste research, see Chen, H., Jiang, W., Yang, Y., Yang, Y., Man, X., 2016. State of the art on food waste research: a bibliometric study from 1997 to 2014. J. Clean. Prod. 140 (Part 2), 840-846.

¹⁷ Sala et al (2017) refer to the following two studies: Goossens, Y., Berrens, P., Charleer, L., Coremans, P., Houbrechts, M., Vervaet, C., De Tavernier, J., Geeraerd, A., 2016. Qualitative assessment of eco-labels on fresh produce in Flanders (Belgium) highlights a potential intention performance gap for the supply chain. J. Clean. Prod. 140 (Part 2), 986-995, and Olson, E.L., 2016. The rationalization and persistence of organic food beliefs in the face of contrary evidence. J. Clean. Prod. 140 (Part 2), 1007-1013.

Some authors propose carbon-based food taxes as a future way to stimulate local, environmentally friendly food choices (García-Muros et al. 2016; Sala et al., 2017). Other authors propose in-restaurant growing of vegetables and species in order to reduce transportation energy loss (Davies and Doyle, 2015). It should be noted, however, that some studies indicate (Schmitt et al., 2017), that in some cases of locally grown food the saved energy in the transportation link is outweighed by increased energy and resource inputs in the production/growing link.

Water in food preparation and production

The direct use in the hotel kitchen can be addressed by the business itself without need for cooperation with others. However, the indirect water-use accumulated through the production and processing of for example food items, requires inter-sectorial cooperation for the hotel kitchen to influence.

Reduction of water use in production phase – an example from France

The company Danone, France, (here from Murphy & Rosenfield, 2016) offers an example of a company that has engaged in reducing its water use in the production phase of food products. However, it is an initiative with a long time-horizon and high financing requirements, and as such is more accessible to large-scale companies like Danone, than to the typical tourism SME.

Kitchen appliances

Alternatives to ownership-based uses of kitchen appliances may be considered, for example, through the establishment of lease agreements for the top-of-the-line refrigerators with a company that owns the refrigerators and thus have the incentive to ensure long lifetime and handling of the after-use-life. Through the purchase or lease policy of the hotel restaurant, it may help stimulate the demand for products with more reusable content in closer and slower loops.

Other possible CE initiatives within hotel restaurants' kitchen appliances include:

- Choose kitchen appliances that optimizes the efficiency of food production, food processing in the restaurant kitchen, as well as food storage.
- Use of smart technologies in shaping cooking and eating practices; use of intelligent fridges (Davies and Doyle, 2015).
- Sufficient and adequate storage facilities to keep food fresh longer, thereby reducing and preventing food waste by. For example, new packaging technologies and systems that extend food life and minimize packaging waste are mentioned as an option for this (World Economic Forum et al., 2014).

- Inform users about product footprint so they can make informed choices: Notarnicola and colleagues (2017) highlight the importance of activation of EU standard labels initiatives such as the Life Cycle Analysis-based product footprint (so-called Product Environmental Footprint).¹⁸

Cutlery, plates, glasses and other 'dining-ware'

Cutlery, plates, glasses and other 'dining-ware' also represent material flows, which can possibly become more circular. Initiatives can include sourcing used items, thereby reducing the material and energy 'footprint' of the items. Sourcing of new items may include considerations of environmental footprint of the product, as well as how the 'after-life' of the item can be, depending on the materials it involve. Consider the different environmental footprint of different products, including through drawing upon the EU standard labels initiative of the Life Cycle Analysis-based footprint (mentioned above). For an example of bio based, edible materials for disposable cutlery see <https://www.kickstarter.com/projects/1240116767/edible-cutlery-the-future-of-eco-friendly-utensils>.

4.3.5 Opportunities for implementing CE elements in hotel restaurants

In this section, actions and business cases pertaining to more circular resource flows within the hotel restaurant sector have been described. The proposed actions in this sector are based on examples from research articles, from online CE databases as well as from white papers, reports and other materials presenting CE transitions. As already mentioned, the majority of the proposals are related to food waste (prevention, or handling) as well as handling of excess food, as this is where the bulk of attention and practical experience is concentrated. This concentration is a reflection of the otherwise highly complex production system that food represents, making it challenging especially for SMEs to engage in. However, the food sector, and particularly SMEs within the food sector, represent an area of rich potential for innovation and development of novel solutions and thus for niche business models.

Possible actions and business case opportunities based on CE principles for the hotel restaurant sector are presented below in Table 10.

¹⁸ EC, 2013. Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations. Off. J. Eur. Communities 56 no. L124, and related guidance, available at: http://ec.europa.eu/environment/eussd/smgp/pdf/Guidance_products.pdf.

Table 10. Possible CE actions and business case opportunities within hotel restaurants

Material flows	Near future		More distant future		
	Firm internal; no or few current barriers	Dependent on other actors or sectors, no or few current barriers	Firm internal; current barriers to be overcome	Firm external, current barriers to be overcome	Sector external, current barriers to be overcome
Biological inputs in food and beverages	Fraction food waste, compost, Daily handling of unavoidable waste	Sharing excess food; Cascade to anaerobic digestion and return nutrients to agricultural land Recycle food waste to other uses, i.e. animal fodder or compost Recover and reuse nutrients in waste	Educating staff and management on avoidance of food waste and handling of food waste. Investing in food monitoring technologies.	Widespread implementation of cascading systems within food distribution and recovery	Policies that support the widespread implementation of circular biological flows
Food packaging	Procurement policy	Reverse supply chain management: accessing existing food packaging products (biodegradable materials); Recover and reuse nutrients in waste	Investment in circular food packaging products	Reverse supply chain management: innovation of new packaging products	Policies that support the development of circular food packaging system
Energy	Daily practises in the kitchen Menu according to season	Identifying products which are as energy efficient as possible (including issues of transportation)	Investment in energy monitoring technologies or new appliances		Setting up local food supply systems and a connected closed loop of biological material handling
Water	Daily kitchen practises reduction.	Water efficient production of food items, or production in water-affluent regions	Investment in greywater systems	Easy access to greywater treatment facilities	Setting up water cascade systems to minimise water downscaling. Looping accumulated water use in food production
Kitchen appliances	Procurement/leasing policies	Depending on up-cycle value chain access to leasing business models		Reverse supply chain management: innovation of business models	Developing general business models based on leasing and use-based models
Cutlery, plates, glasses	Source re-used	Build up supply chain relations with firms that deliver reusables		Longer life/smaller eco-footprint in production	

As the cases in this section show, changing the daily practices in kitchens is a significant factor when reducing food waste. The cases also show that hotel restaurants benefit economically from implementing such measures, whereby the motivation factor is high. This applies regardless of whether the firm has implemented circular policies or is 'just' aiming to reduce waste in their current business model.

Many of the proposed activities/elements that have few barriers to implementation for SMES involve innovative cross-sectoral collaboration and networking. This includes a number of elements that are well tested elsewhere and thus 'ready' for local adaptation and implementation.

Concerning barriers to immediate implementation, we encounter lack of capital for investment in new technologies as well as lack of 'circular infrastructures'. These include local cascading systems to treat food waste, local sharing platforms to distribute food before it perishes and must be down-cycled, access to suppliers of leasing business models, reusable kitchenware, including packaging and, finally, access to down-stream buyers of kitchen bi-products such as used grease.

Some of these actions may encounter institutional barriers – as for example regulations against food surplus distribution, regulation regarding waste separation and handling, quotas or subsidies that influence farmers' choices of crops despite suboptimal distribution from an environmental and social point of view (Jurgilevich et al., 2016). Other barriers for a smoother transition towards a circular economy include infrastructure, geographical challenges and institutional regulations. Despite these barriers, it seems that CE is an area of growing interest, also among consumers, and therefore, that potential first-mover benefits should also be underlined.

4.4. The spa & wellness industry

4.4.1 Introduction

In this section, the spa and wellness sector is studied in order to understand the opportunities for small and medium-sized enterprises to develop more circular business models by applying circular economy principles, using the analytical framework developed for the handbook. It should be mentioned, that we consider spa operations that form part of a hotel or other accommodation service. Therefore, this section will not deal with CE elements concerning the built environment, as this has been addressed in the Section 4.2.

Globally the spa and wellness industry has experienced rapid growth since the late 1990s with the development of new spa resorts, hotels that offer spa services and the upgrade of existing spa facilities (Smith, 2011).

The Futures Company, which publishes global business reports on how macro development trends will influence corporations within different economic sectors, has analysed the future development perspectives for the spa and wellness industry (Schuller, 2015). According to The Future Company's annual Global Monitor, based on 29,500 survey respondents in 24 countries, the following three trends will dominate the development of the spa sector:

- The connected business
- Creating value, not volume
- Becoming 'open' and social

Consumers' constant connectivity through mobile or internet-enabled devices combined with a need to have time and space to think, reflect and switch off from everyday pressures and stresses, influence both the products and the business models within the spa industry. They effect the online spa marketplace. Online marketplaces within the spa business consist of both locality-based services, where customers can schedule an appointment at a number of spas in the vicinity of the costumer, as well as product services, where costumers, based on a database of skin types, lifestyles and preferences, suggest different types of products. These are social sites, not direct commercial sites and website revenues are generated not through sales, but through the database on customer preferences, which is valuable to brand owners. The Future Company assesses that such a system will rely on costumers' trust and companies' transparency, suggesting that a circular economy based on costumers' personal information in return for a trustworthy personalized service will be a growing trend within the sector.

Costumers' unabridged access to information has completely altered the way they shop and the quality of products and services are highly important. There is an increasing desire to improve intrinsic wellbeing by 'doing good', expressed as an expectation that businesses should create value not just for individuals and the society, but for the planet. Within the spa sector this will entail being aware of resource wastage in treatments and material flows. In

other words, spas need to pay attention to increased social engagement and exchange as well as resource usage. Spas face competition from the use of spa products at home and from relaxation and coaching 'treatments' through flexible apps. The Future Company thus argues for the need to implement more flexible business and ownership models within the Spa industry. For example, an Airbnb model of shared resource usage, leveraging existing, underused assets, materials and even staff could be a way forward. Customers can be integrated in the value chain and spas could set up freelance therapist networks and share their own facility resources.

Finally, The Future Company argues for the need for spa businesses to embrace trends toward more dialogue based customer relations. According to Schuller (2015), winning people's trust and being a 'social business' will become a competitive advantage for spas, as customers grow increasingly environmentally and socially aware, and consequently become increasingly more reluctant to believe company claims about environmentally and socially sound behaviour. In other words, there will be a trend toward businesses fulfilling people's needs rather than generating new consumption wants. This may also change the role of spas in communities that will result in spas becoming more social venues that answer to communal needs.

4.4.2 Sustainability issues in the spa & wellness industry

The literature review of the spa industry reveals no studies on the advance of circular economic transitions within the spa and wellness industry. Even the academic work on sustainability activities within the spa sector is limited. According to R.A. Smith (2011) and Cohen and Shivdasani (2011), there is, however, growing attention within the spa and wellness industry on sustainability issues.

The primary material flows within the spa sector are:

- Energy
- Water
- Cleaning products / chemicals
- Treatment products including cosmetics

Towels and linens are also a significant material resource in the spa and wellness industry, but this has been treated under accommodation (section 4.2) and is therefore not included here.

Energy

Significant levels of energy can be consumed by a spa's infrastructure (e.g. lighting, pools, and saunas). A significant determinant of energy consumption concerns the climatic conditions in which the enterprise is located. Cooler climates will require more heating of pools, while warmer climates will increase evaporation of outdoor pools (Watt & Beyada,

2011). Even in hot climates, thousands of litres of water need to be heated at spa resorts for different spa treatment and accommodation-related uses (Six Senses, 2016). Spa environments also demand temperature-control systems, which are often energy demanding and may involve heating inside spa landscape areas during cold seasons as well as cooling systems during warmer days. Although some of these demands may be addressed through building and construction actions (See Accommodation, Section 4.2), circular energy consumption systems are an important aspect of the spa sector as well.

Spa traditions vary widely between cultures and climates. In an innovation process towards more sustainable and more circular spas, some traditional spa systems may conserve more energy than others – again, depending on its surrounding climate – and may serve as sources of inspiration.

It should be mentioned that many of the luxury spa facilities involved in CE activities are located in tropical or subtropical climates. Although their experiences with energy-efficiency and water conservation are inspiring, they cannot be directly applied to a South Baltic setting.

Water

"Since water is the single most important shared resource across all supply chains, and wastewater is the largest untapped waste category – as big as all solid-waste categories taken together – it is the natural starting point for the circular revolution" (Stuchtey, 2015).

Access to enough water and water of a clean quality is at risk globally as the world population is rising combined with threats from climate change and changing weather patterns. In the face of ever-growing demand, wastewater is gaining momentum as a reliable alternative source of water, shifting the paradigm of wastewater management from a 'control, treat and dispose' agency to 'reuse, recycle and resource recovery' agenda (WWAP, 2017). Wastewater can potentially be a cost-efficient and sustainable source of energy, nutrients, organic matter and other useful by-products. Wastewater's vast potential as a source of resources, both as energy and nutrients remains underexplored and underexploited (WWAP, 2017). According to the UN, urine collection is 'likely' to become an increasingly important component of ecological wastewater management, as it contains 88% of the nitrogen and 66% of the phosphorous found in human waste – both nitrogen and phosphorous being essential components to plant growth and therefore having a potential within agriculture (WWAP, 2017, p.4.).

In the tourism industry, urine-based wastewater as an acceptable source of in-house water use is unlikely. Many spa treatments involve a high level of human exposure to water directly or indirectly. Consequently the water, from a human health perspective must be of a quality fit for drinking (Stevens & Cunliffe, 2011). Potable water resources consist of water suitable for drinking that usually has been treated to remove harmful elements. In spas, potable

water is consumed by a wide range of activities such as cleansing and beauty treatments including saunas, recreational facilities such as pools, as well as more general services such as kitchens, laundry, cleaning and watering grounds etc. (Watt & Beyada, 2011).

Risk management concerning water quality in spa and wellness centres has an impact on both human health as well as the environment. Concerning human health there are three main components to consider: water supplied to the spa, water when used in the spa (contamination in-house) and health issues related to the disposal or recycling of spa wastewater.

Environmentally, there are three components to take account of:

- Where the water was taken from¹⁹
- The spa infrastructure
- Where the wastewater is returned to the environment

Where the clean potable water is taken from and where the wastewater is returned to the environment concerns municipal or regional water treatment systems, whereas the spa infrastructure can more readily be managed at the firm level.

There may, however, also be cultural barriers to the use of wastewater. Although communal bathing practices go back many centuries and is a central aspect of the renowned Roman bath practices, spa and wellness treatments today stress individual luxury treatments surrounded by pristine waters in a clean environment. Especially concerning treatments, the notion of "dirt is matter out of place" is relevant. Anthropologist Mary Douglas (1966) has asserted that there exists an established order or system and that this in turn establishes dirt as symbolic and therefore a cultural construct. Thus, dirt or 'the dirty' cannot be understood simply based on its objective qualities, but also its cultural classification. Shoes, for example, are not by definition dirty, but are dirty when placed on a table. When food is placed on a plate it is not dirty, but if it is on the floor or left on the plate after the meal is finished, it is classified as dirt. In the same sense, tourists may pay for a mud treatment, stepping into clean, potable water in order to receive treatment, but would most likely find it offensive to pay for a treatment by which they step into a pool filled with 'wet dirt'. Thus the concept of the spa sector, its built environment and its relation to clean water, is constructed around culturally agreed upon concepts of luxury, cleanliness and health, limiting the number of conceived uses of treated wastewater in a spa setting. Slowly changing such conventions is a potential for circular economy, as it is possible to produce high-value beauty products from what might otherwise be considered dirt or waste.

¹⁹ Including the source of the water and its chemical composition, which may or may not require further treatment.

Outside the firm: sources of water for use in spa facilities and wastewater

Water for spas can be supplied from a variety of sources. These include:

- Mains water – from the tap and usually potable water quality.
- Ground water – from bore, springs or thermal springs.
- Rainwater – usually stored in a tank and captured from roof structures.
- Surface water – lakes, rivers, streams, dams and reservoirs.
- Storm water – water captured from man-made structures like roads and other hard surfaces, usually in urban environments.
- Seawater – water collected directly from the sea.
- Recycled water - any of the above sources which have previously been used for other purposes, then treated in order to be suitable for another purpose.

Stevens and Cunliffe (2011) show that access to water influences both the amount of water used in the spa, both for treatment and operations as well as influences the types of treatments offered.

The use of all other types of water than recycled water requires little treatment if the water quality is managed at the catchment scale.

Recycled water is the reclaimed and reused wastewater, which is publicly accepted for non-potable purposes such as landscape watering. We distinguish between black and grey water, where grey water comes from showers, laundry and bathing and black water, which comes from toilets. There are separate issues with kitchen wastewater as such water may contain oil and food particles (see restaurant section). Research has highlighted that the closer used water comes to direct exposure to the individual the less accepting we are of it (Asano et al, 2007; Marks et al, 2006), therefore, as mentioned above, the use of recycled wastewater in the spa environments is limited.

Wastewater remains an undervalued resource, all too often primarily perceived to be a troublesome waste product, which does not reflect its actual value: *"-wastewater is a potentially affordable and sustainable source of water, energy, nutrients, organic matter and other useful by-products" (WWAP, 2017, p.2).* Winans et al (2017) have done a literature review on existing water treatment facilities and conclude that the cycling of water within a closed-loop system is possible if the materials added to the water throughout its use and reuse consider the long-term applications and quality of the water. Similar results were found in an assessment of the application of the CE concept to water tourism (Scheepens, Vogtländer, & Brezet, 2016).

While measures that promote the direct use of certain types of untreated wastewater may be relatively easy to implement, the cost of developing treatment systems for recovering wastewater from certain specific human activities may be prohibitive in some cases. There can also be a mismatch between the location and timing of the source of wastewater, and its eventual use. Wastewater management systems, therefore, need to be designed based

on its characteristics (e.g. origin, components and level of contaminants) and the intended end use of the effluent stream, including any useful by-products, as these will dictate the most appropriate and practical wastewater source.

Utilizing wastewater at, or as close as possible to its source generally increases cost-efficiency due to the lower costs of conveyance.

From a resource perspective, sustainable wastewater management requires: 1) supportive policies that reduce the pollution load up front; 2) tailored technologies that enable fit-for-purpose treatment to optimize resource utilization; and 3) taking account of the benefits of resource recovery (WWAP, 2017).

Inside the firm: managing water as part of the infrastructure of the spa

Within the spa, and therefore the responsibility of the spa business, water is used in three general areas:

- Treatments
- Operation
- Landscape and aesthetics in the built environment

For treatments, the volume of water used in spa facilities varies considerably depending on number of guests and the types of treatment that are offered. It is measured as volume of water usage per client.

Operational water requirements include toilets, cooking, showering, equipment washing and cleaning. The largest single use of operation water is for laundering towels and garments. It has been estimated that between 22-31% of all water used in spas concerns laundering (Stevens & Cunliffe, 2011). Off-site laundering is a potential improvement of efficient water use as is the practices of using towels by staff during treatment as part of the spa luxury experience (see also accommodation, Section 4.2).

Water requirements for landscapes and the aesthetics of the built environment varies considerably. Questions concerning in- or outdoor landscaping and the concordance between landscape and natural climate has an effect on evaporation and water requirements.

Greywater treatments systems within the firm

A number of greywater reuse systems are under development for the single (private/household) user as well as for single public institutions and private firms. Greywater reuse promotes a significant reduction in potable water consumption and sewage production, once the water is used a second time for non-potable purposes prior to being discharged to the sewer system. However, its quality must assure the user's safety and thus a treatment system is necessary. The costs of these systems are being reduced and maintenance levels are being simplified, making them more realistic to invest in and implement in relatively small businesses (an example is provided in the Case Textbox about Green Solution House,

section 4.2.3). These systems collect and treat (and some disinfect) the water to various levels of purity and hygiene. Several stages are involved in the treatment of water:

- Filtration of solids (lint and hair)
- Removal of pathogens and unwanted chemicals (such as salts and nutrients) using either microorganisms or chemical treatment
- Disinfection by chlorination or ultraviolet light, though not all systems do this

Treated wastewater can be used for laundry and flushing toilets, as well as for landscaping, as mentioned above (Sadi & Adebitan, 2014, Bartone, 1991). There is thus great potential for greywater recovery, because of the simple, low-cost and easy maintenance features, and because it provides high reduction of suspended solids as well as oxygen demand (whether chemical or biological) (Santos, C, Taveira-Pinto F, Cheng C, 2012).

The disadvantage of reusing water waste hinges on the financial cost of installing and maintaining a reuse system (Sadi & Adebitan, 2014).

It is also possible to conceive of a business model by which reclaimed wastewater is used by industry. Although most previous studies of industrial use of wastewater pertain to industrial symbiosis, other studies suggest that the hospitality sector may also engage in such symbiotic resource flows. Industrial reuse is highly cost-effective for industries where the process does not require potable water quality and where industries are located proximate to wastewater sources (Sadi & Adebitan, 2014).

Chemicals

The use of chemicals in spas consists of two overall types:

- The active (non-water) chemical ingredients of treatment and cleaning products (for example lotions, hand and body soaps, shampoos, laundry detergents, surface degreasers, cleaners etc.)
- Those used to condition water facilities (for example in pools to control bacteria, additives to soften water etc.)

These products can end up in wastewater from cleaned toilets, washbasins, washing machines, kitchen sinks etc.) as well as in the ground- and storm water systems (from pool draining, runoff from roofs, windows, driveways etc.). They can represent a significant source of environmental contamination in terms of toxicity and disturbance of the natural balance of ecosystems. Many 'natural' substitutes exist which do not only create less impact on the environment and human health, but are often cheaper. Technology has also developed various alternatives. Where no alternatives are possible, the proper storage, handling and use of chemicals will reduce potential impacts.

Circular Cosmetics

Within the cosmetics industry, the circular economy is becoming an increasingly popular phrase. According to a survey from December 2016, top-performing companies within the personal care and cosmetics industries, who offer CE and resource efficiency initiatives, generate twice as much value as their peers, who do not participate in such initiatives (Hermes, 2017). Unilever has reported a 30% faster growth rate for its 'sustainability brands' compared to its other brands and these brands contribute to nearly half of the firm's total growth in 2015. Sustainability initiatives are not limited to content, but also packaging. In January 2017, Unilever pledged that 100% of its plastic packaging will be fully reusable, recyclable or compostable by 2025 (Hermes, 2017). Procter & Gamble owns two recycling and environmental management companies (TerraCycle and Suez) and together, they developed the first recyclable shampoo bottle made from 25% recycled beach plastic. The cosmetics company L'Oréal also works with Suez in order to develop a business plan toward a neutral or positive water footprint by boosting material recovery (Hermes, 2017). Obviously, such cosmetic giants' innovations are beyond the SMEs in focus here. The cases, however, stress the dependence of SME spas on the availability of CE products upstream in the value chain.

Related to circularity in cosmetics used in spas, is an ongoing discussion regarding the relevance of locally sourced products. As has been discussed above, local products may be, but does not necessarily have to be, more circular than imported products.

Natural springs, geothermal spas and the circular economy

With the proliferation of spa and wellness offers and businesses, spas are popping up everywhere, including on the fourth floor of global hotel chains. The popular notion of "taking the waters" can, however, be traced back to many countries in Europe, where it gained popularity as the affluent of the 18th and 19th centuries flocked to natural springs in pursuit of health and beauty. Later, many of these establishments took a medicinal approach, stressing water therapy and different types of water qualities for specific ailments, until spas fell out of favour due to the evolution of scientific cures (Ellis, 2011). Nevertheless, the significance of water in different types of therapies and the close connection to medicinal purposes remains an important characteristic of today's international spa community. A circular approach to utilising the specific water qualities of different water springs and thermal water sources should also be considered.

CASE: The Blue Lagoon - Example of a geothermal spa

One such example is the Svartsengi Resource Park in Iceland, perhaps better known as the Blue Lagoon. The Blue Lagoon was accidentally created in 1976 after the commissioning of the Combined Heat and Power Plant in Svartsengi on the Reykjanes peninsula, as outlet water from the power plant formed a lagoon. In 1978, people suffering from psoriasis began bathing in the bluish coloured geothermal fluid of a small lagoon adjacent to the power plant. The effects of brine on the porous lava rock was found to promote the healing of skin conditions, which initiated the development of the Blue Lagoon complex <http://www.bluelagoon.com/about-us/>

The energy company HS Orka extracts the geothermal fluid from its reservoir by drilling deep wells of up to 2000 metres. The geothermal fluid, which reaches 240°C, is then used to heat freshwater for central heating and to create electricity. This unusual and ecologically sound power plant – the only one of its kind in the world – provides hot water for central heating for around 17,000 people and electricity for 45,000, including Blue Lagoon. The geothermal seawater is led directly to Blue Lagoon, Blue Lagoon Clinic and the Research and Development Center, where its active ingredients are isolated and used in Blue Lagoon skin-care. Today, the Blue Lagoon, which has more than 400,000 visitors per year (2015), comprises a spa, a psoriasis clinic and a research and development centre, collectively called the Svartsengi Resource Park, a unique form of industrial symbiosis (Mikkola, Randall, & Hagberg, 2016; Albertsson & Jónsson, 2010). With the exponential growth of tourism in Iceland, questions pertaining to the sustainability of water qualities etc. are raised.

CASE: Earth Lab at the Six Senses Spas

The Six Senses Hotels, Resorts, Spas company provides spa services in luxury hotel and resort settings. They operate 11 resorts and 31 spas in 20 countries under the brand names Six Senses, Evason and Six senses Spas with their head office in Bangkok, Thailand. Especially the spas in remote locations without access to energy and water have substantial sustainability policies that feature on their websites, whereas Six Senses Spas in Europa and in urban spaces are less clear on their sustainability policies and activities.

The Six Senses company has worked with providing sustainable spa resort facilities for a number of years, including programs that conserve energy, re-use water for secondary applications and re-cycle waste materials produced by resorts. It has been an integrated aspect of the Six Senses business model, as the spa resorts are primarily located in remote and often vulnerable natural habitats.

In August 2017, a new, more circular sustainability programme was launched. 'Earth Lab' is both a showcasing initiative and an upcycling initiative, and in this sense it is circular. The Earth Lab project includes both firm internal initiatives as well as local interaction with other actors. This can for example be collaboration with local marine conservation actors, forest restoration initiatives and other community development projects. The Earth Lab is also intended to be a benchmarking and showcasing project that displays resort consumption data including water, energy and waste.

The concrete initiatives include eliminating all import of bottled water including use of plastic water bottles and bottling potable water on site. Renewable energy is produced from solar and biomass energy. Use of local, biodegradable products instead of plastic straws, for example lemongrass and bamboo. Local production of biologically active cleaning solutions in small batches as well as distillation from plants of natural insecticides, thus providing a local alternative to chemical cleaners and sprays. Construct organic gardens in the spa landscapes, feed by compost from kitchens and producing organic fruits and vegetables for resort restaurants. Seeds are extracted and made available for guests to take home. Local keeping of goats and chicken to landscape waste, produce goats' milk and free-range eggs respectively. Keeping bees to produce honey and pollinate local crops. Glass that is not recyclable is upcycled into flowerpots, pacing

stones and light fixtures. Plants are harvested and oils freshly extracted for treatments.

As part of the stay at a Six senses resort, guests are invited to workshops that innovate ways to re-use different materials. Videos of these are produced and shared online. Local communities members are invited to learn and share traditional knowledge (Six Senses, 2011, 2016).

The Earth Lab initiative is instigated at the franchise/ brand level of the Six Senses enterprise. One of the characteristics of the Six Senses brand is the local embeddedness of each resort, it is therefore not expected that the initiatives developed in one resort may be useful in another with a completely different environment. The Earth Lab project is not expected to disseminate evenly across all Six Senses spas and resorts. The Earth Lab project is, however, the practice of the company's basic policy, that each spa resort should implement practices that over an undisclosed period of time should lead to zero waste.

The Zero Waste programme means that each spa must plan and design for no waste in such a way that all materials are reused. This is an obvious choice for spas and resorts that are most located in parts of the world where there is no access to fresh water or electricity and their business model is based on unique and exclusive access to pristine natural environments. If those environments are harmed, it is not only a disaster for nature in and of itself, but ruins the business base of the Six Senses company (Yong, 2010).

The concrete circular solutions developed at the different Six Senses spa resorts are not directly relevant to SMEs located in and around the Baltic Sea due to the vastly different environmental conditions. Nevertheless, the case showcases the role of firm level policy projects, that work to develop more sustainable – and in due course more circular – resource loop practices. Many six senses spas function much like Bouldings' earth space ship, i.e. they are designed and planned from their establishment to be self-reliant and self-sustainable, (i.e. conditions that foster circularity) while they are deeply embedded in each of their unique habitats. Their luxury spa services are provided in places where access to potable water and electricity is limited and may thus be a lesson to other spa businesses.

A final relevant feature is that all Six Senses spas and resorts are Green Globe certified. There may be valuable lessons to learn from working with individual business innovation simultaneously working with the development of an international benchmarking and certification scheme.

Green Globe: Improving circularity through certification schemes

Green Globe is a privately owned and independent corporation that offers a widely recognised certification scheme based on a structured assessment of the sustainability performance of travel and tourism businesses and their supply chain partners. Businesses can monitor improvements and document achievements leading to certification of their enterprises' sustainable operation and management.

Green Globe has established environmentally responsible benchmarking specifically for the spa industry. The organization developed Sector Benchmarking Indicators (SBI) for spas in collaboration with Six Senses Resorts & Spas. These SBIs are based on the EarthCheck benchmarking system and can be seen as the first ecolabel for the spa industry. Up until the introduction of this programme, spas have traditionally been benchmarked through the resorts and hotels in which they operate, rather than independently.

According to Green Globe, the greatest environmental and financial benefits related to business operations are achieved by frequently monitoring utility bills, effectively training and providing incentives for staff to implement energy efficiency programs and practices, and routine preventive maintenance of mechanical equipment. The Green Globe certification scheme has set up a series of standard criteria and indicators. These encompass not only environmental criteria, but also sustainable management, social/economic sustainability and sustainable cultural heritage standards (Green Globe, 2017).

Examples of water-related circular technologies

Water consumption should be measured, sources indicated, and measures to decrease overall consumption should be adopted.

Examples of closed loop showers

A Swedish company has launched the OrbSys recycling shower — a new kind of shower that saves up to 90% of the water and 80% of the energy consumed by a normal shower. The shower achieves such savings by being a closed-loop, re-circulating system, much in the same way that astronauts aboard the International Space Station re-use their wastewater. The OrbSys shower, devised by Orbital Systems in Sweden, is essentially an advanced real-time water filtration system packaged as a recycling shower. You turn the shower on, start bathing, but instead of the wastewater running directly into your house's drainage pipes, it enters the special (patented) OrbSys filtration system. The OrbSys shower removes more than 99.9% of contaminants, and actually pumps out cleaner water than the water entering your house from the main water supply. The process is capable of retaining most of the heat in the water, resulting in huge energy savings. The system can operate in real time at up to 24 litres per minute — more than enough to sustain a strong, invigorating flow of water. See <https://orbital-systems.com/changing-the-world-one-shower-at-a-time/>.

A similar technology has been developed at Hamwell's e-shower. See <https://www.hamwells.com/e-shower>.

Stuchtey (2015) has argued for the need to secure access to clean water through the development of water-system management systems. He calls for product-design partnerships between for example producers of chemicals (herbicides, disinfectants, detergents etc.) and wastewater operators in order to ensure that water can be cleansed of such chemicals. He also calls for the re-innovation of wastewater utilities into energy-positive tanks that through technical advances can harness sludge, heat and chemicals into energy and nutrients. Another suggestion is the establishment of local organic nutrient cycles, where wastewater from households and local businesses are treated and fertilizer components for agricultural use are extracted (Stuchtey, 2015). Such systemic water management systems are part of possible regional CE frameworks in the future to which local businesses such as spas can contribute to through their wastewater, but also draw on for access to clean water.

A salient characteristic of a healthy and luxurious lifestyle is the daily intake of bottled water, often through import of well-known brands in disposable plastic bottles. Historically, the import of bottled water has been based on accessing specific mineral qualities from

renowned springs (Back, Landa, & Meeks, 1995). Today, many hotels and spas have replaced disposable plastic bottles with re-usable glass water bottles.

Example of locally sourced bottled water

At the Six Senses Yao Noi spa resort in Thailand, the firm has replaced all previously imported drinking water with in-house produced potable water, which is sold in still or sparkling versions at a water bar. The water preparation is usually considered a back of the house operation. According to Yao Noi, the main reason behind this change is to become more environmentally conscious and to create a public awareness of "food miles" towards guests and hosts. <https://www.greenpearls.com/hotels/asia/thailand/six-senses-yao-noi-ko-yao>

Examples of other circular spa technologies and products

Also within the cosmetics and beauty treatment industry, the concept of local products has gained ground.

Example of beauty products-related CE initiative

An example is a Riga-based ECO-spa, which stresses their use of locally grown birch trees as the basis of their business model. The spa offers a range of eco certified products combined with their own directly prepared products primarily based on birch trees for cosmetology, body treatments and spa rituals. See <http://www.verdantecospa.lv/en/SPA>.

Although a much more non-toxic business model than traditional spa businesses, there is nothing to indicate that this spa is actually utilising a circular business model. It may, however, be an example of 'the local trap' by which all locally produced and accessed products are understood to be eco-friendlier than non-locally accessed materials. As discussed earlier, this, however, may not always be the case.

4.4.3. Opportunities for implementing CE elements within the spa industry

In Table 11 below, the possible actions and business case opportunities based on CE principles for the spa and well-being sector are presented.

Table 11. Possible CE actions and business cases within the spa sector

Near future			More distant future		
	Firm internal; no or few current barriers	Dependent on other actors or sectors, no or few current barriers	Firm internal; current barriers to be overcome	Firm external, current barriers to be overcome	Sector external, current barriers to be overcome
Energy	Applying energy efficient practices	Access to affordable renewable energy systems	Invest in renewable energy technologies	Entering into CE certification schemes	Access to circular or renewable energy sources
Water	Applying water efficient practices Firm-based wastewater management plan	Wastewater management plan in interaction with related and non-related but proximate firms.	Invest in firm-based wastewater management systems Invest in closed-loop showers	Entering into CE certification schemes. Industrial symbiosis using heated water.	Water system management at the regional level
Minerals and chemicals	Switch to non-toxic, eco-certified products	Switch to service-based provisioning	Implement technology that collects minerals and chemicals in water and in treatment products for re-use	Consider bi-products from the water and other treatments that can be used in new products	Implement policies that enhance the incentive to reuse minerals and chemicals
The circular spa as business case	Monitor all resource uses	Participate in benchmarking schemes	Implement Zero waste programmes	Participate in innovation transfer programmes and showcasing	Open innovative milieus. Cultural shifts toward spas as communal experiences more than hedonistic individualism

The opportunities for implementing CE elements within the spa industry are many and vary from simple implementation of resource efficiency measures to completely re-designing

water access and treatment systems at the regional level. The opportunities are many, as the spa industry does not seem to concern itself very much with sustainability issues, much less with circularity opportunities.

For SMEs, the starting point, as with accommodation and the restaurant sector, concerns monitoring and registration of resource use – it is not possible to implement further measures until a certain level of clarity has been obtained concerning current use and waste patterns. This includes implementation of sustainable water and energy management plans. Concerning access to sustainable energy sources and implementation of greywater treatment systems, the spa sector mirrors that of the accommodation sector and will not be elaborated on here. What does emerge is the need to participate in benchmarking schemes, which hitherto have not existed separately for the spa industry, but instead been a part of the hotel and accommodation sector. Perhaps focussing more singularly on the specific challenges that spas face will lead to new developments.

In the long run, thinking with a circular perspective may lead to new business opportunities. Spas are producers of large amounts of heated water as well as mineral-rich and chemically enriched water, both of which may be usable in other products or in other symbiotic forms. Such opportunities need to be innovated and do not seem to be available at the moment. The Earth Lab example presented in the Six Senses Spas case above, indicates that some actors within the sector are calling for circular innovation activities, developing forums that facilitate transferring of innovations from one spa to the next and showcasing the most successful innovations. It would be well to remember that this is taking place within one very large spa resort firm and that such open transfers of innovations between competing spa firms is unlikely. Perhaps it is too idealistic to imagine a time not too far off, where cascading circular business models could facilitate more open innovation milieus, where knowledge and ideas spill over from one firm to the next across sectors, in order to create open resource flows.

5. Summary and concluding discussions

This Handbook is the result of work carried out in Work Package 3 in the Interreg South Baltic innovation project, CIRTOINNO. The CIRTOINNO project aims to increase the innovativeness of small and medium-sized enterprises (SMEs) within the tourism sector by supporting the integration of *circular economy* elements into their services, products and business models. The project results are to be implemented by project partners in their regions: Pomerania (Poland), Klaipeda (Lithuania), Kronoberg (Sweden), and Bornholm (Denmark). A main purpose of this work has been to build a common understanding of the Circular Economy concept, focussing on its possible implications for the tourism sector.

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The primary target group for the handbook is the CIRTOINNO project partners and other advisors, consultants and knowledge institutions that promote, advise or generate new knowledge for tourism SMEs in or outside the South Baltic Region in order to support businesses to develop and engage in innovative and circular business models and activities. Hopefully, the report's many real-life examples of CE solutions will also be directly relevant for individual companies and other actors in search of inspiration for adopting CE ideas in their organizations.

The specific aims have been three-fold:

1. To provide an overall understanding of the concept of the circular economy and of the societal dynamics through which innovations and transitioning processes towards a circular economy are realised.
2. To describe and discuss the specific economic and political context for applying and developing the circular economy in the CIRTOINNO project. The specific contexts are the tourism sectors in the South Baltic partner regions.
3. To investigate and discuss the opportunities for small and medium-sized tourism businesses to adopt circular economy ideas, and to identify possible 'good practices' among tourism SMEs in developing and applying circular economy solutions, especially in relation to the fields of foci of the CIRTOINNO project: accommodation, food and spa services.

The handbook is organized into three main chapters (2, 3 and 4) each addressing one of the above-mentioned three aims respectively.

Methodologically, the Handbook has been made through three different types of inputs and methodologies:

1. Search and review of research literature and other materials via the internet
2. Information and data provided from partners
3. Study visits

Below the findings of the three main chapters are summarized and discussed.

Chapter 2 addresses the first of the above aims of the Handbook. It provides a basic definition of the circular economy concept including how to distinguish the concept from related concepts within the 'green' economy concerning sustainable growth and development. The chapter further defines the core CE elements and business models as well as the enabling and constraining factors for applying and diffusing CE solutions among SMEs. One central aspect is the systems approach to CE transitioning, meaning that at its full potential, the CE has the capacity to be transformative of the society as a whole. Accordingly, we also outline a multi-level transition perspective on how to understand the societal dynamics by which circular economy innovations and transitioning are realised. Finally, the chapter presents the analytical framework that has been elaborated for the investigation of opportunities for tourism SMEs to adopt CE ideas.

The analyses and findings in chapter 2 can be summed up in the following main points:

What is the Circular Economy as compared to the Green Economy?

The concept of CE defines a set of principles for production and consumption, radically different from the linear 'take-make-use-dispose' regime prevailing in today's market economies, based on continuous growth and increasing resource throughput. The circular economy goes further than calling for increased implementation of 'green', resource-effective and environment-friendly technologies in isolated links of production systems. Merely striving for resource efficiency, renewable energy provision, minimization of waste and environmental impact of humans through introduction of 'smart' technologies, which are core strategies in the 'green economy', does not change the overall principles and models of production and consumption.

From value chains to value cycles

Instead, the CE requires a broader and more comprehensive design of radically alternative solutions over the entire life cycle of products and adoption of closing-the-loop production patterns within the entire economic system. The CE does not rely on unidirectional value chains, in which each production, distribution and consumption link is focused on value maximization for the own good. Instead, the CE relies on *value cycles* in which value is created through restoration, regeneration and re-use of resources and which are enabled by new types of business models and consumption that discard ownership and rely on active 'users' rather than passive 'consumers'.

Systems thinking

Thinking in terms of (eco) systems is key. The circular economy concept is based on several related schools of thoughts such as the Blue

**From zero to
positive impact**

Economy (Gunter Pauli) and Biomimicry (Janine Benyus), which take their point of departure in the naturally regenerative functions of the earths' ecosystems. Systems thinking is the understanding of things within the context of a larger whole. All parts are connected and internal diversity ensures the resilience of external shocks. This system thinking implies a fundamental global (as opposed to local) approach to the realization of the CE, as natural systems have no borders.

Hence, the CE implies reconsidering the relationship and interaction between the economy and nature. While in a traditional linear economy as well as in a 'green economy', nature is understood as something 'out there', separate from technical and industrial society. It follows from such an understanding that the best practice is the one that causes the least, and ideally no impact on nature. The approach in circular economy is somewhat different. Based on systems thinking, nature and human society are seen as symbiotic and interconnected in complex systems that make it hard to distinguish one from the other. This means that the ideal is not to reach zero impact, but rather to design solutions with a positive impact on the system.

**CE as call for
paradigm shift**

In line with this vision, the CE is designed to be restorative and regenerative. Compared to previous business-as-usual economy models, the regeneration of resources is about not only material recovery, but also aims to improve our way of living and the economy as a whole. CE has the potential to understand and implement radically new patterns of production and consumption and help society reach increased sustainability and wellbeing at low or no environmental costs. Nonetheless, some protagonists of the CE concept such as the Ellen MacArthur Foundation, stress it can be considered as an 'alternative growth discourse' and not an 'alternative to growth discourse'.

**A system
transition
perspective**

It follows from the above that truly circular business models cannot be conceived as involving only a single firm and cannot be implemented by individual businesses without interaction with external actors, primarily through the supply chain (or 'value cycle', cf. above). Fully understanding the CE thus necessitates a *system transition perspective*. The possible but still only embryonic and open-ended development towards a circular economy implies a transition of the dominant 'socio-technical' systems of the linear economy. This encompasses major transformations in the way societal functions such

	as dominant business models, financing, transportation, communication, education systems, housing, energy provision etc., are fulfilled. This involves not only technological changes, but also changes in regulation, laws and infrastructures, industrial networks, consumption cultures, etc.
A multi-level perspective	Studies on technological transitions usually apply a <i>multi-level perspective</i> , distinguishing between three different levels, which are organized in a nested, hierarchical manner and at which change processes occur: landscape (macro), regime (meso) and niche (micro).
Landscape factors pushing for transition	A number of current mega-trends at the global landscape level seem to push the prevailing linear regime in more sustainable, green and circular directions. Examples of these are: increasing scarcity and prices of natural resources; globalization of markets and production systems; growing political commitment to address problems related to climate change; world population growth, mainly in the global south; and technological and cultural change related to use of digital social medias.
Innovation at niche level	A multi-level transition perspective can help in clarifying that the ongoing development and diffusion of innovations based on CE principles take place at the micro-level of multiple smaller niches of networking firms and suppliers within varying industries and fields of activities, which may - or may not - succeed in changing the prevailing linear regime in the years to come.
Obstacles for a regime shift	Whether or not such a transition will take place is certainly not given at present and it certainly will not be a simple, straightforward process of creating and diffusing new technical solutions, equipped with certain 'advanced', 'smart', 'rational', universally applicable features that inevitably enable them to replace and outcompete existing technologies. Like any other regime, the linear regime is based on strong economic, political and social interests, including job and income structures and consumption cultures, which expectedly will constrain the diffusion of CE principles. Hence, the transition towards a circular economy is not an all-inclusive win-win situation but one that - at least in the phase of transitioning - creates winners as well as losers.

The analytical framework for investigating CE tourism business opportunities

Based on the above understanding of the CE we have elaborated a simple analytical framework for investigating possible opportunities for adoption of CE solutions among tourism SMEs (which is applied in Chapter 4). The framework is based on two overlying dimensions: One dimension concerns the **temporal scope** of an innovation, where a distinction is made whether the innovation is immediately accessible for SMEs or whether it requires further/future technological or economic development of new technologies or value cycles, new regulation etc. The second dimension concerns the **scale of innovations** where three elements are considered: can the innovation be implemented within the individual firm? Does it depend on upstream suppliers and reverse chain innovation? Or, does it depend on innovations outside the tourism sector, for example implementation of new renewable energy in the region? The suggested framework thus addresses the following five innovation strategies:

Short scope innovation (strategies for the near future)

1. Firm internal; no or few barriers
2. Upstream value chain dependent, but still no or few current barriers

Long scope innovation (strategies for the more distant future)

3. Firm internal; current barriers to be overcome (for example lack of capital or economic incentives)
4. Firm external; current barriers to be overcome (for example lack of new technologies upstream)
5. Sector external; current barriers to be overcome (for example lack of access to renewable energy or water treatment systems)

Chapter 3 addresses the second of the above aims of the Handbook. It thus investigates the contextual settings for the application of circular economy solutions in the CIRTOINNO project. This contextual analysis is focussed on defining tourism as a distinct economic activity, in order to invite reflection upon the specificities of the sector in relation to identifying untapped CE potentials. The chapter also presents and maps the tourism sectors in the South Baltic partner regions of Pomerania, Klaipeda, Kronoberg and Bornholm, including the tourism industry structures, strategies and policies.

The analyses and findings concerning the tourism sector can be summarized as follows:

CE challenged by the travel imperative in tourism

A defining characteristic of tourism is the act of travelling, where the tourist travels from their home to a given temporary destination. The international trend in tourism is towards MORE. More people are traveling and they travel MORE often. This is supported by, amongst other things, a fast growing low-priced international airline sector and an increasing numbers of destinations. These trends accentuate a significant threat to the environmental sustainability of tourism despite other measures to decrease carbon emissions.

CE challenged by the hedonism of tourism consumption

On top of the travels associated with tourism, holidays are also often a chance to let loose and use more. This is not only the case in terms of spending more money, but is also built into what is expected of e.g. a hotel stay. Once the room is paid for, one expects to be able to use utilities, power, air conditioning, etc. as one pleases. Although steps have been taken to change tourist practices and sustainability measures have been implemented, there is much room for development of new perceptions and practices at tourist destinations and in the hospitality firms that service them. We argue that potentials exist, not only for reductions in resource use, but also for re-designing tourism products and services, and marketing them accordingly.

Hotels and destinations as CE living labs

While tourism does have inherent issues relating to sustainability, it also represents a unique opportunity to re-configure the way people live – if only for a brief period of time. The fact that as tourists, we carry very little with us, and let ourselves immerse in new surroundings, means that tourism has the capacity to experiment with the way daily life is organized. It presents an opportunity for tourists to enter into ‘living labs’, in which they can experience, play with and radically re-think the organization of daily life. This is not only interesting from a societal perspective, but represents a market opportunity for both businesses and operators as well as tourism destination organizations.

Envisaging future tourism consumption

Opportunities for a transformation of tourism markets and user practices from linear models that emphasize spending, hedonism and unlimited resource use, to vacations as experiments in circularity, are many. There is an obvious selling point in advertising a destination as a window to the future, and for individual companies to distinguish themselves successfully. There is a potential for a much more direct

involvement of tourists with the resources they use and the way these are disposed of. In many tourism destination, energy and water infrastructure is invisible and resources are lead away as the guest is left unaware of their disposal and possible recycling. One specific way of changing this is through user engagements and smart interactions with hotel room resources, but the opportunities are many and can at this stage only be imagined.

Next followed an analysis of the concrete context for development of circular economy opportunities in the South Baltic partner regions. The results are briefly summarized here:

Key figures on the socioeconomic conditions in the partner regions

The economic growth rates in Poland and Lithuania, nationally as well as in the CIRTOINNO partner regions, are much higher than in the Swedish and Danish partner regions. On the other hand, the GDP per capita in Sweden and Denmark is far above the EU-28 average while the GDP per capita in Poland and Lithuania lies far below the EU average. Everything else being equal, this report therefore assesses that there are better demand conditions for domestic as well as international tourism in Pomerania and Klaipeda as compared to Kronoberg and Bornholm.

Rationalization of the mature tourism industry in Danish and Swedish partner regions

The tourism industries in the partner regions are very different and follow different development trends. Bornholm relies on tourism to a much higher degree than the other three regional economies. Bornholm is experiencing a development within its tourism industry characterised by market maturity and a phase of economic optimization and renewal. This means that there is an increase in the efficiency and profitability of businesses whilst the number of hotels, rooms and beds is decreasing. This also seems to characterize the hotel sector in Kronoberg - though from a lower capacity level and in a market context of growing demand, i.e. increasing hotel overnights.

Booming tourism in Polish and Lithuanian partner regions

In contrast, but starting from lower points of departure, the tourism demands and supplies are booming in both Pomerania and Klaipeda. Accordingly, the number of new hotels and similar establishments has grown by about 10% in both regions and the number of hotel rooms has increase by 34% in Pomerania and 29% in Klaipeda. These growth rates are mainly driven by foreign tourists, who also use the regional airports and thereby cause considerable growth rates in international flights.

The need of prioritizing CE and sustainability in future tourism investments and planning

These trends create needs for future investments in and construction of new tourism facilities such as hotels, other types of accommodation, transport infrastructures, food supplies, information systems, services centres, amusements etc. In front of such large-scale upgrading of the tourism capacity, regional authorities will face major planning challenges regarding, for instance, protecting natural resources, provision of water and renewable energy, and reducing pollution. CIRTOINNO partners may play an important role in their regions by advocating for the advantages of a systemic circular economy approach to the challenge of securing an environmental, social, and economic sustainable output of the expected growth in tourism in the coming years.

The role of national tourism policies

While Sweden's national tourism strategy embraces the concept of sustainability, concerns for and action-oriented priorities on issues such as sustainability, environmental protection, renewable energy etc. are still hard to find in national tourism strategies in Denmark, Poland and Lithuania. However, certain policy initiatives do exist that tourism CE initiatives can either benefit from directly or draw on as inspiration. The Swedish national 'Nature's Best' tourism certification offers a promising example of how pioneering sustainability efforts can become a market advantage for both individual SMEs and destinations as such.

The emergence of CE in tourism relies on bottom-up initiatives

Accordingly, circular development initiatives in tourism are not supported strategically by national tourism authorities and organizations seem to have to rely mainly on bottom-up initiatives carried out by local government actors and businesses. Among the four partner regions, Bornholm seems to have come the farthest by launching a regional branding and development strategy called "Bright Green Island", although the local tourism industry in general is not an aspiring front-runner. Thus, the location on Bornholm of the Green Solution House hotel (a business case described in section 4.2) with a variety of circular tourism solutions, reflects longstanding economic, social and political commitments to developing a tourism-based cradle-to-cradle showcasing hotel.

Cross-regional learning and transferring of CE solutions

Many of the individual solutions developed and implemented in the Green Solution House do not rely on specific local CE potentials but are immediately transferable to other contexts including the South Baltic partner regions and could be used for cross-regional learning among CIRTOINNO partner regions.

The South Baltic region as platform for developing circular tourism

The expected future growth in tourism in Pomerania and Klaipeda and the related needs of substantially increasing the overnight capacity and tourism infrastructures, is a window of opportunities for investments in circular solutions in these regions. The high-income populations in the Swedish and Danish South Baltic regions, interested in the environment and in perpetual search for new destinations providing 'authentic' experiences, may be considered a main demand-side condition legitimizing the same type of investments in a high-profiled CE tourism sector. Thus, although the South Baltic partner regions have only few structural commonalities to draw from in the development of a circular tourism industry, they may form important complementary supply and demand components in the creation of a future circular tourism economy.

Chapter 4 addresses the third of the above aims and in many ways forms the core chapter in terms of fulfilling the overall goal of a 'Handbook' with practical information, inspirational examples, references to further information, etc. It analyses the specific implications of the circular economy for tourism SMEs and goes into detail about possible actions for developing and applying CE elements. This is structured along the three thematic fields that are the focus of the CIRTOINNO project. These are accommodation services (4.2), food services (4.3), and spas (4.4). A fourth sector - that of energy - is also in focus but only as a central resource in each of the three priority fields rather than as an independent field. The primary resource flows in each thematic field are presented and the elaborated analytical framework (chapter 2) is used to present different possible business models or opportunities for business innovation within a circular economy perspective. Chapter 4 also contains a number of business cases on selected, real-world circular economy initiatives. These case studies are intended to exemplify and further describe the theorized and conceptualized CE models and action frameworks, and thus provide crucial empirical evidence regarding CE solutions for tourism SMEs. The analyses and findings are summarized below:

Accommodation

The primary resources that flow through the accommodation services sector concern five overall areas:

Building and construction. This includes the materials used in the building as well as the design of how these materials interact with the surrounding climate. It also includes the construction process such as use of energy during construction, access to local and non-local labour as well as financial resource flows. Although this primarily

concerns new buildings, this element is also important during refurbishing of buildings.

Energy for climate control and electricity as well as water flows; this includes the design of energy and water systems within the building and connected to local energy/ electricity grids, water and sewage systems.

Materials inside the building, i.e. paints and other wall and ceiling coverings, floorings, bathroom fixtures, furniture, lighting etc.

Materials used in accommodation services such as soaps and shampoos; cleaning products; as well as linen, towels and their laundering.

The final element involves the **practices among staff and guests** of using all the above-mentioned materials, primarily the management of such flows.

Opportunities for development of circular business models are manifold.

Firm internal short scope innovation opportunities includes:

- Implementing monitoring systems for energy and water use, waste treatment systems, and staff managing systems concerning use of amenities and waste handling.

Firm external short scope innovation opportunities includes:

- Building relationships with upstream suppliers of products that are re-usable and remanufactured and down-stream buyers that redistribute the hotels' discarded products.
- Implementation of renewable and circular energy sources.

Circular business models almost per definition demand interaction between firms and prerequisite long-term relationships between suppliers and users.

For small and medium-sized hotels, the state of transitioning toward a more circular economy seems constrained. SMEs meet barriers pertaining to lack of capital to invest in expensive new technologies. Their scope of actions is also limited by the lack of what we might term 'circular infrastructure', i.e. access to suppliers and business partners that are able to deliver remanufactured, reused and refurbished

goods or down-stream businesses that are willing to buy their used mattresses, sorted waste etc.

Firm internal long scope innovation opportunities include:

- Building new and refurbishing hotel buildings using existing circular technologies.
- Expanding supply chain management for accessing all materials used in the hotel from furniture to soaps and accessing leasing rather than ownership based business models.
- Investing in or leasing various smart energy and water monitoring systems connected to booking systems.
- Investing in greywater systems.

Firm external long scope innovation opportunities include:

- Expanding on all of the above opportunities in collaboration with up- and downstream suppliers and buyers.

In the long run such innovations prerequisite policy support as well as the development of 'circular infrastructures'. These include:

- Implementation of policies that demand circular resource flows integrated in the built environment.
- Cascading systems for the design, use and treatment of all products used in the day-to-day operations of accommodation services.
- Policies that generally support the development of business models based on use and access to services than on ownership.
- Access to 100% renewable energy sources in the local grid.
- Access to circular water treatment systems, including greywater handling.
- Development of advanced feedback systems targeting staff and guest practices.

Restaurants

The material resources that flow through the restaurant services sector to a large degree mirror those of the accommodation sector, particularly concerning building and construction, energy and water flows and materials inside the building. However, the primary resource flow within the restaurant sector is the flow of biological resources in the production, distribution, preparation, service and disposal of food products. Therefore, a major resource interception within the

restaurant sector is designing circular resource flows that prevent biological resources in being wasted.

Opportunities for development of circular business models.

Firm internal short scope innovation opportunities include:

- Wide opportunities for changing the daily practices in kitchens is a significant factor when reducing food waste. The cases also show that hotel restaurants benefit economically from implementing such measures, whereby the motivation factor is high.

Firm external short scope innovation opportunities includes:

Many of the proposed activities/elements that have few barriers to implementation for SMES involve innovative cross-sectoral collaboration and networking. This includes a number of elements that are well tested elsewhere and thus 'ready' for local adaptation and implementation.

- Sharing of excess food on sharing platforms
- Cascading food resources back to the agricultural food production
- Cascading food resources into biofuel
- Recover and reuse nutrients in waste
- Reverse supply chain management: accessing existing food packaging products

Concerning barriers to immediate implementation, we encounter lack of capital for investment in new technologies as well as lack of 'circular infrastructures'. These include local cascading systems to treat food waste, local sharing platforms to distribute food before it perishes and must be down-cycled, access to suppliers of leasing business models, reusable kitchenware, including packaging and, finally, access to down-stream buyers of kitchen bi-products such as used grease.

Some of these actions may encounter institutional barriers – as for example regulations against food surplus distribution, regulation regarding waste separation and handling.

Firm internal long scope innovation opportunities include:

- Investing in food monitoring technologies.
- Investment in circular food packaging products.

- Investment in energy monitoring technologies or new appliances.
- Investment in greywater systems.

Firm external long scope innovation opportunities include:

- Widespread implementation of cascading systems within food production, distribution and recovery.
- Reverse supply chain management: innovation of new packaging products.
- Easy access to greywater treatment facilities.
- Reverse supply chain management: innovation of business models.

In the long run such innovations prerequisite policy support as well as the development of 'circular infrastructures'. These include:

- Policies that support the widespread implementation of circular biological flows.
- Policies that support the development of circular food packaging system.
- Setting up local food supply systems and a connected closed loop of biological material handling.
- Setting up inter-sectional water cascade systems to minimise water downscaling. Looping accumulated water use in food production.
- Developing general business models based on leasing and use-based models.

Spas

The primary material resources used in the spa sector pertain to the use of potable water for water-based wellness and therapeutic treatments. Spas are also involved in the other general material flows mentioned above; i.e. building and construction, energy for climate control and materials inside the building. Spas are also renowned for using different types of chemicals in their water-based therapeutic treatments as well as large amounts of creams, hair treatment and cosmetics. Finally, their laundry-based resource use is substantial.

For this reason, spas can contribute to the more circular use of water by intervening in the water treatment cycle – concerning both the spa's use and reuse of potable and greywater as well as through re-designing laundry treatment and practises.

Firm internal short scope innovation opportunities include:

- Implementing energy efficient practices concerning energy.
- Implementing water efficient practices concerning water.
- Implementing firm-based wastewater management plan.
- Switch to non-toxic, eco-certified spa treatment products.

Firm external short scope innovation opportunities includes:

- Accessing affordable, renewable energy systems.
- Wastewater management plan in interaction with related and non-related but proximate firms.
- Switch to service-based provisioning of spa treatments.
- Participate in benchmarking schemes.

Firm internal long scope innovation opportunities include:

- Invest in renewable energy technologies.
- Invest in firm-based wastewater management systems, including closed-loop showers.
- Implement technology that collects minerals and chemicals in water and in treatment products for re-use.
- Implement Zero waste programmes.

Firm external long scope innovation opportunities include:

- Entering into CE certification schemes for water and energy circular use.
- Developing industrial symbiosis partnerships based on heated water.
- Developing new products from bi-products from the water and other treatments.
- Participate in innovation transfer programmes and showcasing.

In the long run such innovations prerequisite policy support as well as the development of 'circular infrastructures'. These include:

- Implementation of policies that enhance the incentive to reuse minerals and chemicals.
- Support for the establishment of more open innovative milieus targeting cascading knowledge flows between businesses and across sectors.

'Good Practices' business cases

The cases and examples given throughout chapter 4 show a variety of ambition levels and are undertaken by both small and large corporations. Some are related mostly to day-to-day practices, and

Framing a strategy as 'circular' matters

easy to initiate for SMEs, while others are examples of technologies either current or under development, which in time represent opportunities for moving towards a circular economy.

A conclusion to draw across the included business cases is that it matters whether you frame even the very first environmental measures as greening/reductions or as a journey towards circular economy. While reductions may happen year after year, the push to introduce new measures and generate positive impacts, such as upcycling, is simply much greater with a CE strategy. The most significant difference is that a CE approach recognizes that radical redesigns are necessary, while a greening approach implicitly finds it sufficient to reduce the resource use of the current setup. The ambitious ideas inherited in the CE concept thus appears to push companies to initiate a process of rethinking their business models and make far-reaching demands of their suppliers.

Other lessons

Cases also highlight the following lessons:

That working with the supply chain is not just about choosing suppliers that 'somehow' consider the environment, but about rethinking and redesigning products and services in collaboration with suppliers, with a focus on the entire product or service lifecycle.

That the circular economy is about rethinking the firm as not only a provider of accommodation, food or spa services, but as a producer of a multitude of (by-)products that can be valued instead of wasted. That some of the measures, mostly exemplified through elimination of food waste promise substantial cost reductions.

When considering waste reductions, the metaphor of 'the spaceship' can be a powerful one – the idea to completely redesign the material flows of a business can be helpful in launching visions for the development of the firm.

That although the innovative capacities of big firms cannot be copied by SMEs, the role of the large hotel chains seems to be to drive new technologies, that in turn may shift policies. For example, the innovation of new technologies built into new hotels may affect building regulations and policies that may drive improvement of the built environments in general.

Finally, the cases show that a number of emerging technologies are under development. These look promising for tourism SMEs, and will in

**Lesson to learn
from a selected
business case:
Green Solution
House**

all probability be accessible through upstream service providers in the near future.

The Green Solution House on Bornholm is a special case because it represents a particular type of business model that may be of interest for destination developers. The Green Solution House showcases the development of a municipally driven 'green' place brand that has gone hand-in-hand with the development of a cradle-to-cradle business model, positioning the hotel as a lighthouse for the local place brand. Related to this, the Green Solution House is an example of a business model based on partnerships between a hotel and a number of advanced technology firms that wish to experiment and test new technologies in a real environment. Thus, the GSH functions as a 'living lab' for a number of new technical solutions that need documentation through use. In other words, the green solution house is a test hotel for new technologies and can be studied both for the results of those technical tests, but also for the innovative partnerships that are an ingrained aspect of the GSH business model.

Preliminary recommendations to CIRTOINNO partners

This report is written in sand. The authors know that the circular economy will keep developing – and probably very rapidly. How we understand the concept, how it is practised – technically, organisationally, governance-related and socially – will be redefined repeatedly. On the basis of the accomplished theoretical and conceptual analyses of the Circular Economy concept and before the practice-orientated activities of the CIRTOINNO project have been carried out, it is difficult to provide CIRTOINNO partners with useful recommendations as to how they may best work for supporting tourism SMEs in developing and implementing CE principles. However, below are a few preliminary recommendations with this aim. At the end of the project period in 2019, the Handbook will be complemented with a set of final recommendations, elaborated in collaboration with partners.

**The
overwhelming
obstacles of
starting system
transition**

From the perspective of individual businesses, it is difficult to comply with idealised CE principles like described above. Such an approach would certainly complicate and impede the creation of circular technologies and innovations. Moreover, the immense obstacles of realizing true system change - implied by the multi-level transition perspective above - might prevent businesses and policy actors from

**Bottom-up
entrepreneurial
mushrooming of
CE solutions**

starting work on finding and implementing circular solutions as these may be considered fruitless efforts in niches along errant tracks of technological history.

However, it is crucial to underline the open-ended, bottom-up and entrepreneurial element of the ongoing niche-level development of CE solutions. A grand scheme of universal ready-made CE technologies and a one-size-fits-all route to their diffusion and implementation does not exist. Rather we witness a mushrooming introduction of new circular technologies and business models driven by individual (often manufacturing) companies, realized through social interaction and learning with suppliers and customers, and targeted specific business opportunities connected to particular production and consumption contexts. Very often, such innovation processes start with steps, which are not truly 'circular' but should be considered 'green' or 'sustainable', sometimes even simply common-sense. Moreover, often the driving motive for starting a change towards more circular (or green) business operations is the highly mundane, almost trivial one of saving costs.

**Businesses not
researchers are
the innovators
of CE**

Hence, the introduction of circular economy will not depend on diffusion of a supply of ready-made universal solutions but primarily on the ideas and initiatives of business owners, managers, skilled staff, networks of suppliers, customers and other stakeholders, identified on the basis of practice-related knowledge about specific opportunities and needs. Rather than high-profile university researchers and visionary public support agencies, the true innovators of circular technology are the varying types of practitioners, professionals and users related to the specific (economic or social) domain where the technology is required and applied (i.e. managers, marketers, receptionists, electricians, plumbers, technical suppliers, etc.)

SME barriers

Small and medium-sized enterprises (SMEs) generally have more limited capacity for innovation than larger corporations do. This is especially the case for the group of companies in focus of the CIRTOINNO project, i.e. tourism SMEs often owned and run by a family, which are characterized by a relatively low staff education levels, lacking managerial professionalism, limited financial resources, reliance on widespread standard technologies etc.

Transfers of CE technologies and organizational practices from large corporations

Most of the first-movers in the CE, and in particular within tourism, will be large corporations such as global hotel chains. Nevertheless, many technological and organizational solutions developed and applied by large tourism companies certainly hold potentials also for small and micro tourism firms, especially in a long or medium-term perspective after an initial phase of developing, diffusing and reducing the costs of new solutions. A type of practice amongst large corporations that directly could (and should) be transferred to smaller firms, regards the organizational aspects of operating in a circular economy, for instance about tools, practices and procedures for monitoring material and energy flows or how to organize and systematize change and innovation processes in more general terms.

Advocate for pragmatic but informed approach

In CIRTOINNO partners' support of increased development and implementation of CE principles among tourism SMEs, it is thus crucial not to complicate the obstacles of change by pushing for too ambitious goals. Instead, it would be prudent to advocate for a pragmatic, stepwise and situated approach, taking into account local conditions and potentials and drawing on specific opportunities in relation to the socio-technical setup one is embedded in. In most cases, the way forward will pass through the domain of green technologies and practices. Rome was not built in one day. However, change processes should be decided and accomplished on an informed basis and thus, a first step is to set up monitoring systems within the enterprise in order to assess where resources are being used – and wasted.

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