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MASTER THESIS

BUILDING LOCAL ENVIRONMENTAL AND SOCIAL SYNERGIES BY EMPLOYING CIRCULAR ECONOMY IN WASTE MANAGEMENT

A CASE STUDY ON THE DUTCH ISLAND OF TERSCHELLING

Double Degree M.Sc. Water and Coastal Management
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ABSTRACT

Unsuitable governance structures pose a challenge for establishing a circular economy. Therefore, this thesis' objective was to identify barriers and enablers for circular initiatives in local governance structures. These barriers and enablers were explored by a case study approach through the theoretical lens of area-orientation and circular economy in the context of two initiatives operating on the Dutch island of Terschelling in organic residual waste streams. The major barriers (e.g. incoherent objectives across sectors, lack of anticipating technological development) that currently lie in formal frameworks restrict local authorities to allow for circular projects. Further, opportunities to amend formal frameworks are rare as they are volatile to certain factors to coincide: political terms, procedural time horizons and personal ambitions. Local cultures impede cross-sector and multi-actor collaboration on the planning level, and the financial positioning of the location itself does not urge the community to change the system. If the contextual factors are neither improving nor deteriorating, and the adaptability and cross-sectoral coherence of formal frameworks remains, local actors have little room to progress with circular initiatives. However, one of the local opportunities is to create an arena for the development of a shared vision that benefits the entire community of Terschelling and promotes knowledge development to make better use of the formal room to manoeuvre.

Keywords: circular economy, governance structures, area-orientation, waste management

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LIST OF ABBREVIATIONS

CE	Circular Economy
CMC method	Controlled Microbial Composting method
CO2	Carbon dioxide
EIA	Environmental Impact Assessment
EZK	Ministerie van Economische Zaken en Klimaat/ Ministry of Economic Affairs and Climate Policy
IenM	Ministerie van Infrastructuur en Milieu/ Ministry of Infrastructure and Environment
LAP	Landelijke Afvalbeheerplan 2009-2021/ National Waste Management Plan 2009 – 2021
Mbrce	Meer en betere recycling voor en circulaire economie/ More and better recycling for a circular economy (covenant)
OBV	Optimal Biomass Valorisation
PESTEL	Politics, economics, social, technology, environment, legal (assessment framework)
R & D	Research & Development
RDi	Regeling Duurzame initiatieven/ Regulation on sustainable initiatives
Ro	Regeling omgevingsrecht/ Environmental Law Regulation
SEA	Strategic Environmental Assessment
VANG	Van Afval naar Grondstof program/ from waste to resource program,
Wabo	Wet algemene bepalingen omgevingsrecht/ General Provisions Act
WFD	Water Framework Directive
Wm	Wet milieubeheer/ National Environmental Management Act
Wro	Wet ruimtelijke ordening/ Law on spatial planning
Wtw	Waterwet/ Water act

1. INTRODUCTION

1.1 BACKGROUND

Being limited in space, planet earth holds limited resources that humankind has to economise. Yet, on the 2nd of May 2018, for instance, Germany overshoot its ecological footprint (Germanwatch e.V., 2018). If everyone on earth had the same intensity of resource consumption as the German citizens do, all renewable resources would be used up by that date for the rest of the year (Ibid, 2018). The ecological deficit calculated for European countries looks similar (figure 1) (Global Footprint Network, 2018a, 2018b, 2018c). Since the 1970s, researchers predicted a rise of the ecological footprint if society would not transform (Meadows et al., 1972). Today, we experience a whole discourse about how to live sustainably, i.e., using resources in a way as to prevent living beyond our means (Jordan, 2008; Meadowcroft, 2009; Sauvé et al., 2016; UNCED, 1992; United Nations, 2017). However, the search for framing this kind of lifestyle and curb a sustainable development seems to pose significant challenges to various sectors and professional domains (Geissdoerfer et al., 2017; Kirchherr et al., 2017; Lu, 2014).

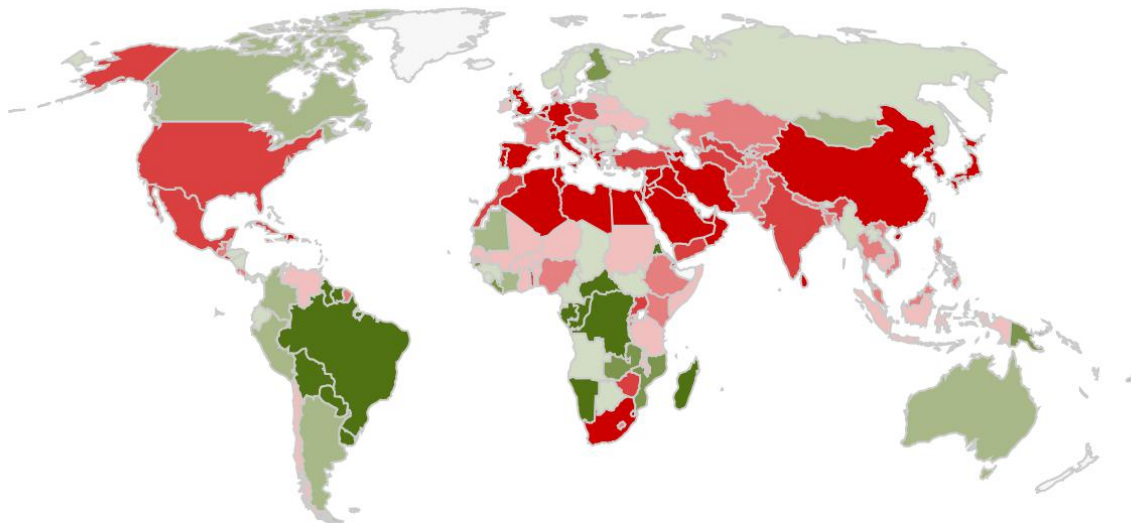


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A concept to operationalise sustainable development is the so-called circular economy (CE), stipulating great interest from practitioners and scholars in the economic sector (Kirchherr et al., 2017). It implies the requirement to deviate from the current linear model of production and consumption (take-make-dispose) and turn towards a more restorative economy. Using and reusing natural capital in the most efficient manner achievable while "finding value throughout the life cycles of finished products" is key to the CE (Bouton et al., 2016, p. 5). The Ellen McArthur Foundation (2013, p. 23) depicts the CE as to inherently generate synergetic relationships "between ecological and economic systems."

However, a recent comprehensive study concerning CE reveals that despite its acknowledged potential it is still highly untapped and underexploited (Bouton et al., 2016). Next to the concept's continuously evolving and inconsistent definition (Blomsma and Brennan, 2017; Kirchherr et al., 2017; Reike et al., 2018) insufficient governance frameworks and policies (governance structures) prevent its breakthrough (EC, 2015; Kirchherr et al., 2017; Reike et al., 2018). Furthermore, it can be assumed that different settings influence the potential for employing CE in a society and its systems (Dehoust et al., 2017; Hytönen, 2016). This concerns amongst others the spatial context, offering different physical opportunities for synergies favouring a circular regional development. Such opportunities may involve the spatial availability to an economic activity, the viability to create new synergies between different sectors, the physical organisation of the waste treatment or simply the local willingness to act upon new ideas and initiatives (ESA, 2017; Ritzén and Sandström, 2017; Simeonova et al., 2010). As such, it is a missed opportunity in light of the desire and need for more sustainable societies.

Regions that could especially benefit from a circular regional development are islands. Disconnected from the mainland and limited in space, islands often have to make an extra effort to provide life-supporting provisions (water and food) and to take care of the life-cycle of these products, for instance, sewage-water treatment and waste management. Studies show that regarding life-cycles the efforts merely differ from island to island (Kakazu, 2007; Wong et al., 2005). Where affordable, the mainland takes care of the residuals (Zsigraiová et al., 2009) thus additional expenses are necessary. Closing circles on an island, making use of local and imported resources more efficiently could significantly enhance cost-savings. Reusing organic material in waste could even ameliorate soil fertility or provide energy and nutrients, a concept understood as *Optimal Biomass Valorisation* (OBV) (Ellen MacArthur Foundation, 2013; Jantzen and Hjermitsev, 2009; MedCompost and SCOW, 2016).

OPTIMAL BIOMASS VALORISATION FOR A CIRCULAR ISLAND DEVELOPMENT

Considering the disadvantage of additional expenses for islands to process their waste, as well as their limited space, it becomes important to seize the answer to how new initiatives, striving to employ OBV, can arise. Alongside, islands across Europe have recognized the necessity to become self-supporting and at the same time depict the ideal place to test circular models (Annikki et al., 2011; EU et al., 2011; Galle et al., 2017; Province of Friesland, 2013; State of Green, 2017; Tybirk et al., 2016). The Dutch island Terschelling aims at becoming self-sufficient by 2020 (Gemeente Terschelling, 2015a). It currently reveals one initiative in place and one project that has been in the planning, both relating to closing local loops according to OBV (CupCompost Terschelling, n.d.a; Waddeneilanden, 2018). The objective of this thesis is to identify the current barriers and enablers in local governance structures that have hampered respectively supported action and innovation for circularity in residual waste streams relating to OBV on Terschelling. After identifying these barriers and enablers, propositions for how to mitigate or enhance them will be put to the fore.

Moreover, having emerged as a company-concept, the integration of the CE in socio-economic systems is still very much limited to small-scale applications, focusing on individual structures. These comprise for example circular constructions (houses) or products having higher value retention options (ROs) in the long run. Yet, from a system's perspective which is inherent to CE, its application is plugged within a broader context wherefore the very same should also be considered from a different angle than solely the company or product scale (Metabolic, 2018).

1.2 A SPATIAL LENS ON CIRCULARITY

The first theory of interest is the concept of CE and its dependence on external integration within governance frameworks and policies. The focus points of CE are investigated concerning the extent of external integration and by means of looking at the initiatives on Terschelling. Analysing corresponding governance structures may indicate which adjustments can open up waste management for circular economy initiatives (circular initiatives).

However, “governance” as a term, alike CE, reveals significant conceptual vagueness (Jordan, 2008; Jordan et al., 2013). This thesis builds on the area-oriented approach which employs a spatial design that considers governance a part of spatial planning and which brings more clarity about the term. Governance herein is expressed by revealing the relationship between content, process, and procedure of the planning (Heeres, 2017a; Heeres et al., 2010). The spatial context identifies the respective actors that play a role in effecting the development or management regarding a particular matter – the waste management (Biesbroek et al., 2009). The concept's advantage is its integrative character. While integration has a physical and an institutional side; governance structures constitute the institutional side. This thesis focuses on the institutional side. Analysing enabling and constraining factors for integration, this study builds upon literature on policy integration in infrastructure planning (Geerlings and Stead, 2005; Heeres et al., 2010; Hull, 2008; Lafferty and Hovden, 2003). The strength of these studies lies in their scope that considers the functional interrelatedness of different infrastructure policy sectors and actors, which is also key for successful CE (Heeres, 2017a). They thus can provide clues on how to overcome institutional fragmentation. As such, the thesis aims to enhance the analysis of CE's by incorporating an explicit ‘spatial lens’ using area-orientation on the extent of Terschelling.

1.3 RESEARCH OBJECTIVE AND RESEARCH QUESTIONS

Application of the CE concept is rarely found in connection to a regional application and in terms of how a whole region and the related governance structures are, can or need to be involved. Even though understood to be fundamental for making CE work, their exact implications are most often not specified in the literature (EC, 2015; Reike et al., 2018). Associated hurdles (lack of political will, lack of national waste management policies, rules and regulations, and others) so far do not pinpoint how they materialise concerning insufficient governance structures (Reike et al., 2018). This unclarity makes it difficult to specify how to support the successful implementation of a circular island development in the first place. Especially on an island, changing the conditions for initiatives that seize value retention might be very beneficial. This thesis' objective is to identify current barriers and enablers for circular initiatives in the local governance structures of Terschelling within organic residual waste streams.

The research entails a single-case-study methodology, for which the major research question will be: “what are the current barriers and enablers in local governance structures that have hampered respectively supported circular initiatives for circularity in organic residual waste streams on Terschelling and how can these barriers and enablers be mitigated respectively be enhanced?”

The sub-questions following are divided into theoretical and empirical concerns, upon which follow questions that will lead to the synthesis of both. Thereby answering the major research question:

Questions which are answered within the theoretical framework of this research:

1. What does a circular island development imply and what is the importance of governance structures?
2. How can an area-orientation contribute to an enhanced understanding of the opportunities and barriers these governance structures produce for a circular economy?

The question which is answered by the empirical findings of this research:

3. How do governance structures on Terschelling support or complicate the development of a circular economy in residual waste streams?

The question that represents a synthesis of the theoretical and empirical questions, giving an answer to the primary research question:

4. How can the current obstacles be resolved to enhance or speed up a circular regional development on Terschelling within organic residual waste streams?

1.4 SOCIETAL AND SCIENTIFIC RELEVANCE

Our society needs to re-orient and develop future-oriented solutions that help to sustain humankind and its needs (UNCED, 1992; UNEP, 2010). It is vital that concepts enabling a sustainable development evolve providing islands such as Terschelling with methods that enable a more considerate treatment of resources.

The scientific relevance lies in gaining in-depth knowledge about the drivers and their interplay with a particular focus on governance structures for enabling initiatives to operationalise circular waste management on Terschelling. Gaining in-depth knowledge can provide other islands in a similar context with a conceptual approach to identify which governance frameworks and policies in place need adjustments. That is, to operationalise more circularity in residual waste streams in a holistic manner. It can also provide islands in a different context with inspiration regarding suitable solutions for overcoming barriers and enhancing enablers. Besides, the operationalisation of CE with view to a fundamental driver – governance frameworks and policies – becomes more concretised. This is crucial to clarify the practical implications of the concept. It is debatable to what degree aspects and factors, should be specified especially as context-specificity reasonably argues against blueprint planning (Hytönen, 2016). Yet, making use of the area-oriented planning approach gives context-sensitivity justice and therefore ensures the consideration of the context (Heeres et al., 2012).

The societal relevance can strongly be related to the research objective of this thesis. Once drivers and hurdles have been identified, it becomes clearer what needs to be tackled, and more attention may be awarded to aspects being of high importance. Conclusions and recommendations can be made that ultimately enrich decision-making from affected and effecting stakeholders. Receiving new insights and recommendations might also motivate the islanders of Terschelling to prospectively plan new initiatives that focus on circularity employing area-orientation in order to avoid hurdles and be more successful in the operationalisation of circularity straight away.

1.5 INTRODUCTION TO THE CASE



FIGURE 2: LOCATION OF THE DUTCH ISLAND TERSCHELLING (RED MARK) (GOOGLE, 2018)

As part of an island agreement amongst all Dutch Wadden Sea islands, Terschelling (figure 2) considers the possibility to exploit the value of residual flows like wastewater, household, and garden waste in order to reduce value destruction of these resources (Gemeente Terschelling, 2015a). The motivation behind this is to reduce the value destruction of these resources (Ibid., 2015a). However, the island's future vision to become completely self-sufficient by 2020 is questionable since little can be found on circular-related progress and successes (Ibid., 2015a). Nevertheless, two initiatives that planned to introduce circular processes with organic materials can be identified:

The initiative CupCompost employs bio-waste management with the prospective aim to expand its spatial impact as well. CupCompost makes use of agricultural and garden waste to produce compost. This avoids shipping the waste off the island to let it treat on the mainland including related costs (CupCompost Terschelling, n.d.a). The produced humus is considered to go easier on plants and groundwater than artificial fertiliser or liquid manure. CupCompost wants to take care of installing a central green and garden waste collection point in the municipality so that both, house owners and the municipality itself can benefit from the composting service offered (Ibid., n.d.).

A pilot project using pyrolysis was planned to be carried out on Terschelling (Galle et al., 2017). However, as of January 2018, the project's realisation was opened for a tendering process as the original initiator could not come up with a financing plan in time (Waddeneilanden, 2018). With pyrolysis, bio-oil stemming from biomass can be produced under high temperatures and exclusion of oxygen. The process being exothermic thereby releases additional energy that can be used for generating electricity (Bodenstaff and Alijk, 2016). The objective is to cover five per cent of the electricity used on the island and give the island's sewage sludge two purposes: 1. to dry the sewage sludge utilising the heat that is being released during the pyrolysis process, and 2. use the dry material for the combustion of the pyrolysis process.

The limited success of these two initiatives shows the urgency to look closer at related barriers and enablers. Thus, identifying which hurdles hampered the implementation of circularity in residual streams can be mastered on Terschelling.

1.6 THESIS OUTLINE

As visualised in figure 3, chapter 1 has provided the background and aim of the thesis, alongside the relevance in science and society.

Chapter 2 will render the theoretical framework, elaborating on the circular economy, the area-orientation and how they are linked to each other in the conceptual framework. The theoretical framework will be followed by the methodology in chapter 3, explaining how the empirical data is gathered as well as what the object for assessment is. Chapter 4 will provide the contextualization of Terschelling, which includes the description of the Dutch waste management system and a contextual analysis carried out according to the PESTEL framework (Song et al., 2017). Chapter 5 includes the results identifying the enablers and barriers to triggering initiatives and innovations that enable circular initiatives with the focus on organic residual waste streams. The synthesis in chapter 6 provides the conclusion and reflection of this work.

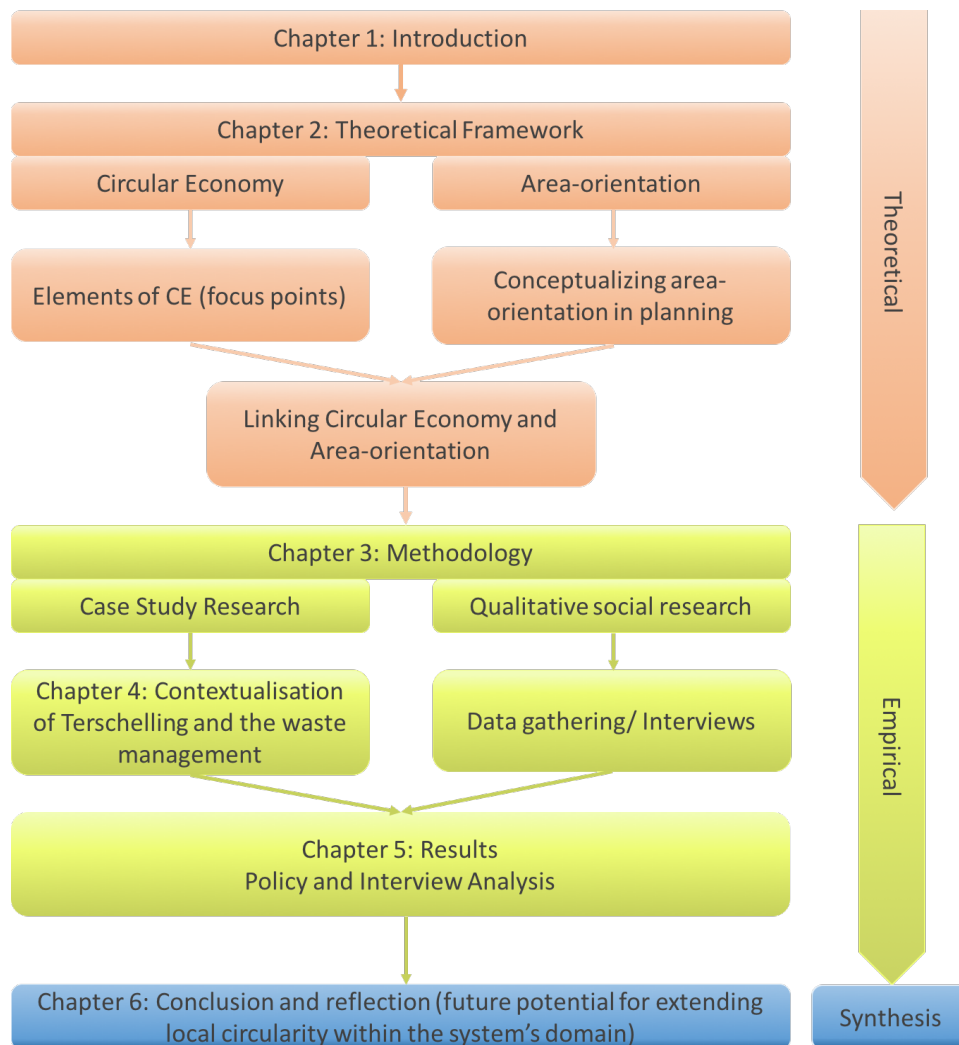


FIGURE 3: VISUALISATION OF THE THESIS' OUTLINE (CREATED BY AUTHOR)

2. THEORETICAL FRAMEWORK

The theoretical framework elaborates on the theories that this research is grounded on. First, the circular economy and its major points are denoted (chapter 2.1). Subsequently, area-orientation is outlined, and its integrative characteristics are described (chapter 2.2). These theories create the conceptual framework for answering the research question (chapter 2.3).

2.1 CIRCULAR ECONOMY

2.1.1 THE ROOTS AND VALUE OF CIRCULAR ECONOMY

Strategies for low resource and carbon use are sought across continents (Geissdoerfer et al., 2017; Kirchherr et al., 2017; Lu, 2014). The CE is an alternative growth strategy where resource use is decoupled from economic growth (Reike et al., 2018). In some eyes, the concept is new, developed by several schools of thoughts (cradle-to-cradle, biomimicry, R-principles/ imperatives; Ellen MacArthur Foundation, 2017). Others argue the concept to be everything but “a clearly defined academic discipline” connoting it with a decoupling myth (Blomsma and Brennan, 2017; Kirchherr et al., 2017; Reike et al., 2018, p. 10). In a meta-study comprising 69 relevant articles, Reike et al. (2017) consider the CE as a rather refurbished than virgin concept which seeks the means and options for the best value retention: “the conservation of resources closest to their original state, and in the case of finished goods retaining their state or reusing them with a minimum of entropy as to be able to give them consecutive lives” (Reike et al., 2018, sec. 10).

However, the current take-make-dispose cycle costs Europe € 7.2 trillion yearly. Waste-based energy recovery and material recycling only capture “five per cent of the original raw-material value” (Bouton et al., 2016, p. 6). Despite major investments in the outset, changing from a linear to a CE could contribute significantly to achieve Europe's employment, growth, and environmental objectives. Regarding finite materials, currently defined as *waste*, closing the loop means remanufacturing and recycling. For renewable materials closing the loop implies extraction of energy by anaerobic digestion from organic waste. A recent study found 146 anaerobic digestion plants deployed in the United Kingdom, treating 66 % of sewage sludge (Ibid., 2016, p. 9). Another 175 plants generate bioenergy from solid waste (Ibid., 2016, p. 9). These figures demonstrate the feasibility of various types of circular designs in combination with readily available technology to give waste further purpose.

2.1.2 DEFINING CIRCULAR ECONOMY

Kirchherr et al. (2017) have investigated 114 definitions of CE publication, comparing core aspects, their abundance and relatedness to each other. They propose a final definition this thesis refers to:

“A circular economy describes an economic system that is based on business models which replace then ‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production/ distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and the macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations.” (Kirchherr et al., 2017, p. 224 f.)

This definition reflects the principles of reducing, reusing, recycling and recovering materials on a micro-, meso-, and macro-level (Kirchherr et al., 2017). The principles serve for an orientation on what should be done in practice, while the levels indicate the various arenas, instances and respective networks that need to be addressed to gain momentum and operationalise the concept. Considering this, altering the waste cycles seems to be the right starting point to use resources more efficiently (cf. Reike et al., 2018).

Operationalising CE is argued to be rooted in system thinking, thus to consist of a “product concept and design life cycle to which [...] different ROs [retention options] can be attached” (Ibid., 2018, sec. 14). These ROs build an iterative process and include strategy formulation within policies. Although market parties are at the heart of design, a broader set of actors, including consumers, the government and non-governmental organisations (NGOs), becomes essential. It involves a more inclusive, collaborative approach with more transdisciplinarity in planning and, thus, implies a more governance-driven type of management in which integration becomes essential (Ibid., 2018). Suitable governance structures must, therefore, promote integration across sectors and at all levels so that not only recycling is enforced, but also concerns beyond the technical dimension, such as societal objectives, are taken into account.

2.1.3 BUILDING BLOCKS OF THE CIRCULAR ECONOMY

Even though the R-imperatives¹ represent the widespread interpretation of CE, the paradigmatic divide and the abundance of different understandings of the R-imperatives argue against the use of such broadly interpretable criteria. One of the biggest form-giving, interpreting and cited organisations of the CE is the Ellen MacArthur Foundation (Blomsma and Brennan, 2017; Bouton et al., 2016; Winans et al., 2017). Henceforth, the focus of this research will rely on four focus points put up by this foundation that determine the concept's operationalisation. The focus points clarify whom or what should be considered in organisational structures and functions:

- (A) *circular design* – “improvements in material selection and product design,”
- (B) *innovative business models* – “changing from ownership to performance-based payment models,”
- (C) “building up the capabilities and infrastructure” (*new capacities*) and
- (D) “enablers to improve cross-cycle and cross-sector performance” (Ellen MacArthur Foundation, 2013, pp. 9, 58).

These focus points shall help to realise the principles of (1) designing out waste, (2) building resilience through diversity, and (3) relying on energy from renewable sources. Reintroducing materials and products into the biosphere is at the heart of a CE and can be achieved by a few design changes to the system (Ibid., 2013).

By applying Reike's et al. (2018) categorisation of the different ROs to organic residual waste streams, materials undergoing recycling and recovering lose their “original product structure and can be applied anywhere” and so for any purpose (Ibid., 2018, p. 12). Owners of the activity for recycling and

¹ R-imperatives are known, for instance, by the terms *reduce*, *reuse*, *recycle* and depict the types of retention options (ROs). Across literature and practice the number of ROs varies between three (3Rs) and ten (10Rs), revealing a highly inconsistent understanding and application of the concept. For the 3-Rs alone, the principles are associated with six different meanings (Reike et al., 2018, p. 8).

recovery may be collectors, an energy company, the municipality, a processor or a waste management company (Ibid., 2018). Accordingly, and in the context of the organic residual waste streams chosen for this work (including residues from water- and bio-waste) – the focus points are investigated. The spatial scope of the research being focused on Terschelling implies that investigations of the organic residual waste stream delimits itself to the local governance structures and exclude CE processes that precede the island’s organic residual waste streams. Significant attributes of each focus point are summarised in table 1, at the end of the section.

A *circular design* (A) can reduce the costs of “moving products into ever-tighter reverse circles” (Ellen MacArthur Foundation, 2013, p. 59). Therefore, knowledge of the system structure, its product, and nutrients (including suppliers), customers and the reverse processes are a necessity (Ibid., 2013). It also requires waste collection with subsequent sorting in waste collection facilities and giving consecutive purpose to these products. In combination with the net efficiency of waste separation (Ibid. 2013; Kirakozian, 2016; Roust, 2018), consecutive technologies and certain skills promote giving *waste* another purpose. This may involve recycling materials to recover nutrients as an input for new crops or generating different energy and heat fluxes, such as on Samsø/ Denmark (figure 4). Consequently, a circular design relies on the best options and their combination as optimal as possible, thus carrying out Optimal Biomass Valorisation.

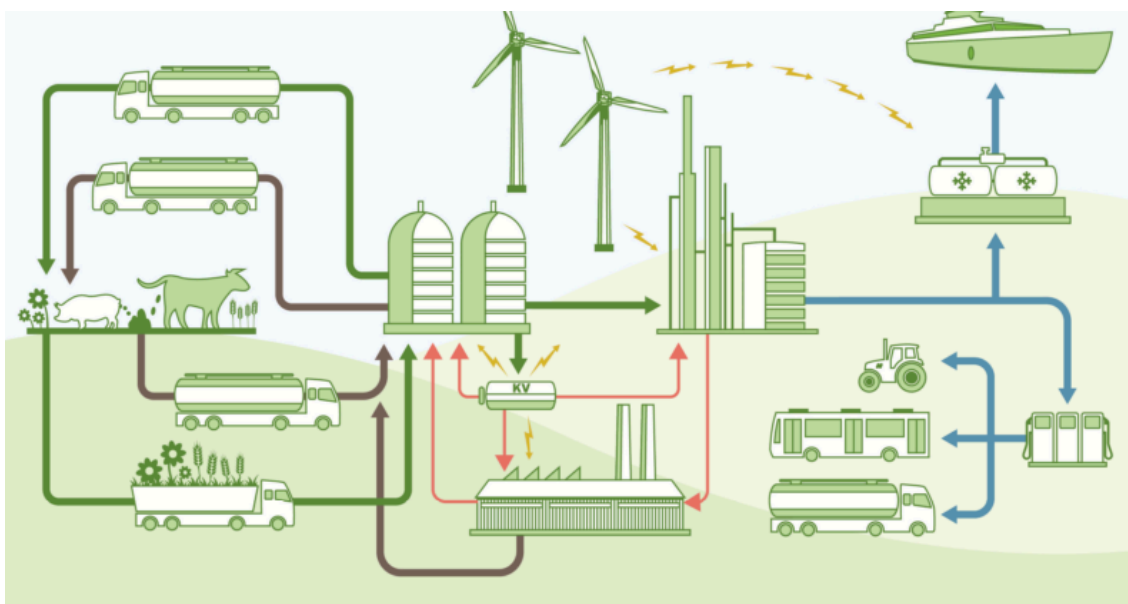


FIGURE 4: SCHEMATIC OUTLINE OF THE BIO-ECONOMY CIRCLE OF THE BIOGAS-UNIT ON SAMSO (TYBIRK ET AL., 2016)².

Innovative business models (B) are needed for more circular products to successfully compete with low-cost but high-efficiency products within the linear paradigm. Corresponding business models are usage- and performance-based payment models (i.e., leasing, hiring) as well as the expansion of the

² On Samsø, bio-waste from farmers is collected and transferred to a biogas plant. The output is gas, which is condensed into liquefied natural gas, used for local transport, and nutrients that are re-used in agriculture. This loop is closed by agricultural activities that create the product locally and use the bio-waste from their own activities and adjacent garden activities to re-produce and deliver logistics (Tybirk et al., 2016). Phosphate-containing effluents have the potential to be used to fertilize crops and are now being tested and planned for crop irrigation (Manniche et al., 2017; State of Green, 2017).





product features. Achieving fit and attractive value propositions are at their core (Ellen MacArthur Foundation, 2013). An example is the buy-back model (Ibid., 2013, p. 44). On an island this could materialise through individuals or businesses such as farmers that partly become producers who transfer their waste to one of the initiatives. The former receive either money, a share of the waste product, i.e. compost, generated by the waste or a credit for new purchase (Ibid., 2013). This model creates win-win situations and provides an incentive for various stakeholders to engage in a new waste management to generate profit while fulfilling an environmental or social mission (Lombardi, 2017).

Focus point (C) refers to “building up the capabilities and infrastructure to close” the loops, here declared as *new capacities* (Ellen MacArthur Foundation, 2013, p. 59). That is to allow for “cost-efficient, better quality collection and treatment systems with effective segmentation of end-of-life products” (Ibid., 2013, p. 59). Collection systems need to be user-friendly, accessible and maintain long-term material quality (Ibid., 2013, p. 59). On Terschelling, for example, it becomes essential that practising waste separation and perhaps store organic or garden waste at a specific location from where the cycle goes on is easily manageable for participants. Incentivising participants to collaborate also involves a supportive infrastructure and that carrying out necessary tasks and adaptation measures are easily attainable and affordable.

Enabling factors to improve cross-cycle and cross-sector performance (D) depend on policy makers and institutions, popular opinion leaders, and educational institutions (here entities)³. These factors can include joint infrastructure management and product development, increasing the value chain transparency, setting mechanisms for ‘match-makers,’ establishing industry standards, or aligning incentives between business partners (Ellen MacArthur Foundation, 2013, p. 60). A good example is the application of taxes on labour instead on material which favours the linear production paradigm (Ibid., 2013). Social procurement movements have recently found support for initiatives and social start-ups in the recycling and composting industry. Governmental acts guarantee tenderers “preferential treatment for receiving taxpayer funds for contracted community services,” provided their financial offer includes a social value (Lombardi, 2017). Entrepreneurs on Terschelling could benefit from the introduction of OBV if their product in return could be taxed lower than usually is the case in the legal framework. Also of importance is the possibility of accessing risk management and financing instruments for capital investment as well as research and development (R&D) (Ellen MacArthur Foundation, 2013). Such access and legislative changes are related to a stable, generally more stimulating institutional environment (Ibid., 2013, p. 60) and may influence the rise of circular initiatives, such as like the one on Terschelling.

³ Notably, the term “institutions” often gets associated with collectives of individuals forming for instance specific entities, bodies or organisations of different functions (governmental, economic, etc.) (Fusco Girard and Nocca, 2017; Geng and Doberstein, 2008; Jawahir and Bradley, 2016; Netherlands Enterprise Agency, 2017; Pauliuk, 2018; UNFCCC, 2015). However, in the present work, *institutions* will be used as referred to by Alexander (2005), Sorensen (2015) and Duit and Galaz (2008), namely as the formal structures (rules, regulations, laws, etc.) laid down on paper, whilst any collective with a specific function distinctively will be named, as such (*entity, organisation, body, etc.*). However, in this case, it is expected that institutions are meant in the sense of an entity.

TABLE 1: ATTRIBUTES OF THE FOCUS POINTS OF CIRCULAR ECONOMY (CREATED BY AUTHOR)

Focus points	Purpose	Attribute(s)	Example in Waste streams applied to an island context
(E) <i>Circular design</i> 	Reducing costs, minimize waste, enhance overall sustainability within value chain	Having or putting in place an innovative design and technology to last and increase efficiency	<ul style="list-style-type: none"> Effective waste selection/ separation and consecutive purpose tailored to context
(F) <i>Innovative business models</i> 	Ability to compete against products created highly (cost-) efficiently and according to a linear-design	<ul style="list-style-type: none"> having or putting in place usage- and performance-based payment models ability to come up with fit and attractive value propositions 	<ul style="list-style-type: none"> creating win-win situations through e.g. social enterprises that make a business-case for repurposing waste interesting and viable to all parties involved
(G) <i>Capacities</i> 	Closing the loop	Having or putting in place: <ul style="list-style-type: none"> cost-efficient, better quality collection and treatment systems with effective segmentation of end-of-life products (spatial) accessibility user-friendliness attractiveness to participate/ use system long-term oriented function 	<ul style="list-style-type: none"> building up supportive infrastructure and capabilities to practice waste segregation and easy participation having the knowledge-base that helps doing this
(H) <i>Enablers for cross-cycle and cross-sector performance</i> 	Improve cross-cycle and cross-sector performance	<ul style="list-style-type: none"> supportive market mechanism key figures: policy-makers, opinion leader, educational entities system facilitators: joint infrastructure management, joint product development institutions aligning economic incentives across sectors stable institutional environment 	<ul style="list-style-type: none"> allocation of taxing waste making cross-cycle and cross-sector interaction more urgent and wanted apply mechanisms such as social procurement adjust laws that favor the establishment of circular systems regarding to residues and thereby enforcing cross-cycle and cross-sector interaction

2.2 AREA-ORIENTED PLANNING

Area-orientation seems to be incoherently conceptualised within the few literature available (Heeres et al., 2010, 2012; Heeres, 2017b; Struiksmas and Tillema, 2009). Therefore, its conceptualisation is approximated and complemented by other papers on policy integration (Geerlings and Stead, 2005; Heeres et al., 2010; Hull, 2008; Lafferty and Hovden, 2003). Subsequently, the author understands area-orientation as an umbrella-term for a locally orientated focus on community (development), infrastructure or also policy integration. Hence, no further distinction is made between area-development and area-oriented planning.

Considering residual streams on Terschelling, the connections between the waste streams' sources and the initiatives themselves can be regarded as an infrastructure. Therefore, aspects of area-

orientation and integration are drawn from literature on road infrastructure and applied to residual streams and correlating initiatives.

2.2.1 FROM LINE- TOWARDS AREA-ORIENTED APPROACHES

Traditionally, line-oriented structures such as waste management systems have been developed within the realms of an own sector, apart from other spatial sectors and regardless of their spatial impacts and consequences on landscape, nature, and inhabitants. Not spatial quality as such but building connections had been the primary concern (Heeres et al., 2010, 2012; Struiksmā and Tillema, 2009). This was manifested through a sectoralised policy framework, specific legislation, a governmental planning agency as well as own funding mechanisms. Even until now, the Netherlands have 84 sectoral plans in place which regulate the management of distinct waste types (IenM, 2014a). Nevertheless, various societal factors like a rising environmental awareness as well as the acknowledgement of the relationship between infrastructure and other spatial developments (Heeres et al., 2010, p. 5), gave rise to more integrative approaches to ensure spatial quality in the Netherlands.

In the Dutch waste sector, a Waste Management Council was established in 1990 "to achieve a joint and coherent approach for the waste management" between the national, provincial and local level (RWS, n.d.). Since all targets were met and waste was no longer a pressing topic on the political agendas by 2006, the council's work ended. The cooperation between the different levels for "defining policies, implementation and enforcement" however continued (RWS, n.d.). As analysed by Heeres et al. (2012, 2010), Heeres (2017c) and Struiksmā and Tillema (2009), Dutch infrastructure planning ever since has been undergoing a major transition away from line-oriented approaches towards more area-oriented approaches, making spatial quality and sustainability the ultimate criterion for new planning endeavours.

2.2.2 BENEFITS OF AREA-ORIENTED APPROACHES

The strength of area-orientation lies in its scope that considers the functional interrelatedness of different spatial policy sectors and actors in an area which need involvement to, for example, enable Optimal Biomass Valorisation. Collaborative actor capacity on different levels is sought at an early stage of planning. The involvement of many stakeholders in the planning process hereby gets embraced (Heeres, 2017c; Heeres et al., 2012). Such integration prevents institutional fragmentation and ensures context-sensitivity in that the layout of the new waste streams can be adjusted to the context and vice versa. For example, new waste flows and related land uses should be integrated into places that suit the physical demands of the new waste flows and emerging developments (Hrelja, 2015, p. 2). Converging infrastructural planning and the planning of other spatial uses can furthermore help to identify more solutions which may lever new synergetic project outcomes, a higher resilience to future uncertainties and new ways of value-capturing (Heeres, 2017c; Heeres et al., 2012). It can be assumed that thereby also the financing of prospect spatially-related projects can be improved.

2.2.3 CONCEPTUALIZING AREA-ORIENTATION

Regarded as an integrated, adaptive, flexible and context-sensitive planning approach (Heeres, 2017c; Heeres et al., 2012), area-orientation comes close to what is called place-based, area-based or transit-oriented developments in other countries (Heeres et al., 2010). Analysing these, Heeres et al. (2010) conclude that planning on a lower scale is gaining importance to address issues of the local context efficiently and effectively. Its practical implementation comprises two dimensions:

1. “Functional-spatial plans and designs and
2. the related institutional organisation that provides structure to inter-actor collaboration” (Heeres et al., 2012, p. 150).

The first dimension represents the physical-spatial outcomes of planning actions framed by content-related developments. In terms of waste management for Optimal Biomass Valorisation, this would be embodied by the spatial allocation of where which material is processed and how. The second dimension shapes the governance structures through process and procedures – the operational respectively strategic planning level (Ibid., 2012).

Ultimately, the first dimension can be viewed as an output of the second dimension. Content reflects the extent to which governance and integration are translated into functional-spatial plans and designs of the initiatives’ waste flows and additionally how spatial conditions shape it. As content only reflects the extent of integration but does not influence it as process and procedure do, it is considered to instead underlie the second dimension. For this reason and with view to the research objective, this thesis focuses on the second dimension.

Figure 5 depicts the relationship between content, process, and procedure. Their embeddedness in the context visualises the context’s relevance and potential of influencing the planning of the new waste streams and vice-versa (figure 6). Notably, process and procedure portray many overlapping characteristics (Heeres et al., 2012, 2010). Especially here, the line blurs between planning policies and planning projects as will become clear in the run.

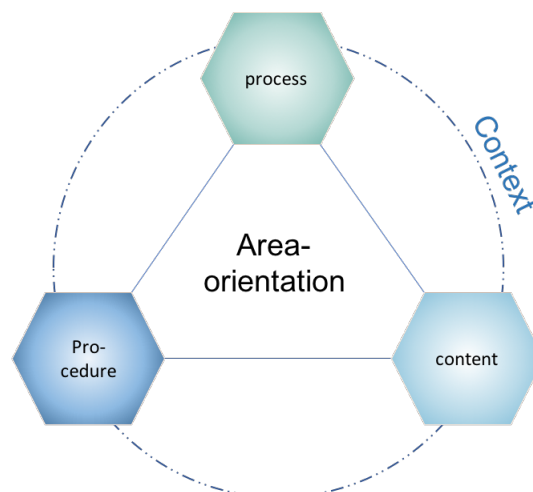


FIGURE 5: THE PILLARS OF AREA-ORIENTATION IN ITS ENVIRONMENT (CREATED BY AUTHOR)

Policy integration and integration between other formal frameworks of and between different operational (planning) sectors is considered a significant driver to area-orientation to achieve integrative planning processes that encompass public policy-making (governance) (Heeres et al., 2010, 2012; Struiksmā and Tillema, 2009). Heeres et al. (2017b; 2012, 2010) pronounce that integration is reflect-

ed in process and procedures, where the procedural level must enforce integrative planning processes and where policy-making “revolves around the ability to build coalitions, and orchestrate various interests” (Salet and Woltjer, 2009, p. 245).

Two different types distinguish integration:

- (a) Internal policy integration, the “process of convergence of policy-making and planning for several components within” one policy sector (Heeres et al., 2012, p. 150; Struiksmas and Tillema, 2009) related to the vertical, intra-sectoral axis of integration (Geerlings and Stead, 2005; Lafferty and Hovden, 2003) and
- (b) external policy integration, strongly converging different sectors and involving multiple stakeholders (Heeres et al., 2012, 2010; Struiksmas and Tillema, 2009). Hence, it relates to enabling cross-sectoral, multi-level and multi-actor interaction.

Whereas the success of area-orientation especially depends on the quality and degree of external policy integration, this does not imply internal policy integration is irrelevant. Yet, Heeres et al. (2010, 2012) appoint relatively higher importance to external policy integration as it frames the integrative scope and significant advantage of the approach. Therefore, external integration is expected to be the major contributor for enabling initiatives that want to make organic waste streams more circular and is being focused on here.

EXTERNAL INTEGRATION

Heeres et al. (2012, p. 150) define external integration as a “process of integration between road infrastructure and further spatial policy sectors” but also as the “convergence of infrastructure planning and planning for other land use functions” resulting in ultimate plans (Heeres et al., 2012, p. 149). Both layouts of external integration encompass internalising ambitions, objectives and principles of one specific sector across other sectors, hence horizontally, the one formally and the other informally. Ideally though without overriding the other’s sectors principles (Geerlings and Stead, 2005; Lafferty and Hovden, 2003).

To external (policy) integration, in particular, applies that the boundaries of policy integration are widely interpreted:

1. Making policies consistent across different policy sectors, preferably outgoing from authorities (Geerlings and Stead, 2003; Hrelja, 2015; Lafferty and Hovden, 2003) over to
2. public policy-making which involves stakeholders outside authorities, to
3. the practical implications of policy integration on the different levels, national, regional and local level (Hamdouch and Depret, 2010; Hrelja, 2015) and
4. the fact that the delineation of the arena of external integration remains unclear (Heeres et al., 2012)

External integration on a process level, the operational planning level, is thus understood to encompass local activities reflected in collaborative and integrative planning processes. Here, the extent of external policy integration, so external integration within procedures, can enable cross-sector, multi-actor and multi-level interaction of stakeholders needed for introducing OBV. How external (policy) integration transcends into the two dimensions of area-orientation is outlined below:

EXTERNAL INTEGRATION WITHIN CONTENT

Broadly framed, content represents the product of external integration. In the Netherlands, spatial quality including the pillars of sustainability is the primary objective in planning and is therefore targeted employing external integration. At the same time, the Dutch government uses spatial quality as an assessment criterion in spatial policies. Plans taking into account utility value, experiential value and future value in synergy with the pillars of sustainability are expected to deliver a higher spatial quality (Heeres et al., 2010; Hooimeijer et al., 2001). Due to the missing specification of the previous three values, the operationalisation of this concept shows major drawbacks, lacks easy applicability and as of now requires broad assessment frameworks (Arts et al., 2016). Heeres et al. (2010) hypothesise that the more inclusive area-based planning is, so the more interests of all sectors are considered, the higher the spatial quality will be.

To approximate external integration within content in relation to the initiative's plans, the representation of interests from the different parties/ sectors shall be identified within the plans. Representation of interest relates to the aspects that needed integration, departing from the physical, functional processes involved and can give an indication about whether the spatial quality is limited or not.

EXTERNAL INTEGRATION WITHIN PROCESS AND PROCEDURE

Process and procedure cannot always be clearly delineated from each other, possibly due to their reciprocate effects. Yet, process relates more to the planning process while procedure relates more to the formal frameworks that influence the process (i.e., policies, regulations) (Heeres et al., 2012).

Process appears to be based on multi-actor, multi-level and cross-sector collaborative and integrative activities of public and private agencies. Integrative meaning to share goals and objectives, thus streamlining them between the stakeholders and sectors (Heeres et al., 2012, 2010). Collaborative meaning to develop a plan together (co-production), finding consensus through negotiations, collaborating or cooperating (public-public, public-private partnerships (PPPs)) so to create win-win situations and possibly actor coalitions. Public policies including common actor strategies might emerge (Ibid., 2012, 2010). Such governance often gets experienced in line with political decentralisation (Heeres et al., 2012) and helps to establish public-public and public-private cooperation (Heeres et al., 2010). A shared sense of urgency amongst stakeholders, likely due to a crisis or collective public initiatives, is a relevant driver for area-oriented planning processes to come through (Heeres, 2017d). Outcomes of area-oriented processes are shared risks, more fluid policies, and an increased likeliness of the content to be implemented (Heeres et al., 2010).

To realise OBV, area-oriented procedures need to enforce integrative planning processes and contain clear rules and responsibilities as well as be coherent across the different related policy sectors that affect OBV (Heeres et al., 2012, 2010). Coherence can be identified through "the consistency of purpose and priorities across several policy sectors" (Hull, 2008, p. 95) or merely sharing goals (Geerlings and Stead, 2005), understood as the integration of principles (Lafferty and Hovden, 2003). External policy integration can support coalition-building (Heeres et al., 2012). Integrative and collaborative activities can also be encouraged directly, for example through covenants about cooperation amongst various actors (Heeres, 2017d). Policies supposed to enhance context-sensitivity pay great attention to the maintenance of the community value. This demands tailored designs which include the preservation of natural, cultural, scenic and community resources without causing major disruption using re-

sources efficiently and effectively (Heeres et al., 2012). It can be assumed integrative planning processes are also encouraged through procedures which incentivise OBV in different ways (i.e., spatially, financially-related). Meanwhile, process can also shape procedures as throughout or in support of process, new, to the case tailored procedures might emerge.

Factors that can support a high degree of external integration in policy-making processes are strong horizontal information flows for drawing integrative policies (Geerlings and Stead, 2005, 2003). In contrast, coming alongside the devolution of powers in governance-like steering, compartmentalised structures of governments are regarded likely to limit information flows amongst ministries and thus can hamper horizontal consistency (Lafferty and Hovden, 2003). Different time horizons of policy levels and sectors, cross-level political tensions or insufficient political and public support can pose a significant challenge to converge important goals and measures within policies or prevent amending and introducing new, externally-oriented policies (Geerlings and Stead, 2005, 2003; Hrelja, 2015). Individuals can act as key-influencers helping to push forward an issue or decision-making in support of circular initiatives. However, gaining political support for long-term, less electable and rather unpopular issues from (other) politicians may not be easy. That can be complemented by personal ambitions or agendas that naturally favour different objectives (Geerlings and Stead, 2005; Hrelja, 2015). So, the allocation of a waste facility as well as incorporating principles of a circular economy in policies of different business sectors needed for OBV could be overthrown because (1) the citizens do not ultimately feel benefits, (2) the facility and related operations visually and sensually disrupt the landscape through smell, noise or a blocked view or (3) making the waste system more circular is simply not of a considerable interest to certain politicians whose voices are needed.

Apart from this, Geerlings and Stead (2005) identified that locations carrying an environmentally-related title or status are more inclined to drive policy integration related to environmental concerns. One could also say that environmental awareness induces an urgency of acting. Hence, a broad acknowledgement of the need for more initiatives that drive circularity in waste streams could induce policy integration for such purposes.

Table 2 below depicts a summary of the attributes belonging to the dimensions of area-oriented planning and external (policy) integration and need to be considered when investigating content, process, and procedure of the local waste management.

TABLE 2: ATTRIBUTES OF AREA-ORIENTATION (CREATED BY AUTHOR)

Independent variables (except content ?)		Characteristics
Dimension I: physical/ functional characteristic	Content	<ul style="list-style-type: none"> • Spatial plan/ design or management of the waste system • outcome of external integration in process and procedures: • representation of different interests incorporated in spatial plan/ design
Dimension II: governance structures structuring inter-actor collaboration	Process (external integration on an informal level)	<ul style="list-style-type: none"> • Context-sensitive planning process (multi-actor, multi-level, multi/ cross-sector): Collaborative activities – negotiations and collaborations different stakeholder Integrative activities – sharing, streamlining goals amongst stakeholders Hybrid arrangements: actor-coalitions/ public-public or public-private cooperation (PPPs), co-production, public-policies, win-win situations • Political support • Key individuals • Shared sense of urgency
	Procedure (external integration formally manifested)	<ul style="list-style-type: none"> • Formal frameworks as legal, financial and administrative basis (policies, regulations, etc.): • Formal consistency of purposes and priorities across procedures of different policy sectors/ shared goals • Enabling collaborative activities • Enabling integrative activities • Establishing clear rules and responsibilities • Incentivizing circular activities

2.3 CONCEPTUAL FRAMEWORK: LINKING CIRCULAR ECONOMY AND AREA-ORIENTATION

Waste management can be understood as an infrastructure of its own (ESA, 2017; Simeonova et al., 2010). It prevents adverse impacts on health and the environment (UNEP, n.d.). Waste management depicts a network of necessary connections conditioned by governance structures with the potential to create synergies. Based on system thinking and by modifying a system's connections, the circular economy aims at increasing a system's efficiency while finding value throughout (Arnold and Wade, 2015, p. 675; Bouton et al., 2016; Reike et al., 2018). In other words, it is considered to create synergistic relationships (Ellen MacArthur Foundation, 2013) (cf. chapter 2.1). Hence, the ambitions of an area-oriented approach, as well as those of CE, seem to be very much alike: creating synergies and more sustainable development.

Consequently, CE can span across a spatial context and between different levels and sectors to create synergies. Applied to an island, it is therefore expected that a gradual development of creating (more) synergies can put a circular island development into motion. Creating synergies however necessitates governance structures to enhance cross-sector interaction through its major strength: external integration. External integration is embodied within process and procedure and reflected in content (cf. chapter 2.2). Making adjustments to a system, such as the organic residual waste stream on Terschelling, and enabling the focus points of the CE is expected to require external integration as framed in area-orientation.

The combination of external integration as conceptualised by area-orientation (cf. chapter 2.2.3) and the focus points building a CE creates the conceptual model of this thesis. Figure 6 depicts how process, procedures, and content, as outlined in table 1 (chapter 2.2.3), embody external integration. Focusing on the institutional side of area-orientation, external integration in local governance structures represents the independent variable. Since content is considered to underlie governance structures (process, procedure), representing the outcome of process and procedure, it is not regarded to influence the extent of external integration. Accordingly, figure 7 depicts content below process and procedure. Even though content does not directly influence the amount of external integration, it remains considered within the research as it can indicate external integration (cf. chapter 2.2.3). From there, this conceptual framework aims to examine the extent to which external integration has enabled the focus points of the CE (cf. chapter 2.1.2) in context with organic residual waste streams. Thus, the focus points are the dependent variables (figure 6). Meanwhile, the planning of the organic residual waste streams on Terschelling delimits the spatial boundary of the research (figure 6).

Consequently, procedures are researched for their integrative nature and enforcement of external integration on the process level. Process is investigated with regards to the operational sphere of external integration on the operational level. It regards the planning of the circular initiatives on Terschelling in the field of organic residual waste streams. Herewith, the focus here lies on:

1. the importance of external integration to the initiatives' achievements and success,
2. the employment of external integration through the lens of content, process, and procedure,
3. the role of external integration in realising the focus points of the CE in the initiatives are researched.

By researching the extent to which external integration possibly supports circular initiatives in organic residual waste streams, concurrent barriers and enablers of local governance structures on Terschelling can be identified. It is not considered how policy integration between related ministerial departments takes place. Yet, public policy-making resulting from collaborative planning activities is considered as it indicates successful external integration on the operational planning level.

The point of departure for identifying content, process, and procedure is Terschelling's organic residual stream network and related organisations. The focus lies on enablers and barriers to governance structures of local initiatives on Terschelling. The research distances itself from going beyond the spatial borders of the island. However, this may include actors which operate outgoing from the mainland.

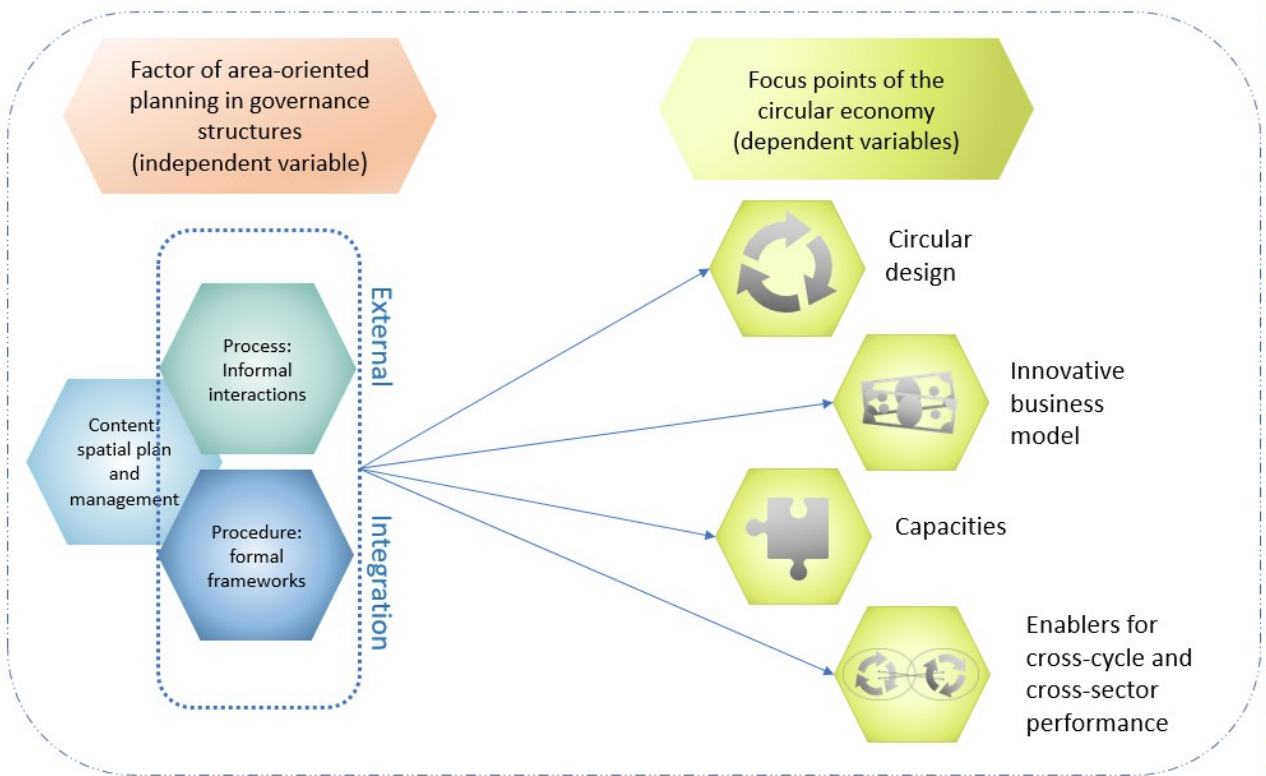


FIGURE 6: CONCEPTUAL MODEL DEPICTING FACTORS OF EXTERNAL INTEGRATION FOR ORGANIC RESIDUAL WASTE STREAMS (CREATED BY AUTHOR)

3. METHODOLOGY

This chapter outlines the methodological base, explaining the research approach (chapter 3.1), the research strategy (chapter 3.2), the following methods for gathering and analysing the data (chapter 3.3) and the limitations of the approach (chapter 3.4).

3.1 RESEARCH DESIGN

This study aims to identify barriers and enablers to operationalise OBV within the organic residual waste streams on the Dutch island of Terschelling, emphasising on the importance of external integration in governance structures.

The research employs a qualitative type of research: a case study approach, using two in-situ cases represented by two initiatives. This approach was chosen for several reasons. For once, area-orientation demands to define a spatial scope of planning. To create more synergetic relationships between land-uses, a good demarcation to the area is necessary to keep the work feasible and to not lose sight of the planning focus (Heeres et al., 2017, 2012). Also, As Yin (2009, p. 18) and Flyvbjerg (2006) argue, "an empirical inquiry must examine a contemporary phenomenon in its real-life context, especially, when the boundaries between phenomenon and context are not clearly evident." The case study "allows investigators to retain the holistic and meaningful characteristics of real-life events – such as individual life cycles, small group behaviour, organisational and managerial processes, neighbourhood change, [...] and the maturation of industries" (Yin, 2009, p. 4). Governance structures together steer human activities and processes (cf. chapter 2.2). Focusing on governance structures thus are relatable to real-life events wherefore it seems viable to also consider them when identifying respective barriers and enablers or circular initiatives. Another reason is the newness of research area which currently is not yet broadly covered by literature (Eisenhardt, 1989): the connection of a spatial planning concept with a somewhat trending concept, the circular economy.

CHOICE OF CASES - RESEARCH UNITS

The in-situ cases have been chosen according to two major factors: Innovativeness of the circular processes applied and feasibility.

Innovativeness was defined as that the island would benefit in terms of optimal biomass valorisation and saving costs and CO₂ emissions.

Feasibility relates to matters of limited time and financial means that both frame reachability. Terschelling being located within the province of Friesland is reachable by public transportation as well as related interviewees would be. This offers the opportunity to travel to the location and interview partners within a fair amount of time and costs.

While remaining within the confinements of a case area, focusing on a particular type of circularity (OBV) decreases the holistic characteristic of CE, it keeps feasibility in scope. Nonetheless, discoveries during the empirical data gathering that regard further options relating to organisational arrangements are not disregarded. Even though this possibly increases the scope of the loop's impact or its function, those insights could help figuring out future solutions, visions, and synergies.

3.2 RESEARCH STRATEGY

Case studies consisting of in-situ cases and including only one set of data, like interviews, often are criticised for missing out quantitative sets of data (Yin, 2009). Therefore, the case study was accomplished by a PESTEL analysis, a policy document analysis and qualitative semi-structured interviews allowing a triangulation of these qualitative methods. Triangulation is associated with mixed-methods by Yin (2009). It allows approaching the thesis' research question from the angle of more than one source (Decrop, 1999; Vayda, 1968). Using multiple methods helps to limit methodological and personal biases (cf. chapter 3.4) (Ibid., 2009) and subsequently "enhances a study's generalizability" (Decrop, 1999, p. 158).

3.3 DATA COLLECTION METHODS

3.3.1 PESTEL ANALYSIS

Since interests are likely to be shaped by the local context and the possibilities that actors see in it, the projects needed to be contextualised so to understand whether and how the context played into the case's developments (chapter 4). Contextualising the location helps obtaining a better image of why obstacles have come up. Further, interview questions can be better tailored to the location of research. This is done by using the PESTEL framework as it helps to structure the context into different sections, providing a useful and brief overview (Song et al., 2017). The data used was derived from archives, written documents and papers that directly relate to the cases and Terschelling as well as from the interviews.

3.3.2 POLICY DOCUMENT ANALYSIS

Data from recent policy documents were reviewed and analysed to understand procedural aspects that revolve around planning for waste, circular economy, space, and sustainable development in the Netherlands and on Terschelling. The key aspects which identify and drive external integration as outlined in chapter 2.2.3 were researched within formal frameworks. 52 retrieved documents revolving around these areas were filtered and narrowed down to 23 documents that showed relevance in their content. Relevance was considered under three conditions:

- (1) Some pre-defined terms (table 3) could be found and needed a closer look
- (2) they stood in a spatial/ environmental relationship to Terschelling. This especially regards spatial, environmentally-related planning documents from the various governmental levels
- (3) documents had to be valid and set up between 2007 (the initiation of CupCompost) and 2016/ 2017 (the time in which the pyrolysis project was still in the planning).

All documents reviewed can be found in appendix I, ordered into their topic of belonging and level of authority.

Because many policy documents are written in Dutch, it was necessary to translate relevant key-terms from chapter 2, to filter the documents correspondingly. Table 3 depicts the list of terms which served as identifiers for related passages that content-wise might be subject to these terms. Meanwhile "objective" (*doelstelling*) was used as a term that should directly point out, whether the policy has shared goals with other topic-related policies and therefore emphasises external integration. Further, it is also considered to what extent external integration has taken place regarding the focus points of the CE. Therefore, related terms were used respectively and also changed into the corresponding verbs.

TABLE 3: TRANSLATION OF TERMS SERVING AS IDENTIFIERS (CREATED BY AUTHOR)

English	Dutch
Collaboration/ collaborating	<i>Samen/ werking/ -en, wisselwerking</i>
Participation	<i>Inspraak, deelname</i>
Objective	<i>Doelstelling</i>
Sector (to identify whether external integration is sought after)	<i>Sector</i>
Area-orientation	<i>Gebiedsontwikkeling</i>
Cooperative, cooperation	<i>Coöperatief/ -ve, coalitie/ coalitief</i>
Actor	<i>Actor</i>
aspects of CE as far as the author knew how to best translate them ¹	<i>Innovatie, bedrijven, markt, circulaire economie, circulaire design, integratie, ketten (sluiten), kettenbenadering, participatie</i>

3.3.3 QUALITATIVE, SEMI-STRUCTURED INTERVIEWS

Interviews were done with public as well as private parties that are or have to some extent been involved in the projects' evolution. Transcription has been carried out with F5 which provides a smooth workflow and displays each section with timecodes. How detailed an interview is being transcribed depends on the research purpose and question. Since the purpose of the research is more content-oriented and does not relate to significant social phenomena where emotions become essential to the analysis, the methodology of the transcription has been carried out according to the guidelines of Dresing and Pehl (2015). Here, the language becomes "flattened". The author reserves the addition to ignore short interventions by the opposite person if it does not contribute to the outcome of the content. Further, Dutch and German are sometimes used when this eases the respondent to answer.

INTERVIEWEES

The number of interviewees was set to range between six and ten candidates. Twelve candidates were chosen according to the snow-ball sampling since it proved difficult to identify all relevant interviewees connected to the cases prior to the fieldwork. Snow-ball sampling is an effective tool that can reveal and obtain access to what is not accessible and retrievable via public data sharing platform, such as information to hidden individuals (Noy, 2008). Regarding the two initiatives identified on Terschelling, it was particularly helpful to identify related individuals that either played a role or could reveal information. The final number of interviewees as can be seen in table 4 amounts to seven individuals.

TABLE 4: INTERVIEW PARTNERS (CREATED BY AUTHOR)

Organisation	Level	Person	Purpose	Date
Municipality	Municipal/ local	Bert Wassink (mayor)	General state of the art, CupCompost	20.07.18
Municipality	Municipal/ local	Kirsten Kramer (sustainability)	Pyrolysis, CupCompost and organic residual waste streams	21.08.18
Municipality	Municipal/ local	Sietze Haringa (wethouder)	Legal affairs of Terschelling	21.08.18
Terschelling Energie	Private/ local	Jelle Cupido	Member of the board and knowledge on local initiatives	20.07.18
Urgenda	Public/ local	Antoine Maartens (project manager)	Pyrolysis project	24.07.18
Wetterskip	Public/ provincial	Sybren Gerbens	Pyrolysis project	29.08.18
Province of Friesland	Public/ provincial	Durk Holwerda	Local initiatives, pyrolysis project and CupCompost	10.10.18

Throughout mid-April until beginning of October 2018, the interviewees were contacted and asked for an appointment. Interviews were planned to be taken between July and end of September 2018. Despite the many efforts taken, not all candidates were willing or had time to support this research and in some cases kept unresponsive, even upon multiple verifications and trials to get in touch with them. In other cases, the people were denying due to time issues during this period no matter which medium was offered for doing the interviews (in person/ via skype/ via telephone). Hence, in both cases, the pyrolysis plant as well as CupCompost, no inside can be offered from the persons in charge which thus needed to be reconstructed as much as possible through documents and the content of the other interviews.

INTERVIEW ANALYSIS

The analysis of the interviews conforms to a structured qualitative content analysis of Kuckartz (2012, p. 77). This analysis depicts an interpretative form of evaluation, in which the codings are done based on interpretation, valuing and classification. That means the evaluation corresponds to a „menschliche Verstehens- und Interpretationsleistung“ – human efforts of understanding and interpretation (Kuckartz, 2012, p. 39). The coding corresponds to naming, categorising and theoretical filing of the empirical data represented through a content unit which appears in the form of a highlighted passage in the transcribed text (Kuckartz, 2012, p. 48). Such a passage serves as a reference for a specific content which can be retrieved employing the content unit, a coding. Concurrently, codings can be developed departing from the text (Kuckartz, 2012). Both perspectives are possible. Thus, the coding in the research at hand has been done inductively-deductively: First, placing content units happens deductively, which is based on the focus of the questionnaire (appendix II) supported by identifying integrative aspects as summarised in table 2 (cf. chapter 2). During the coding process, the categories can moreover be developed and differentiated, which relates to induction. Furthermore, several categories can be assigned to specific content (Kuckartz, 2012).

For the coding and the analysis process a qualitative data analysis software (MAXQDA), was used as recommended by Kuckartz (2010) and Dresing and Pehl (2015). This software offers the possibility to depict the number of times an aspect was mentioned in a code matrix (example picture in appendix III). It informs which aspects of external integration are significant to answer the research question and allows inductive-deductive coding so that essential findings can be added. The coding trees, therefore, comprise more than the aspects regarded within the conceptual research (figure 7).

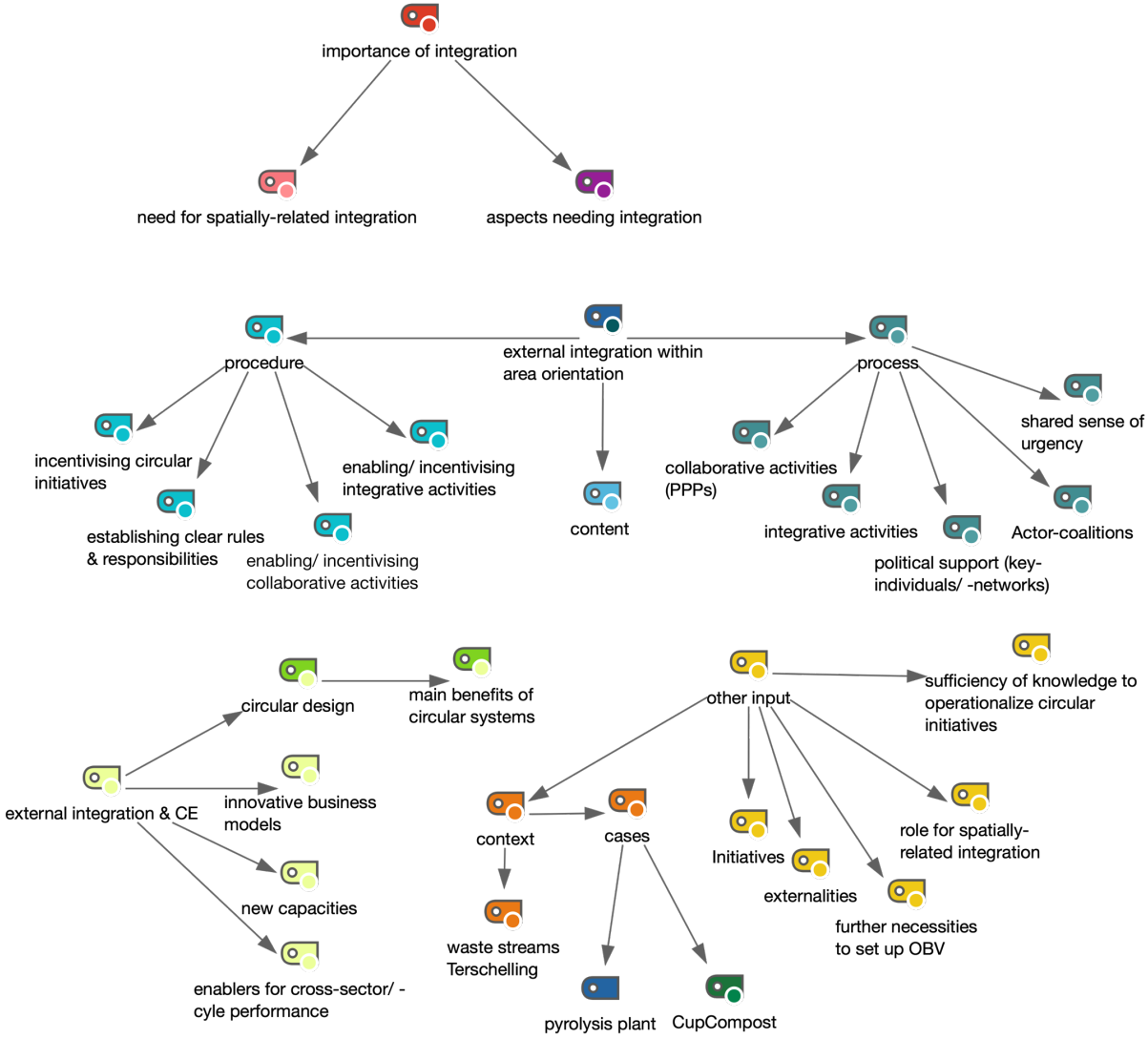


FIGURE 7: CODING SYSTEM (CREATED BY AUTHOR)

3.4 LIMITATIONS TO THE METHODS

Despite their advantage for context-dependent topics, case studies also have to withstand some criticism a researcher must be aware of:

Firstly, representing a qualitative type of research, case studies are accused of being not generalizable (Dolowitz and Marsh, 1996; Yin, 2009). Nevertheless, case studies can be understood as to be generalizable to theoretical propositions (analytical generalisation) of which enumerating frequencies is not the goal. As Eisenhardt (1989, p.548) argues, "theory developed from case study research is likely to have important strengths like novelty, testability, and empirical validity, which arise from the intimate linkage with empirical evidence."

Secondly, case studies are accused to be randomised field trials which has downgraded the case study research as they are not capable of addressing experimental issues. Yin (2009) stresses however that case studies can offer significant evidence in complementing experiments by explaining how or why the treatment in an experiment worked. Applied to the research topic, one can understand the initiatives as the experiments where the case study can answer what the barriers and enablers in related governance structures are.

Thirdly, good case studies are difficult to undertake since there are few ways of screening for an investigator's ability to do good case studies (Yin, 2009, p. 16). The value of the research itself largely depends on the ability of the investigator to demonstrate a certain level of accuracy of the results. This involves two components: reliability and validity.

Reliability relates to the consistency of observations and signifies replicability of the results if done by other researchers investigating the same phenomenon using the same methodology (Gagnon, 2010; Yin, 2009). Validity refers to the connection between reality and result. It is ensured as long as the construct developed by the researcher depicts proper measures or representations of the categories that are under observation (Gagnon, 2010). Yet, ensuring both factors in qualitative research is much harder if not impossible than in quantitative research in which numerical identifiers can confirm or deny their accuracy (Ibid., 2010). To attain both, it is essential to be open and transparent about the research process as is demonstrated in this chapter. Concerning reliability, other researchers may apply the same methodology to the same phenomenon which allows reaching the same conclusions. For ensuring validity, the evidence (interviews, policy documents) has been documented and analysed consistently and according to the measures presented in chapters 3.2.3 and 3.2.4. Further, a case site was chosen which was not over-studied but new.

Additional steps to be taken to ensure accuracy is to reduce the number of biases created by the researcher's personality and primarily refer to the interviews (Ibid., 2010). The elite bias is formed by attaching greater importance to information from informants articulating themselves clearly opposed to less articulate informants (Ibid., 2010). To prevent this, the researcher verified for the correct understanding of a respondent's answer during the interview. The content of the respondent was re-phrased so to get confirmation or a second explanation.

The holistic illusion is formed by appointing greater consistency and connectedness to certain events while ignoring facts which do not fit into the picture that is being formulated (Ibid., 2010). Facts that did not fit the conceptual framework but related to the overall phenomenon have been coded with units from "other input" (figure 7) and are articulated in chapter 5 under "Additional findings".

An over-assimilation means the researcher does not critically enough reflect on the informant's perceptions, adapting to their opinion to a certain extent. Since this thesis is done by one person only, over-assimilation cannot entirely be excluded. The researcher nevertheless tried to remain as objective as possible throughout the interviews and their analysis, going along the questionnaire as far as possible and making use of the coding trees.

4. CONTEXTUALISATION OF TERSCHELLING

The following sections serve to contextualise the in-situ-cases, using the PESTEL-analysis (chapter 4.1), a brief overview of the Dutch waste governance structure (chapter 4.2) and some background information on the cases themselves (chapter 4.3).

4.1 SUMMARY OF THE PESTEL ANALYSIS⁴



FIGURE 8: THE ISLAND OF TERSCHELLING (PDOK, N.D.)

Being located within the province of Friesland (Fryslân) and the Natural World Heritage Site of the Wadden Sea, the 84 km² big island (figure 8) currently inhabits about 4900 people. Terschelling as a community has a clear vision that thrives to become a vital society by 2025 employing three pillars including a sustainable economy that is valuable to the environment and provides new job opportunities. A fact which reveals an inherent interest of the local government to keep the local economy thriving and attractive for citizens to remain on the island.

To achieve this goal, the island expresses the use of factors that may be related to collaborative activities as well as some needed for the focus points of the CE: the use of cooperation, innovation, technology, and dialogue. The island sees potential in green growth and a viable role in reusing different waste streams as well as raw materials and products and thus expresses a clear interest in letting new projects rise which support the vision. Entrepreneurs are taken into the responsibility of providing innovative concepts and looking for opportunities as well as to cooperate with other actors. The municipality positions itself as a facilitator, providing for organisational structures and a monetary fund.

Several sources of funding are available for CE initiatives. Examples are the Waddenfonds, sustained by the three northern provinces, Friesland, Groningen, and Noord-Holland. Further, the Mienskipfûns – a provincial fund of Friesland and allocated within the European LEADER program as well as the European LIFE program which offers substantial monetary resources. It could after that be expected there are enough opportunities for initiatives to be able to make essential investments in order to create *new capacities* (focus point C).

⁴ Note: The whole PESTEL analysis including sources can be found in appendix IV

Besides, the educational level achievable can be considered high. All higher educational activities which do not relate to nautical education needs to be followed on the mainland. In correlation with a somewhat higher age average, it can be assumed younger people having accomplished relevant knowledge regarding circular processes reside on the mainland. This is reasoned by that more opportunities in this area might be offered on the mainland than on the island.

Amongst all households, the average disposable income represents the third highest in Friesland together with very little unemployment. Most of the economic activities on the island relate to farming, but most important tourism and leisure activities. Welcoming 500 000 visitors a year, it is very likely this economic wealth depends on this strong economic sector. Further, it is quite likely to be driven through the island's natural environmental assets. Thus, making the island more sustainable and broaden its economic sectors might be very important to ascertain the citizen's future. Nevertheless, financially and considering the low unemployment, there possibly is no urgency great enough that could drive people and local players to invest in OBV-related activities.

Procedures carry central importance to keep the natural assets intact: 56 % of the island's surface is under nature protection of at least the Natura2000 network legislation. The rest of the island is for human use as designated in the different *bestemmingsplannen* (spatial zoning plans). The biggest and connected part of this is the Terschellinger Polder, including dunes, different kinds of vegetation, villages and the *Buitengebied Polder* and the *Bedrijventerrein* (industrial zone). The first being ascribed to farming activities, the second to industrial activities like waste collection. Both cases of this research are located within the Terschellinger Polder, where CupCompost acts within the Buitengebied Polder and residential area and the pyrolysis plant was envisioned within the industrial zone.

Situated in a democratically-governed country and therefore considering people's opinions, the city council introduced an informal working method which can be identified as a governance-like structure in 2015. It builds upon conversations "between council members and stakeholders such as residents, institutions and entrepreneurs" (Gemeente Terschelling, n.d.). This development indicates that activities of external integration are becoming more abundant on a procedural level of Terschelling through which circular initiatives might get more influence on a political level.

Overall, the conditions seem to be supportive for CE initiatives: enough space is available, the vision of Terschelling aligns with the purpose of the CE and funding opportunities provide for financial potential. However, current efforts mostly aim at establishing renewable energies. Moreover, and due to the sensitive surrounding within which the island is positioned, strict laws such as the environmental and the strategic impact assessment (EIA, SEA) and the Natura 2000 protection impact what is possible within the Terschellinger Polder. Therefore, also the technological potential, being relevant to the CE, is closely interlinked with physical, environmental conditions and moreover its development. Thus, timing combined with the previous settings also plays a role in providing opportunities for technological implementation and further a circular development for Optimal Biomass Valorisation.

The PESTEL analysis has served to gain a broad overview of the case itself. However, this analysis' construct is not oriented towards specific topics to get researched. Topic-related to this thesis, it is, therefore, necessary to get a better idea on how the waste management in the Netherlands and subsequently Terschelling is organised and governed.

4.2 WASTE MANAGEMENT IN THE NETHERLANDS

The following section elaborates on the Dutch waste management structure and legal frameworks shaping it. This is done by first outlining national and international frameworks followed by the provincial and municipal level. The objective is to crystallise the governance structure that influences waste management on Terschelling. Doing so is vital for that the content of the policy and interview analysis are put into perspective to the study's context and increases the researcher's understanding regarding the research object.

NATIONAL AND INTERNATIONAL FRAMEWORKS

On a national level, the *Landelijke Afvalbeheerplan 2009-2021* (National Waste Management Plan 2009 – 2021, LAP) has been established. It comprises a policy framework, sector plans, and capacity plans which cover a period of six years, looking ahead up to 2021. It represents the focal document outlining the management and assigning the tasks to the different authorities. Laying down such a document is compulsory by EU directives (Rijkswaterstaat, n.d.a) such as the Waste Framework Directive (WFD, Directive 2008/98/EC). The WFD establishes basic concepts and definitions for waste management as *waste, recycling, recovery* as well as when waste turns into “a secondary raw material” or how waste and by-product are distinguished (EC, 2016a). For what biodegradable waste is concerned, national decision-makers are furthermore provided with guidelines to identify the most suitable, efficient and environmentally-friendly manner to handle it (EC, 2016b). Consequently, international legislation influences national waste policies.

Due to the national constitution of the Netherlands, municipalities play an important role as they, in turn, must implement policies which steer waste management within limits given by provincial and national frameworks (VNG, n.d.). On Terschelling, this is laid down within a so-called *Afvalstoffenverordening* (Gemeenteraad, 2010) and the *Uitvoeringsbesluit Afvalstoffenverordening* (Gemeente Terschelling, 2010). Moreover, because of environmental concerns regarding waste, current waste management is heavily influenced by environmental policies. This is reflected in that under the Environmental Management Act, the *Ministerie van Infrastructuur en Milieu* (Ministry of Infrastructure and Environment, IenM) needs to amend the LAP at least every six years and lay out prospects for the following six years (IenM, 2014a).

THE PROVINCIAL AND MUNICIPAL LEVEL

For authorities and water quality managers on a provincial and municipal level, the LAP represents the guideline against which all authorisations involving waste are only granted when adhering to the Environmental Management Act. Such authorizations regard for instance “permits for waste management establishments” or companies (Rijkswaterstaat, n.d.a) (IenM, 2014a). The costs for waste management are carried by either the citizens that are charged with the municipal waste tax or the companies and consumers that are producer/ importer respectively consumer of the “final” products (Huisman, 2014). In this respect, businesses are obliged to set up contracts with collectors, trader, carriers or brokers to manage their waste (IenM, 2014a).

The task of recycling is done by private companies (Mansveld, n.d.), such as Duinhof b.V. on Terschelling. Companies can bring different types of waste, also for composting. Municipalities are responsible for collecting and processing waste that originates from households and public spaces. The municipality can outsource these tasks to private actors such as Omrin on Terschelling, but the formal responsi-

bility remains with the municipality (OMRIN, 2017; VNG, n.d.). As for Terschelling, other than those assigned to collect the waste from households are not allowed to receive or collect the same, as long as no exemption is given by the municipality (Gemeenteraad, 2010, § 2, Artikel 6). Additionally, the municipalities must offer a so-called *milieustraat*, a place where citizens can bring their bulky waste or special waste that is not regularly picked up. On Terschelling, the task of managing the milieustraat is also outsourced to Omrin (Gemeente Terschelling, 2010).

Sewage water and sewage sludge containing organic materials underlie different rules than solid waste and within different authorities. For urban areas, it is again the municipalities that are responsible for the drainage of wastewater (Rijksoverheid, n.d.). While sewage water and sludge are subject to the Policy Document on Water Management, sewage water is also governed by chapter 10 of the *wet milieubeheer* (Environmental Management Act, Wm) and sewage sludge by the Pollution of Surface Waters Act (Rijkswaterstaat, n.d.). Thereof results that the municipality is responsible "for the collection and transport of urban wastewater", the "handling and processing of run-off rainwater" and for "limiting adverse effects of the groundwater level" (Rijksoverheid, n.d.). According to the *waterwet* (Water act, Wtw), the purification of wastewater is handled by the water board or a designated legal person (Rijksoverheid, 2009 § 4, Artikel 3.4). On Terschelling, Wetterskîp treats the sewage water and is located right next to Duinhof b.V. on the Bedrijventerrein. All the sewage sludge is transported off the island with only 4 % of it dry matter. As is formally demanded it subsequently is burned in an incineration facility in Harlingen (Interviewee project manager Wetterskîp Friesland, 2018, sec. 32). For the rest of the waste produced on the island also applies that unless it is not composted at Duinhof b.V. it is shipped off the island and further treated in Omrin's waste facility in Harlingen (Interviewee policymaker Terschelling, 2018a, sec. 25; Interviewee project manager Urgenda, 2018, secs. 13, 169).

This overview indicates a rather decentralised governance structure, where per national procedures local, public entities are employed to introduce local procedures and management processes. The decisions on details of local waste management are taken by local governmental entities that can employ private companies for waste treatment. Further becomes explicit waste management effectuates the objective of preserving human and environmental health as is reflected in national, environmentally-related procedures. Finally, to be able to carry out the analysis on Terschelling utilising the two in-situ cases within, the initiatives aiming at Optimal Biomass Valorisation are outlined in the following section.

4.3 LOCAL INITIATIVES FOR OPTIMAL BIOMASS VALORISATION

4.3.1 CUPCOMPOST

Having emerged in 2007 and out of an agricultural venture (Cupido Corporation) of Jelle Cupido in Lies, Terschelling, CupCompost employs the *Controlled Microbial Composting method* (CMC) – a type of bio-waste management – which delivers high-quality humus. Being better for plants and the groundwater, this fertiliser can be reintroduced in the agricultural cycle. At the same time, shipping costs for transporting green and organic materials from the island to Harlingen can be cut by using a significant share of it already on the island self and thereby closing the circle. Another positive aspect is that with the CMC method, the CO₂ emissions are substantially smaller than other current methods of waste management (CupCompost Terschelling, n.d.a,b).

HISTORICAL EVENTS - FROM SMALL SCALE TO A LARGER- SCALE VISION

CupCompost initially received a permit for small-scale operation in 2007, allowing the Cupido Corporation to start another business that derived from the agricultural business, but limited to the corporation's organic material and ground (Raad van Staate, 2017). Three years after the exemption, the processes were not yet fully up and running so that based on the Wm became invalid (Ibid., 2017, bijlage 2 p.1f.). Concurrently, the new vision of CupCompost declares that their objective is to process the organic materials from the Terschellinger citizens, meaning that CupCompost aims to create a central collection point in the villages. CupCompost wants to take responsibility for the subsequent logistics to get the green materials to their grounds. Further, the CupCompost also considers providing the municipality and the inhabitants with their composting service. According to CupCompost's official information, their vision fits the vision of Duurzaam Terschelling and therefore is viable to the island (CupCompost Terschelling, n.d.b).

However, these ideas transcended the scope the activities initially were allowed, getting bigger in economic and spatial size which implied the need for additional space. Cupido consequently applied for another exemption incorporating the new visions and new size, crossing over into the Buitengebied Polder or else an amendment of the affected spatial plan (Gemeente Terschelling, 2017). A lengthy legal process started as retrieved in a compound of juridical writings throughout 2015-2017 (Raad van Staate, 2017).

After years of back and forth between not only the municipality Terschelling and the corporation Cupido but also the court of Noord-Nederland and the national court in The Hague, the requests from the corporation Cupido were not granted for the following reasons:

- a. The requested activities by Cupido stand in conflict with the spatial zoning plan of the Buitengebied Polder. The size requested for amounted to 750m² (Gemeente Terschelling, 2017, p. 11).
- b. According to planning rules, it is not allowed to store first, organic materials on the edge of the water reservoir from which organic material is sourced and second, green matter from third parties that do not originate from agricultural activities (Ibid., 2017, p. 11). It crystallises that this, however, is a matter of how to legally layout whether compost may fall under agricultural activities and or not (Raad van Staate, 2017).
- c. According to the council, composting per definition is not comprised in storing of material and therefore does not fall under what is allowed as a process (Gemeente Terschelling, 2017, p. 11).
- d. Composting under an own name and derived company (CupCompost) can only take place as long as the organic material derives from the agricultural corporation and the business (Ibid., 2017, p. 11).
- e. It is against the law to construct a concrete area that reaches outside of the own grounds and into the Buitengebied Polder (Ibid., 2017, p. 11).

Because of repeatedly receiving requests and appeals on behalf of CupCompost and the Cupido Corporation over the years, the municipality expressed their willingness, already in 2015, to try and help Jelle Cupido run his project under the umbrella of declaring it a pilot (Ibid., 2017). Under limited scope of the activities and other conditions, for instance, a yearly evaluation, no substantial traffic adding to

the current, no extension of the area into the Buitengebied Polder, controlling of undesirable odours, a maximum of 50 % of materials from third parties can be received. Further, the pilot would momentarily only be allowed for five years (Raad van Staate, 2017). At the time of publication of the *verweerschrift*, the environmental exemption has been in preparation for realising the pilot (Gemeente Terschelling, 2017, p. 8). As of current information, the pilot has been confirmed recently so that Cup-Compost can officially take off with its optimisation of composting processes (Interviewee policymaker Terschelling, 2018a; Interviewee sustainability officer Terschelling, 2018).

4.3.2 PYROLYSIS PLANT DUINHOF B.V.

Information on the pyrolysis project medially is very scarce. Therefore, almost all information on the context on the case had to be filled in through the interview's contents.

The idea of the pyrolysis is to generate oil and coal out of biomass (Interviewee project manager Urgenda, 2018, ll. 9–11). The process being exothermic releases additional energy that can be used for generating electricity (figure 9) (Bodenstaff and Alijk, 2016). Biomass would be sourced from bio-waste (scrubs, hedges, grass) coming from Staatsbosbeheer, green garden waste as well as sewage sludge from Wetterskîp (Interviewee project manager Streekwerk, 2018, sec.114; Interviewee project manager Urgenda, 2018, sec. 87), the Frisian corporation that is responsible for the sewerage system. The heat produced with the pyrolysis would be sufficient to dry the sewage sludge, after which the dry matter can be fed into the pyrolysis process as well (Interviewee project manager Wetterskîp Friesland, 2018, sec. 32).

The added value of this kind of OBV would be to save on shipping costs and CO₂ emissions related to the previous when transporting green matter and wet sewage sludge to the mainland. The sewage sludge usually is getting transported to the incineration plant in Hereveen where it is burnt (Interviewee project manager Urgenda, sec. 13, 2018; Interviewee project manager Wetterskîp Friesland, 2018, sec. 32). However, only air-dried before transported off the island, it consists of 4 % dry matter and 96 % water (Interviewee project manager Wetterskîp Friesland, 2018, sec. 32). That implies, the process could contribute to a significant reduction in volume and mass and thus the costs of shipping as well as CO₂ emissions (Interviewee project manager Urgenda, 2018, sec. 13, 171). In total, the process could save Wetterskîp an approximated 50 000€ a year (Interviewee project manager Wetterskîp Friesland, 2018, se. 56).

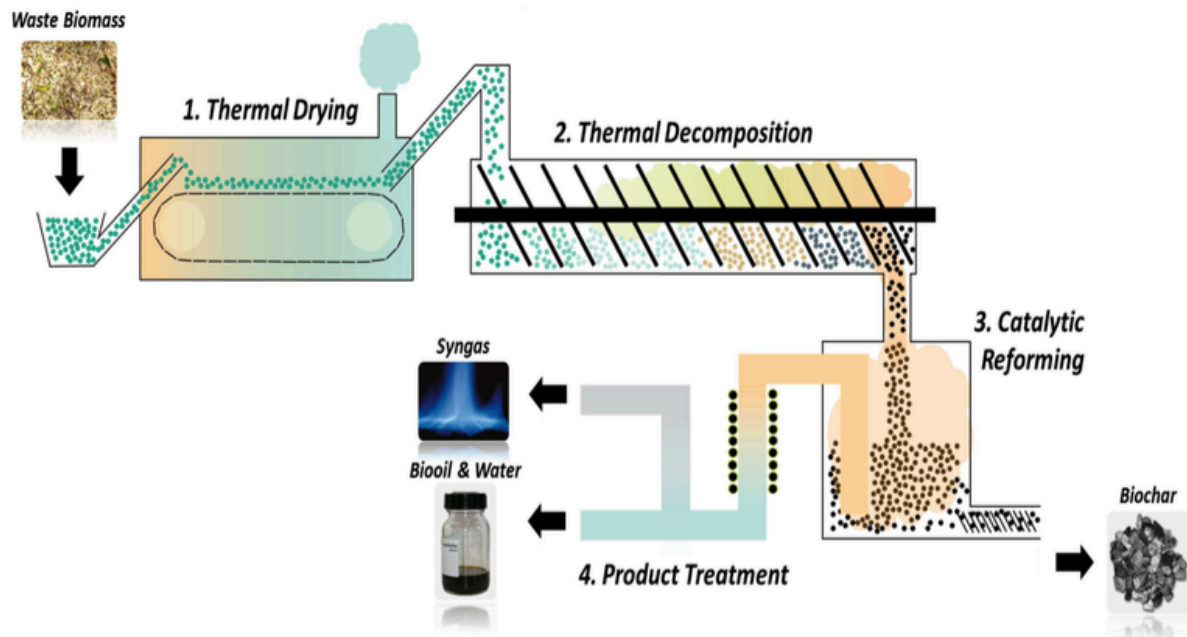


FIGURE 9: PYROLYSIS PROCESS (SUSTEEN TECHNOLOGIES GMBH AND ENGIE, 2016)

HISTORICAL EVENTS

The idea first came up in 2015, when a project manager from Urgenda assigned to projects for the Dutch Wadden Sea islands ran into people working for the Fraunhofer Institute (Interviewee project manager Urgenda, 2018, secs 127–129). They had developed the machine and Duinhof had a suitable location, having all the permits to construct and operate such a facility. Subsequent steps to proceed with the project were taken in November 2017 (Galle et al., 2017). However, as of January 2018, the project's realisation was opened for a tendering process as the original initiator (Duinhof) could not come up with a financing plan in time (Waddeneilanden, 2018). In other words, the business case did not have substantive grounds and financial support to build on (Interviewee project manager Urgenda, 2018, secs. 63, 161, 213; Interviewee sustainability officer Terschelling, 2018, secs. 8, 44) for which several reasons will crystallise in chapter 5.

5. RESULTS

5.1 RESULTS OF THE POLICY ANALYSIS – PROCEDURAL ATTEMPTS TO EXTERNAL INTEGRATION

As outlined in chapter 3, the policy analysis regards four areas: planning for waste, circular economy, space, and sustainable development in the Netherlands and on Terschelling. They, however, should be considered as partly overlapping fields. In this section, the most significant policies and regulations are outlined with a focus on the extent of enabling respectively hampering external integration. The table at the end of this section provides an overview of what aspects of external integration are emphasised or even enforced (table 5).

5.1.1 NATIONAL ENABLERS AND IMPEDIMENTS FOR EXTERNAL INTEGRATION

FROM A STRATEGIC DEVOTION FOR EXTERNAL INTEGRATION IN WASTE MANAGEMENT...

On a national level, various strategic and operational policies try to streamline the ambitions of the Dutch government. Regarding circularity in residual flows and more specifically OBV, frameworks apply which even do not specifically mention the type of waste that relates to OBV. This unknown nevertheless may impact to what extent external integration can take place and thus how initiatives can emerge and operationalize OBV. Be it for example via subsidies to do research and development (R&D), demanding more collaboration between different sectors and levels to find solutions or through the room that local authorities are granted to enforce such activities.

Often, policies part-wise incorporate fractions of external integration or hint at it strategically. Only a few propose or establish concrete ideas and measures how aspects of external integration can be enforced operationally, let alone in connection to circular initiatives. An example is the *Landelijke Afvalbeheerplan 2009-2021*, the umbrella policy in the sector of waste and circularity. An inherent objective is to deviate from its rather sectoral character. One of its goals is to foster chain-oriented thinking so that innovation and smarter collaborations between companies can emerge, resulting in better use of materials and energy. Yet, it does not seem as if creating a new symbiosis between stakeholders relates to a collaboration of sectors beyond those that historically have been involved in the current waste management (IenM, 2014a). Concurrently, the LAP considers collaboration central to circularity. Thus, it is neither clear about which aspect finally contributes to which one and regarding collaboration, how to enforce it.

The LAP also aims to promote green growth and the objectives of the *Van Afval naar Grondstof* program (from waste to resource program, VANG) which is directed at approaching a CE. It, therefore, acknowledges the need to support front-running initiatives that employ innovations to optimize the waste system (EZK, 2013; IenM, 2014a). However, means and measures to enforce initiatives are neither outlined nor seems external integration to be enforced. Its support to establish more circularity within residual flows comes down to the establishment of the *Ketengericht afvalbeleid* program comprising six pilot projects to employ *integrated C2C*. Besides generating knowledge about focal points to the residual streams of these projects and their particular needs to become more circular, it does not specify on the meaning of integrated C2C (IenM, 2014a, p. 71). It can only be assumed that here, inte-

grated means incorporating the C2C concept into specific waste streams as there is also no sign that it solely aims for policy integration.

The LAP can be seen as a first formal step to transform from a sectoral towards a more integrated waste policy but remains vague in its explications and primarily strategic. Containing 84 sectorplans each for a different type of residual flow also contradicts counteracting sectorality (IenM, 2014a, 2014b).

One of the strategically most integrative documents identified on a national level is the *National Agreement on the Circular Economy*. Its intention is “to develop transition agendas for the circular economy” in collaboration with parties from different levels and sectors (IenM and EZK, 2017, p. 1). The signing partners span from the industry and entrepreneurs over employees, environmental and nature conservation organisations, municipalities, regions, provinces and water authorities up to financial and knowledge organisations and further social organisations, partnerships, and platforms. Like the covenant *Meer en betere recycling voor en circulaire economie* (More and better recycling for a circular economy, Mbrce), this agreement aims at creating coherence and synergy between jointly established courses of action of the sector’s individual transition agendas (Ibid., 2017, p. 2). Besides setting its focus on using raw materials more efficiently, it considers reorganizing regions to make closing the loop more viable. It is very precise about the transition agendas to be integrative in nature and practice-oriented, proposing “a select number of innovation projects”: “coherence with other social goals”, “cross-sectoral connections with the other transition agendas”, “designing the implementation process, including a clear interpretation of the roles and responsibilities of the relevant partners” as well as considering bottlenecks of institutional nature and funding (Ibid., 2017, p. 4).

This first insight reveals that there are many ambitions to make waste management more circular and be more integrative, therefore. However, especially the waste management policies lack concrete measures to realizing the ambitions whereas economically-oriented policies are more concrete in doing external policy integration.

TOWARDS AN OPERATIONAL COMMITMENT TO EXTERNAL INTEGRATION IN WASTE MANAGEMENT

It turned out, many national policy documents are rather strategic than operational and outsource responsibilities to local administrative levels or even to private parties to propose concrete ideas. Yet, there also exist national policies which operationalize many of the national strategic ambitions while seeking a strategic-operational coherence between the different policies. Such a document is the VANG. It can be considered the operationalization of one of the eight domains that constitute the Dutch Green Growth Policy and most importantly of the chain-oriented waste management as advocated for in the LAP (EZK, 2013; IenM, 2014c). Together with the Mbrce, it stresses and implements stakeholder involvement and collaboration, also by having been created collaboratively with many other ministries. The objective: to be as integrative as possible in order to live up to what the IenM considers important to turn waste management more circular. While transferring many duties to decentral authorities, it contains concrete actions in the form of sub-programs that support circularity in waste management as established within the Mbrce (IenM, 2015). Clearly, the VANG has applied external policy integration and demands for further procedural integration to take place.

The involvement in VANG programs spreads from the national to the local level, which depicts the operationalization of the national government as a facilitator. A strong focus is on supporting innovation and accordingly companies to enter the market and be not prohibited by institutional and financial obstacles. Measures comprise inter alia support centres to educate especially smaller companies about procedures as well as financial and other market incentives (financial fund) and enable them to experiment and innovate. In many instances, programs that provide knowledge or toolboxes to entrepreneurs are set up in collaboration with municipalities and other regional and local authorities (Ibid., 2015). Surprisingly, none of the Frisian islands makes part of the VANG (VNG et al., n.d.). As far as strategy and goals thereof are concerned, the LAP overlaps with the VANG to a great extent. Yet, the different time horizons of these policies prevented a full alignment of the contents.

This indicates the difficulty attaining external integration on a procedural level already within one sector and also between operational and strategic documents. First, the documents thereby might not entirely be supportive of each other so that the full potential of external integration remains untouched. Strategic fragmentation remains likely. Concurrently, technological development could be missed out in older policies through which their use can be hampered in case they have an overarching function, such as the LAP, influencing other procedures. In that sense, the number of policies that regard a topic can be considered to cause an additional challenge to create external policy integration. Further, Terschelling does not make use of the VANG which could be of help to progressing with their vision.

Concerning the Mbrce, it provides additional project teams to VANG-initiated projects, formulates common goals with all stakeholders involved in the covenant and appoints each of those specific tasks. For instance, the *Koninklijke Vereniging voor Afval- en Reinigingsmanagement* received the task to set up new projects for closing the chains by intensifying the collaboration between municipalities, producers, distributors, and the waste- and recycling- sectors (IenM et al., 2015 Article 7, V.). Such action can enable external integration between future initiatives. Cross-Sectoral collaboration as emphasised in area-orientation cannot be identified and must be assumed to depend on how the local level approaches such projects and encourages sectors that have not commonly been part of the waste- and recycling- sector.

THE ECONOMIC PERSPECTIVE TOWARDS EXTERNAL INTEGRATION – CONCRETIZING EXTERNAL INTEGRATION

Going beyond the understanding of cooperation as emphasised by some of the prior documents, the government-wide program *A circular economy in the Netherlands by 2050* intends to enforce cross-sectoral cooperation without delimiting the sectors area-wise (waste management). One of its priority areas being biomass and food it, opts for OBV. For every priority stream holds that the aim is to establish a temporary “value chain cooperation project subsidy” in combination with infrastructure in the form of networks. That is to enable cooperation between supply chains that otherwise would stall before new initiatives could even emerge (IenM and EZK, 2016, p. 22). A steering committee and a project group constituted by representatives of each stakeholder involved ensure “cross-sector steering of the transition agendas” to avoid fragmentation also between the priority streams (Ibid., 2016, p. 22). The government's role is defined as a market regulator, network partner, and director that steers the course including active cooperation with multiple stakeholders across scale levels and sectors. The objective is to encourage initiatives to reinforce each other and to enforce public-private cooperation

(ibid., 2016, p. 18). Examples are *City Deals* initiated by the cabinet and made between various public and private stakeholders. Initiated together, the national government “collects their learning experiences” and supports the monitoring (ibid., 2016, p. 18). Through closer proximity of parties and the ultimate connection with the labour market and consumers, City deals represent an ideal form of coalition-building between the different scale-levels and sectors (ibid., 2016).

From this results, procedures from the economic sector and with focus on the CE are ahead of waste management procedures in that they are very operational at their core, introducing concrete tools to effectuate external integration.

SPATIAL RELEVANCE TO EXTERNAL INTEGRATION IN WASTE MANAGEMENT

Even though the spatial sector is ascribed the potential to enforce circular initiatives (ibid., 2016), overarching spatial regulations and policies are not very much enabling external integration. External integration would depend on the room left for the allocation of facilities on different grounds as is laid down in the *Wet ruimtelijke ordening* (Law on spatial planning, Wro) (Rijksoverheid, 2006). This again is aligned with the *Wet milieubeheer* and reflected in local spatial plans laid down by the municipalities (Rijksoverheid, 2011, 2010).

The *Regeling omgevingsrecht* (Environmental Law Regulation, Ro) to which a core matter is environmental protection, merely lays out what entrepreneurs or in general organisations and entities have to take into consideration when applying for permission to put up for instance a recovery facility for handling waste (Rijksoverheid, 2010 Artikel 4.10 Afvalvoorziening). It further sets out the management of waste materials and for different types of categories, such as biomass. Here, additional information is demanded from the initiator to evaluate for granting exemption or permission (Rijk, 2010 Artikel 4.7. Beheer van afvalstoffen).

Finally, giving permissions or exemptions from certain rules and regulations as prescribed by the *Wet algemene bepalingen omgevingsrecht* (General Provisions Act, Wabo) also affects what municipalities and provinces can incorporate in their local and regional spatial plans since they also have to act upon this law (IenM, 2014a; Rijksoverheid, 2006). Be that as it may, giving permits or exemptions from rules is a case-to-case issue and is usually carried out by the local authority. Additionally, the conditions must be in line with minimum standards set in the LAP (IenM, 2014a, sec. 3.5). Further, in line with the Wm, bio waste is exempt from parts of both, the LAP and the Wm. But whether it applies or not depends on whether the materials carry a waste status and also on the composition of the bio-waste (IenM, 2014a, sec. 3.5). So, the question is, does it carry a waste status or not? Accordingly, more implications apply (IenM, 2014d) which are not outlined further.

Similarly, for innovations and techniques pertains that the best available technique has to be used for any new establishment in order to prevent adverse effects on the environment as is stated in the Wabo (Rijksoverheid, 2008) and outlined in the Ro (Rijksoverheid, 2010). Thereby, specific techniques are assigned to certain industries while the LAP indicates which Best Available Techniques Reference Document might apply to which waste category (IenM, 2014a). These findings indicate firstly that particularly environmentally and spatially- related procedures in combination with waste management procedures can create a substantial degree of complexity when it comes to identifying the waste status and subsequent procedures that apply. It is assumed that attaining a good overview of the proce-

dural web that applies to one's initiative represents a challenge and can cause obstacles for an initiative to start up.

TACKLING PROCEDURAL OBSTACLES TO EXTERNAL INTEGRATION

It is sufficient to say that current procedural structures are complex and could bear obstacles to entrepreneurs in understanding them. The LAP, the VANG and further policies acknowledge that there exist many procedural impediments for innovation also in the area of recycling which amongst others affects the useful application for agricultural waste, co-fermentation or also the use of biofuels for energy use (IenM, 2014a, 2014c; IenM and EZK, 2016). Therefore, the LAP pursues deregulation for especially products that do not cause environmental risks and by replacing requirements for recovery with general rules under the Activities Decree (IenM, 2014a). The policy also stresses that this is caused through insufficient cooperation on the different scales and further demands legislation to provide more room for new technologies and experimentations (IenM and EZK, 2016). It further conducts analyses of practical examples to (1) provide more clarity concerning liability and tax aspects and (2) review whether certain regulations need amendment to promote circular revenue models more successfully (IenM, 2014c; IenM and EZK, 2016).

With regards to organic waste streams, the VANG initiated a collaborative research group consisting of research institutes to investigate the obstacles and opportunities that arise specifically for Optimal Biomass Valorisation. The objective: to set up a program that accelerates closing biotic cycles. In the long run, the VANG aims at making European and national norms more dynamic for enabling innovations and thus also new initiatives (IenM, 2015). An insight of the IenM and the ministerie van Economische Zaken en Klimaat (Ministry of Economic Affairs and Climate Policy, EZK) (IenM and EZK, 2016) reveals that new knowledge about circularity as well as new working methods are needed amongst licensing authorities and inspectors to use the existing legislative room to manoeuvre optimal and in favour of upcoming initiatives. In line with this, the program uncovers that often bio-based initiatives struggle with viable business cases due to the missing promotion of these materials in policies.

ENABLING INNOVATION AND PROCESS INTEGRATION

To offer more room to innovation and enable the renewal of procedures and entrepreneurship, the EZK released the program *toekomstbestandige wetgeving* (future-proof regulations) along the ambition of the cabinet's operational program *Ruimte voor Regels* (Smart Regulation Program) and the City Deals and Green Deals (Ibid., 2016). The Smart Regulation Program enforces support for circular initiatives under development, extending over spatial concerns (spatial planning, testing facilities) as well as jurisdictional concerns. The program stresses that room to manoeuvre and consequently for innovation and new business models necessitates a greater and ultimate dialogue between entrepreneurs, policymakers and inspectorates so that legislation and policies can become enablers. Further, the cabinet aims for phasing out subsidies such as (tax) market incentives which are counteracting the development of a CE (Ibid., 2016).

Despite the previous efforts and as assumed before, recent investigations of the EZK have shown that 50 % of all perceived obstacles in jurisdictional documents is a matter of understanding them correctly, most likely caused by the complexity of the legislative structure. The EZK pronounces this to be improved by better, easier and more accessible explanations. Additionally, reluctance on behalf of civil servants to provide clarifications on notices of objection is presented as another discouragement for

citizens and companies. Further, the room that already has been created to make exemptions, especially with regards to innovations, often remains unused by authorities, caused by a risk-avoiding behavior or also limited knowledge (EZK, 2016).

To help bring clarity about terms which are all used in legislation and which have shown to contribute to confusion, the government very recently released guidelines to identify better what is *waste*, *by-product* and the *end-of-waste status* as well as what inherently links to waste - *to discard*. Guidelines are made to help initiatives understand what legislative documents are relevant for their planning and how they can avoid being obstructed by them by keeping in line with these procedures (IenW, 2018). Therefore, it is viewed as a viable step taken by the government to help initiatives get off the ground upon having acknowledged the difficulties that procedures cause.

TOUCHING ON THE BOTTOM-LINE

In some instances, external integration remains very vague or only minimal when considered on a strategic level. This despite objectives to aim for less sectorality in waste management. It was recognized circularity needs cross-sectoral interaction (LAP) and that other documents pronounce and incorporate cross-sectoral and multi-level interaction going beyond the historically involved sectors in waste-management (VANG, covenants). However, such documents usually have a strong operational core with a solid connection to strategic ambitions of umbrella policies. Hence, it is often left to operational policies to identify translating strategic ambitions and set them in motion. This could cause fragmented actions across sectors.

Further, those documents have not all been adopted at the same time. It can be observed that with time, strategic documents also received an increasingly concrete style (guidelines on terms) which clarify jurisdictional and strategic policies. However, new technologies developed ex-post of the introduction of older procedures are therefore usually not anticipated in them. Thus, their chance to enter the market and give sectors the opportunity to integrate and set up new initiatives remains low. Many strategic documents running on another timeline have difficulties to keep up with the introduction of newer, operational documents. Periodical incoherence amongst policies may eventually lead to operational challenges on local levels, such as on Terschelling. Additionally, purely spatially-related jurisdictions appear to be not integrative, opposed to policies adopted by the economics ministry or economic-related policies. Lastly, the amount of procedures has shown to cause complexity that is difficult to overcome by entrepreneurs.

Nevertheless, procedures increasingly aim at making room for innovation, entrepreneurship and procedural amendment by investigating where the barriers lie within procedures. Notably, a major difficulty to entrepreneurs discovered is the lack of clarified terms (inter alia waste or by-product). This confuses and may hamper consulting the correct procedures. Subsequently, wrong trajectories may be chosen and lead to a lock-in of a project's planning.

5.1.2 LOCAL ENABLERS AND IMPEDIMENTS FOR EXTERNAL INTEGRATION

FROM STRONG AMBITIONS AND LOSE TIES TOWARDS EXECUTIVE ATTEMPTS

In general, all Wadden islands are pronouncing their will to enable and support initiatives that emerge from society and which opt for a circular economy and sustainable development. The concrete actions can only be set up on each island chaired by the government and its citizens (Waddeneilanden, 2014).

With regards to waste policies, the current Terschellinger waste policy of 2010 does not emphasise external integration. The same accounts for the area of CE (Gemeente Terschelling, 2010). Merely a policy carrying the title *Regeling Duurzame initiatieven* (Regulation on sustainable initiatives, RDi) was put in place in 2011 to support sustainable initiatives with financial subsidies. Initiatives, for instance, must add to the communal politics. Even though, the local government put the focus on Terschelling to become self-sufficient in energy and water supply (also from biomass and residual streams), and on the sustainable use of material and production (Gemeente Terschelling, 2015a) the scope of the RDi only covers initiatives going for energy and water-self-sufficiency (Gemeenteraad Terschelling, 2011).

The island's government strategically promotes a sustainable economy alongside new job opportunities focusing on innovation and collaboration. Entrepreneurs shall combine forces where the municipality declares its role as a facilitator. This role entails to bring together parties, stimulate and participate in consultation and organisational structures and to establish an entrepreneurial fund. By "intensifying economic partnerships [...] with the business community and other partners" it is expected opportunities, and new markets are explored (Gemeente Terschelling, 2015a, p. 51). Partwise, the local authority sees itself to actively execute projects in cooperation with other actors. Thus, external integration also appears on a local policy level by providing means and assistance for entrepreneurs. The connection to residual streams, CE and Optimal Biomass Valorisation nevertheless is a loose one that the private parties have to identify themselves. With one exception: the re-use of products and raw materials shall be maximized and value-destruction minimized for which the municipality seems to be open to any ideas. To enable this, the municipality posits to make their governance structures and processes more sustainable, yet without giving any concrete idea (Ibid., 2015a).

Technology and innovation are appointed importance in the future of Terschelling. To ascertain innovation and opportunities are sought after, the local government declares to establish a breeding ground for innovation by introducing an arena for entrepreneurs to co-work and inspire each other (Ibid., 2015a). Besides, the municipality sees strong opportunities in a green economy which the local government refers to projects that incorporate a "sense of place" – the community and natural value of the area. "Working together, looking for connections, challenging each other" but also helping these projects and enabling smart and unprecedented combinations is what the municipality considers vital to realize such economic activities (Ibid., 2015a, p. 62). As a concrete action, the municipality states that together with Staatsbosbeheer and the local business community it will explore opportunities that align with this projection.

For executing the ambitions and transfer them into executive plans, the local authority plans to involve (organisations of) citizens from an early stage in the planning process. This is important to area orientation and context-sensitivity. Understanding civic participation as to integrate the consultation of residents, entrepreneurs and local organisations in plans, the local government recognizes that

respect and mutual trust with a room for dialogue are crucial. Subsequently, the municipality believes that this also gives more room for initiatives to emerge (Ibid., 2015a, p. 62).

According to what the municipality proclaims, their ambitions to foster circular initiatives, with national ambitions and appears sufficiently present. However, there is a massive discrepancy between what is aimed at and executed in line with the ambitions. Such becomes visible by the RDi that excludes circular initiatives whereas the municipality wants to offer a fund for initiatives that can be considered to opt for circularity in organic residual waste streams.

LOCAL OPERATIONAL FRAMEWORKS – SPATIAL PLANS MISSING OUT ON CHANCES?

Most local operational plans are limited to the spatial sphere. The current *Landschapontwikkelingsplan* (landscape development plan, LOP) (Kloosterziel et al., 2004) has shaped Terschelling's development so far. However, integrating ambitions for enabling initiatives are only appointed for within the tourism industry. The visions expressed above, therefore, are operationalized utilizing zoning plans where all activities must comply with the national environmental management act.

The spatial zoning plans that apply to the initiative's areas are the *Bestemmingsplan Buitengebied Polder* (Spatial plan outer polder area) concerning CupCompost and the *Beheersverordening bedrijventerrein Niewedijk* (Management regulation business park Niewedijk) applying to the pyrolysis project (Gemeente Terschelling, 2015b, 2015c). The former outlines the overarching objective of the province to achieve area-orientation but does not thoroughly incorporate external integration. Solely a steering group was appointed the responsibility to prepare an integrated area development including a landscape plan to guide the management of the landscape. Therein is stated that the municipality is open for agricultural companies also to have business activities that do not relate to agricultural activities. This holds for as long these projects fulfil certain conditions to receive exemptions from formal environmental frameworks (Gemeente Terschelling, 2015b).

In contrast to the spatial zoning plan affecting activities of CupCompost, the pyrolysis was planned in the area of the business park. This zoning plan outlines rules about what may be allowed respectively is prohibited as well. However, external integration cannot be found according to its characteristics defined through area-orientation (Gemeente Terschelling, 2015c, p. 23).

A SHORT REFLECTION

In summary to this policy overview, it has crystallised that nationally a high number of strategic documents exist, expressing the ambition to contribute to the circular economy by integrating. However, integrating has appeared limited and unclear depending on the policy fields. Economic-related policy fields managed to be more consistent concerning setting and executing ambitions in line with external integration than policy fields related to waste management for instance. In the latter area, policies still express more ambitions than they can realize. Yet, an increasing number of policies has been adopted in support of strategic ones, even bridging over towards the area of CE. Meanwhile, others have been adopted specifically to reduce procedural impediments caused by a complex web of procedures and the number of procedures. In comparison, local procedures of Terschelling are ambitious regarding closing the loop, even if expressed more indirectly. Nevertheless, current operational documents are not sufficiently focused on circular initiatives yet, and spatially-related frameworks seem more restrictive than enabling and could miss out enforcing cross-sector interaction and enabling new solutions.

That is for environmental procedures strongly influence them. A quick overview of the results of this analysis is provided in table 5.

TABLE 5: EXTERNAL INTEGRATION WITHIN PROCEDURES/ PROCEDURAL FRAMEWORKS FOR CIRCULAR INITIATIVES IN THE FIELD OF ORGANIC RESIDUAL STREAMS (CREATED BY AUTHOR)

Aspect of integration	Strategic ✓ (yes) / ❏ (partly)/ * (no)/ / (n/a)	Policy level	Example	Operational ✓ (yes) / ❏ (partly)/ * (no)/ / (n/a)	Policy level	Example
Formal consistency of purposes and priorities of different policy sectors / shared goals	❏	National	Transition agendas, Mbrce, National Agreement on the Circular Economy; a little less the LAP; excludes environmentally-spatially related procedures	/	National	By nature, strategic
	*	Local	/	/	Local	By nature, strategic
Enabling collaborative and integrative activities - negotiations and collaborations between public and private actors (multi-actor, multi/ cross-sector)	❏	National	Transition agendas, strategic policies created collaboratively across different sectors; excludes environmentally-spatially related procedures	❏	National	City Deals, Green Deals, signing parties of the Mbrce assigned to encourage collaboration, future-proof regulations, Smart Regulations Program, policies partly formulated collaboratively across different sectors
	✓	Local	Establishing entrepreneurial fund and an arena as a breeding ground	✓	Local	RDi
Establishing clear rules and responsibilities	✓	National	State as the facilitator, decentralized structure of steering	✓	National	Decentralized structure of steering recognizable in the steering of waste management
	✓	Local	Local authority appoints as a facilitator and participator in consulting	✓	Local	Local authority appoints as a facilitator and participator in consulting
Incentivizing circular initiatives	✓	National	Clarifications of official terms	✓	National	Smart Regulations Program, future-proof regulations, City Deals, Green Deals, VANG & Mbrce
	*	Local	/	*	Local	/

5.1.3 THE EXPERTS' PERSPECTIVES ON EXTERNAL INTEGRATION WITHIN PROCEDURES

As conveyed by all the respondents, external integration portrayed through area-orientation has not taken on a central role in the planning of neither the CupCompost nor the pyrolysis initiative. Occurring 83 times in context to the questionnaire's content, most significant for external integration to happen seem to be procedures and their future adjustment. It appears that currently more procedural room is given to renewable energy projects, "but when it goes for garbage, then you have a lot of legislations," environmental legislation, and thus "more barriers" (Interviewee policymaker Terschelling, 2018a, secs 189–191). This general statement is reflected multiple times in the following sections.

PRISONER OF PROCEDURES – A BIAS

It appears, the local and provincial authorities find themselves in a bias of decision-making power when it comes to circular initiatives and their room to operate. On the one hand, both governmental levels express their ambition to facilitate and stimulate such initiatives as much as possible (Interviewee project manager Streekwerk, 2018, secs 40, 50; Interviewee sustainability officer Terschelling, 2018, sec. 16). The province recalls that there is a policy stating the province' priority to become circular and to not transport all materials to and from the island (Interviewee project manager Streekwerk, 2018, sec. 100). On the other hand, the municipality as an important stakeholder, evaluating initiatives and handing out permits according to environmental laws (Interviewee policymaker Terschelling, 2018b, sec. 53, 2018a), has to act and align own activities and procedures with procedures from higher levels and thus is bound to them (Interviewee policymaker Terschelling, 2018a, secs 27, 63; Interviewee project manager Streekwerk, 2018, sec. 62; Interviewee sustainability officer Terschelling, 2018, sec. 16). That becomes visible within the Bestemmingsplan Buitengebied Polder that affects CupCompost and that according to the municipality is difficult to adjust (Interviewee policymaker Terschelling, 2018a, sec. 149). After that, CupCompost is not allowed to receive and process organic material from other parties as this is not previewed for farmland onto which he wants to expand (Interviewee policymaker Terschelling, 2018a, secs 73–74, 118–121; Interviewee sustainability officer Terschelling, 2018, sec. 14). CupCompost instead could move his activities to the Bedrijventerrein to make his plans happen (Interviewee policymaker Terschelling, 2018a, secs 118–125; Interviewee sustainability officer Terschelling, 2018, secs 14, 79). Governmental actors express that therefore they are limited in their freedom to do or decide things on its own on the island in most of the cases (Interviewee policymaker Terschelling, 2018a, sec. 45; Interviewee sustainability officer Terschelling, 2018, sec. 16), even stating "we are prisoner of our own regulations" (Interviewee project manager Streekwerk, 2018, sec. 56).

The decision-making bias seems to stand in context with the objectives of the regulations and their purpose of protecting the environment and the human health (cf. *formal consistency of purposes and priorities of different policy sectors/ shared goals*). In this regard, the province considers integrative activities relevant for aligning objectives (Interviewee project manager Streekwerk, 2018, secs 51–52). The province favours to act within the boundaries and suggests to find solutions by doing external integration more on the operational level. The reason: laws are perceived difficult to change (Ibid., 2018, secs 61–62). In line with this is stressed that "the legislation we have is not by coincidence," people have put good thought into them to prevent adverse impact by respective facilities and concurring activities (Interviewee policymaker Terschelling, 2018a, secs 27, 55, 57, 126–127, 193, 2018b,

sec. 47). To enable spatial integration only for CupCompost through adjusting procedures is not considered viable (Interviewee policymaker Terschelling, 2018a, secs 126–127). Yet, thereby collaborative activities are unlikely to emerge as corresponding activities that connect different actors are formally prevented. According to Terschelling Energie, many similar ideas like CupCompost rely on licenses/permits to operate on certain grounds but most often would strand at the town hall (Interviewee initiator Terschelling Energie, 2018, para. 82).

The difficulty of adjusting procedures comes down to that windows of opportunity to change or introduce more enabling procedures are seldom for they are conditioned by the different governing terms, individual ambitions and procedural time horizons. The municipality emphasises that the opportunity occurs "once every three years to change something within the governmental type of bodies. And then you also have the political cycles, and they do not always concur with the implementation and having the right people at the same time [...] You are very limited by that" (Interviewee sustainability officer Terschelling, 2018, secs 120–121). Overlapping with the different procedural timelines (cf. chapter 5.1.1), this finding stresses that (1) procedural change is volatile to a fitting correlation of political cycles and individual ambitions and the procedural time horizon and that (2) this correlation influences the quality of external integration. This confirms the relevance of individual ambitions on political decision-making with subsequent procedural developments (cf. chapter 2.2.3).

STATE OF TECHNOLOGY

Another barrier for actors to engage in circular initiatives seems to relate to the state of technology considered in procedures and therefore external integration within procedures. This being emphasized with regards to the pyrolysis plant (Interviewee project manager Wetterskîp Friesland, 2018, secs 115–116), Wetterskîp argues this to be caused by that a Dutch national law (likely a Policy Document on Water Management (cf. chapter 4.2)) that prescribes that sewage sludge can only be incinerated. However, due to bad experiences in the past, pyrolysis is not an accepted means, wherefore incineration in a waste facility "is the only option" (Ibid., 2018, secs 14–16, 20, 115–116). Another example is given by the municipality (Interviewee policymaker Terschelling, 2018b, sec. 79) emphasising the local procedures were never written with "the possibility of a bio-waste installation" in mind, so newer technologies. "So when a bio-waste installation will be planned, it will be looked upon by the plan that is in place, by the bestemmingsplan" (Interviewee policymaker Terschelling, 2018b, sec. 79). Thus, external integration also relates to the extent to which technology is considered within laws.

MAKING ROOM

Despite all the previous barriers, it appears that under certain conditions and when the ambitions of initiatives and the governmental cohere, the municipality can give initiatives more space. Apparently, there are instruments, to identify whether laws can be "stretched." This is, for example, when something is hugely relevant for the economy or the island, backed by arguments that fit the municipal program (Interviewee policymaker Terschelling, 2018b, secs 47, 84, 121; Interviewee project manager Streekwerk, 2018, secs 84–88). This finding overlaps with that decision-making correlates a lot with what the different governmental levels estimate to be the most critical (Interviewee project manager Streekwerk, 2018, sec. 96). Meanwhile, the municipality expects the ones initiating CupCompost to be aware of these options and also barriers and thus initially look for a location where the impact on the environment would be less concerning (Interviewee policymaker Terschelling, 2018b, sec. 47). This

finding suggests that the room for circular initiatives is influenced by the decision-making bias mentioned beforehand and local priorities.

Interestingly, a so-called *Omgevingsvisie* (environmental vision) will soon replace the spatial zoning plans and demand more proactivity from people that have the intention to change something in their surroundings. Procedures will be put in place according to which the initiator must evaluate the impact on and interact with the neighbours himself and before going to the municipality and proposing a project. Haringa assumes that this future *Omgevingsvisie* will offer more possibilities to Terschelling (Ibid., 2018b, secs 162–164).

FACTORS

As outlined in chapter 2, there are several factors of area-orientation that indicate external integration on a procedural level. Accordingly, the findings on these factors are presented.

Principally, no procedures were revealed which enable *integrative* or *collaborative activities*. Currently, it seems, it is mostly networks and social qualities that act enabling as is outlined in *collaborative activities* in chapter 5.2.

Regarding *formal consistency of purposes and priorities of different policy sectors/ shared goals*, no respondent pointed out that there is an inconsistency between different policy sectors. However, regardless of the policy sectors, a barrier could be detected which seems to span across different authority levels and can be considered far-reaching: each authority level has a variety of objectives. All together must be considered the moment an initiative is launched locally. Most of the times, they interfere with each other (Interviewee project manager Streekwerk, 2018, secs 195–202). Such can be expected to cause difficulties in the execution of projects and handing out permits. Thus, where do priorities eventually lie is the question that remains open and can be related to the decision-making bias mentioned before.

Additionally, it is strongly assumed the different objectives are also considered in legislation. Subsequently, the different legislations from the scale levels might interfere. Even if on a national level, objectives are already made more coherent between different policy sectors (cf. 5.1.1), this does not appear to be consistent on levels further down. This situation seems to challenge local authorities having the legal strength to support circular initiatives and thus to enable other collaborative and integrative activities concurrently.

Against the positive impression within the policy analysis, a *clear division of rules and responsibilities* is not felt in practice and appears to slow down processes and hamper entrepreneurial action. Referring to whether it is the province, Staatsbosbeheer, the town or Rijkswaterstaat, Urgenda (Interviewee project manager Urgenda, 2018, sec. 258) emphasises that "it is just a constant battle of parties that who has the say on the islands?" Apparently, this is tiring and slows everything down. Rules and responsibilities are also not clear enough to entrepreneurs (Interviewee project manager Streekwerk, 2018, secs 164–166). The municipality proposes to provide such initiatives with the evaluation criteria that so they can see what aspects are important to consider and choose a good planning trajectory (Interviewee policymaker Terschelling, 2018b, sec. 53). That can be argued to help entrepreneurs partly overcome the complexity of procedures and un-clarity of terms (cf. chapter 5.1.1). Further, more clarity which governmental agencies are responsible for what and possibly also accessible for

finding solutions could be very helpful for preventing false hopes and choosing the right trajectory of action.

Regarding *enabling/incentivising circular initiatives*, it came across that unless policies do not demand otherwise or unless there is no (formal) urgency or incentive, the municipality does not consider supporting circular initiatives one of its highest priorities. Currently, initiatives are rather money-driven. If there is no policy prioritising CE and no related urgency expressed, then there is no ultimate need expressed to draw local policies in support of circular initiatives. So far neither of both are present (Interviewee policymaker Terschelling, 2018b, secs 122–126). Urgenda conveys that when the pyrolysis project started, no incentive existed to do the project with the inherent objective of reducing CO₂. It was the potential revenues that triggered the project's activities (Interviewee project manager Urgenda, 2018, sec. 213).

Additionally, the procedural understanding of waste, and subsequently what standards must be adhered to, appear to impede circular initiatives. The perception is that procedures are not yet oriented towards cycles. That is reflected by how products of the pyrolysis are restricted: due to the coal stemming from materials declared as waste (sewage sludge and other organic material), a waste product (barbecue coal) officially is introduced into the food chain. Consequently, demanding standards have to be adhered to (Ibid., 2018, sec. 69). The moment material is considered waste, “there is a whole set of different rules and regulations” applying alongside with certain standards that must be met (Ibid., 2018, secs 71, 183). Complying to these depends on continuously checking “whether the products that are in the coal are legal for [...] the food chain” (Ibid., 2018, secs 190–191). Yet, there was no staff available to do so (Ibid., 2018, secs 190–191). The costs imposed by taxes on the resulting oil further would not be viable for the business. The project manager from Urgenda concludes “the whole law is not geared towards circularity. It is geared towards a linear process” (Ibid., 2018, secs 177–179). He confirms that the understanding of what is considered as waste needs to change within regulations so to foster external integration within process (Ibid., 2018, secs 180–181).

There could be procedures directly aimed at supporting circular initiatives. However, it became clear that depending on the case and product the circular project is dealing with different legislations that complicate the progress. The variable of not knowing what procedures follow which product and cycle could represent a major barrier to starting a project that demands investment. Indicated also in context with cross-sectoral, multi-level collaborations, the findings show procedures momentarily represent barriers to develop circular initiatives in the field of organic residual streams. Most often, because the involvement of multiple stakeholders and the formation of actor-coalitions is hampered.

5.2 EXTERNAL INTEGRATION WITHIN PROCESS

As far as the results show, external integration within process has only taken place to a minimal extent. Besides, findings within process also show aspects that are not obviously depicting the identifiers of process but seem to play into them. Therefore, they are also being mentioned within the following sections.

THE SPATIAL DIMENSION

External integration related to spatial aspects has come across necessary for circular initiatives to be functional and relates to the management of organic materials. Coming together at the locations of the different initiatives they need to be coordinated, including agreements on provider, delivery, storage and time (Interviewee project manager Streekwerk, 2018, secs 64, 67–70, 118; Interviewee project manager Urgenda, 2018, sec. 227). Since however, neither of the projects are up and running, it is tough to define this more precisely. Sure is though, both initiatives want to have partly the same materials (Interviewee policymaker Terschelling, 2018a, secs 108–113; Interviewee project manager Streekwerk, 2018, sec. 114). Therefore, it seems viable both initiatives communicate about who needs what and whether they may even support each other.

FACTORS

As proceeded with in chapter 5.1.3, the results of the factors concerning the process-level of area-orientation (cf. chapter 2) are presented here. For reasons of clarity and structure though, it is done in separate sections.

ACTOR COALITIONS

For what *actor coalitions* are concerned, good and long-term oriented agreements currently seem to condition external integration between participants. Providing safety to initiatives, long-term agreements appear crucial. Safety, in terms of regularly receiving materials and engagement from partners. Making agreements though appears to depend on the coherence of the inherent objectives of each stakeholder (cf. *integrative activities*). According to the province and Urgenda, external integration between the different parties of both initiatives implies to make long-term agreements with those delivering the materials in order to create a viable business case (Interviewee project manager Streekwerk, 2018, secs 63–64; Interviewee project manager Urgenda, 2018, sec. 177). The manner, time and location of delivery as well as where to store the materials need clarification (Interviewee project manager Streekwerk, 2018, secs 63–64). As materials are needed regularly throughout the year and in a sufficient amount, it is quite essential for Duinhof and CupCompost that the regularity of material streams partly coming from the same providers is reliable (farmers, Staatsbosbeheer, municipality) (Interviewee policymaker Terschelling, 2018b, sec. 54; Interviewee project manager Urgenda, 2018, sec. 13). Thus, actor coalitions need to define organisational and spatial aspects in such agreements – also between each other to avoid shortcomings of materials (cf. *spatial dimension*).

The same applies to how much each party invests into a project. For example, Wetterskîp and Duinhof would need to agree on how much Wetterskîp has to pay for the generated heat – in both scenarios: with and without the input of the sewage sludge (Interviewee project manager Wetterskîp Friesland, 2018, sec. 48). Wetterskîp conveys that by making such agreements stakeholders are provided with reliability and accountability of other participants which also ensures, the business case is not sudden-

ly at stake (Ibid., 2018, sec. 46–48,90). It however appears, that due to decision-making bias Staatsbosbeheer and the Terschellinger municipality do not want to risk making long-term agreements with either Duinhof or CupCompost (Interviewee project manager Streekwerk, 2018, secs 50, 74). Following processes to overcome existing procedures are slow and take long – as has been the case with CupCompost (Interviewee sustainability officer Terschelling, 2018, sec. 16).

Actor coalitions require regular meetings all along the existence of initiatives (Interviewee project manager Wetterskîp Friesland, 2018, secs 79–80). These depict spatial alike organisational aspects which need external integration. Another sense-making format communicated are cooperatives. These concepts allow individuals to join along the way through which the project's topic would gain size and local importance while member continuously could benefit (Interviewee initiator Terschelling Energie, 2018, sec. 40). Yet, getting to such a point or making such a decision to found a cooperative can be assumed to again depend on the procedural circumstances.

In sum, external integration should appear in the form of agreements between stakeholders so they can proceed with circular projects. Agreements provide accountability and reliability between stakeholders and the safety of regularly receiving organic materials to avoid material shortcomings where also spatial aspects must be communicated (cf. *spatial dimension*). Besides, external integration necessitates regular meetings to create and maintain actor coalitions.

COLLABORATIVE ACTIVITIES AND SHARED SENSE OF URGENCY

Collaborative activities seem to be closely connected to monetary efforts of stakeholders and willingness to engage. In the case of the pyrolysis project, different parties involved were not making considerable steps forward and neither taking financial risks (Interviewee project manager Streekwerk, 2018, secs 50, 74; Interviewee project manager Urgenda, 2018, sec. 125, secs 177, 207): “they were just leaning back more or less. And maybe they had their reasons [...] maybe we did not have the money quick enough [...] We asked them to *well do you want to participate? Do you want to invest with us?* Well, that was not something they wanted to do. The Wetterskîp was far more forthcoming with that and but the same thing from the town hall. They were not very interested to start doing this“ (Interviewee project manager Urgenda, 2018, sec. 125).

Perceived as holding back, being in a waiting position or expressing little interest contradicts what came across through the municipality regarding CupCompost (Interviewee initiator Terschelling Energie, 2018, paras 139–142; Interviewee project manager Urgenda, 2018, secs 135, 157, 177, 245–246). For what Wetterskîp was concerned, they only intended to engage with the sewage sludge as soon as they could see the process was successful with solely the organic materials from Staatsbosbeheer and the municipality (Interviewee project manager Wetterskîp Friesland, 2018, sec. 118). The reason: a larger investment of one to two million Euros would be necessary to establish the respective preparation facilities on their ground and connect the different waste streams by aligning the drying process with the pyrolysis (Ibid., 2018, sec. 54). Also, Duinhof required making significant adjustments in his logistics which represented a massive challenge to Hofman (Interviewee project manager Urgenda, 2018, secs 73–81). Potential participants did not offer sufficient help to do these.

Funding organisations do not seem to be forthcoming enough either: the Waddenfonds at which Urgenda applied for funds, wanted the initiative to have the amount for investment readily available.

Thus, the Waddenfonds financing € 450 000 expected Jan Hofman to guarantee € 1,2 mln in advance; an aspect that was incomprehensible to Urgenda (Ibid., 2018, secs 139–141).

Further, collaborative work seems hampered by the un-clarity of responsibilities mentioned in procedures and stresses also what has been found in chapter 5.1.2. Setting up sustainability-oriented projects has somewhat been experienced "a complete fight" (Ibid., 2018, sec. 256). This un-clarity could add up to the decision-making bias and slow down initiatives in starting with their endeavour.

Successful collaborative activities momentarily rather seem to happen on bigger scales. For instance, through congresses and under the umbrella of knowledge-exchange and networking through established organisational bodies (Interviewee initiator Terschelling Energie, 2018; Interviewee project manager Streekwerk, 2018, sec. 50; Interviewee sustainability officer Terschelling, 2018, secs 50, 60). An example is Circulair Friesland, a network of public and private actors and organisational structure to which also the municipality Terschelling is member. But being member alone apparently does not change anything. It necessitates transparency, trust, spending time and doing things together (Interviewee sustainability officer Terschelling, 2018, secs 104–111) This reveals, there is a spatial aspect to collaborative activities as well for that social qualities are crucial. In the case of CupCompost, these aspects were somewhat lacking wherefore the project has been rather challenging reaching from many meeting and negotiations to court processes (Interviewee policymaker Terschelling, 2018a, secs 78, 86; Interviewee sustainability officer Terschelling, 2018, secs 108–109).

Views on how to structure collaborative work between both initiatives and other parties differ widely. Whether the businesses themselves (Interviewee project manager Streekwerk, 2018, secs 129–132), whether there should be an external person guiding it (project manager) (Interviewee project manager Wetterskîp Friesland, 2018, secs 62, 73–74) or at least inhibiting an active leadership role (Interviewee initiator Terschelling Energie, 2018, secs 54–56; Interviewee sustainability officer Terschelling, 2018, sec. 141), what form such collaboration can take on (Interviewee initiator Terschelling Energie, 2018, sec. 40) as well as who should decide who gets which and how much of the material streams from the providers (Interviewee project manager Streekwerk, 2018, secs 129–132). It can be argued that the incoherence of opinions on and uncertainty about how to best collaborative activities should be structured may slow down starting collaboration in the first place.

Regarding a *shared sense of urgency*, an obstacle to external integration may also be drawn to a resentful behaviour alongside the lack of a shared vision between islanders and initiatives but also between organisations. Findings stressed, it necessitates urgency, a real need, shared goals and visions or common enemies and pain on the horizon to make islanders constructively work together and grant each other success (Interviewee policymaker Terschelling, 2018b, seccs 140, 142; Interviewee project manager Urgenda, 2018, secs 83–87, 90–91). A common enemy or real need can be argued to relate to the financial position of Terschelling, being well off and not pressured to change how organic waste currently is managed. Such a vision could be that Terschelling "is an island, [...] [where] we live from clean and healthy nature and environment and within a clean and healthy nature environment waste prevention, waste management, waste recycling is part of it" (Interviewee policymaker Terschelling, 2018b, secs 30–31). Staatsbosbeheer, for instance, was reluctant on delivering organic material to Duinhof. They usually pay Duinhof to get rid of the material. Knowing Duinhof would make more benefit out of it, did not trigger their support (Interviewee project manager Urgenda, 2018, sec. 87). In context to this is stressed the vision must ensure benefits for every participant. Thus, a shared

sense of urgency alongside a common vision and ensuring win-win situations is needed for external integration (cf. chapter 2.1).

Altogether, it becomes visible, trust and social interaction as well as a common sense of urgency are necessary to initiate collaborative activities from within the community. Current actions are highly influenced by financial questions and thus money-driven. This may arguably relate to larger investments and the corresponding risk a business must take to engage in a circular design. Urgency may emerge in times of (financial) crises (cf. chapter 2.3.3), which, in turn, could lower the barrier for taking risks. Besides, un-clarities of responsibilities and incoherence on how to structure and manage collaborative activities are possibly interconnecting and have shown to be possible obstacles to initiate collaboration.

INTEGRATIVE ACTIVITIES

Like *collaborative activities*, also *integrative activities* on Terschelling are rather money-driven instead of following the ideal to reduce CO2 emissions (Interviewee initiator Terschelling Energie, 2018, sec. 144; Interviewee project manager Urgenda, 2018, sec. 219). Wetterskîp mentions that the unfinished business plan might have been the downfall to integrative activities implying financial responsibilities (Interviewee project manager Wetterskîp Friesland, 2018, sec. 92). Going out from the importance of such agreements, it can be said that no integrative activities concerning streamlining objectives happened. Upon stating that the objectives of procedures would need to be integrated to drive integrative activities, the province raised the question on who would need to take on the responsibility to manage integrative activities in policy-making. Here, the municipality stresses that leading characters could be beneficial (Interviewee policymaker Terschelling, 2018b, sec. 146). Even though Urgenda took on an advisory role, the findings enforce the need for good project management, potentially from an external person acting as a *key individual* (cf. chapter 2.2).

Related to the previous section, having a shared vision is essential and integrative activities may even condition collaborative activities in the first place. The municipality stresses that such a vision is crucial and must be given a scale that fits the procedures and that sustains the initiative on a community level (Interviewee policymaker Terschelling, 2018b, secs 112–113; Interviewee sustainability officer Terschelling, 2018, sec. 50). For example, the output of the pyrolysis was not completely aligning with objectives from partner organisations: when it crystallized the barbecue coal was too difficult and cost-intensive to produce and financially could not compete with barbecue coal sourced in Ghana, the initiative opted for selling it in the form of a low-quality coal to a coal plant in Groningen. This new objective did neither fit the municipality nor Urgenda (Interviewee project manager Urgenda, 2018, secs 19, 71; Interviewee sustainability officer Terschelling, 2018, sec. 78). It becomes visible procedures play into forming common visions and subsequent action. Meanwhile, key individuals could represent meaningful support to integrative activities. Thus, different objectives consequently can be associated with impeding *innovative business models*.

Connected to the objectives that interfere on the local level (cf. *formal consistency of purposes and priorities of different policy sectors/ shared goals*) as well as to making room for initiatives (cf. chapter 5.1.3), aligning objectives between public and private actors considerably can be prevented, provided intentions do not fit local programs and policies. Moreover, a general incoherence of objectives between stakeholders impede innovative business models and creating a business plan wherefore

streamlining objectives is crucial. Nevertheless, it remains unclear who should manage integrative activities.

POLITICAL SUPPORT

For what the political support is concerned, it got already apparent that a certain level of political willingness is present. However, this willingness depends on the boundaries given (cf. chapter 5.1.1.) and is biased at times. On the one hand, creating circular systems, thereby keeping things on the island, is regarded valuable as it is viewed to contribute to sustainable development. Therefore, circular initiatives and corresponding ideas are welcomed (Interviewee policymaker Terschelling, 2018b, sec. 93, 2018a, secs 48–49; Interviewee project manager Wetterskîp Friesland, 2018, sec. 166). On the other hand, the current waste management system is still considered the best solution by the municipality (Interviewee policymaker Terschelling, 2018a, sec. 183).

As identified in policy documents (cf. chapter 5.1.2) the political support seems to inhibit a facilitative position consultancy tasks are preferably forwarded to external actors. Though, the understanding of facilitation remains vague. The ambition is to help connecting actors and finding subsidies (Interviewee policymaker Terschelling, 2018a, 2018b, para. 53; Interviewee sustainability officer Terschelling, 2018, secs 46, 50). Governmental agencies pay external advisors to support initiatives startup as has been the case with Maartens from Urgenda advising Jan Hofman in exploring his options (Interviewee project manager Streekwerk, 2018, secs 93–94). Employing external consultants seems to be a tool of the government to facilitate.

Meanwhile, the municipality expects the expert-knowledge "to come from the business itself" (Interviewee sustainability officer Terschelling, 2018, sec. 78). Urgenda communicates to have encountered a rather reluctant behaviour of the municipality concerning the pyrolysis (Interviewee project manager Urgenda, 2018, sec. 93). Terschelling Energie perceives that many project proposals "strand" at the town hall (Interviewee initiator Terschelling Energie, 2018, sec. 82). The differentiated views on facilitation raise the questions as to what is understood under facilitating and so, to what extent it is carried out and why investing in the initiatives on behalf of the government might not also be an option.

Finally, appreciation from non-governmental actors crystallises for the governmental parties to become more active and also initiate projects (Ibid., 2018, secs 139–140). Even though this "would be very new" the alderman of the Terschelling town hall conveys that he might be open to investing into new initiatives as long as there is a ready and sustainable business case to it (Interviewee policymaker Terschelling, 2018b, sec. 55). He considers to starting initiatives, however without making the impression that the whole responsibility ends upon the municipality (Ibid., 2018b, secs 26–29). In that sense, it can be argued political support is present, yet again weakened through procedural boundaries and possibly the easiness of going along with what is already in place.

The findings make evident that political support is currently not sufficiently present. Procedures limit the extent of facilitation while locally, there is a bias concerning the extent of facilitation by the government itself.

5.3 EXTERNAL INTEGRATION WITHIN CONTENT

Drawing from the conceptual framework, spatial quality could not be achieved through the initiatives, or only to a minimal extent. This is for both initiatives have not (entirely) materialised, and no spatial plan is available for assessment. It can be assumed that as soon as procedural barriers are removed or decreased, content will play an important role. In comparison, when an area is newly planned, planners and decision-makers could directly investigate how to layout the area concerning the companies that have been chosen.

5.4 EXTERNAL INTEGRATION CONTRIBUTING TO THE FOCUS POINTS OF THE CIRCULAR ECONOMY

Section 5.4 reveals the findings that concern to what extent external integration is potentially contributing to the focus points as visualised in the conceptual framework in chapter 2. For this purpose, every focus point is outlined under an individual section. Notably, answers on the questions regarding the focus points have sometimes been vague, in fact not aligning with the questions themselves, others concrete. As becomes visible by the previous results and the following ones, a low level of external integration on a procedural and process level coincides with how the focus points currently are enabled, respectively not enabled.

FOCUS POINTS

CIRCULAR DESIGN

Most of the respondents expect *circular designs* to be enabled by external integration. Either through leveraging higher efficiencies of waste streams, advancing and introducing technologies or gathering knowledge that helps finding solutions (Interviewee policymaker Terschelling, 2018b, secs 116–117; Interviewee project manager Streekwerk, 2018, secs 157–159; Interviewee project manager Wetterskîp Friesland, 2018, secs 133–134; Interviewee sustainability officer Terschelling, 2018, secs 112–113). Further, external integration is expected to help extend the network and in turn to create new projects (Interviewee project manager Wetterskîp Friesland, 2018, sec. 132).

Nevertheless, it appears the value of creating circular systems would depend on that external integration benefits the participating parties. So in the case of the pyrolysis, potential participants made very clear that if they could not "get a revenue of ten per cent," they would not participate (Interviewee project manager Urgenda, 2018, sec. 73). As for Wetterskîp wanting to step in, they would have needed to invest a significant amount of money as outlined in chapter 5.1.3 (Interviewee project manager Wetterskîp Friesland, 2018, secs 52, 54, 57–60). This kind of spatial adjustment turns out to be an external integration on a spatial and organisational level, where it is organisations that need to interact with each other so to make agreements on how to align processes (Ibid., 2018, sec. 52). Unless Wetterskîp could not save a significant amount of money, by, for instance, receiving the heat in a beneficial deal, investing into the circular design on their behalf would not be interesting (Ibid., 2018, secs 56, 60). This finding can be linked to setting up *innovative business models* as well as to that integrative activities are very money-driven.

INNOVATIVE BUSINESS MODELS

As it looks, external integration, notably within procedures, is likely and perceived to be useful for creating *innovative business models*, provided win-win situations between parties are guaranteed. External integration is considered to be useful for setting up business cases (Interviewee project manager Streekwerk, 2018, sec. 164), where Wetterskîp pronounces a good agreement which turns the sharing of resources (sludge, heat) into a beneficial deal are crucial (Interviewee project manager Wetterskîp Friesland, 2018, secs 57–60, 146). Emphasising the need for external integration at this point, Urgenda conveys that for creating a sound business case, procedures need to change (Interviewee project manager Urgenda, 2018, secs 214–215).

Further becomes evident that a reallocation of incentives on a procedural level is needed as well. Urgenda reasons that CO₂, as well as nitrogen oxide emissions, must be taxed to stimulate innovative business models and reducing CO₂ must be the common objective of the parties (Ibid., 2018, secs 220–221). Thus, done across different policy sectors external integration can increase the willingness to invest in circular projects.

Opposed to that, Kramer (Interviewee sustainability officer Terschelling, 2018, secs 118–119) reasons that whether external integration is necessary for innovative business models is a chicken and egg question: "in order to integrate, you have to be innovative in general [...] Otherwise, you do not integrate, I guess" because innovative thinking is needed.

The results show, creating innovative business models that cater to circular systems can be connected to especially the procedural limitations which did not foster the business ideas and following process activities to a large extent (cf. chapters 5.1.1, 5.2). The correlation of the limited external integration within procedures with the low success of innovative business models indicates external integration across all levels of area-orientation is very likely to enable innovative business models, where making solid agreements can be considered a form of external integration itself.

NEW CAPACITIES

External integration is perceived very likely to enable *new capacities* however with some counter-arguments, such as contributing to fuzziness in planning (Interviewee policymaker Terschelling, 2018b, secs 96–97, 151–152; Interviewee project manager Streekwerk, 2018, secs 175–180; Interviewee sustainability officer Terschelling, 2018, secs 124–129). It also is considered to enhance knowledge development. According to two respondents, a broad knowledge may support improving practical matters, thus necessary capacities (Interviewee policymaker Terschelling, 2018b, sec. 117; Interviewee project manager Wetterskîp Friesland, 2018, sec. 132). Momentarily, external expert knowledge needs to be imported for that the knowledge available on the island is perceived too scattered (Interviewee sustainability officer Terschelling, 2018, sec. 141). Meanwhile, respondents stress the entrepreneur has to be most up to date about, for instance, about technological development (Interviewee project manager Wetterskîp Friesland, 2018, sec. 166; Interviewee sustainability officer Terschelling, 2018, sec. 78).

Opposed to that, the municipality argues new capacities might also be hampered by external integration, referring to a multitude of people getting involved. Thereby it is thought, a planning process is slowed down. That is argued to result from continually new knowledge to be integrated into the plan-

ning process without arriving at the point of decision-making (Interviewee policymaker Terschelling, 2018b, secs 96–97).

Drawing from *innovative business models* and chapter 5.2 it can also be reasoned that upon settling agreements between actors, this improves practical matters which form the physical and logistical organisation surrounding the material streams. Subsequently, settling agreements may enhance capacities as well. In the case of the pyrolysis, it relates to the spatial and organisational connection between Wetterskîp and Duinhof in order to benefit from each other's processes and seems to be conditioned by external integration of procedures (Interviewee project manager Urgenda, 2018, secs 180–181, 214–215). In turn, for CupCompost having the capacities purely relates to external integration within procedures that would allow the corporation to extend the surface to operationalise the composting processes (cf. chapters 4.3.1, 5.1.1).

ENABLERS FOR CROSS-SECTOR/ CROSS-CYCLE PERFORMANCE

Once successful pilots have been introduced, further *enablers for cross-sector/ cycle performance* may emerge. Wetterskîp, the province and the municipality assume respectively reason that subsequent to success, the government is more stimulated to adjust or introduce new procedures that enable future initiatives of a similar kind (Interviewee policymaker Terschelling, 2018b, secs 154–155; Interviewee project manager Streekwerk, 2018, sec. 194; Interviewee project manager Wetterskîp Friesland, 2018). Such enablers may, for instance, come in the form of "separate sets of rules" and corresponding criteria with long-term validity needing fewer reviewings time after time (Interviewee policymaker Terschelling, 2018b, secs 154–155). However, this seems to concur with an ultimate urgency that makes a matter relevant to the local liveability as was pronounced in *procedure* and *process* (Ibid., 2018b, sec. 155). Associable with a formally more stable environment the municipality assumes that then actors might be willing to join new systems (Interviewee policymaker Terschelling, 2018a, secs 184–185; Interviewee sustainability officer Terschelling, 2018, secs 132–137). Thus, external integration on a procedural level appears to play an essential role in enabling this focus point, while successful projects also seem to be a driver themselves. Yet, first, they must be enabled.

Also, monetary incentives and taxes can enable this focus point. Therefore, external integration on procedural level needs to reallocate such instruments in line with procedures that aim for a circular development. For instance, it is still less expensive to source barbecue coal from Ghana, instead of producing it locally (Interviewee project manager Urgenda, 2018, sec. 71). Second, oil produced through pyrolysis is taxed on a level which does not support the business case of pyrolysis and rather complicates processes (Ibid., 2018, sec. 65). Surprisingly, social procurement was not mentioned by the respondents to provide preferential conditions for circular initiatives regarding taxing (cf. chapter 2). Thus, monetary incentives arguably must be repositioned which involves external policy integration.

Concluding from previous sections, procedures momentarily lack integrative character hampering stakeholders to collaborate. This lack of external integration mostly relates to technology and what is allowed to be done with the materials as well as where and the allocation of incentives. However, as pointed out by the province under 5.1.3 the different objectives limit the room to the planning on a local level and changing laws is tough due to seldom opportunities (Interviewee sustainability officer Terschelling, 2018, secs 120–121). Another respondent even voices against the fact that external inte-

gration could enhance this focus point concerning creating a formally more stable environment. Instead, he argues, a sounder business plan is needed (Interviewee project manager Urgenda, 2018, secs 190–191). Nevertheless, looking at what prevented, for instance, the pyrolysis project, it can be argued that this goes side by side with having external integration on a procedural level as otherwise, such business cases might have no chance to emerge.

Pointed out to be an enabler itself to cross-cycle and cross-sector performance is the willingness of the different parties which has been perceived to be unequally distributed across the different actors of the pyrolysis project (Ibid., 2018, secs 204–207). By extending the network of partners and intensifying the connections, short lines with other organisations get further developed which subsequently helps to create future projects (Interviewee project manager Wetterskîp Friesland, 2018, sec. 132). Besides, a successful project is itself an incentive for other parties to engage in a project (Ibid., 2018, sec. 160,162).

In sum, external integration on a procedural level precedes enablers for cross-cycle and cross-sector performance. That is because it can create a formally more stable and incentivising environment upon which initiatives are enabled to emerge easier.

Finally, concerning all focus points, the findings suggest that a higher level of external integration contributes to the operationalisation of circular initiatives in organic residual waste streams and that barriers and enablers to external integration are barriers and enablers to such initiatives.

5.5 ADDITIONAL FINDINGS

As previously described, adhering to standards and regulations to put up an innovative business model can be quite challenging and requires a certain scale. In the case of Duinhof, major processes needed to change, including all the tasks for which there was no staff (Interviewee project manager Urgenda, 2018, sec. 73). Not having the staff could also be related to the sufficiency of knowledge necessary for changing processes. Regarding the scale, CE has "to have a little bit of size," meaning that concerning organic materials flowing together from different providers the quantity must be sufficient to make something out of it (Interviewee sustainability officer Terschelling, 2018, secs 40, 50, 82).

Moreover, governmental parties expect more flexibility from initiatives in terms of adhering to existing procedures. The municipality suggests that were the Cupido corporation more flexible; they could move their project to the *Bedrijventerrein*. There, their activities would be within the legal frameworks (Ibid., 2018, sec. 16). By now, however, the municipality could declare CupCompost a pilot through which they may proceed on a small scale (Ibid., 2018, secs 16, 102–103). More information about how precisely the municipality found a solution could not be identified in the interviews. Two respondents only recently joined the municipality on Terschelling. Even though the matter would be their responsibility, this concern dates back longer than their employment. (Interviewee policymaker Terschelling, 2018b, sec. 25; Interviewee sustainability officer Terschelling, 2018, sec. 14). The negotiation processes have been transferred onto a higher level where the contract for running the pilot is soon to be signed (Interviewee sustainability officer Terschelling, 2018, secs 102–103).

Helpful in setting up comparable initiatives is also argued to be conditioned by personal attitudes. An expert from the municipality considers open-minded crucial and that individuals "always look for innovative solutions. That they do not judge the others and they do not take it personal" (Interviewee sustainability officer Terschelling, 2018, secs 102–103). The same holds for remaining perseverant and not give up on a vision (Interviewee project manager Urgenda, 2018, sec. 185; Interviewee sustainability officer Terschelling, 2018, secs 102–103).

Miscommunication may be another barrier to the planning process of circular initiatives. Wetterskîp and Urgenda report that a major obstacle was that the technology they wanted to purchase for the pyrolysis was not ready at the time they would have liked to construct it on location (Interviewee project manager Wetterskîp Friesland, 2018, sec. 8). It could have only be delivered by 2020 (Interviewee project manager Urgenda, 2018, sec. 143). However, that fact was only revealed relatively late in the process and came as a real surprise (Ibid., 2018, sec. 147). Thus, this finding enforces what has been found to be necessary for collaborative activities: transparency.

5.6 BARRIERS AND OPPORTUNITIES TO CIRCULAR INITIATIVES WITHIN ORGANIC RESIDUAL WASTE STREAMS

Drawing connections between the policy and interview analysis, chapter 5.5 highlights the key findings of the empirical results and shows which barriers and opportunities for circular initiatives reside within current governance structures on Terschelling. Thereby the third sub-question of this thesis is answered (cf. chapter 1.3).

EXTERNAL INTEGRATION – OPPORTUNITY TO CIRCULAR INITIATIVES

Most importantly, enhancing external integration within formal frameworks and the operational planning level carries high importance in order to enable the focus points of the circular economy. That could be seen in that external integration has been considered to increase waste management efficiencies, the potential to introduce technologies, such as pyrolysis, but also to gather knowledge for finding solutions and handling respective infrastructure.

That also relates to knowledge development and the capacity to enable practical matters such as providing for the right infrastructure along with a knowledgeable human resource to operate this infrastructure. Lastly, external integration has been identified to establish a formally more stable environment that drives cross-sector/ cross-cycle performance. The reason is, better incentives can be introduced through which bio-based business cases receive the chance to emerge, being financially more viable.

However, unless external integration does not guarantee benefits and security regarding accountability and reliability to all participating parties and further does not give the incentive to invest, it is hardly imaginable to take place. Ultimately, the findings that depict barriers and opportunities to external integration within the governance structures of Terschelling can be considered the same to operationalising circular initiatives in the context of organic residual waste streams. In the same vein, these barriers and opportunities go beyond the local influence, pointing towards the fact that procedures on higher administrative levels play into forming barriers and enablers. Thereafter, the following findings

are most significant to hamper respectively enable circular initiative on a procedural and process levels:

PROCEDURAL (MIS-)ALIGNMENT

Firstly, there is a strategic-operative discrepancy, nationally and locally and between sectors. This discrepancy relates to probably the most significant finding and biggest current barrier, namely the misalignment of objectives alongside their content. Misalignment is between the different policy sectors, levels and subsequently defines the room for external integration and thus circular activities:

Nationally, procedures are insufficiently aligned between the different sectors that concern Optimal Biomass Valorisation which needs cross-sectoral interaction. This misalignment has been identified to connect to the objectives of the sector's procedures. Environmentally-related procedures and waste management procedures for instance predominantly aim at protecting human and environmental health. Procedures focused on circularity acknowledge the need for external integration, proposing operational programs such as the City Deals to create public-private, cross-sectoral interaction. Due to the former ones, however, facilities and related activities that are assumed to have negative externalities (i.e., pollution, sensual implications) on the natural and human environment when handling organic materials are prohibited. That, for instance, could be seen in terms of the pyrolysis project that, even though located in the industrial zone of Terschelling, was not allowed to make use of sewage sludge in context with the technology that would connect the different sectors.

Additionally, national misalignment has been found to trickle down to local levels, creating a local decision-making bias. Local visions may aim at enabling circular activities and cross-sector interaction, but allowing for such appears to be hampered by procedures from higher levels and thus what can be allowed within formal frameworks. The reason: provincial and local procedures must adhere to objectives laid down on a national level. For example, CupCompost is allowed to do the composting activities planned on the corporation's ground and with own farming material, but not with material from other providers. That is for surrounding neighbours could sensually be disturbed whilst the expansion into the Buitengebied Polder does not align with the local spatial zoning plan (adhering to environmental procedures). A decision-making bias furthermore can lower the likeliness for actor coalitions to emerge and innovative business models to be set up. Actor coalitions laid down formally provide safety concerning reliability and stability. However, if the administrative side is undecided of engaging in the provision of organic materials from the municipalities' side, a form of security is taken away from the initiatives. Reducing the decision-making bias by enhancing procedural alignment can lead to actor coalitions that subsequently make bio-based business cases more viable.

REALLOCATING INCENTIVES

Alignment also implies how subsequent incentives offer opportunities to innovative business models. The current lack of promotion for innovative business cases hampers finding business cases for bio-based projects. For example, taxes on barbecue coal currently favour importing the product from Ghana instead of producing them locally and making bio-based business cases financially viable. Thus, external integration on a procedural level must also take the allocation of incentives into account. Doing so can ensure a formally more stable environment encouraging external integration on an operational level.

Regarding the previous sections, the major opportunity for circular initiatives lies in generating coherence of objectives across sectors, thus also levels, and accordingly reallocate incentives which provides the base for factors that lever external integration on an operational level. Windows of opportunities to align however have been identified to remain seldom and depend on good timing.

TIMING

Timing has been identified an obstacle which concerns the periodical incoherence of procedure's time horizons. Periodical incoherence limits the potential for procedural alignment (external policy integration) and enforces sectoral fragmentation as could be seen with the VANG and LAP. Such incoherence limits how much procedures can enforce each other and local action. For instance, technologies developed ex-post the amendment of the national waste management plan, running for many years, thereby are not anticipated. Granting more room to manoeuvre on the operational level can be regarded as an opportunity for external integration to happen on an operational level.

However, the correspondence of a procedure's time horizon, political cycles, and individual ambitions is significant to whether procedures get amended and potentially aligned with other procedures. As has been found, such windows of opportunities are seldom, and thus alignment is.

CONSIDERATION OF TECHNOLOGICAL DEVELOPMENT

Another significant obstacle directly concerns the extent to which technological development is considered within existing procedures. This obstacle has become evident with respect to the pyrolysis plant, where it depends on the technology to close the loops. The consideration of technological development in procedures has been reasoned to improve giving innovative technologies more room.

URGENCY

Another finding regards the necessity for the local degree of urgency, raised in procedures and felt by citizens and local authorities: a (shared sense of) urgency to take new, enabling measures, or relocate priorities. Such can lead to making exceptions or draw new formal procedures and else to get together and integrate on an operational level. As of now, however, the urgency is not high enough. Firstly, because it is not expressed in procedures and secondly, the financial need to change the system may not be high enough considering the financial wellbeing of Terschelling. An opportunity is therefore seen in artificially creating that sense of urgency to drive external integration on a process level. Creating urgency also implies changing market mechanisms for incentivising cross-sector interaction, inter alia, taxing CO2 emissions.

COMPLEXITY OF PROCEDURES AND UN-CLARITY OF TERMS

Another barrier identified is the current complexity of procedures which can be discouraging for entrepreneurs to act. It is caused by first, the multitude of procedures that generally exist and second, the difficulty to identify those which potentially apply to a circular project. This correlates with defining the waste status of the material and/ or the product. A way out is seen in civil servants that improve their knowledge base to support initiatives and ease the planning. Another opportunity for overcoming complexities has been argued to be provided by the local government in preparing initiatives better by providing more information and guidelines on relevant procedures.

FORMAL UNDERSTANDING OF WASTE

As of now, the understanding of "waste" apparently hampers making business cases viable through the system's output and the associated standards that need to be adhered to. This obstacle has been shown with regards to the pyrolysis plant and the resulting barbecue coal having to adhere to strict standards that make the work processes complicated and very cost-intensive. In the run, the barbecue coal turned out to be unable to compete with barbecue coal being imported and retailed from Ghana for less money and less effort. Changing the understanding of waste and/ or altering market mechanisms have been identified as a great opportunity to give room to circular initiatives in organic residual waste streams and withstand competition.

KNOWLEDGE DEVELOPMENT

A current barrier and simultaneous opportunity is the need for knowledge (development). Currently, the room to manoeuvre is insufficiently used. Civil servants that are meant to facilitate and help to see through the complexity of procedures are not informed well enough to do so. Having created a network of partners can aid in finding solutions quicker while for operating new technology such as the pyrolysis, knowledgeable staff is needed as well. The opportunity identified thus lies in increase and support knowledge development of policy-makers respectively human resource.

LOCAL MIND-SET

It also appeared viable, objectives get streamlined not only on a procedural but also an operational level: within initiatives, between initiatives, sourcing from similar material streams, as well as within the whole community. Findings suggest this might help to overcome the rather common enviousness which prevents granting other people's success and potentially also supporting another's organisation cause. For instance, by providing enough organic material. Community alignment has been identified as helping to build a favouring mind-set for circular initiatives and represents an opportunity that may counteract the missing urgency.

LONG-TERM FORMAL AGREEMENTS: CREATING WIN-WIN SITUATIONS AND SECURITY

Creating win-win situations and security has been identified crucial to companies such as Wetterskîp. The reason: alongside innovation, spatial restructuring, and the possible educational need, often high investments correlate to enable the handling of the organic materials. For instance, the connection between Wetterskîp and Duinhof demands significant investments into the infrastructure to align the processes. Again, making solid, long-term agreements between stakeholders is therefore essential. Such agreements ensure that win-win situations remain stable by providing accountability of stakeholders to their responsibilities, such as delivering the materials regularly and in a sufficient amount. Long-term formal agreements have been identified as a clear driver for making business cases and especially related investments viable.

FACILITATING AND MANAGING EXTERNAL INTEGRATION

A critical finding relates to the uncertainty of how to best facilitate, manage and structure external integration on an operational level. Meanwhile, facilitation, as promised in procedures, is not fully executed. Consequently, the extent of governmental facilitation is unclear. Findings have shown that the government has the idea of providing knowledge and manage external integration. The responsi-

bilities of who is in charge of bringing people together and streamlining objectives, as well as how much knowledge have to be provided by the initiative itself has been found biased within governmental entities. Such uncertainty has been argued to slow down starting initiatives. Taking on a financial perspective findings also proved that there is a wish for governmental parties to facilitate projects financially. The local government has also not made use of the full potential of a local procedure that amongst others finically facilitates (RDi). It is not integrative enough concerning considering circular initiatives as a form of sustainable initiative to support.

TRUST AND TRANSPARENCY

Only briefly mentioned in the context of making external integration work, however, proven by experience to be essential is a mindset that amongst others allows for building trust:

- (1) having a personal attitude that is open towards ideas and keeps rational about decisions
- (2) be perseverant
- (3) communicate transparently

Little trust is argued to be unsupportive to enable circular initiatives and getting together, communicating openly is essential to building it.

6. CUTTING TO THE CHASE - CONCLUSION AND REFLECTION

The following paragraphs are meant to give an answer to the main research question and to provide suggestions for how to tackle the current situation, which implies the fourth sub-question of this thesis (chapter 6.1). Besides, a reflection on the theoretical approach and correlating research process is provided (chapter 6.2).

6.1 CONCLUSION

This study set out to identify current barriers and enablers in local governance structures that have hampered respectively supported circular initiatives in the context of organic residual waste streams on Terschelling. Implicitly, the objective was to identify how these barriers and enablers might be mitigated respectively enhanced. Therefore, a conceptual framework was constructed, making use of theories on area-orientation and circular economy to serve as a theoretical roadmap for the empirical part of the research: carrying out a case study on Terschelling and collecting different data samples. After analysing the data samples and collecting the results, concrete barriers and enablers respectively opportunities could be identified.

Firstly, external integration on a policy and operational planning level represents a key driver to the focus points of the CE and so to circular initiatives operating with organic residual waste streams. Obstacles and enablers to external integration are therefore the same to circular initiatives. Further, primarily a lack of external integration between procedures of different sectors affecting the planning of organic biomass valorisation currently limits external integration for circular initiatives on the planning level. The reason is their significant influence on what legally can or is given the incentive to be planned. On Terschelling, this concerns inter alia the allocation of activities of circular initiatives and their environmental and sensual externalities in the surroundings. Such might be felt by an increase in transportation or unusual sight or smell in the landscape which does not conform to the island's touristic image.

This lack causing a strategic-operative discrepancy between what formally is aimed at and practically is effectuated on an operational planning level is caused by several implications on a formal as well as informal level:

The first reason is procedural misalignment, leading into a local decision-making bias of governmental bodies. Objectives of the sectors that influence the planning of circular initiatives in organic residual waste stream do not correlate sufficiently between each other. So, even though the Futurevision 25 on Terschelling promotes activities that enhance a sustainable development also within organic residual waste streams, local spatial zoning plans adhering to national procedures speak against circular initiatives with potential impact. Subsequently, the local government is biased whether the cause can be supported or not.

The second reason concerns the lacking anticipation of technological development in procedures, the understanding of what is "waste" and current market mechanisms. If not prohibited, the use of new technologies leads to additional obligations to comply to strict norms and standards which likely increase production expenses. Subsequently, the product is not able to financially compete against a similar product originating from a more linear system on the market. Such happened to the pyrolysis project on the island, where the barbecue coal could not compete with the one imported from Ghana.

Relating to this, current market mechanisms incentivise the old system instead of initiatives that can cut, for instance, CO₂ emissions by reducing transportations of waste from Terschelling to Harlingen. The opportunity is to formally change the understanding of what is waste and enhance procedure's anticipation of and adaptability to technological development. Doing so can create more room for circular initiatives and increases the competitive strength on the market. An additional opportunity for Terschelling is to amend the *Regeling Duurzame initiatieven* and guarantee financial support to sustainable projects that work with organic residual waste streams. So far, such are excluded prevents such projects to emerge alongside the willingness of actors to invest.

Third, procedural complexity currently confuses entrepreneurs. It is caused by the multitude of procedures and the difficulty to identify those which potentially apply to a circular project. The applicability of procedures often correlates with defining the waste status of the material and/ or the resulting product. Regarding this and establishing processes for circularity requires more knowledge. Enhancing knowledge development by providing more information and more explicit guidelines on relevant procedures can help policy-makers but also initiatives and human resource significantly. Terschelling for instance already offered to provide a list of criteria by which initiatives would be assessed, so they can check for opportunities and chose a realisable planning trajectory.

Fourth, procedural integration requires certain factors to correlate as well as urgency. Influenced by several aspects that need correlation, windows of opportunities for changing procedures rarely occur: political terms, time of implementation and personal ambitions. Indeed, when pilot projects can convince the government to arrange for better procedural conditions, formal enforcement of external integration becomes likelier. Generally, though, local governments need to sense the urgency through procedures from higher administrative levels to enhance respective efforts. As for now, the positive financial situation of the island is likely to contribute to the reluctance the government and local stakeholders to externally integrate.

Further, success is not granted to others, and stakeholder's objectives divert counteracting mutual benefits to rise. Opportunities, therefore, lie in artificially creating urgency through local procedures that mitigate the lack of national incentives. Local procedures can positively stimulate circular action guaranteeing initiatives to help start-up financially. Second, it might be helpful to practice community alignment, so to agree on a common objective amongst for instance Terschelling's citizens. Community alignment could help to counteract local inter-actor resentments to increase the willingness to support each other and interact cross-sectoral.

Lastly, there is a bias regarding how facilitation for external integration is best managed and structured. It concerns the responsibility of managing cross-sector interaction and streamlining objectives (public or private) as well as the extent on behalf of the local government (little information, much information and/ or financial support). This bias can slow down projects to start. The opportunity for Terschelling is, to communicate more about rules and responsibilities as well as to find a common sense on the extent of facilitation within the government and between the government and non-governmental organisations. Actors thereby get a better idea of how realistically facilitation on behalf of the government can be used. Finally, communicating openly about facilitation and amongst every stakeholder increases trust and transparency which are needed for circular initiatives to gain ground.

Altogether, initiatives on Terschelling currently do not find all the practicalities they need. However, national and local opportunities are also present to improve the situation and if not of a procedural

nature concern people's interaction and own motivation. Concrete recommendations are outlined in the following section.

HOW CAN THE CURRENT OBSTACLES BE RESOLVED TO ENHANCE OR SPEED UP A CIRCULAR REGIONAL DEVELOPMENT ON TERSCHELLING WITHIN ORGANIC RESIDUAL WASTE STREAMS?

External integration needs to take place on a stronger degree between the policy sectors applying to organic residual waste streams; nationally alike regionally and locally. Next to procedural amendments that demand making procedures more adaptive to, for instance, technological development, incentives must be reallocated, market mechanisms altered and the understanding of waste be changed. These changes may help loosen the grip on products originating from "waste" and stimulate engagement. Further, the urgency for circular initiatives to locally emerge needs to be created artificially. Lastly, rules and responsibilities need to be outlined more clearly. Entrepreneurs thereby are helped to see a more precise pattern of entities, their tasks and get a better idea of what opportunities they may seek within the formal frameworks. For local governments, this may help to counteract the bias which currently slows down initiatives to take-off. For what Terschelling's planning level is concerned, the following recommendations may mitigate the current barriers.

RECOMMENDATIONS FOR THE PLANNING PRACTICE

- (1) The municipality could step into the role of the temporal initiator and demonstrate what opportunities can be used in line with existing procedures. After a project's introduction, the municipality could transfer the project to the participating parties.
- (2) The municipality could provide initiators with a list of criteria according to which activities in the Terschelling Polder and individual zoning plans are evaluated. Alongside, the content of procedures that obviously affect organic residual streams could be communicated more actively and comprehensible to the public. Thereby, entrepreneurs receive the opportunity to choose planning trajectories fitting to procedural frameworks.
- (3) Local procedures to incentivise sustainable projects should also target circular initiatives handling organic residual waste. The RDi which provides financial support, therefore, needs amendment.
- (4) The local government should commit more to its policy to create an arena for entrepreneurs to innovate. Thereby, knowledge can be accumulated, common visions may be drawn, solutions found and trust built amongst stakeholders.
- (5) Private actors also should be more proactive to create an arena to do community alignment. Their great chance is to work on a shared vision which stimulates working for together and from which everyone can benefit. Becoming pro-active may show the local, regional but also the national government, that there is an urgency to undertake a procedural alignment in favour of circular projects. Ideally, this is driven by a neutral person or under islanders, a spokesperson, accepted by many of the community. Such individuals can be key to integrate externally successfully. An organisational structure that readily is in place and could provide an arena is Terschelling Energie. Having implemented renewable energy projects already, this organisation already has a knowledge base on project-management and possibly on aligning objectives
- (6) Concerning knowledge development, the local and provincial government are already on the right path to support gathering information and importing knowledge from other organisations for initiatives. Yet, civil servants should be educated so they can fully exploit the room to manoeuvre within formal frameworks.

With the knowledge, that a new spatial instrument – the *omgevingsvisie* – is going to be enacted and simultaneously will replace local spatial frameworks in 2019, it is hoped that thereby, more freedom can be given to such projects.

6.2 REFLECTION

Despite its explorative nature, the findings of this thesis shed new lights on the understanding of governance frameworks in context to the circular economy and organic residual waste streams. Further, the research enhanced the understanding of how to identify what needs to change within governance frameworks to make them suitable for circular initiatives.

REFLECTION ON THE THEORETICAL MODEL

One concern regards the connection between the spatial and economic sphere. So far, little research has been done on the connection between CE and spatial development. The same holds for area-orientation being a newly declared phenomenon in spatial planning. Focusing on external integration has been the solution for building up the theoretical construct and for connecting both theories. Delineating external integration from internal integration and frame it within the dimensions generally was challenging. That is because integration is understood differently across literature and most often refers to policy integration on a purely governmental level. The translation onto the executive planning (process) level only takes on a little extent. However, connecting two, still, as "young"-perceived fields of research can be considered a step forward for research. Additional research for the connection between both could help revealing more implications on suitable governance frameworks for circular initiatives as well as the role of the spatial dimension. Acknowledging content of area-orientation hardly took on a function in the analysis, the purpose of how content is used for the analysis should be adjusted. A suggestion is to ascribe current spatial zoning plans to this dimension. Even though it then embodies a procedural nature, content then represents a plan that can show how much spatial quality is present and at what points specifically the present plan lacks external integration.

REFLECTION ON THE RESEARCH PROCESS

Researching for this thesis, three significant points of critique could be identified.

First, when the questionnaire was set up, the theoretical model was still under adjustment. The very details of how to frame the questions in line with the aspects of the conceptual framework remained unstable. That may have caused greater difficulties for the respondents to grasp the intention of a question. Depending on the respondents' professions, the understanding might have increased or decreased and contributed to distorting the perspective on the case. Where the researcher felt, uncertainty persisted, the researcher reformulated the question in a simplified way or else re-explained the issue at hand to prevent major distortion. As the interviews were carried out in a semi-structured manner, the researcher used her freedom to ask questions that went off the questionnaire's questions and by that attain a question's purpose.

Second, the analysis of the interviews itself and primarily relates to the coding process and the researcher's relative subjectivity: since the answers did not always correspond to the questionnaire, coding could not be done according to the questionnaire most of the times. In such cases, the content

was coded per code most suitable. Throughout the analysis, codes were sometimes adjusted in case another code deemed more fitting to the respective content and remained better in line with the conceptual framework. Rechecking the codings and adjusting them could help increase reliability and validity.

Third, key individuals involved in both projects could not be interviewed, despite significant efforts to get hold of them. The lack of their input might have distorted the outlining of the cases and now may reflect an inequality of input regarding the representation of public versus private parties interviewed. Amongst others, the time available to those individuals as well as a language barrier has been assumed to play into this situation. For future research, thus, it is recommended to make either more time and offer a translator as an alternative option, or, delimit the spatial scope of research to boundaries fitting linguistic prerequisites.

FURTHER SUGGESTIONS FOR FUTURE RESEARCH

Based on the limited amount of research that so far has been done regarding governance structures and their suitability to enable circular initiatives, the first suggestion for further research is to prospectively amplify the scale of the research done in this thesis. Comparative research could help concretise what has been found in little and inform the Dutch government about alternative ways of going about barriers and enablers in governance structures and external integration within.

Furthermore, and since this thesis has shown that a procedural alignment is crucial for prospectively enabling circular initiatives better, a second suggestion is to investigate into policy-making for procedural alignment. As of now, policy fragmentation is present, and alignment is challenged already by the different horizons of procedures alone. With all the factors influencing policy-making (political terms, procedural time horizons, individual ambitions), it could be investigated to which extent the way of policy-making that the Netherlands and probably most of Europe's countries apply is helping external integration and how it can best be driven under these circumstances.

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8. APPENDICES

APPENDIX I 3.3.2 POLICY DOCUMENT ANALYSIS – ANALYSED

Planning area		Document	Type		
Circularity (in) waste	Waste	National	Landelijk afvalbeheerplan 2009-2021. Naar een materiaalketenbeleid. Tekst na tweede wijziging (IenM, 2014a)	strategic	
			From Waste to Resource Annex 1 : Progress of the actions per operational objective (IenM, 2015)		
			Van Afval naar Grondstof (IenM, 2014b)	Strategic/operational	
		Provincial	/	/	
		Municipal	Terschelling Uitvoeringsbesluit Afvalstoffenverordening 2010 van de gemeente Terschelling	operational	
	Circular economy	National	Leidraad. Afvalstof of product. Richtsnoeren voor de uitleg en toepassing van de begrippen 'afvalstof', 'bijproduct' and 'eindeafvalstatus' (IenW, 2018)	Operational	
			Meer en betere recycling voor een circulaire economie (IenM, BRBS Recycling, FHG, NVRD, & VA, 2015)		
			Groene Groei: voor een sterke, duurzame economie (EZK, 2013)	strategic	
			A circular economy in the Netherlands by 2050. Government-wide Programme for a Circular Economy (IenM & EZK, 2016)	strategic	
			A circular economy in the Netherlands by 2050. Summary (Dutch Ministry of Infrastructure and the Environment & Ministry of Economic Affairs, 2016)		
National agreement on the circular economy. Letter of intent to develop transition agendas for the Circular Economy together. (IenM & EZK, 2017)			operational		
	Provincial	/	/		
	Municipal	/	/		
Spatial planning	National	Besluit algemene regels ruimtelijke ordening (Rijksoverheid, 2011)	operational		
		Wet ruimtelijke ordening. Geldend van 01-07-2018 t/m heden (Rijksoverheid, 2006)	operational		
		Wet algemene bepalingen omgevingsrecht. Geldend van 28-07-2018 t/m heden (Rijksoverheid, 2008)	Operational		
		Vragen voor overmorgen. Strategische Kennis- en Innovatieagenda Infrastructuur en Milieu 2016 – 2020 (IenM, 2016)	operational		
		Regeling omgevingsrecht (Rijksoverheid, 2010)	operational		
			Provincial	/	/
			Municipal	Landschapontwikkelingsplan Terschelling. Eindrapport (Kloosterziel et al., 2004)	strategic
			Bestemmingsplan Buitengebied Polder. Vastgesteld (Gemeente Terschelling, 2015b)	Operational	
			Beheersverordening bedrifventerrein Niewedijk (Gemeente Terschelling, 2015a)	operational	
			Visie op uitvoeringsbeleid Ruimtelijke Ordening. Wetstechnische Informatie (Gemeente Terschelling, 2014)	strategic	
Sustainable develop-	National	Afsluitende brief programma toekomstbestendige wetgeving			

ment		(EZK, 2016)	Strategic
	Provincial	Gezamenlijke Agenda Waddeneilanden (Waddeneilanden, 2014)	Strategic
	Municipal	Regeling Duurzame initiatieven- Regeling ondersteuning lokale duurzaamheidsinitiatieven (Gemeenteraad Terschelling, 2011)	Operational
		Municipality of Terschelling (2015). <i>Future Vision Terschelling</i> [TS 25: Terschelling in 2025] (Gemeente Terschelling, 2015c)	strategic

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begrippen 'afvalstof', 'bijproduct' and 'einde-afvalstatus', 1st ed. Ministerie van Infrastructuur en Waterstaat, Den Haag.

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Waddeneilanden, 2014. Gezamenlijke Agenda Waddeneilanden. n.p.

APPENDIX II: 3.3.3 QUALITATIVE SEMI-STRUCTURED INTERVIEWS – QUESTIONNAIR

General Information

Name Interviewee:

Date of the interview:

Organizational Type: Private/ Public

Name Organization:

Anonymization preferred: Yes / No

Duration of Interview:

Recording allowed: Yes/ No

Further procedure:

1. Introducing myself
2. Explaining the research and its purpose

I am interested to understand how regulations, organizational structures and ways of collaboration enable or constrain possibilities for making residual waste streams more circular on the island itself. Popular examples you might know is the deposit or refund system of glass bottles which may work better if a network or shop on the island joins the system or when the collection locations would be located in areas close to agglomerations of people and supermarkets.

I particularly look at the possibilities for integration: between sectors, e.g. gastronomy and waste management. But also between policies, e.g. economic and planning, and organizations, e.g. farmers and logistics.

So, I am very keen on learning from your experiences that you have made regarding the planning and management of projects such as CupCompost that want to make processes more circular and so use resources more efficiently.

3. Can you maybe come up with an example for integration yourself?
4. Introduce interviewee to the structure of the interview: Three blocks each focusing on three different main heading upon which possibly follow-up questions will be posed.
5. Ask whether the interviewee has any further questions in advance + get confirmed how much time you have for the interview.
- 6.

Start Interview:

Could you, as a start, please introduce yourself and what you do and what your role is in the management of this project?

Can you tell me a bit about the background and the historical events of the project? How it came to life, who was involved, what were barriers and enablers for the project to develop? Just things that come to your mind seem important to its development and current state of the art.

Themes	Main question	Notes
BLOCK 1: Importance of Integration for the waste system/ project that was created	<p>Q1: To establish this new waste-cycle, were there any aspects that needed integration between your sector and other sectors (who) on the island?</p> <p>If so, what are these aspects and to which sectors and underlying parties do they relate in what way (how)?</p> <p>Q2: More in detail, what aspects needed integration between your organization and other organizations? (For</p>	<ul style="list-style-type: none"> •

	<p>instance responsibilities, intersections of physical processes, organizational mechanisms, financial dependencies, etc.)</p> <p>Q3: To what extent was (would be) there a need for spatially related integration which would for instance involve creating physical changes to support a better coordination of the workflows and processes?</p> <p>Follow up: How do (would) they relate to other sectors and organizations?</p>	
<p>BLOCK 2: Integration within content, process and procedure</p>	<p><u>Q1 [content]</u>: Which elements had to/ or (would) need to be combined for the new system, departing from the physical, functional processes that constitute this system?</p> <p><u>Q2 [process]</u>: Since integration seems to have played a role, in what way have you (would you need to start) started or strengthened working together with the different parties that prospectively were needed to make this system and its processes? In other words, how are the collaborations organized? This may involve regular meetings prior, during and post the establishment or the way you interact with each other as well as the spatial distance to each other, etc.</p> <p>Follow up I: Where do you or could (would) you see difficulties but also ease in working together? What were the organizational structures in that regard?</p> <p>Follow up II: And how does this affect the project?</p> <p><u>Q3 [procedure]</u>: Were there any important formal frameworks that enabled or hampered the interaction between the different sectors and all the parties you just described? This is meant to regard physical/ functional aspects as well as organizational aspects.</p>	<ul style="list-style-type: none"> •

<p>BLOCK 3: To what did the integration lead to?</p>	<p><u>Q1 [circular design]:</u> What are the main benefits of the circular design in place? / What do you think will be the main benefits of the circular design which is in the planning?</p> <p>Follow up I: Did the integration lever higher efficiencies of the system as well as other positive externalities?</p> <p>Follow up II: Did / is it likely the integration also help(s) implementing a new technology?</p> <p>Follow up III: In how far do you think, did this influence a certain level of improvement in your living environment and local sustainable development?</p> <p><u>Q2 [innovative business models]:</u> Did the integration contribute to implementing or creating an innovative business model related to the system? If so, how?</p> <p><u>Q3 [capacities]:</u> How do you think does/ did integration support the long-term orientation, user-friendliness, accessibility, cost-efficiency and smoothness of the system's value-chain?</p> <p><u>Q4 [enablers for cross-cycle and cross-sector performance]:</u> What are the main advantages of the project for the wider area/ community of Terschelling?</p> <p>Follow up I: How do you think the integration has led to a formally more stable environment that gives participants incentive to become part of it?</p> <p>Follow up II: Has this initiative also led to the introduction of other initiatives?</p>	<ul style="list-style-type: none"> •
<p>Additional</p>	<p>If we go twenty years further and imagine such a system was successfully set up, what would you imagine was important and needed to do so?</p> <p>Is there a role for spatially related integration? If so, to what extend?</p> <p>Is there enough knowledge on the island to operationalize circular initiatives that aim for optimal biomass valorisation in the first place?</p> <p>Hypothetically spoken and taken as an example: The island has a lot of tourism and therefore next to private households produces organic waste. In Zwette Leeuwaarden, such waste together with the sewage sludge are fermented and transformed into fatty acids. Through this</p>	

	<p>process, organic plastics can be produced and used for the production of new products. If an initiative on the island or you as actor would like to do such thing, is there any type of integration needed and what aspects would this relate to on the island?</p> <p>Follow up I: Who would need to be involved? Follow up II: In how far does spatial integration play a role here?</p>	
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Closing

Thank you very much for your participation. Is there anything left untouched that might be relevant for my research? Any suggestion for people I should speak to? Or documents I should study?

Re-explaining integration

Integration can take place internally, so within one sector, but also externally. It can be driven through policies and other formal frameworks such as regulations and laws but also informal processes, other than laws, policies et. Its major purpose is to make objectives, goals or also purposes and priorities between different sectors – for instance the gastronomy and waste management – more consistent and synergetic. This entails sharing goals or at least thriving for mutual goals.

In line with this, these shared goals, purposes, priorities or however they are understood materialize in the formal frameworks and operations that regard the system and here the system that surrounds the waste management of the initiative. Thus, underlying processes which help to realize these goals become more cohesive or better adjusted to each other. This involves improving the coordination of different forms of waste management or a crucial process of the waste management with a process of another sector where both sectors connect with each other. Further it could express itself in improving the attractiveness of using a certain system or parts of a certain system. For instance, the deposit and refund system of glass bottles would probably not work that well (assuming it works relatively well) when the facilities would be located in areas where they are badly connected to agglomerations of people and supermarkets.

APPENDIX III 3.3.3 INTERVIEW ANALYSIS – CODE MATRIX

The screenshot displays the 'Code-Relations-Browser' interface, which is used for analyzing interview data through a code matrix. The interface is divided into several main sections:

- Code Matrix (Top):** A grid where rows represent codes and columns represent interview transcripts. The 'aspects needing integration' code is highlighted in green. A tooltip indicates a relationship between 'circular design' (X-axis) and 'aspects needing integration' (Y-axis) with a count of 1.
- Code List (Bottom Left):** A hierarchical tree of codes with their respective counts. The 'aspects needing integration' code has a count of 20. Other codes include 'importance of integration' (18), 'process' (43), and 'context' (14).
- Transcript Viewer (Middle Right):** Shows a transcript from 'Sietze Haringa' with three segments highlighted in blue:
 - 147: Interviewer: But is it a driver? Is it like an enhancer or enabler?
 - 148: Interviewee: Certainly it can be an enhancer. But, but the... it's not bringing six people together with different disciplines, doesn't make something work. And having one people dreaming of a solution and going for it and going for it doesn't work either. There is works on your own level, but it cannot be scaled up to another level. So you have at the right time combine people that have good ideas, workable ideas, with people that make things possible, and will make possible the scaling up of things.
 - 149: Interviewer: Who are those people that make things possible?
- Coding List (Bottom Right):** Shows the selected coding for the highlighted text, which is '#01:02:58-5# Interviewee: Certainly it can be an enhancer...'.

APPENDIX IV CHAPTER 4.1 PESTEL ANALYSIS

POLITICS

TERSCHELLING'S VISION

The vision of Terschelling's citizens and politicians is to become a vital society by 2025 and reveals the inherent interest of the local government to keep the economy driving and the island attractive to citizens. This includes the island's role to provide for living space, job opportunities, learning and recreation as well as hospitality for touristic activities. A closer insight shows the extent of the current and local political support and whether with regards to material streams, they already materialised practically.

The fundament for this vision are three pillars: a strong society, a sustainable economy with sufficient employment opportunities and a valuable environment. To achieve a sustainable economy by means of factors the island considers factors that make part to process (collaborative activities) and enabling the capabilities and infrastructure to close the loop: cooperation, innovation, technology and dialogue which thereby also helps broadening and renewing the labour market and keep the island attractive (Gemeente Terschelling, 2015c). Entrepreneurs are seen responsible for innovating and looking for opportunities wherefore it is expected they join forces and enter a cooperation with other actors. In turn, the municipality clearly states its role as facilitator in "bringing parties together, encouraging consultation, participation in consultative and organisational structures and introducing an entrepreneurial fund" (Gemeente Terschelling, 2015c, p. 47).

Looking at what the island considers to sustain - its environment and therefore also one of its economically most viable assets, executing OBV- related initiatives could well fit the frame of the vision. This can be seen in that the island envisions itself to be self-sufficient concerning water and energy and to use and produce materials sustainably by 2020. For this, a role is seen in reusing different waste streams as well as in maximising the reusability of raw materials and products. Furthermore, the island considers potential in green growth – "ecological development with economic growth" (Gemeente Terschelling, 2015c, p. 62), where again activities that broadly fit activities of external integration (supporting each other, working together and "looking for the connection") are considered vital (Gemeente Terschelling, 2015c, p. 62).

ORGANIZATIONAL STRUCTURE

Looking at the governance structures of Terschelling, it can reveal the importance of how political support is currently framed on the island if it comes to the planning of circular initiatives in general and also to the extent of political influence citizens formally are granted by the government.

The municipality of Terschelling administratively is located within the province Friesland (Fryslân) and is locally governed by the Gemeenteraad – the city council. The latter consists of 11 members that each are elected for four years and represent the different parties of the Dutch government. Elections have taken place this year. Thus the next governing period stretches from 2018 – 2022 (Gemeente Terschelling, n.d.). Politically, the biggest party is the PvdA (36,4%), followed by the VVD (27,3%) and the Plaatselijke Belang (18,2%) (van Bijsterveld, 2018). Both, the constitution of parties and governing periods can be expected to influence the realisation of Terschelling's vision and potential bottom-up initiatives in the area of OBV.

Situated in a democratically-governed country, citizen involvement makes part of the governing practices. For example, opinions regarding topics that are set on the political agendas can legitimately be given during the meetings of the city council on behalf of private parties. These council meetings fur-

ther can publicly be followed via the internet. Since 2015, the city council furthermore introduced an informal working method which can be identified as a governance-like structure that builds upon conversations "between council members and stakeholders such as residents, institutions and entrepreneurs" (Gemeente Terschelling, n.d.a). A measure thus, which could indicate that maybe even unconsciously, activities of external integration are becoming more abundant on a procedural level of Terschelling.

STAKEHOLDERS

Due to its economic and natural assets as well as to fulfil the vision's ambitions and explore opportunities in the area of residual cycles are the business community including private recycling and waste-managing companies but also companies doing other business which broaden their scope. Such are for instance the companies representing the initiatives Duinhof b.v. and CupCompost. Additionally most important to mention with regards to the cases are two semi-governmental and governmental organisations, namely the local Wetterskîp and the municipality of Terschelling together with Staatsbosbeheer and the province (Gemeente Terschelling, 2015c). These so far have played a role in the case's development.

Staatsbosbeheer (National Forestry Service) is responsible for most of the island's physical maintenance and therefore also carry an important role also regarding the disposal of organic material that is removed from natural areas. The provincial and local councils are responsible for handing out environmental permits under the Nature Conservation Act (de Haan et al., 2014).

The Wetterskîp is the primary organisation to manage municipal water flows and thus also the cleaning and processing of residual waters. Its objectives are to contribute to the biobased economy, primarily with reusing the sewage sludge in different ways which they want to explore together with the different municipalities (Wetterskîp Friesland, 2016).

Other stakeholders that to a lesser extent have been involved or carry a governmental function are not further outlined. Either because they are not mentioned during the interviews, inhibit no further importance to answering the research question or are self-explaining by operational nature.

ECONOMY

The purpose of the economic section is to gain a better understanding of the economic positioning of Terschelling. The local economy influences the plausibility of external integration regarding an optimal biomass valorisation as every sector has different priorities and needs. Also, for doing integration for OBV, investments are likely needed, and sectors need to integrate. Investments might coincide with other plans and projects that are more favoured by parties from the same sectors. Lastly, interest is also given in funding opportunities for circular economy projects as this might counteract the reluctance on investing in projects that accumulate revenues more in the long-term.

DISPOSABLE INCOME AND THE ISLAND ECONOMY

Income and economic branch can be indicative of the possibilities given to circular initiatives and how external integration currently plays a role respectively is executed by different sectors. Be this that money is available for investing in new projects, the need to run a risk by making investments, but also where priorities of the sectors lie. This outcome, however, will only tell more in context with the input of the interviews.

Numbers show the average disposable income currently represents the third highest in Friesland (van Bijsterveld, 2018) and averaged 32.500€ per household in 2012 (Provincie Fryslân, 2015, p. 47). Besides, in 2014 only little unemployment was registered (5,5%) and according to a respondent's information unemployment still is considered very low (Provincie Fryslân, 2015, p. 44). Thus, the island can be considered one of the more wealthy spots of the Netherlands which is likely to relate to mainly its strongest economic branch: About 39% of all companies are allocated in the area of catering and trade, considered to relate to tourism (see orange colour, figure 8) (Gemeente Terschelling, n.d.b,d; Terschelling-info.eu, n.d.; van Bijsterveld, 2018). Visible also become other stronger economic areas possibly relate to the tourism sector.

With around 25%, Friesland economically is the strongest province in the tourism sector, followed by North-Holland, and welcomes around 500 000 visitors per year (including travellers via private ships). Further, high seasons have blurred for almost the whole year; only during some weeks after the Christmas break, the island becomes calm and primarily belongs to the Islanders (VVV Terschelling, n.d.a).

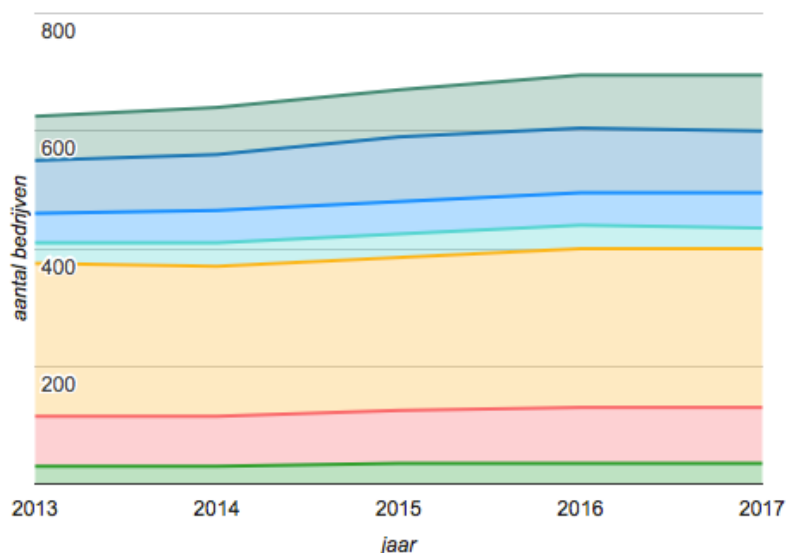


FIGURE 10: NUMBERS OF COMPANIES AND SECTORAL DIVERSITY BETWEEN 2013 – 2017 (VAN BIJSTERVELD, 2018), LEGEND: GREEN: AGRICULTURE, FORESTRY AND FISHERY, RED: INDUSTRY AND ENERGY, ORANGE: TRADE AND CATERING, TURQUOISE: TRANSPORT, IT AND COMMUNICATION, BLUE: FINANCIAL SERVICES AND REAL ESTATE, PETROL: BUSINESS SERVICES, PINE-GREEN: CULTURAL ACTIVITIES, RECREATION AND OTHERS

Comparing the industry sectors of Terschelling with the Netherlands, it can be concluded that the economy of Terschelling is substantially more focused on hospitality than the whole of the Netherlands.

Concurrently, such a strong focus on tourism and leisure is likely to cause a strong dependence on economically-related activities as well as the local landscape and nature carries the local attractiveness (Gemeente Terschelling, 2018; Smit et al., 2012). However, looking at another island that has started citizen-driven projects that successfully materialised, people were in real need and practically were forced to act upon the economic decline and concurrent unemployment (Heaslip et al., 2016). This situation cannot be identified on Terschelling. Subsequently, this could imply that as there is no ultimate urgency, local citizens, companies and governments are not significantly inclined to invest into and contribute to OBV-related initiatives.

FUNDING OPPORTUNITIES FOR CIRCULAR INITIATIVES

When it comes to funding circular initiatives, one should take into consideration a broader spectrum of possible funding opportunities under the term sustainable initiatives. That is because circularity contributes to sustainable development and possible funds seem to cover several areas that circular economy embraces.

In that respect, one primary source represents the Waddenfonds. The Waddenfonds is a jointly established financial subsidy program by the provinces Fryslân, Groningen and Noord-Holland with the purpose to support projects for the environment and economic development of the Wadden Sea area (Het Waddenfonds, 2016a). It focuses on nine different areas amongst which to “improve the socio-economic sustainability of local communities, and contribute to new networks of existing networks and where the initiative is a product of cooperation (multiple project partners contribute to the implementation)” (Het Waddenfonds, 2016b).

Further options are presented through and part-wise provided by the province of Friesland itself. On the one hand the provincial fund (Mienskipfûns) or the European LEADER program. The previous one calls on initiatives that improve the local livability. Topics which are considered relevant are in the area of liveability itself, social capacity and social innovation, culture, sustainable villages, cultural heritage and landscape (Provincie Fryslân, n.d.). LEADER specifically turns towards projects that develop the Frisian area in spatial terms, known for its vast horizons and flat landscape. Demands can be made for subsidies starting at 43.750€. In both cases, the *Streekwerk* is the agency that can be asked for support concerning the application and also receive knowledge support (Provincie Fryslân, n.d.).

Besides the previous programs, the European LIFE program, established in 2014, provides substantial monetary means for projects that focus on supporting environmental and climate action, each representing one sub-program (European Parliament and Council, 2013). For the period 2018 – 2020, the first sub-program has been assigned 1,24 bln €, comprising five categories for which initiatives may apply: environmental and resource efficiency, nature and biodiversity and lastly, environmental governance and information (European Commission, 2018a, p. 12; RVO, n.d.). The first category calls on smart business plans which also aim at introducing a circular economy on a local level and has been provided with 444,8 mln € for the whole of Europe (European Commission, 2018a, p. 12). Out of that, the Netherlands receive a substantial part each period and from 2014-2017 and thus far 143 projects have been co-financed in the Netherlands. Finally, initiatives can apply and get help via the Rijksdienst voor Ondernemend Nederland (RVO) (European Commission, 2016; RVO, n.d.).

SOCIAL

DEMOGRAPHICS

In 2018 Terschelling was inhabited by 4906 people. If compared to 2013, numbers have increased by 2% (CBS, 2018; van Bijsterveld, 2018). As visualised in figure 2, the age distribution currently shows a large share of citizens between 45-65 years old. Furthermore, the density of citizens decreases from west to east (van Bijsterveld, 2018), which possibly reflects the favouring of citizens and their economic activities to be positioned in close proximity to the significant infrastructure connection to the mainland: the harbour in West-Terschelling which carries economical and transport-related importance also with regards to the residual streams that would feed both initiatives.

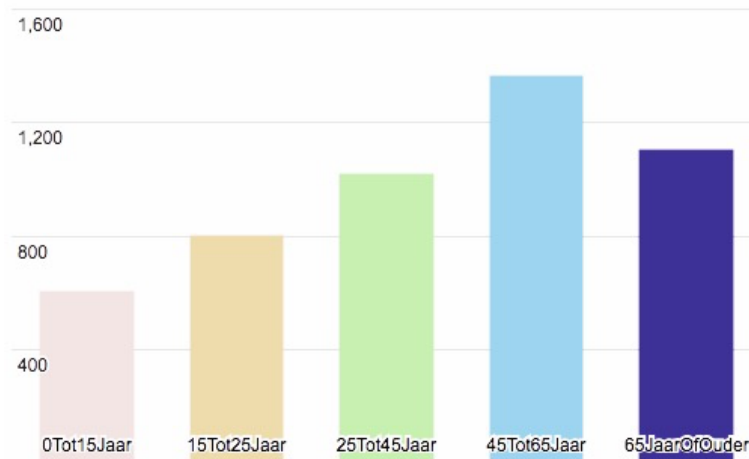


FIGURE 11: NUMBERS OF CITIZENS PER JANUARY 2018 DEPICTED ACCORDING TO THE RANGE OF AGE (VAN BIJSTERVELD, 2018)

The level of education meanwhile is difficult to define for Terschelling since the most recent census accessible in that regard stems from 2011. At that time 400 students followed primary school and 652 students followed a higher education track. On the island, multiple primary schools, one community school, a secondary school as well the possibility for higher education (nautical school) can be found (CBS, 2011). By what the demography and educational structure in context to the primary economic sectors depict, it can be assumed that contributive knowledge to the focus points of the circular economy might first develop on the mainland. That is because all higher education apart from a nautical school must be followed on the mainland. In the same vein, it is supposed that such knowledge relocates itself to the mainland corresponding with the job opportunities present for innovation and CE.

SOCIAL ACCEPTANCE AND ENGAGEMENT IN CIRCULAR INITIATIVES

To Terschelling applies that generally more seems to be done departing from the objective to carry out an energy transition. This can be concluded from that not only one of the pillars of Terschelling's vision TS25 strongly emphasises to become self-sufficient in terms of energy (through a variety of materials and resources) but also in the establishment of the local Energy cooperative in early 2016, *Terschelling Energie* (De Terschellinger, 2016). Its main goal is to spread renewable energy directly from the source and across the island whilst offering citizens the opportunity to benefit from private consulting, how to save and store energy at home. It follows the principle of Samsø by investing its returns in further local investments for renewables (Interviewee initiator Terschelling Energie, 2018). Going out from what the municipality is stating, there is undoubtedly a political openness towards sustainable initiatives in general (Gemeenteraad Terschelling, 2011; Waddeneilanden, 2014b). No such cooperative can be found whose aim it is to carry out circular initiatives and neither is it one of the foci of local energy cooperative (Terschelling Energie, 2016). Further can be assumed that alike in other regions and as often researched regarding bottom-up renewable energy initiatives, several success factors, may be decisive to enable bottom-up circular endeavours and related means and measures. These include for instance the prominent NIMBY (not in my backyard) effect (De Bakker et al., 2011) which ultimately also relates to physical, environmental and technological opportunities (Heaslip et al., 2016; Johnsen and Hermansen, 1999; Jørgensen, 2007; Wüstenhagen et al., 2007). Further, trust and understanding, key influencers, different cooperation opportunities (Bolinger, 2001; Walker, 2008) and favouring network structures (Heaslip et al., 2016), transparency (Safian, 2014) and finally suitable ways of communicating (Heaslip et al., 2016; Safian, 2014).

TECHNOLOGY

So far, no scenario study on what the technological opportunities for a circular economy are on the island has been finalised. However, two of the respondents communicated that the municipality in cooperation with Streekwerk and Haskoning B.V. is currently assessing all residual streams on all Wadden Sea islands, and thus also Terschelling. The objective is to find out, what materials are needed where, and at which locations the same or similar materials are considered waste. Thus it is aimed to building relationships how and where these materials can be re-used and further, whether an exchange between the islands would make sense to create local and regional synergies (Interviewee project manager Streekwerk, 2018; Interviewee sustainability officer Terschelling, 2018).

OVERALL IMPRESSION

As pronounced before, efforts still seem to aim more towards establishing renewable energies, even though it does not represent the sole objective as stated in TS25. Successively though, efforts show the intention to enable a local circular economy, related to organic materials, of which one of the outputs might also be renewables (see 4.3). Moreover, the current technological potential is closely interlinked with physical, environmental conditions as well as its development. Thus, timing combined with the previous settings also plays a role in providing opportunities for technological implementation. Therefore, assessing all residual streams is a first and necessary action to identify which technologies might be needed for what purposes. Upon providing such knowledge, more results can be offered in this category.

ENVIRONMENT

Since the realisation of projects of many kinds depend on the local physical-geographical circumstances (e.g. physical connections such as roads, technical facilities and necessary ground) it is viable to look at the geographical conditions on Terschelling. These conditions are likely to influence the projects in the planning (CupCompost, pyrolysis plant) as well as any other future circular initiatives to the extent that this depends on geographical space.

LOCATION

Terschelling is located in the area of Friesland-Noord, making part of the province of Friesland and is situated within the Wadden Sea Natural World Heritage Site (CBS, 2011; Meijer et al., 2016). Having developed into a barrier island during the 14th and 15th century, it now measures 84 km² in size. Of this, more than 56% is nature protected area (Terschelling-info.eu, n.d.). The island consists of various nature reserves, such as Terschelling's dune areas or the Boschplaat. These and basically all natural areas except the residentially, agriculturally and industrially used areas designated in the island's *bestemmingsplannen* (spatial zoning plans) have been put under the protection of the Natura2000 network since the introduction of the WHS status in 2009 (Meijer et al., 2016; Ministerie van Landbouw Natuur en Voedselkwaliteit, 2017; Provincie Fryslân, 2006).

ENVIRONMENTAL AREAS

With a size of 50 km² the Boschplaat is the Netherland's most significant nature reserve, inhabiting a broad diversity of plant and animal species that are typical and important for the ecosystem of the Wadden Sea area (Terschelling-info.eu, n.d.; van Bijsterveld, 2018). Furthermore, it is a designated

Dark-Sky site – the only one in the Netherlands –thus providing for good visibility of the outer space during nights as well as significant room to unique plants and animals (Meijer et al., 2016; VVV Terschelling, n.d.b). Next, to the Boschplaat, there are a variety of smaller but mostly accessible nature reserves. For instance, the Kroonpolders nature reserve, close by West-an-Zee, consists of a vast dune area which is ideal for dry grassland communities and abundantly used as a breeding ground by Wadden Seabirds. Besides, several forests and "Elzensingel-areas" cover the island. Those, like the planting and thereby fixing the dunes in earlier times is predominantly human-made and nowadays managed by Staatsbosbeheer (Gemeente Terschelling, n.d.d; Heimann, 2017; Terschelling-info.eu, n.d.).

HUMAN-USE-AREAS

The part which is used for built-up area and human use is situated south of the nature reserves and called *Terschellinger Polder*. Consisting of dunes and different kinds of vegetations, villages (except West-Terschelling) and the *Buitengebied Polder*, ascribed to mostly agricultural activities, and the *Bedrijventerrein* (industrial zone), it represents a transitional area from nature to human-used space (figure 3) (Dienst Landelijke Gebied, 2012; VVV Terschelling, n.d.d).

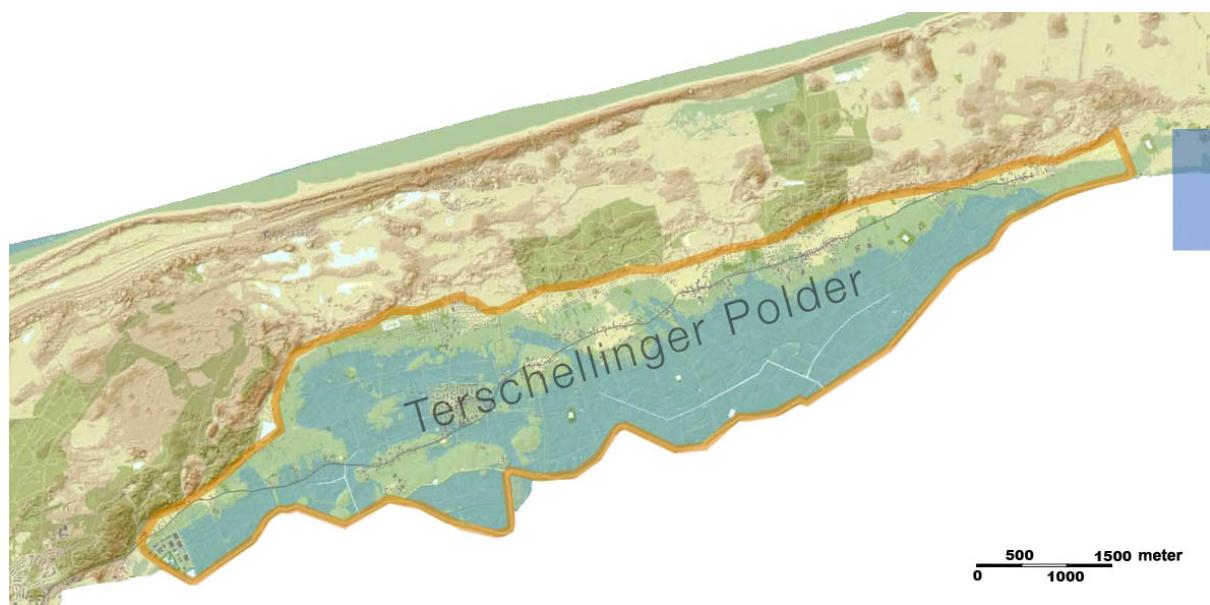


FIGURE 12: TERSCHELLINGER POLDER (DIENST LANDELIJKE GEBIED 2012, P. 12)

For the previous paragraphs can be concluded that although Terschelling has vast spaces in which human use can take place, much more of the island is under different protection status. Protection status might prohibit certain activities and therefore limit the environmental opportunities that relate to activities of circular projects within organic residual streams.

LEGAL

The final section focuses on the legal arena that generally surrounds Terschelling and which may regularly confront a wide array of projects, given these have a physical impact in the landscape. Looking at this side of the analysis reveals the spatial potential for new projects.

ENVIRONMENTAL

Most projects having a potential impact on the environment in any way are legally bound to be assessed through an environmental impact assessment (EIA, Directive 2014/52/EU) or also strategic environmental assessment (SEA, Directive 2001/42/EC). What projects need assessment are sometimes more, sometimes less concretely defined in the annexes of Directive 2014/52/EU and Directive 2001/42/EC (European Parliament, 2001; European Parliament and Council, 2014b). An SEA applies to mostly public plans and programs that incorporate a strategy and set out a framework for future development in a particular area in which public and private projects would need an EIA as well as type of infrastructure, town or land-use plan that require an assessment pursuant to the Habitats Directive (Directive 92/43/EEC) (European Commission, 2018b). Thus, an SEA applies rather to policies and strategies, an EIA to concrete local projects and plans. For example, an SEA is mandatory for programs for waste management, incorporating many aspects of infrastructural connections. An EIA would be required for the installation of waste facilities of any kind and any other element that refers to waste management – on a project base. An EIA generally is required for visually apparent elements in the landscape (roads, railways) and other projects that emit negative sensual and/or environmentally-harmful output as defined in the legislation (European Parliament and Council, 2014a). Examples may be odour, nuisance, toxins and others which represent a risk towards the environmental and human health, projects that might have a cumulative effect in combination with other projects in the surrounding as well as transboundary effects or also “effects on areas or landscapes which have a recognised national, Community or international protection status” (European Parliament, 2001 Annex II; European Parliament and Council, 2014a). The lists of criteria to determine a possible significance to EIAs is not long but of these results, many projects are a potential subject to EIAs and on a bigger, strategic level also SEAs taking into consideration the aspect of future development stated in the SEA. Yet, so far, no documents could be detected regarding whether the initiatives had to run through an EIA.

As outlined in the section on Environment, most of the island's surface is under nature protection status. The protection status implies that any human activity potentially counteracting the purposes of protection and conversation to the degree set in the respective legislations (e.g. Habitats Directive) are prohibited (European Communities, 1992; European Union, 2014). However, such prohibitions range from total closure of access up to allowances for passage on different routes (as is the case on Terschelling) or also periodical closure for passage according to environmental cycles and the resulting degree of sensitivity (Staatsbosbeheer, 2018). It can be expected that national environmental laws formally integrate the need for EIA and SEAs. However, with regards to the initiatives, no documentation of an EIA or SEA could be found.

SPATIAL PLANNING

Spatially-related laws which affect OBV to the extent known on Terschelling as well as that intersect with waste management and physical implications in the land-use are examined in the policy analysis (chapter 5.1).

However, legally, the island's surface is separated into different areas, standing under different procedures and related zoning plans. Because a zoning plan is implicitly laid out according to national and provincial procedures that have to be taken into consideration before setting up a zoning plan, the very same has ultimate legal effect in the respective area relating to how it may be used. Up to now, 40 of these plans exist for Terschelling. Furthers are in the making (Gemeente Terschelling, n.d.d).

Consequently, these zoning plans also reflect how visions from a national and provincial and local level are put into effect practically (see for instance (Gemeente Terschelling, 2015a)).

The zoning plans which are relevant for the cases of this thesis are the *Bestemmingsplan Buitengebied Polder* and the *Bestemmingsplan Bedrijventerrein*. Out of the previous results that the activities that CupCompost wishes for, do not accord with the zoning plan and the current policy on Terschelling. Out of the latter results that for the pyrolysis plan there are no apparent barriers to the activities that relate to the plan. Both will be further outlined in the section on the cases.

CIRCULARITY IN ORGANIC RESIDUAL STREAMS

As is shown in chapter 4.3 of the thesis, circular initiatives, even if allocated in the same area (OBV), employ and thus rely on technology, spatial structures as much as on organisational arrangements. Connected to spatial planning, any new infrastructure that is physically impacting the environment through being present – including technology – might need evaluation according to the laws described further above. However, since the circular economy and also OBV cannot point towards any specific type of technology that is needed, it is difficult to pick laws (Interviewee project manager Urgenda, 2018). Simultaneously, technology develops. Case-dependent on the physical structure of the circular system that is supposed to be implemented, here OBV, different laws are expected to apply. For Cup Compost applies at least one spatially-related law which has impacted the case's development (see chapter 4.3). It is also assumed that due to the newness of the circular economy and its physical and technological needs, technology and its development might not even be framed in laws and therefore might need special treatment.

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Appendix IIV

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