Sea, Sand and Sustainability

How can the beach pavilions at Scheveningen align themselves with The Hague's Climate Agreement?

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Eva Aarts | 4350480 | s2082748
Marin Visscher | 4763181 | s1479067
Tessa Baart | 4903927 | s2137291
Quirien Reijtenbagh | 4898370 | s2164051
Ankita Singhvi | 4283600 | s1976451

Preface

Each of us began the MSc Industrial Ecology from a different background, but with a similar ambition to work towards a more sustainable use of our natural resources. After months of studying in classrooms, we had the opportunity to put our knowledge to use in the 'real world' with this project. And to our enjoyment, the 'real world' in our case was Scheveningen beach!

We were commissioned to support the beach pavilions at Scheveningen in aligning themselves with the climate goals of the Haags Klimaatpact. We decided to focus on collaborative measures that they could take to make better use of energy, materials and water. We used the perspective we have developed in the last year from Industrial Ecology to develop three collaborative solutions and multiple other recommendations for the beach pavilions.

We have been working on this project two days a week for the last five months. We would like to extend our thanks to Hans van den Broek and Noortje Schrauwen, our commissioners. They made time to provide feedback on our work throughout the entire process, and made space for us to work at Hans' sunny beach pavilion The Shore. Both of their enthusiasm for our work infused us with enthusiasm as well! Furthermore, we would like to thank Sander Verschuren, who kindly allowed us to join him during his interviews, and from which we gained many valuable insights. Finally, we would like to thank René Kleijn for thinking with us throughout this entire project.

With our research, we focused on the importance of collaboration. As we wrap up this report and reflect on what we have learnt in the last five months, we realise that one of the main lessons was the importance of collaboration in our own research. Each of us brought a different perspective to the table, and with this, a different strength. The process of aligning our strengths has led to a more comprehensive result than would have been possible by any one of us individually.

Happy reading!

Eva Aarts, Marin Visscher, Tessa Baart, Quirien Reijtenbagh and Ankita Singhvi

Contents

Executive summary 5
1. Introduction 7
    1.1 The beach pavilions 8
    1.2 Haags Klimaatpact and the Green Key certification (MVO scan) 9
    1.3 Research aim 10
    1.4 Research questions 10
    1.5 Research approach 11
2. Contextualising ‘sustainability’ 12
    2.1 Sustainability and Industrial Ecology 13
    2.2 Sustainability and the Haags Klimaatpact 13
    2.3 Sustainability and the Green Key certification 13
    2.4 Sustainability and the VVS 13
3. Methodology 15
    3.1 Social analysis 16
    3.2 Technical analysis 17
    3.3 Best practises 17
    3.4 Opportunities for cooperation 17
    3.5 Opportunities for change 17
    3.6 Collaborative solutions 18
    3.7 Implementation and impacts of solutions 18
    3.8 Funding and initiatives 20
    3.9 Deliverable: a booklet 20
4. Social analysis 21
    4.1 Perspective of the beach pavilions 22
    4.2 Perspective of the municipality 23
    4.3 Actor analysis 24
5. Technical analysis 26
    5.1 Energy 27
    5.2 Water 30
    5.3 Materials 32
    5.4 Conclusions: Technical analysis 37
6. Best practices analysis 38
    6.1 Energy 39
    6.2 Waste 39
    6.3 Food and packaging 40
    6.4 Water 41
    6.5 Conclusions: Best practises 41
7. Opportunities for cooperation 43
    7.1 Actors that signed the Haags Klimaatpact 44
    7.2 ‘Green Champions’ in The Hague 44
    7.3 Conclusions: Opportunities for cooperation 46
8. Opportunities for change 48
    8.1 Infrastructure, logistics and climate adaptation 49
    8.2 Materials 50
    8.3 Energy 51
    8.4 Conclusions: critical moments analysis 52
9. Conclusions from analysis 53
    9.1 Summary of analysis 54
    9.2 Opportunities for collaboration 54
    9.3 The next step 56
10. Introduction to collaborative measures 58
11. Transport Hub 59
    11.1 A strategy for sustainable mobility 60
    11.2 Implementation: Step 1 61
    11.3 Implementation: Step 2 63

12. Collective biodigester 69
12.1 Anaerobic digestion container systems 70
12.2 Implementation 71
12.3 Impacts 73
12.4 Fit-to-objectives 74
12.5 Conclusions and discussion 77
13. Alternative terrace heating: Heating people, not places 78
13.1 Transition to alternatives 79
13.2 Implementation 81
13.4 Fit-to-objectives 86
13.5 Conclusions and discussion 88
14. Additional opportunities 89
14.1 Pavilions as 'Living Labs' for Smart City Den Haag 90
14.2 Solar Panel Switcharoo 90
14.3 Knowing your neighbours (and their food): Farmers market 90
14.4 Pavilion of the year 2030 90
14.5 Community building 90
14.6 Seawater for heating and cooling 90
14.7 Repurposing valuable waste streams 91
15. Individual measures 92
16. Funding and projects 94
16.1 Funds 95
16.2 Initiatives and projects 95
17. Conclusions 97
18. Discussion 100
References 102

Appendix A: Comparison Haags Klimaatpact and Green Key certification
Appendix B: Template interview pavilions social analysis
Appendix c: Interview Questions Noortje
Appendix D: Template interview pavilions technical analysis
Appendix E: MVO Scan 1
Appendix F: MVO Scan 2
Appendix G: MVO Scan 3
Appendix H: Overview information from interviews
Appendix I: Stakeholders
Appendix J: Technical analysis calculations
Appendix K: Interview Peggy & Eite
Appendix L: Additional information terrace heating options
Appendix M: Terrace heating calculations
Appendix N: Deliverable to commissioners

Executive summary

Context
The Haags Klimaatpact (Hague's Climate Agreement) was formulated as a statement of intent in 2018. This took the form of a document that states that various political parties, local businesses and the municipality aim to operationalise and localise the international climate goals to the context of The Hague. One of the parties that signed the Haags Klimaatpact is the Association of beach pavilions in Scheveningen (Vereniging van Strandexploitanten Scheveningen). Hans van den Broek and Noortje Schrauwen commissioned us to support them in helping the pavilions become more sustainable. With this research, we aimed to answer the research question: What collaborative measures can be taken to align the beach pavilions with the goals of the Haags Klimaatpact and how can they be implemented?

Research approach
We began by analysing the concerns and requirements of the pavilions and municipality. This was followed by a technical investigation of the material, energy and water use of the pavilions, where we found that the pavilions have a lack of detailed knowledge about their own energy, water and material use. We then gathered best practises for cooperation to learn how other organisations have optimised their use of material, energy and water use. Using this as inspiration, we inventorised the companies in The Hague that presented an opportunity for cooperation and found that they broadly fell into the categories: symbiotic exchanges of organic waste for food, upcycling plastic waste, collective green procurement, using a district heat network, alternative forms of transport and community building. Finally, we looked at the windows of opportunities in terms of critical moments and potential funding.

Based on the analysis, we proposed three collaborative measures, suggested how they can be implemented, and then evaluated their environmental, social and financial impacts.

Three collaborative measures
1. The Transport Hub: A significant part of a beach pavilion's yearly impact comes from trucks transporting goods to and garbage from the pavilion. Furthermore, truck movement is dangerous in an area like the boulevard which is dominated by pedestrians. Therefore, we propose a three-step strategy for decreasing truck movement and increase sustainable procurement. Step 1: Getting insight into transportation and procurement. Step 2: Collaborative procurement to decrease costs of sustainable products and number of suppliers. Step 3: A central location realised for the temporary storage of products; a Transport Hub. All the suppliers bring their products here, and then beach pavilions organise the 'last mile' from the Hub to their pavilion using electric bikes or vehicles.

2. Collective biodigester: Around 90% of waste created by the beach pavilions is residual waste, and roughly half of this is organic waste. We propose small-scale, onsite biodigesters operated per cluster of beach pavilions to convert this organic waste into valuable electricity.

3. Alternative forms of terrace heating: Most of the pavilions in Scheveningen use both the

gas and electrical heaters such as fireplaces running on gas and electrical heaters in parasols. The consumption of energy by terrace heaters is inefficient, and it is not possible for a single pavilion to discontinue their use for the fear of losing customers. Therefore, we propose five alternatives to the traditional terrace heaters that can be implemented per cluster of pavilions: heated tables, heated cushions for chairs, heated cushions for benches, heated benches and blankets.

These results, along with a list of individual solutions and funding opportunities for the beach pavilions are presented to our commissioners in a booklet (Appendix N) and a presentation for beach pavilions owners.

Key takeaways

The main lesson to be taken from our research is that there is no single measure that can be the 'silver bullet' for reaching The Hague's climate goal of net-zero carbon emissions. As with all complex tasks, this transition needs many steps to be taken in parallel. We recommend that the first step is gathering insight: the beach pavilions currently know very little about their own resource use and waste, so they should collect data to understand it better. This data can then be used to understand which collaborative measures would have the most environmental impact, which in turn would have to be supported by municipal and national government in order to spread the risk and initial investments needed. Armed with this knowledge, the next step can be formulated, bringing the beach pavilions closer to the climate goals of the Haags Klimaatpact.

1. Introduction

In this section, we introduce our topic, the beach pavilions and the Haags Klimaatpact. We describe our research questions and approach.

In 2015, 175 parties (including the European Union) signed the Paris Agreement in order to accelerate the global response to climate change. This Agreement emphasised the need to keep global temperature below 2°C above pre-industrial levels, and aimed to provide political support for countries to take action against the effects of climate change. The Paris Agreement asked all parties to state their aims in the form of nationally determined contributions, and required that they regularly and transparently report on their emissions and efforts (United Nations, 2015).

Following from the Paris Agreement, many regional and municipal governments have published agreements for reaching climate goals (Reckien et al., 2018). In The Hague, the Haags Klimaatpact (Hague's Climate Agreement) was formulated as a statement of intent in 2018. This took the form of a document that states that various political parties, local businesses and the municipality aim to operationalise and localise the international climate goals to the context of The Hague.

One of the parties that signed the Haags Klimaatpact is the Association of beach pavilions in Scheveningen (Vereniging van Strandexploitanten Scheveningen, hereafter referred to as VVS). Hans van den Broek and Noortje Schrauwen are important contributors to the VVS, and have commissioned us to support them in helping the pavilions become more sustainable, with the question: How can the beach pavilions at Scheveningen reach the climate goals for 2030 as stated in The Hague's climate agreement?

1.1 The beach pavilions

Our research focuses on the pavilions at the beach in Scheveningen, in The Hague. There are 56 beach pavilions in our research area; the beach area that sits between the harbour and the north end of Scheveningen (Figure 1.3). Most of these pavilions are a member of the VVS. The beach pavilions are restaurants or cafes, and some of them have a surf school in addition. Most of the beach pavilions are open between April and October, with some exceptions that are open year-round.

Scheveningen is one of the districts of The Hague, which is the capital of the province of South Holland and the third-largest city in the Netherlands. The combination of city and beach makes The Hague an attractive city for

Figure 1.1: The Vereniging van Strandexploitanten Scheveningen signed the Haags Klimaatpact on April 9, 2019 (Source: 070KlimaatPact, 2019)

Figure 1.2: Hans' beach pavilion: The Shore. (Source: Own image)

tourists. Furthermore the seat of the Dutch government is located in The Hague, so the city plays a politically important role for the Netherlands in setting an example to the rest of the country.

1.2 Haags Klimaatpact and the Green Key certification (MVO scan)

The Haags Klimaatpact is a pact created and signed by thirteen political parties and supported by another 300 organisations (e.g. companies, non-governmental organisations, sportclubs, banks) in The Hague (Haags Klimaatpact, 2018). The objective of the pact is to create a more sustainable city by 2030 by setting goals in terms of energy, food, buildings, jobs, education and transportation (Klimaatpact, 2018). In total 50 goals are set, spread over 12 categories (e.g. 'Exemplary function of the municipality.' and 'Food.'). The issue with the Haags Klimaatpact, however, is that its goals are very broad, making it easy to agree upon, but difficult to operationalise by companies.

The Green Key certification was developed to operationalise sustainable actions for companies. It is a voluntary eco-label, developed by the Foundation for Environmental Education for the hospitality branch (FEE, n.d.) and managed by Stichting KMVK (Stichting Keurmerk Milieu, Veiligheid en Kwaliteit). To earn the Green Key certification a business has to comply with a list of sustainable measures, some of which are mandatory, others of which are optional. These measures are clear and ready to be implemented right away, in contrast to the Haags Klimaatpact. The Green Key certifications are developed specifically for different types of businesses, including a certification for beach pavilions. This certification is translated to a MVO scan, corporate social responsibility scan. The scan is voluntary and will not provide a pavilion with a certificate. The Hague's municipality has financed twenty-five MVO scans at Scheveningen. The MVO scans help the pavilions gain insight in their sustainability performance, and reveal opportunities for improvement. Taken together, the scans give insight into the performance of Scheveningen's pavilions.

Considering that the overarching research question was to find out how the beach pavilions can reach the goals in the Haags Klimaatpact, the starting point of our study was to analyse the extent to which this MVO scan would allow the pavilions to reach

the Haags Klimaatpact. After all, it is not interesting to take into account measures already described by the MVO scan. However, since the MVO scan is explained in little detail but based the Green Key certification, we will compare the Haags Klimaatpact with the Green Key certification instead of the MVO scan. The differences and similarities are analysed to determine which goals will be relevant for this report (Appendix A).

We conclude that the goals of the Haags Klimaatpact that are not covered by the Green Key certification are the ones that require more than one actor to be involved to be accomplished. In other words, the Green Key certification focuses on individual actions that the pavilions can take to become more sustainable, but misses the measures in the Haags Klimaatpact that need cooperation.

1.3 Research aim

The Green Key certification lists solutions that the pavilions can take individually to become more sustainable, but it does not offer guidance for the goals described in the Haags Klimaatpact that require collaboration. Therefore, we consider it important to propose sustainable measures that the beach pavilions must take collaboratively in order to reach the goals described by the Haags Klimaatpact. We aim to propose measures, suggest how they can be implemented, and then evaluate the environmental, social and financial impacts of the measures. The result of the research is a booklet and presentation for the beach pavilions owners that describes three sustainable measures in detail.

1.4 Research questions

Our commissioners want to know how the beach pavilions at Scheveningen can reach the climate goals for 2030 as stated in the Haags Klimaatpact. In order to explore this topic, we formulated two main research questions, divided up into a number of sub-research questions:

1. What collaborative measures can be taken to align the beach pavilions with the goals of the Haags Klimaatpact?

- What are the needs (i.e. requirements and concerns) of the beach pavilions and the municipality?
- What are the material, energy and water inputs and outputs of the beach pavilions?
- What are best practises for cooperation that optimise the use of material, energy

Figure 1.3: Geographical scope of our research (Source: OpenStreetMap, 2015)

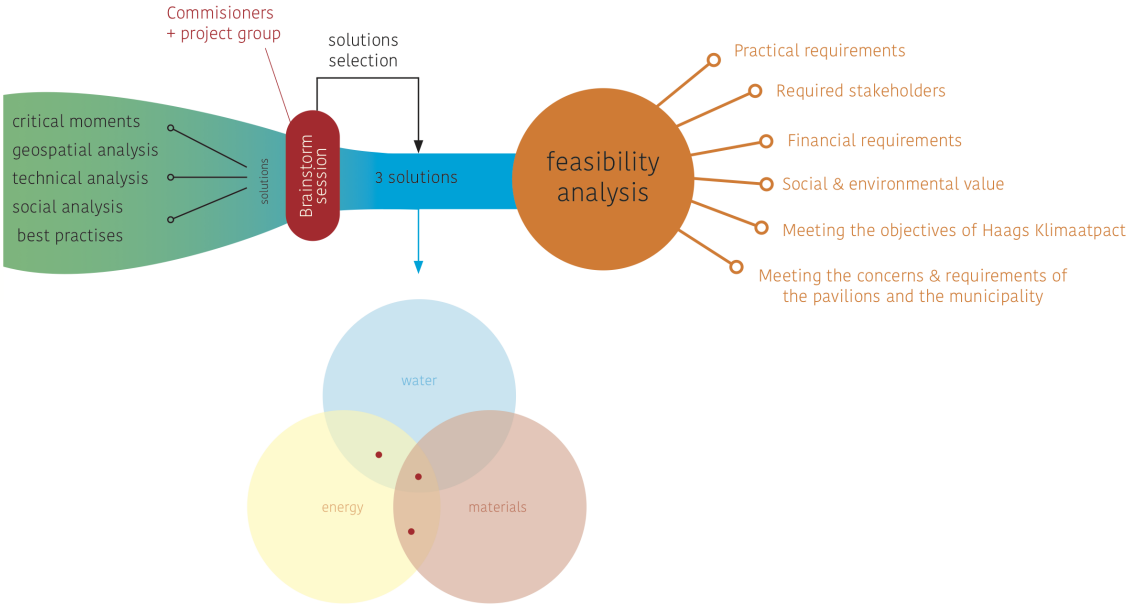


Figure 1.4: Research plan (Source: own illustration)

and water?
- Which companies and organisations offer opportunities for cooperation in the surroundings of Scheveningen?
- When are the critical moments that present an opportunity for changes to be implemented?

2. How can these collaborative measures be implemented?
- What are the requirements for implementation for each measure in terms of practicalities, stakeholders and financing?
- To what extent will each measure create social and environmental value?
- Which Haags Klimaatpact objectives are addressed by each measure?
- To what extent does each measure meet the needs (i.e. requirements and concerns) of the pavilions and municipality?
- What types of support are available for sustainable initiatives at Scheveningen?

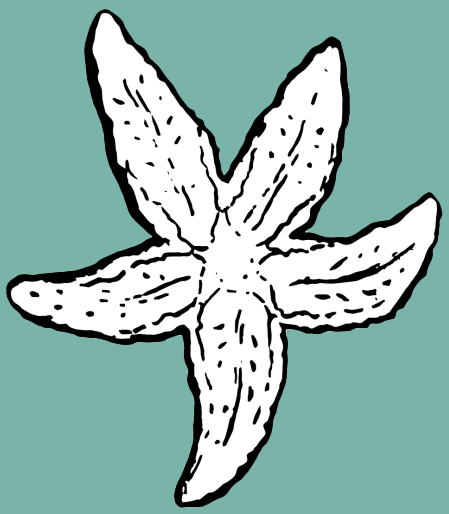
1.5 Research approach

Our research plan is displayed in the figure below (Figure 1.4). First, the focus of our research is on finding opportunities for collaboration. Second, we elaborate on three selected opportunities in depth to explore how they can be implemented and what their impact could be.

This report begins with a brief contextualisation of the role of sustainability. This is followed by a detailed methodology based on various theoretical frameworks. Each of the sub-research questions is then answered in turn, resulting in a number of measures that can be taken to aid the beach pavilions reach the climate goals for 2030. Our final deliverable to our commissioners is a booklet that describes these measures in detail, along with the practicalities of implementing them and their eventual social and environmental impacts.

2. Contextualising ‘sustainability’

The concept of sustainability can be considered from many different perspectives, and it is therefore essential to create a solid foundation on which this report will stand. In this section, we relate sustainability to the field of industrial ecology, to the Haags Klimaatpact, to the Green Key certification and to the VVS.



2.1 Sustainability and Industrial Ecology

The field of industrial ecology is relatively young, having been formalised in the 1970's and 80's (Graedel and Lifset, 2016). Graedel and Allenby's explanation of industrial ecology is:

"the means by which humanity can deliberately and rationally approach and maintain sustainability, given continued economic, cultural, and technological evolution. The concept requires that an industrial system be viewed not in isolation from its surrounding systems, but in concert with them. It is a systems view in which one seeks to optimise the total materials cycle from virgin material, to finished material, to component, to product, to obsolete product, and to ultimate disposal. Factors to be optimised include resources, energy, and capital" (Graedel and Allenby, 1995, p.18).

In short, the central aim of industrial ecology can be summarised as: defining solutions for sustainable use of materials, energy and capital from a systems perspective. Elkington (1998) expand the discussion from industrial systems to businesses, stating that businesses should take into account the triple bottom line: social sustainability, ecological sustainability and economic sustainability (people, planet, profit).

2.2 Sustainability and the Haags Klimaatpact

The Haags Klimaatpact states that The Hague strives to be 'climate neutral' by 2030, which means that it wants to achieve a net zero carbon footprint by 2030. The agreement is divided into eleven categories that cover different sustainable measures that would need to be taken for The Hague to reach this goal. Their ideas are summarised in Table 2.1.

From Elkington's triple bottom line, these categories take into account the planet and profit, but they do not explicitly take into account social sustainability. From a systems perspective, the ideas described in the Haags Klimaatpact require individual as well as integrated action from the municipality, businesses and residents of the Hague.

2.3 Sustainability and the Green Key certification

Like Elkington, the Green Key certification sees sustainability as actions that companies can take to expand the traditional bottom line from just profit to people, planet and profit. The main objective of the actions in the Green Key certification is ecological sustainability such as energy use reduction and waste separation. For social sustainability, there is attention given to measures such as purchasing of fairtrade textiles and wheelchair accessibility. From an economic sustainability point of view, although it is not explicitly mentioned, all the measures are assumed to be economically feasible, otherwise beach pavilions would not be willing to implement them.

2.4 Sustainability and the VVS

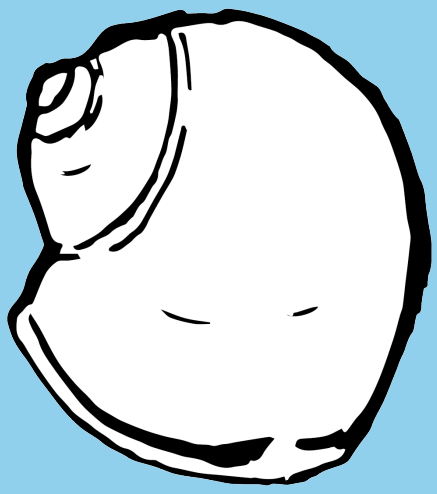
This research was commissioned by the VVS. Their view on sustainability is led by the Haags Klimaatpact, and therefore their goal is net-zero carbon emissions. Their focus is on materials, waste and energy. To this, we add that an excessive reliance on potable water is an important problem to take into account. With this holistic perspective of sustainability, we formulated a focus on material, energy and water for the rest of this research.

Table 2.1: Summary of Haags Klimaatpact, shows the twelve topics that the Haags Klimaatpact covers.

Topics	Examples of sustainable measures
Setting concrete climate goals	Setting clear, actionable goals and mid-goals for reaching climate neutrality, making all the *College van Burgemeester en Wethouders* accountable for holding to the Haags Klimaatpact
Municipality sets an example	Sustainable procurement, subsidising sustainable investments, discussions with fossil energy producers, etc.
Role of residents and companies	Stimulating, supporting and promoting local initiatives & cooperative and commercial entrepreneurship
Municipality facilitates actions	Organising a 'sustainability circle' for each sector, education on the subjects of sustainability
Energy transition	Energy transition towards renewable sources, starting from what is possible rather than what is perfect
Heat	Reducing the need for heating, increasing the mix of low and high temperature heat networks
Electricity	Giving attention to the matching of demand and supply of electricity
Dwellings	From 2020, every new building will be built 'climate neutral', housing corporations and residents will be stimulated to use heat pumps, sun collectors and solar panels
Climate adaptation	Urban areas will be made more adaptive to unpredictable and excessive rain and heat
Mobility	Priority to pedestrians, cyclists and public transport
Circular Economy	Material passports, burning less waste, inventorising and bringing together companies that want to be 'circular' together
Food	Supporting food that is local, healthy, seasonal and vegetarian

3. Methodology

In this section, we describe the methodology per sub-research question. In other words; we describe what information we were seeking, how this data was collected, what the underlying theoretical framework was (where this was needed) and what form the result took.



3.1 Social analysis

What are the needs (i.e. requirements and concerns) of the beach pavilions and the municipality?

3.1.1 What are the needs of the beach pavilions?

In order to understand the requirements and concerns of the beach pavilions we conducted semi-structured interviews with three beach pavilion owners in collaboration with Sander Verschuren. Sander is a MVO (corporate social responsibility) assessor; he was collecting qualitative data in order to do an MVO inventorisation of Scheveningen and kindly allowed us to join him and ask extra questions at his interviews (MVO scans).

We asked questions regarding how the beach pavilion currently operate, how extensive their current collaboration network is and what their standpoint is concerning collaboration with other pavilions, what they think about sustainability, where their concerns lie for reaching climate goals and what their requirements could be to implement sustainable measures. A template of the questions we asked during the interviews is given in Appendix B. In addition to these interviews, Sander provided us with data from 4 other MVO scans he had already conducted. In total, we were able to extract the concerns and requirements of 6 beach pavilion owners to answer this research question.

3.1.2 What are the needs of the municipality?

In order to understand the municipality's perspective, we arranged three semi-structured interviews: one with the project manager of sustainable entrepreneurship within the municipality, one with the beach and boulevard managers located in Scheveningen, and one with one of the initiators of the Haags Klimaatpact from Fossielvrij Den Haag. We asked questions about the expectations of the municipality for the beach pavilion owners, what their own plans are for the coming years and what they see as their biggest hurdles in the near future. The questions for these interviews can be found in Appendix C.

3.1.3 Which other stakeholders are relevant to the beach pavilions and involved in moving towards the Haags Klimaatpact?

Additionally, we inventorised any additional actors with an involvement in the beach pavilions that could eventually be relevant for finding opportunities for sustainable measures. The stakeholders were retrieved from interviews with Noortje, and online research. We defined 1) these stakeholders' resources availability, 2) their goals with respect to the Haags Klimaatpact and 3) their relevance to our research.

With respect to resources, Klijn and Koppenjan (2015, p.268) define five types of resources: knowledge, legitimacy, financial resources, competencies and production (Table 3.1) that could be useful in solving policy problems. Goals with respect to the Haags Klimaatpact mean what a stakeholder does or could do in order to reach the objectives within the Klimaatpact. Relevance to our project defines what a stakeholder could mean to us and ultimately the beach pavilion owners.

Following the inventorisation of stakeholders and their available resources, their goals and relevance, we created a visualisation of the stakeholder network and their interdependencies concerning the Haags Klimaatpact.

Table 3.1: Five types of resources needed for solving policy problems, according to Klijn and Koppenjan (2015, p. 268-269)

Resources	Description
Financial	The financial resources (e.g. subsidies, budgets, money) available for the realisation of projects
Production	The resources necessary to realise solutions (e.g. services and policies)
Competencies	The formal authority of decision-making
Knowledge	Information and knowledge availability
Legitimacy	The resources that can be used to create support for a certain solution or measure.

3.2 Technical analysis

What are the material, energy and water inputs and outputs of the beach pavilions?

In order to minimise the environmental impact of the beach pavilions, they need to use energy, water and materials more efficiently. The way they use raw materials has to shift from a linear take - make - consume - dispose point of view to a more circular approach, where by-products of one company should be used by another as input of processes and where waste is minimised (Brennan, Tennant & Blomsma, 2015; MacArthur, 2013). The aim of the technical analysis was to identify the main areas that could be optimised when it comes to energy, water and material. This was done by analysing the inputs and outputs of energy, water and material through the beach pavilions at Scheveningen. Data was collected from six MVO scans, academic literature and grey literature.

The yearly electricity, gas and water use was retrieved from four MVO scans of pavilions at Scheveningen. Assumptions about the environmental impact ($CO_{2\text{-eq}}$) and costs of energy and water input were based on academic and grey literature. The output of energy and water was based on the lists of appliances present at the pavilions gathered via the interviews at the pavilions (Appendix D). The use of these appliances was calculated based on academic and grey literature. Data for the material input was conducted through a literature review, looking at analyses from different case studies. Data for the material outputs came from one pavilion, where the owner gave us information on the waste collection in an interview, e.g. how how often waste bins are emptied. Specifically for the material analysis there was very little information available, both from the pavilions as well as from studies conducted online. We found the pavilions to be withholding with all documents that could giveaway financial information. However, we were still able to make calculations with the information from our interviews with the pavilions (Appendix D). Due to large variations between pavilions, it should be taken into account that conclusions from this analysis are not fully representative for all pavilions at Scheveningen beach.

3.3 Best practises

What are the best practices for cooperation that optimise the use of material, energy and water?

Best practices can be used to learn how to improve a company's sustainability performance. For example, companies can learn from how other companies dealt with similar problems in the short- and long-term (Davies & Kochar, 2000).

In order to provide useful learning from best practices, companies' practices should be related to their actual performance (Davies & Kochar, 2000). For our report this meant relating best practises to the performance of beach pavilions in our three categories of interest: energy, water and material. For energy, we focused on sustainable energy supply possibilities. For water, we focused on best practices for sustainable water use solutions. For material, we chose to conduct research on the best practices for procurement and waste management. The best practices were found through multimedia research; this included desktop research beyond academic literature, and interviews with inspiring companies or initiatives, in person and by phone. The best practises were then translated into opportunities for the beach pavilions to optimise their use of energy, water and material.

3.4 Opportunities for cooperation

Which companies and organisations offer opportunities for cooperation in the surroundings of Scheveningen?

The goal of this analysis was to find opportunities for exchange of materials and energy between the pavilions themselves, and with the surrounding companies. To find these potential symbiotic relationships between a pavilion and its surroundings, we began by exploring the other parties that had signed the Haags Klimaatpact, and had therefore already shown intention to become more sustainable. We systematically went through the entire list of signees of the Haags Klimaatpact, and read their websites. We clustered them according to opportunities for collaboration they could present to the beach pavilions. Furthemore, we considered the companies that Duurzaam Den Haag views as 'Green Champions' and therefore proven sustainable frontrunners. Then, using the best practises as a foundation, we proposed opportunities for cooperation. This resulted in a list of potential cooperative measures that could optimise the use of energy, water and/or material.

3.5 Opportunities for change

When are the critical moments that present an

opportunity for changes to be implemented?

The multiple streams framework proposed by Kingdon (Zohlnhöfer, Herweg, & Rüb, 2015) suggests that in order for an idea to move from concept to implementation, three streams need to encounter: the problem, the solution and the political will. The moments in which this happens are defined as 'policy windows'. These critical moments can determine whether the implementation of a new project will succeed or fail. Although it is not possible to predict exactly which conditions are necessary for a project to succeed, it is possible to inventorise when critical moments could take place. We analysed government publications and agendas to deduce critical moments leading up to 2030. We reviewed relevant vision documents related to our three categories: materials, energy and water. For materials, we looked at The Hague's vision on circular economy, waste management and logistics. For energy, we looked at The Hague's energy transition agenda. For water, we looked at their climate adaptation vision. This resulted in a list of critical moments where the conditions look right to implement various sustainable measures.

3.6 Collaborative solutions

Which collaborative measures can be taken to align the beach pavilions with the goals of the Haags Klimaatpact?

In a day-long brainstorming session, we systematically went through the conclusion of each of the previous analyses, extracted potential ideas and then expanded on them. We elaborated each 'opportunity' into a concrete measure that could be taken to align the beach pavilions with the Haags Klimaatpact. It was a creative, iterative process, in which we followed Osborn's principles: go for quantity, withhold criticism, welcome wild ideas and combine ideas to improve them (Putman & Paulus, 2009). At the end of the day, we had a long-list of solutions to present to Hans & Noortje.

In order to take our research a step further, we decided to narrow down the long-list into a short-list of three solutions so that we could work them out in more detail. This would allow us to present a more valuable deliverable to our commissioners. Therefore, we organised a meeting with Hans & Noortje in which we pitched each idea from our long-list. In the end, only Noortje was able to attend. She provided feedback, and chose three solutions that would be most exciting. She also asked that we briefly expand on all the solutions we proposed, even though we could not go into as much detail as the three solutions. The three solutions were individually characterised as a product, an asset and a strategy.

3.7 Implementation and impacts of solutions

3.7.1 Implementation

What are the requirements for implementation in terms of practicalities, stakeholders and financing?

To describe the implementation of each solution we discussed what is required to realise it within the context of the beach pavilion owners. We did this in three dimensions: practical requirements, required stakeholders, and financial requirements. Each dimension was described relating to a hypothetical example, keeping within the scope of this study.

Practical requirements

Within this dimension we described what is physically needed for the solution to be implemented. This could be done in terms of infrastructure, technology and/or space. A list of requirements was generated, and then later used in the financial analysis to show the costs. For this dimension we split up our method for the three different forms of solutions, since they require different approaches:

For strategies, the practical requirements were based on our previous knowledge, similar cases, and interviews with experts.

For products, the practical requirements were formulated based on grey literature. We discussed the advantages and disadvantages of the installation, safety, usability and attractiveness for customers.

For company assets, the practical requirements were based on technical factors (e.g. operatibility, maintenance and constructability), following the feasibility framework of Dey (2002). Additionally, we put some emphasis on the legislative aspects of the project, since these could become hurdles for project implementation. To analyse this, we carried out an interview with the boulevard managers of Scheveningen Beach.

Table 3.2: Summary of the two different forms of capital

Social and organisational capital. Creating social cohesion, trust and stability through:	Environmental capital. Creating a safe environment through:
relationship/network building, communication and interactions	reducing the amount of pollutants into the environment (e.g. emissions)
knowledge sharing, shared behavioural norms/attitude, teamwork and (new) interactions	preserve quality biodiversity and wildlife
institutional, legislative and political arrangements	Reduce use of natural resources and fresh water

Stakeholder requirements
Within this dimension we discussed who should be involved in implementing the solution. In other words, which stakeholders have a big role to play in bringing the solution to life, and/or in maintaining it, and which stakeholders could be barriers to the implementation of the measure. We used Klijn and Koppejan's framework (2015), and sorted the stakeholders according to the resources they have (Financial, Production, Competencies, Knowledge, Legitimacy). Most stakeholders came from the social analysis, others were found through desk research. Per solution, a table similar to Table 2 was made, to give an overview of which stakeholders are important, and why.

Financial requirements
Within this dimension we laid out the financial costs associated with realising the solution. Since a full cost-benefit analysis or calculating the payback time was outside the time limitations of this study, we focused on describing the costs. Price tags were estimated for the practical requirements laid out earlier using desk research and interviews. This price should provide a foothold for owners to estimate whether the solution is worth investing in.

3.7.2 Impacts
To what extent will each measure create social and environmental value?

Furthermore, we looked into the impact of a project in terms of value creation. This value creation goes beyond the economic value of cost and benefits. According to Ekins et al. (2008) there are four forms of capital: manufactured capital, human capital, natural capital and organisational/social capital. The measures we proposed attribute to natural capital and organisational/social capital. Therefore, we qualitatively evaluated the attribution of the measures to these forms of capital (Table 3.2).

Social capital
Social capital is value creation on a community or societal level. Social capital is mainly created by social relationships, as it involves network activities that create cohesion and social interactions among its members. For example, linking companies to other companies and institutions like the municipality of The Hague will constitute a form of social capital. In addition, organisational capital is part of social capital. This is about knowledge sharing, behavioural norms, teamwork and the way of interaction (Ekins et al., 2008). Institutional, legislative and political arrangements are also a part of social capital, as they create trust and stability.

Environmental capital
Natural or environmental capital is the part of nature that provides directly or indirectly human welfare. A project can also negatively affect natural capital when it causes damage to nature. Certain indicators set up by the Economic Co-Operation and Development (OECD) can measure the contribution to natural capital. Pollution issues the OECD mention are: Climate change, water and air quality, ozone layer depletion and waste. Accordingly, the resources that should be preserved or used sustainably are water, land, mineral, forest and energy resources. Additionally, preserving biodiversity and wildlife is also part of natural capital. With respect to our research, we discussed each solution on how it could affect pollution issues

and resource depletion. For example, we estimated total energy savings of a certain project and, subsequently, related avoided carbon emissions. As a result, we could roughly estimate the project's contribution to mitigating climate change.

3.7.3 Fit-to-objectives

Which Haags Klimaatpact objectives are addressed by the proposal?
The measures are compared to the goals of the Haags Klimaatpact, in order to justify their ability to reach the commissioner's objectives. For each solution, this comparison is summarised in a table.

To what extent does the proposal meet the needs (i.e. requirements and concerns) of the pavilions and municipality?
The measures are compared to the requirements and concerns of the municipality and beach pavilions that were found from the social analysis and interviews.

3.8 Funding and initiatives

What forms of support are available for sustainable initiatives at Scheveningen?
In addition to the collaborative measures we propose, Hans and Noortje were interested in an inventory of the existing funds that are available to the beach pavilions at Scheveningen to support their sustainable initiatives. Therefore, we did desk research to accumulate all the funds and initiatives that are currently available for aligning the beach pavilions with the Haags Klimaatpact.

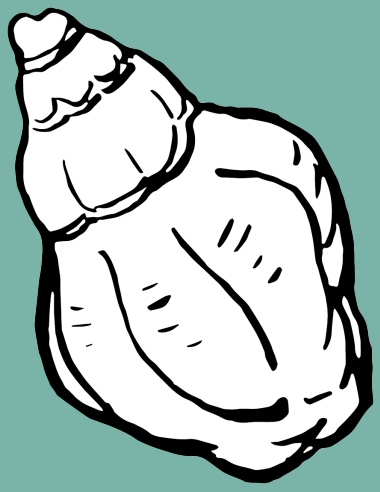
3.9 Deliverable: a booklet

In order to deliver our research in a form that is valuable to our commissioners, we collaboratively chose to make a booklet that summarises our measures in a shorter, more readable, and nicely designed version for the beach pavilion owners and municipality. We will distribute this booklet when we give a presentation to beach pavilion owners. The presentation and booklet will be in Dutch, as requested by our commissioners, to lower the threshold for the beach pavilion owners.

4. Social analysis

What are the needs (i.e. requirements and concerns) of the beach pavilions and the municipality?

In this section, we present the results of the social analysis, an exploratory analysis identifying the different perspectives of important stakeholders and their interactions. We discuss the results of our interviews. This section consists of three parts; the perspective of the beach pavilions, the perspective of the municipality and the actor analysis.



4.1 Perspective of the beach pavilions

The three interviews are shown in detail in Appendix E, F and G. They are compared contrasted with each other in Appendix H, and with an overview of how the owners of the three beach pavilions look at energy, waste, cooperation with other pavilions, communication with the municipality and sustainability in general. Below, we summarise the results to answer the question: What are the needs of the beach pavilions?

4.1.1 They do not know where to begin

From the interviews it became clear that the owners are often uncertain where to start with implementing sustainability. Initial steps are taken, but they do not know how to continue. They are unsure what sustainable measures are possible, and whether their pavilions fulfils requirements to implement them. They ask 'Will I address the right issues, and in the right way?' and 'Does my pavilion fulfil the requirements needed for different sustainable measures?'.

Sufficient information on possibilities and their pros and cons, as well as sustainable alternatives and costs should be provided when aiming for the implementation of sustainable measures. This way the pavilions can overcome their concerns and make decisions based on enough reliable information.

4.1.2 Sustainable choices are considered more expensive

There are also differences in the way the owners think about costs. Costs can be an issue, but some pavilions mention that profit should not be of highest interest. Mentioned by all pavilions is that sustainable initiatives are more expensive than less sustainable products or services. One pavilion mentions that the most important thing is to create awareness among customers when working towards a sustainable menu. Sustainable cooking is still more expensive, and customers find that difficult. Awareness could overcome this. Sustainability is often used as a marketing tool, for example local fish is pointed out at the menu, as well as bread from local bakeries. On top of that, pavilions mention that they do not want to switch to only local products, as 'some customers just want salmon' for example. Therefore, making more subsidies available for sustainable measures more would help in reducing the cost threshold and increasing profitability.

4.1.3 Most pavilions are only present in the summer season

The municipality, Rijkswaterstaat, Hoogheemraadschap Rijnland and Delfland, the water boards, are responsible for permits that allow a beach pavilion stay year-round (The Hague municipality, 2015), as opposed to being built and deconstructed seasonally. This means there is a distinction at Scheveningen between year-round pavilions and seasonal pavilions. Some pavilion owners have stated that they find communication from the water board unclear on why a pavilion cannot be year-round. Some pavilion owners consider being a 'year-round' pavilion as necessary to make changes such as installing double glass windows, better insulation or solar panels.

All pavilions seem to be interested in using solar panels, but for the seasonal pavilions this is difficult because of roof instability, storage in winter and the fragility of the panels. On the other hand, other pavilions have shown that it is possible to place solar panels on not permanent pavilions. An example is one pavilion that has solar panels placed on its flat roof, which seems 'more reliable' than slanted roofs to most owners. A pavilion at the Zuiderstrand even has a slanted roof with solar panels, and says it is definitely doable. Opinions vary, it is necessary to provide enough information on different possibilities when aiming for a larger use of solar panels.

4.1.4 Electricity grid is not powerful enough

The pavilion owners mention that while they all want to switch from gas to electricity, this is not fully possible. The pavilions have a 3 times 63 ampere connection to the grid, which is not sufficient to connect all appliances to. A missed opportunity concerning the pavilion owners, as enough power is needed to make sustainable choices. It may be interesting to explore if and how the pavilions can switch from gas to electricity, taking energy cooperatives into account. It looks like subsidies are sometimes applied when it comes to gas appliances, but sometimes the time and effort required outweighs the benefits of applying for one.

4.1.5 Alternatives to plastic may not be hygienic

The initiative 'Plastic Vrij Terras' is upcoming at the beach of Scheveningen. Multiple pavilions have the ambition to ban single-use plastics. Some pavilions have already eliminated single-use plastics, others are still

looking for alternatives. Costs, hygiene and appearance are seen as concerns with banning plastics.

4.1.6 Waste is not separated

The challenge of waste in beach pavilions is enormous. The municipality states that waste cannot be kept outside due to sight pollution, however pavilions create little storage space for waste inside. This makes separating multiple waste streams difficult. An example is the pavilion on the 'zwarte pad', that cannot separate waste, also not glass and paper (which is mandatory by law), as they do not have the facilities to do this and a transport route for the waste collector is not present. This is a problem that is mainly caused by the municipality according to these beach pavilions. With a collaborative movement between pavilions they think they may have a better chance of success.

Furthermore, food scraps and plastic are never collected separately. The main reason is that the pavilions believe that the plastic waste would be thrown with the residual waste when it is picked up by the waste collectors. There is distrust in the system. For food scraps, for example a compost bin on location could be a solution to not throw these scraps with the residual waste. However all pavilions state that they do not want this bin on their ground, as they would lose space for their pavilion this way. Also, if such a bin would be provided, it should not be far away, as this would make the threshold to bring the food scraps to the bin too high. Furthermore, waste processing costs increased considerably. Considering these waste issues, it would be of great interest to look at collaborative solutions that take into account space and convenience of separating waste, as well as waste processing costs.

4.1.7 Cooperation is difficult due to a multitude of suppliers

All pavilions that are interviewed stated that they would be interested in cooperating with other pavilions. However, because of the multitude of suppliers per pavilion, this seems to be difficult as of now. It is mentioned though that collaborative procurement would enable the possibility to indicate at the supplier that they want for example plastic-free supplies. When multiple pavilions ask for this at the same supplier, it becomes more likely that it is actually implemented.

Currently there is room for better cooperation between the beach pavilions. Contact with other pavilions is not much present, and if there is contact, this is mostly based on a personal level rather than on a business level. When working towards collaborative sustainable opportunities, this should be taken into account. However, there are examples where cooperation is present, and helps working towards a more sustainable environment. An example is the pavilions on the sports beach that did join efforts and have a joint agreement with a single waste company. Also, the sustainability committee from the VVS is established and within the last half a year multiple joint actions have been taken, as the Plastic Free Terrace initiative. "In the sustainability committee the cooperation is working out really well and vibe is very positive" (Noortje Schrauwen). Although cooperation is performing well, Noortje states that pavilions still want to be in control when it comes to for example replacing single-use plastics, to be able to implement own styles and preferences. The pavilion owners doe see sustainability can be a competitive strategy, and keeping control gives them the opportunity to take competitive roles. In order to let cooperation take place, this competitive setting should become as small as possible and it will for example be necessary to build trust between the pavilions.

Contact with the municipality is fine in itself. However, the pavilion owners believe that the municipality could be more open to change, and could help more with the implementation of ideas. How the municipality could help differs per pavilion, as all pavilions have different priorities. Communication could be more clear, an example of unclear communication is the renovation of boulevard of Scheveningen, where it is not known when and what will happen. Therefore pavilions do not know where they stand and what they can expect for the near future; will there be a sufficient electricity network, and how about transportation options? When aiming for collaboration between the pavilions and third parties, it could be possible that the municipality is involved. If so, it is important that these communication issues are dealt with.

4.2 Perspective of the municipality

What are the needs of the municipality? Since the municipality of The Hague is a big organisation and the Haags Klimaatpact is very broadly constructed, it proved hard for us to get an unambiguous perspective from

the municipality. Our preliminary interview was with Noortje, who is hired by the municipality to guide the 'Duurzaamheidskring Strandpaviljoens'. We found that much of the knowledge on sustainability topics is scattered throughout the organisation and different departments. Moreover, general experts of sustainability at the municipality do not necessarily know about the practical case of the beach pavilions, and people who are actively involved in the local situation of Stadsdeel Scheveningen are not actively working on sustainability topics. The initiatives like the Duurzaamheidskring, which are supported by the municipality, do create a platform in which these links and integrations are made effectively.

4.2.1 Interview with Inge Helder

Inge Helder is project manager and sustainable business advisor, employed by the municipality. She explains that the Haags Klimaatpact is a sustainability ambition drawn up by a number of political parties prior to elections. The current College of Mayor & Alderman works with a different document: de Kadernota Duurzaamheid. This document is fully supported by all members of the city council and states ambitions and priorities in becoming a more sustainable city for 2018 till 2022. Our interview showed that the municipality will primarily initiate and support sustainable change through bottom-up approaches. This means that they do not just give subsidies, but usually finance cooperation groups with the aim of making participating companies more sustainable (Duurzaamheidskringen). Inge notes that the beach pavilions have united in their sustainability ambition, but do not yet seem to see the municipality as a fully-fledged partner. Pavilions mainly look at the town hall for financing their own plans and less for co-creation on ambitions. She states that each individual beach pavilion has something to gain from becoming more sustainable. But that cooperation between beach pavilions (along the Dutch coast and/or only in Scheveningen and Kijkduin) could provide great added value. Finally, she mentions that the hospitality sector is very important for the municipality of The Hague. It is a huge economic factor in the city and a job driver for the lower end of the labour market.

4.2.2 Interview with Joeri Oudshoorn

Joeri Oudshoorn is one of the initiators of the Haags Klimaatpact. We interviewed him to gain a general view on the municipality and his vision on the Haags Klimaatpact. He views The Hague has having an obligation to become sustainable faster since it has no industry, is quite rich and is located in an area with potential for sustainable energy generation. He states that change should be instigated bottom-up, but feels that the municipality is not doing enough to instigate this change because it has more attention for big, fossil players instead of local, renewable initiatives. Joeri says that for a fair and fast transition it is necessary that all investments are not made in temporarily improving the situation and then lose their value after the transition has been finished in 2030. According to Joeri the municipality is approaching this transition as 'business-as-usual', which is a large barrier.

4.2.3 Interview with Peggy ten Hoopen and Eite Levinga

Peggy ten Hoopen and Eite Levinga are the beach and boulevard managers at Stadsdeel Scheveningen (municipality The Hague) respectively. They told us how contact with the municipality works in practice and how it is relevant for our project. They explained that being between city centre politics and local businesses means taking a lot of perspectives into account. Something may be very valuable to a beach pavilion, but not so much to citizens living there, or visitors of the boulevard. Currently the Executive Board is very diverse; ranging from a progressive to conservative attitude towards sustainability. This makes it hard to find enough support within the council for the sustainable measures they want to take, as each change needs to satisfy every part. Getting a new sustainable measure approved by the city council can take more than six months. If, on the other hand, there is already interest from the municipality for a sustainable measure from the beginning, they are likely to appoint a project manager themselves.

4.3 Actor analysis

Which other stakeholders are relevant to the beach pavilions and involved in moving towards the Haags Klimaatpact?

The full results of the analysis can be found in Appendix I. Four different stakeholder groups were identified, mostly based on location; 1) 'Stakeholders at Scheveningen', 2) 'Stakeholders at the municipal building of The Hague', 3) 'Overarching stakeholders throughout The Hague' and 4) 'Third parties for collaboration'. This is illustrated in Figure 4.1.

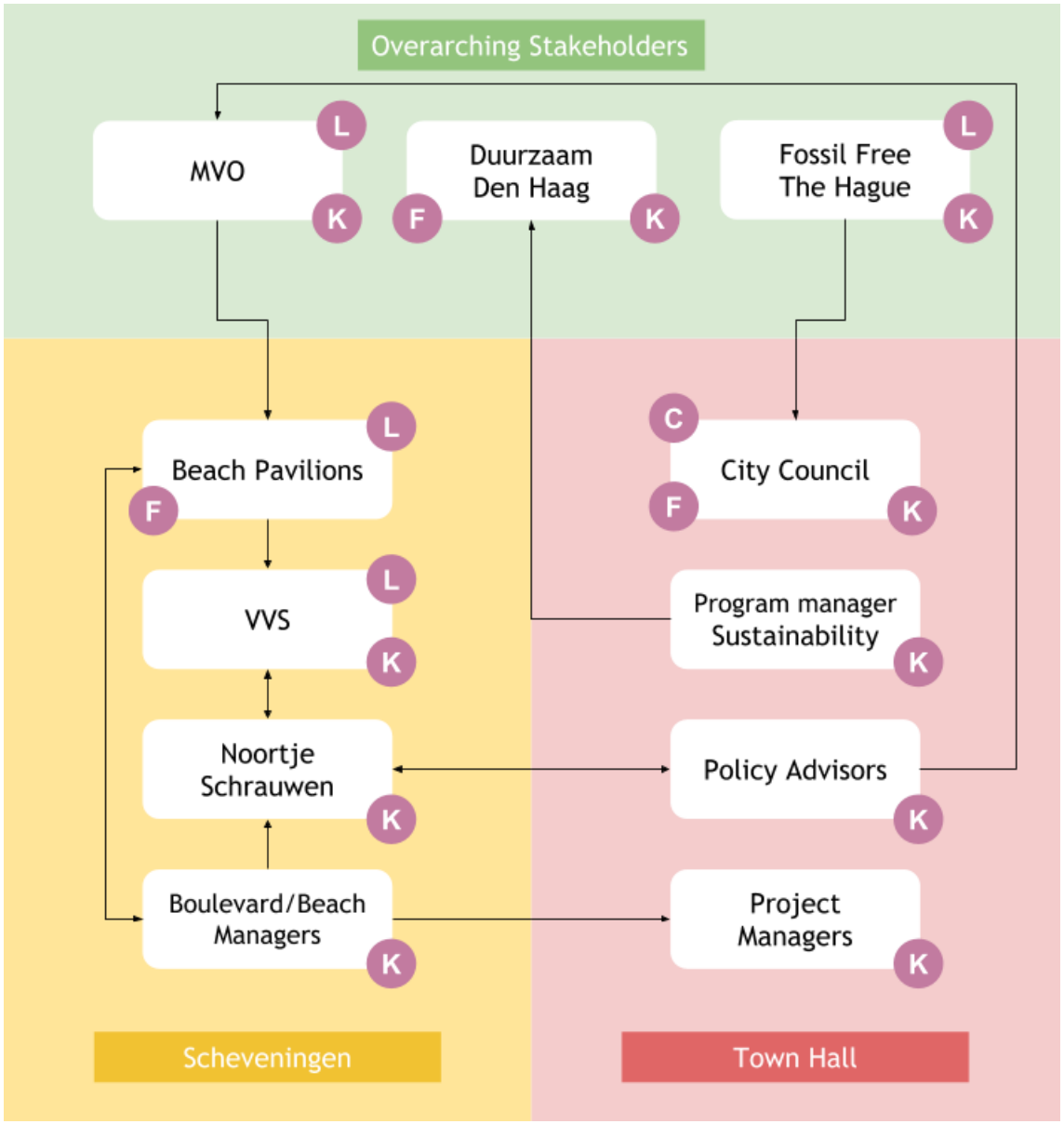


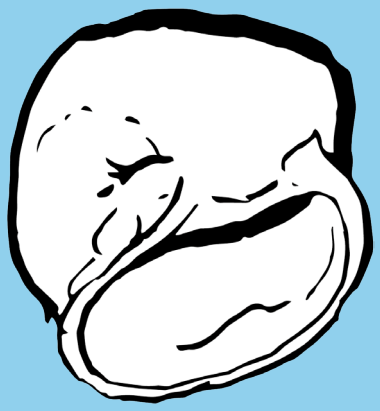
Figure 4.1: Visualisation of the identified stakeholders relevant to beach pavilions reaching the goals of the Klimaatpact. Divided in the three categories. Labels show resources: Legitimacy (L), Knowledge (K), Financial (F) and Competencies (C). (Source: own image)

5. Technical analysis

What are the material, energy and water inputs and outputs of the beach pavilions?

In this section we discuss the energy, water and material inputs and outputs of the beach pavilions. They are specified as follows:

- Energy: The input of energy is divided based on the source, for example: gas, electricity from the grid, solar panels, etc. The output is represented by the appliances that use the energy, for example: the fridge, terrace heaters, dishwasher, etc. The truck movement towards and from the pavilions are considered outside the scope of our research, and were not taken into account.
- Water: The input of water is divided into: potable water, rainwater and recycled streams within the pavilion. The output is represented by where the water was used, for example: the toilet, kitchen appliances, taps, etc.
- Materials: The input of materials is divided into different food fractions, for example: meat, poultry, dairy products, etc. The output is represented by different waste streams, for example: plastics, glass and paper.



5.1 Energy

What are the energy inputs and outputs of the beach pavilions?

We will begin by discussing the inputs and outputs of energy at the beach pavilions. The energy input and output is divided in electricity and gas.

5.1.1 Input energy

Electricity

See Appendix J for an overview of the calculation in this section.

The average electricity use of the four pavilions at Scheveningen is 62 MWh/year, this is retrieved via the MVO scan. The electricity input of the pavilions differs a lot, this is represented by the standard deviation of 14. Bigger pavilions tend to have larger kitchens, more terrace heaters to heat the space, more lighting, etc. In order to have a fairer comparison between the pavilions, the electricity use per year is divided by the floor area of the corresponding pavilion. The floor area of the pavilions is on average 916 m^2, with a standard deviation of 208. The average electricity use of the four pavilions is 68 kWh/year/m^2 floor area, with a standard deviation of 11. In order to compare the electricity use with the gas use, the amount of MJ is calculated. One kWh is equal to 3.6 MJ, so the four pavilions consume on average 222 GJ/year. Again divided with the floor area this is 244 MJ/m^2 floor area/year.

In addition, the amount of kg $CO_{2\text{-eq}}$ is from the electricity use is calculated. It is assumed that the kg $CO_{2\text{-eq}}$ per kWh is 0.0569 (Moro, 2018), this is the carbon intensity of electricity consumed at Low Voltage (with upstream) in the Netherlands. Carbon intensity of electricity can be defined as the GHG emitted for producing or using a certain amount of electricity. The kg $CO_{2\text{-eq}}$ from electricity use is 35 ton $CO_{2\text{-eq}}$/year, again divided with the floor area this is 39 kg $CO_{2\text{-eq}}$/m^2 floor area/year. Since the pavilions are businesses we also calculated the amount of money paid on average for electricity. This adds an economic incentive to reduce the electricity use. It is assumed that for a small business the average price of electricity in the Netherlands is 0.168 €/kWh (Nillesen, 2014). The real price can depend per pavilion, since it depends on the supplier and the length of the contract. The average electricity costs of the four pavilions is 10,000 €/year, this is 11 €/m^2 floor area/year.

Gas

See Appendix J for an overview of the calculation in this section.

The average gas use of the four pavilions at Scheveningen is 17,830 m^3/year, this is retrieved via the MVO scan. The gas input of the pavilions differs a lot, this is represented by the standard deviation of 10,367. The gas use per year is divided by the floor area of the corresponding pavilion. The average use of gas of the four pavilions is 19 m^3/m^2 floor area/year, with a standard deviation of 10. The gas contains 31.65 MJ per m^3 of natural gas in the Netherlands (Zijlema, 2017). The energy of the gas used at the pavilions is 564 GJ/year and 599 MJ/m^2/year. The amount of kg $CO_{2\text{-eq}}$ per MJ of natural gas in the Netherlands is 0.0566 kg $CO_{2\text{-eq}}$/MJ (Dröge, 2014). The kg $CO_{2\text{-eq}}$ from gas use is 32 ton $CO_{2\text{-eq}}$/year, again divided with the floor area this is 34 kg $CO_{2\text{-eq}}$/m^2/year.

Table 5.1: Average energy input of four pavilions at Scheveningen including CO_2 emissions and economic costs

Electricity	Gas	Total	Unit
energy input			
222	564	786	GJ/year
244	599	843	MJ/m^2/year
CO2 emissions			
35	32	67	ton CO_2/year
39	34	73	kg CO_2/m^2/year
costs			
10	11	21	thousand €/year
11	12	23	€/m^2/year

For the gas use we also calculated how much money is spent each year. It is assumed the price of gas is 0.6246 €/m^3 (Zakelijke energie tarieven, 2019). The average gas costs of the four pavilions is 11 thousand €/year, this is 12 €/m^2 floor area/year.

Total energy input
The sum of electricity and gas input results in the energy input. Table 5.1 presents an overview of the average input of energy, the corresponding $CO_{2\text{-eq}}$ emissions and costs.

5.1.2 Output energy

Electricity
The electricity is used for lighting and appliances. Ventilation is not considered since the pavilions can easily open their doors and have ventilation from the sea breeze. The lighting in the pavilions we visited consists of LED lights and fluorescent tubes. The use of LED lights is highly recommended and other lights should be phased out. In the pavilions there is an abundance of appliances. Examples of appliances are: walk-in fridge, freezer room, dishwasher, oven, blender, coffee machine, plate warmer, cup warmer, ice crusher, cocktail shaker, small fridges, cutlery polishing machine, chocomel machine and ice cube maker. The abundance of appliances added complexity to calculate where electricity is being used. The amount of electricity the appliances use depend on a lot of factors, that would differ per pavilion. Out of all appliances, the walk-in fridge and freezer room tend to be the largest. In addition, they need to be turned on at all times to keep everything cooled. Hence, we decided to have a further look at their electricity use. The amount of electricity they are using depends on the brand, the model of this brand, the temperature of the surrounding, how often the door opens and how full the rooms are. See an example the electricity use of a walk-in fridge and a freezer room in Table 5.2, including the percentage of the total electricity use given above. The kWh/year in Table 5.2 are estimations and can differ from reality (KTB-EDE, 2019). The assumptions are the dimensions of the rooms are 2m x 2m x 2.5 m (WxDxH), they are on 16 hours per day, 7 months a year, the rooms are used "normally" and are maintained yearly. If these assumptions are correct for a pavilion, the energy output of the walk-in fridge and freezer room is 15% of the total energy use (see Table 5.2).

To check whether the calculation is roughly correct, the total amount of the appliances and lighting should add up to the total electricity input. However, considering the time limitations of this research this is not done. We recommend that the pavilions gain insight in their own appliances by using a device that can measure the electricity use of an appliance and light. After this amount of time an appliance and light is used should also be considered. Some recommendations that can be given without calculations are: the less lighting and appliances the better, the more energy efficient lighting and appliances are the better and the lower the amount of hours the lighting and appliances are used the better.

Gas
The pavilions we visited use gas for terrace heaters, in the kitchen and for heating water. Similar to the energy output, the output of gas per user of gas depends on many conditions and differs per pavilion. For example, the number of gas used for terrace heaters depends on the brand and model of heater, the total amount of heaters and the hours per year the heater is on. See Table 5.3 for an estimation of the use of gas terrace heaters. The 0.68 m^3 gas use per hour is based on a research of the consultancy KWINK (2018) commissioned by the municipality of The Hague, it is the average of a small and large terrace heater. Furthermore it is assumed that a pavilion has 5 heaters and they are running 7 months a year, 5 hours per day, based on our interviews. If these assumptions are correct for a pavilion, the gas output of terrace heaters is 20% of the total gas input.

As stated above, to check whether the

Table 5.2: Electricity use walk-in fridge and freezer room (KTB-EDE, 2019)

Walk-in fridge	Freezer room	Total	Unit
4493	10886	15379	kWh/year
2621	6350	8971	kWh/year pavilion is open
4%	10%	15%	% of total electricity input

Table 5.3: Gas use terrace heater (KWINK, 2018)

Medium heater gas	
0.68	m^3/h
1065	hours/year
5	number of heaters
3600	m^3/year
20%	% of total gas input

calculation is roughly correct, the total amount of gas users should add up to the total gas input. Considering the number of uncertainties, it is not within the scope of this project to calculate the gas output.

5.1.3 Transition from gas to electricity

Table 4 summarises the input section of energy. Calculating the MJ, kg $CO_{2\text{-eq}}$ and € of electricity and gas makes the use of electricity and gas more comparable. It is useful to compare the two, since this will give some insight into the effects of a transition from gas to electricity. Replacing gas with electricity will influence the energy use of the pavilions. Currently, the pavilions use 843 MJ/m^2 floor area/year, of which 244 MJ from electricity and 599 MJ from gas. The $CO_{2\text{-eq}}$ of the energy use is 73 kg $CO_{2\text{-eq}}$/m^2 floor area/year, of which 39 kg is from electricity and 34 kg is from gas. The amount of money spent on energy is 23 €/m^2 floor area/year, of which 11 € is from electricity and 12 € is from gas. See Figure 5.1 for the distribution of energy in percentages for the amount of MJ/year, kg $CO_{2\text{-eq}}$/year and €/year.

The amount of energy from electricity in comparison with gas is lower, the amount of $CO_{2\text{-eq}}$ is a little bit higher and the amount of money spent is a little bit lower. The transition from gas to electricity is inevitable, but it should be noted that as long as the grid is based on fossil fuels the amount of $CO_{2\text{-eq}}$ will be higher than using natural gas. If gas is not used as an energy source anymore the energy will need to come from electricity. The amount will depend on the efficiency of the appliances, perhaps the appliances that now use gas and would be replaced by electrical appliances use less energy. So, it is not known exactly how much kg CO_2 will be emitted and how much money needs to be spent when the energy only comes from electricity. It is certain that the grid needs to transition from fossil fuels to renewable energy. A pavilion can reduce the $CO_{2\text{-eq}}$ emissions of their electricity use by buying green electricity. When buying green electricity, one must look carefully at the origin and source of the green energy supplied.

6.1.4 Truck routes

The seasonal pavilions are Scheveningen are built every year around April and deconstructed around October. This requires the building materials to be stored in the months that they pavilions are not being used, and for the materials to be transported to and from these storage areas. Some pavilions are stored nearby in Scheveningen (about 1 km from the beach) but others travel about

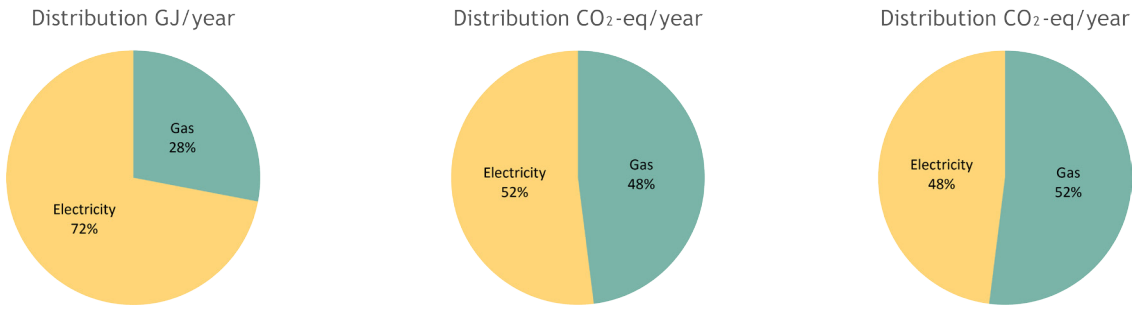


Figure 5.1: Distribution of the energy use in MJ/year, kg CO_2/year and €/year (Source: Own image)

Table 5.4: Freight transport; information on kg CO_2 emissions

	Unit	kg CO_2/unit (WTW)	Source
Gasoline (EU95) (NL)	litre	2.74	CE Delft, 2014
Diesel (NL)	litre	3.23	CE Delft, 2014
Delivery van with a carrying capacity of > 2 tonne	tonne-kilometre	1.153	CE Delft, 2016
Small truck with a carrying capacity of <10 ton	tonne-kilometre	0.432	CE Delft, 2016

100 km. As mentioned in the introduction of the energy section, the truck movement to and from the pavilions for transporting these materials are not taken into account. However, in general it can be said that the less movement the better. It would save a lot of truck movement if there is a storage provided in The Hague where the pavilions can be stored in the winter.

Besides the truck movement of the pavilions themselves, there is also truck movement to deliver supplies and to pick up waste. The pavilions have an abundance of suppliers (e.g. 50), so one can assume that there is quite some truck movement in order to supply all the food and drinks. For most pavilions, the waste collection is divided in glass, residual and paper. An example of the waste collection of one pavilion is: on average glass is picked up 1 time a week in low season and 3 times in high season, residual waste is picked up 4.25 times a week in low season and 14 times in high season and paper is picked up 1.5 times a week in low season and 7 times in high season. A calculation of the amount of km driven and corresponding kg CO_2 emissions to transport the pavilions, deliver the supply and pick up the waste is beyond the scope of this report. In order to give the pavilions some numbers to calculate the impact of the transport themselves, we searched for some information the CO_2 emissions involved with transport. See Table 5.4 for the amount of CO_2 emitted per litre of gasoline and diesel and the amount of CO_2 emitted per tonne-kilometre driven. The CO_2 emissions are based on the well-to-wheel approach, this involves the combustion, productions and extraction. A tonne-kilometre is a kilometre driven with the mode of transport with one tonne cargo.

5.2 Water

What are the water inputs and outputs of the beach pavilions?

5.2.1 Input water

All water used by the beach pavilions is potable water. The pavilions do not collect rainwater and/or seawater. The potable water is supplied by a centralised water supply system, operated by Dunea (Dunea, 2019). The potable water demand of the pavilions is reported in 4 MVO scans. The average potable water demand of the 4 pavilions is 829 m^3/year, with a standard deviation of 58 (see Table 5.5). The potable water demand per square meter on average is 0.93 m^3/m^2/year, with a standard deviation of 0 (Table 5.5).

The supplier (Dunea) of the potable water states that they want to be CO_2 neutral in 2020 (Drossaert, 2018). They want to achieve this by using the energy from solar panels and by using the temperature differences of water streams. It however not published whether this goal is almost achieved or not. The cost of potable is €1.00 per m^3 (Dunea, 2019b), so the incentive to reduce water usage is low for the beach pavilions. The average costs for potable water of the beach pavilions at Scheveningen is 829 €/year. It is therefore valuable that the supplier of potable water is aiming to produce and transport the water whilst being CO_2 neutral.

5.2.2 Output water

The potable water flows to the dishwasher(s), indoor taps, outdoor taps and toilets. All the used water streams end up in the sewer system of the municipality of The Hague, where the water is transported to the wastewater treatment plant. It was difficult to calculate the quantity of the different outputs based on the data retrieved from the MVO scans. For instance the amount of guests is not known, so the amount of toilet flushing is difficult to assume. Due to the limited added value for this report and the amount of time it would take, the outputs of

Table 5.5: Input of potable water

Pavilion	Floor area [m^2]	Water input [m^3/year]	Water input [m^3/m^2/year]
1	900	847	0.94
2	865	767	0.89
3	700	800	1.14
4	1200	900	0.75
Average 4 MVO scans	916	829	0.93
Standard deviation	208	58	0

water for the pavilions at Scheveningen are not calculated. Instead, the division of water outputs is assumed based on a research of EPA (2012). The largest streams are the dishwasher (52%) and the toilets (31%) (see Figure 5.3). The landscaping stream is assumed to be the water used to clean the terrace with the outside taps, since there is no grass at the pavilions (see Table 5.5). The streams left are 'other' and 'cooling' and heating, this can be considered the water flowing to the indoor taps (see Table 5.5). See the assumed percentage of the water outputs of the beach pavilions in Figure 5.2.

5.2.3 The lower the demand, the better!

The water demand should be as low as possible. If there is a lower input of potable water, less energy is needed to produce and transport this water. In addition, the lower the water input, the lower the amount of wastewater created. This entails that also less energy is needed to transport the wastewater to and treat the wastewater at the treatment plant. Furthermore, the runoff of precipitation to the sewer system is expected to increase in urban areas. This increases the stress on the sewer system. The lower the demand, the lower the wastewater output, the lower the stress on the sewer system. In addition, there can be more and longer droughts that cause a shortage of water. Very recently, in 2018, the water suppliers in the Netherlands recommended consumers to limit their water use because of a threatening water shortage, but as the costs of water are low, there is not much economic incentive for the beach pavilions to lower their potable water use.

The beach pavilions do not collect rainwater, this is a stream of water that needs relatively low treatment before it can be used. However, the total area and roof area of the pavilions is quite low, which decreases the possibility of replacing a water stream with the collected rainwater. This makes it understandable the pavilions do not collect rainwater.

Furthermore, the beach pavilions of the MVO scans do not recycle streams of water. Recycling streams of water would reduce the potable water demand. In the shore the water from the taps in the toilet refill the tank for toilet flushing. The tap water is only slightly contaminated and can be reused for flushing before going through treatment at a wastewater treatment plant. There is also no nutrient recovery at the beach pavilions. The black water stream is a relatively small stream of the total wastewater, but it contains the highest amount of valuable nutrients (phosphorus and nitrogen). Before sending this stream to the wastewater treatment, it is valuable to recover the resources. The amount of toilets is relatively low, and there is no space to create compost/fertilizer at site. This means there is an infrastructure needed to transport the resources. It is thus understandable that the pavilions do not recover resources.

Finally, the pavilions do not use sea water, this is good because it is not allowed to supply salt water to the sewer system. This would decrease the quality and length of life of the pipes, and replacing these pipes is very expensive.

5.2.4 Tap water

The tap water that is served is the one stream of water that does not end up in the sewer system directly. The more tap water served instead of bottled water the better. The bottled water is served in plastic or glass. In addition, potable water is produced in Scheveningen and has a short distance of transport, there is a very high chance that the bottled water needs to be transported over a greater distance. Dunea supports restaurants who only serve drinking water from the tap.

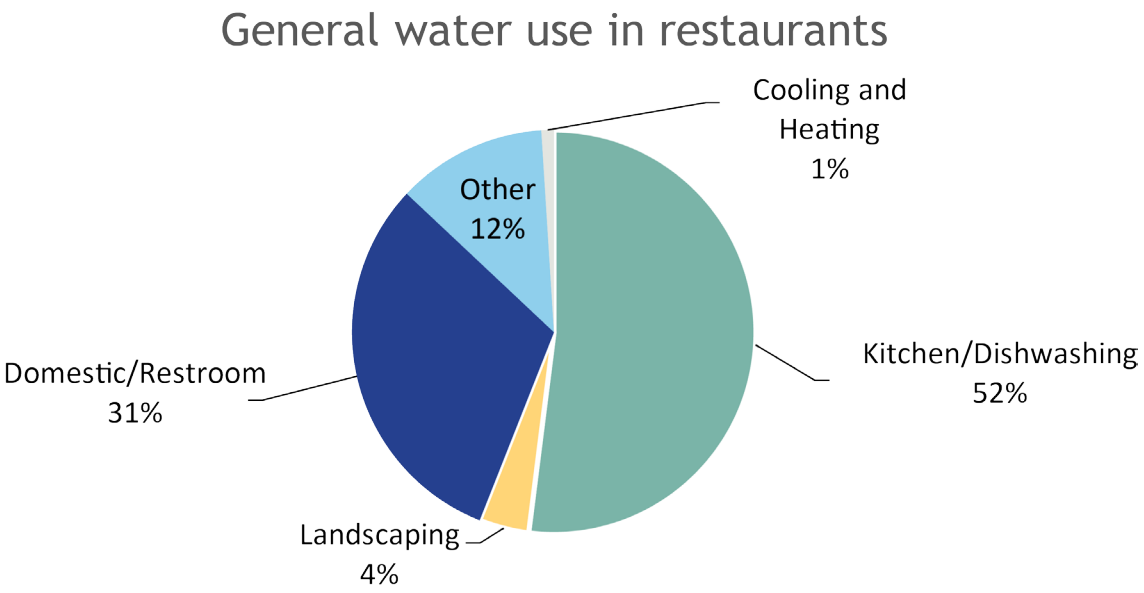


Figure 5.2: End uses of water in restaurants (Source: EPA, 2012)

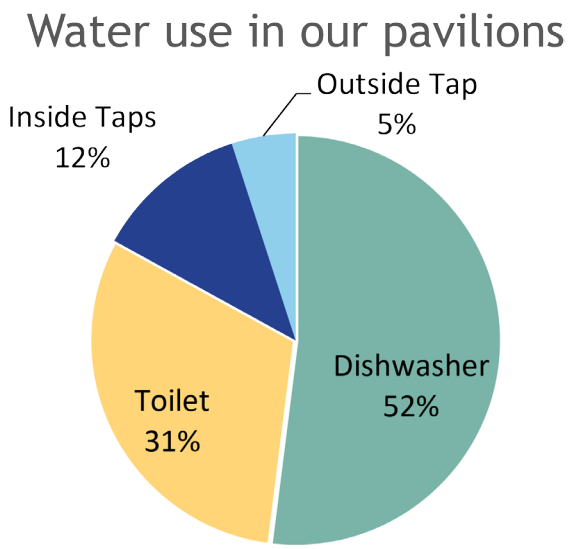


Figure 5.3: Distribution of the water outputs [m^3 potable water/m^2 pavilion] (Source: Own image)

They started an initiative where restaurants can order free carafes (Dunea, 2019a). There are some beach pavilions that joined the initiative, see the blue bulbs in Figure 5.4.

5.3 Materials

What are the material inputs and outputs of the beach pavilions?

There are stocks and flows of materials in the beach pavilions. The stocks are the materials that accumulate: building materials, furniture, cutlery. The flows are the materials that are constantly moving with time: food, beverages, disposable items. When looking at the material inflows and outflows of the beach pavilions, we are interested in the flows, as these are most likely to be optimised by collaborative measures between beach pavilions and third parties. The inflows and outflows give insight into possible opportunities for improvement based on more sustainable, collaborative solutions. The flows that have a significant environmental impact, and therefore have the greatest potential for optimisation, could

Figure 5.4: Restaurants where only tap water is served (Source: Dunea, 2019a)

be addressed to create a more sustainable setting.

By talking to beach pavilion owners we found out that the biggest input stream by far is food. Therefore we chose to focus only on food as the input of the beach pavilions for our material analysis. Most pavilions separate their waste into glass, paper and residual waste. No other separation process takes place. The outflows of beach pavilion are therefore divided into paper, glass and residuals. It is known that the pavilions at the Zwarte Pad are not separating their waste, as it is not possible due to the poor road connection to these pavilions. It is chosen to not take this into account, as separating waste into the fractions paper, glass and residuals is restricted by law, and these fractions are therefore applied within this analysis.

5.3.1 Food

To create an overview of the food inflows for the beach pavilions, we aimed to calculate the average $CO_{2\text{-eq}}$ of six different categories of the food that can be found on the menu of a beach pavilion. These categories are: meat, fish, dairy, vegetables, fruit and others. When dividing food in these categories, it would be possible to show which flows can give possible opportunities for improvement. However, it was not possible to retrieve the necessary information to make this analysis, because of a lack of time and as the beach pavilions owners were not able to or did not want to provide us with information on for example their yearly profit made on meals served.

Instead, we used a study from the U.S. that shows the annual GHG emissions per capita associated with producing the 2010 U.S. food availability (Heller & Keoleian, 2014). Based on this, we were however able to determine information on the contribution of different products to GHG emissions, and so the impact of those on the environment. It is assumed that the ratio products per capita in the U.S. is the same as products per menu of the beach pavilions. Figure 5.5 shows these annual GHG emissions, of which can be concluded that the most emissions are caused by the production of meat. Also dairy products and to some extent poultry contribute substantially to the GHG emissions. The study by Sonesson & Davis & Ziegler (2010) also shows that meat and dairy are the biggest streams when it comes to $CO_{2\text{-eq}}$. It is recommended that the beach pavilion owners compare Figure 5.5 with the dishes they have on their menu, to see whether improvement is possible, and most likely meat, poultry and dairy streams should be addressed.

In the article about the study in the U.S. it is also presented that 'though beef accounts for only 4% by weight of the retail-level food supply, it contributes 36% of the associated GHG emissions'. This shows that weight is not leading when it is about the $CO_{2\text{-eq}}$ related to a product, and an analysis based on $CO_{2\text{-eq}}$ is way more relevant.

The studies mentioned above do not take into account the way the food is prepared in the kitchen, as well as the transport of the food from where it is obtained or made till the pavilions. This means that the $CO_{2\text{-eq}}$ for these processes is not taken into account in the analysis above. The energy and gas that is used to prepare the food, as well as the $CO_{2\text{-eq}}$ emissions that belong to this, are taken into account in our Energy analysis. When we look at the transport of the products, Avetisyan & Hertel & Sampson (2013) state that 'while advocates of a 'food miles' policy suggest that shifting consumption patterns towards domestic foods will reduce the carbon footprint of food consumption, we find that this is more nearly the exception, rather than the rule in today's globalised economy'. An extensive research is conducted, concluding that local goods would indeed reduce GHG emissions, but only when the production is undertaken in areas with 'relatively low emissions intensities'. Garnett (2010) states that we cannot simply look at the carbon emissions when comparing local food with more domestic products. 'The role of transport in fostering structures of production and habits of consumption need also to be considered'.

Therefore, it is recommended that a more elaborate literature review is conducted when aiming for local food supply for the pavilions. It should be found out whether the local areas have relatively low emissions intensities as well as the broader role of transport should be taken into account. We advise buying local seasonal food, as it is tends to have less emissions overall than domestic, non-seasonal food. For the procurement of beverages, recommendations cannot be made until further research is conducted. For example, We are not able to say whether local wine would be 'better' than domestic procured wine, as this goes beyond our project scope.

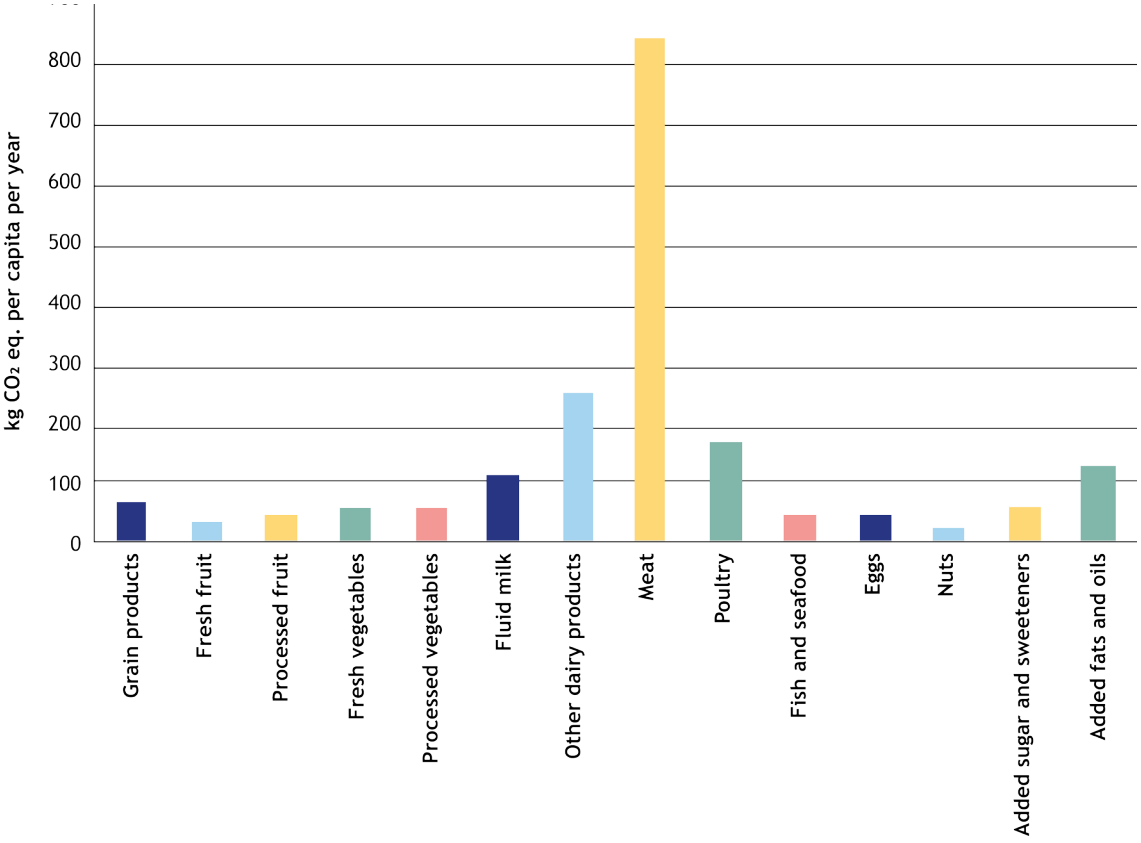


Figure 5.5: Annual greenhouse gas emissions per capita associated with producing the 2010 U.S. food availability. (Heller & Keoleian, 2014)

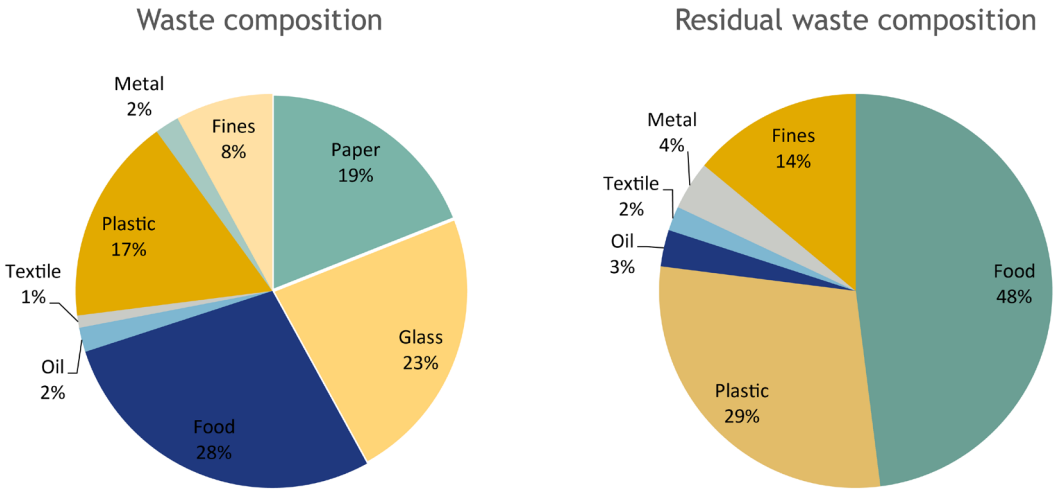


Figure 5.6: In the left picture the waste fractions within the residual waste including the paper and glass is shown. In the right picture the new situation, where the paper and glass are taken out separately, is shown.

5.3.2 Waste

As mentioned in the Social analysis, the challenge of waste at the beach pavilions is enormous. Waste facilities are not sufficient enough to separate multiple waste fractions, so the beach pavilions only separate glass, paper and residual waste, which is restricted by law. Paper and glass are mostly waste flows that come directly from packaging of products. The residual waste consists of among others food scraps and plastics. In this section, we explain how the waste flows of the pavilions are divided, and which streams are the biggest and therefore need to be optimised. (The full calculations can be found in Appendix J, in Table E1 and E2.)

Within this analysis, information of only one pavilion is used, as well as only some studies are addressed. This was because of the lack of information about waste streams in restaurants. This makes the analysis not fully reliable for all pavilions, and if more information on the different waste fractions is wanted, further research should be conducted. However, an impression on the different waste fractions can be given.
To create an overview of the different waste streams, one average beach pavilion provided us with information on the amount of containers they have for glass, paper and residual waste, the volume of these containers, and how many times the containers are emptied per week. The number of times the containers are emptied depends on whether it is peak season or low season. The pavilions provided us with an average of weeks that they are open per year in peak season, as well as in low season, and a number of times the bins are emptied per week, both for the low and peak season. The beach pavilions at Scheveningen beach pay per container that is emptied, so it can be assumed that when the containers are emptied, they are full.

The following assumptions are made:
For paper it is assumed that a full container consists of 80% paper and 20% air. The paper will be well pressed to save space, and it is therefore assumed that only 20% of air is present in the container. The density of paper is given by Stimular (n.d.) as 120 kg/m^3 paper.

For glass, it is assumed that all products are shattered into small pieces when thrown in the glass bin, as well to save space. Here it is assumed that 10% air is present, whereas 90% will consist of glass. The density is given by Stimular (n.d.) as 300 kg/m^3 glass.

For residual waste, is assumed to contain 95% residual waste and 5% air, which is based on residual waste consisting mostly of food scraps, as will come from the analysis that is later explained, that are stacked very dense, and contains furthermore mostly of plastics, which are less dense and create space with air in between. To find out the density of the residual waste, we found a case study conducted in Italy (Tatàno et al., 2017), showing the composition of the generated

restaurant waste.

An overview of this composition is given in Figure 5.6 (left). Here glass and paper/ cardboard are still included, but as these are separately collected, these are left out and a new 100% is found. This is shown in Figure 5.6 (right).

All fractions consist of different forms of the product. However, as food and plastics are by far the biggest streams, only these fractions are elaborated in more detail. An important note here is that oil is still in Figure 5.6, however it is not clear how the oil is going to waste. It is here assumed that the oil will be in the residual waste, but it could be thrown out separately as well. Due to the small percentage of oil in the residual waste it is chosen to not elaborate on this.

For food, two studies by Wageningen University (Luitjes, 2007; Eppink & Soethoudt & Timmermans, 2010) show the percentages of the total food losses in restaurants in 2007. These percentages and fractions are given in Figure 5.7. The densities of all these fractions are found in order to get the average density of the food scraps in residual waste. For bread, starch and others, the density of swill is used, as of the more realistic approach.

For plastics, it is found that thermoplastics represent about 85% of overall plastic demand (Deloitte, n.d.). As packaging and single-use plastics are the biggest streams of plastic going in the beach pavilions, and as these consists almost fully out of thermoplastics, the average of the densities of all thermoplastics (Engineering Toolbox - Polymers-Physical Properties, n.d.) is taken to calculate the density of the plastic in the residual waste.

When taking the densities of all the fractions within the residual waste into account, the density of this waste stream can be calculated, and so the total residual waste in kg/year. This analysis leads to the overview of waste in Figure 5.8.

As mentioned, there is little information available on the material flows in and out the beach pavilions. Many assumptions were made, making it difficult to make real estimations for the volumes of the different waste fractions, as well as to make further recommendations. However, some interesting points could be retrieved from the waste analysis:

Figure 5.8 shows that the biggest waste stream is by far the residual waste, more than 90%. In order to become more sustainable, and more aware of what streams can be addressed in this process, it is advisable to start separating and recycling more waste fractions. This would also enable resources to be better recovered. A recommendation would therefore be to make sure less food, drinks other products become waste, and to recycle as much as possible. The number of times the bins are emptied can be leading when comparing different beach pavilions, to see if improvements should be made or if pavilions are already well on track.

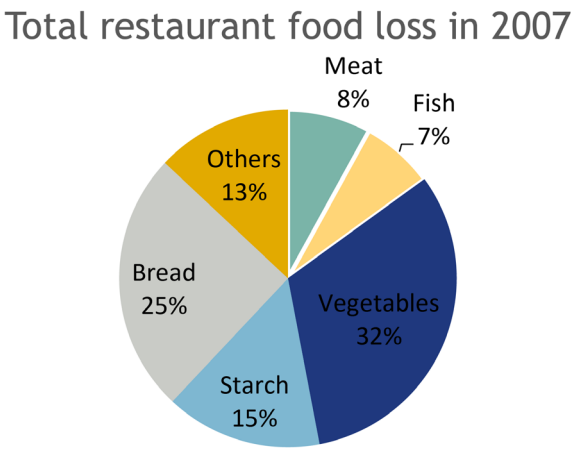


Figure 5.7: Percentages of the total food losses in restaurants in 2007. Per category the % food loss of the total volume is presented.

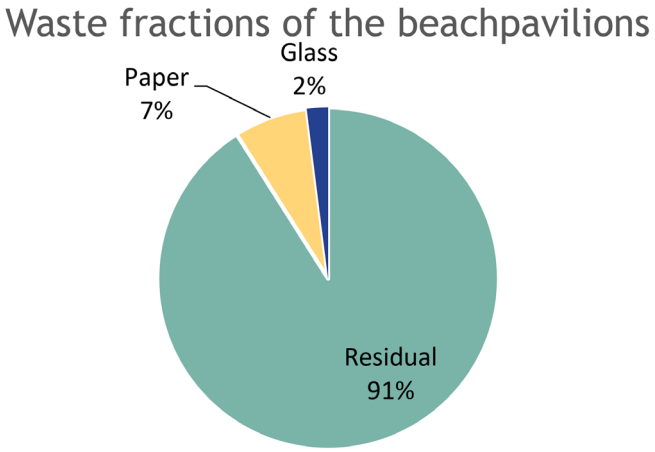


Figure 5.8: Overview of different waste fractions of separated waste in pavilions.

5.4 Conclusions: Technical analysis

What are the material, energy and water inputs and outputs of the beach pavilions?

5.4.1 Energy

The floor areas, electricity and gas inputs for the four pavilions differ substantially, this is shown by the standard deviations. For the energy input it can be concluded that the share of MJ retrieved from electricity is lower than gas, but the CO_2 emissions are a little bit higher than gas. The electricity grid in the Netherlands still needs a transition from fossil fuels towards renewable energy. Pavilions can support the transition by buying green electricity from the Netherlands. It is estimated that the electricity use of the walk-in fridge and freezer room already is 15% of the total. For the gas output it is assumed that the terrace heaters use 20% of the total electricity use. It should be noted, that the total output of electricity and gas is needed to check whether the assumptions are roughly correct. The truck movement from and towards the pavilions is not taken into account, so we do not have the total picture of energy input and output.

5.4.2 Water

The total water input is 829 m^3/m^2 floor area/ year, this is 0.93 m^3/m^2 floor area/year. In contrast with the energy input the difference of water input for the four pavilions does not differ a lot. The only input of water is potable water. The lower the demand for potable, the better. However, the costs are very low. This does not create an economic incentive. The output of water is estimated: the largest flows are the dishwashers (52%) and the toilets (31%). All the output of water ends up in the sewer system. It is recommended to the pavilions to recycle streams of water, this would lower their demand and output to the sewer system. This measure is already conducted by a pavilion at Scheveningen, thus considered feasible.

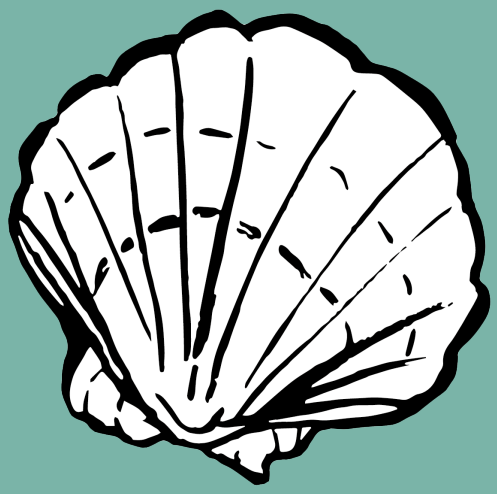
5.4.3 Materials

When looking at the GHG emissions according to the production of different food fractions, it can be concluded that meat is the fraction with the highest emission rate. Also dairy products and to some extent poultry contribute substantially to the GHG emissions. Furthermore, the biggest waste flow is residual waste, which covers more than 90% of the total waste. The paper and glass fractions are 7.3% and 2.2% of their respective volumes.

6. Best practices analysis

What are best practises for cooperation that optimise the use of material, energy and water?

In this section, we summarise the results of our best practises analysis and present case studies that showcase cooperation that optimises the use of energy, material and water.



6.1 Energy

6.1.1 Local small-scale biodigesters

A biodigester can be a possible solution for recycling valuable waste streams into digestate and biogas. Organic waste originate from restaurants, cafeterias, snack bars, supermarkets and households. Biogas production is the result of the break-down of fatty acids, proteins, carbohydrates by organisms. Digestate is a nutrient-rich by-product of anaerobic digestion that can be applied as a fertiliser (WRAP, 2011).

The capacity of the biodigester is related to the amount of waste that can be collected: the more waste collected, the higher the capacity. Additionally, there should be a constant supply of waste to the biodigester, which implies that collection and distribution logistics should be organised very well. One example of local small-scale digester is in the Wildeman neighbourhood in Osdorp, Amsterdam West (Hiemstra, Lie & Rietveld, September 2017). Here bread is converted into biogas in a sea container installation. Researchers from Wageningen University looked into this case-study and found that since the profit of selling biogas is modest, it is better to convert biogas directly to electricity and heat (WUR, 2018).

6.1.2 Heated outdoor furniture

In the past, heating was not based on convection (heating air), but rather on radiation (electromagnetic energy) or conduction (direct physical contact). This principle can be applied to reduce the reliance on gas-powered terrace heaters, by implementing electricity-heated outdoor furniture instead. Commercially viable options already exist, such as EDDYBOY, Sit and Heat and The Hot Seat (EDDYBOY, n.d.; Hot Seat, n.d.; Sit & Heat, n.d.). This could eventually be linked to hot water pipes from local heat networks, although no examples of this could yet be found.

6.1.3 Sharing renewables: cooperative windmill ownership

A reduction of gas use will most likely come hand in hand with an increase in electricity demand. How can this demand be met sustainably, while still being profitable to the beach pavilion owners? Starting an energy cooperative could solve this problem, while instantaneously creating publicity as well.

Energy cooperatives can be formed by a group of entrepreneurs sharing a wind turbine or small solar farm for electricity generation that is not necessarily situated nearby or on the rooftop of their companies. The postcoderoosregeling offers energy tax discount for members of the cooperation (ECoop, 2017). The members of the cooperation pay the investment costs together. As soon as they get registered at the Belastingdienst as being part of this initiative, all participants get energy tax exemption for the energy bill of their energy supplier.

In Limburg, close to the municipality of Leudal, stands windmill “De Coöperwieck” (RVO, n.d.), which has been developed and funded cooperatively together with citizens. In Zeeland as well a windpark with a total of 34 wind turbines has been realised through a cooperative (RVO, n.d.). Although the initial investment may be high, it delivers a local green energy source and stable revenue for the years to come.

For the beach pavilions this may be difficult to replicate, as initial investment would be high, there may be sensitivity about ‘horizon pollution’ (*horizonvervuiling*) and windmills would not be allowed close to the beach.

6.2 Waste

6.2.1 Using food waste to stimulate local urban farms

Currently food waste is not separated by the beach pavilions, leading to valuable nutrients being lost, and paying for that loss through their garbage handler. It should therefore be a win-win scenario to use that waste differently. This could be done by separating food waste and selling it to local initiatives, that can then use the composted waste in urban farming. Urban farming is a term used to describe local crop cultivating initiatives within the city. Wageningen University has researched that within Arnhem urban farming has had a positive influence on the liveability of the city and the social cohesion (Wageningen, 2014). Currently most people have lost connection with the source of their food, through the strict divide in urban and rural landscapes, and because the food is always directly available, anyplace, anytime. Bringing food production back into the city may give people a better sense of sustainability, while also increasing the green inside a city and therefore its climate resilience.

While urban farming is mostly limited by the amount of space available, it may be possible to find an existing local initiative willing to take in the compostable food waste of the pavilions. This saves the pavilions money concerning their garbage collection, and may immediately also create a contact for a biological, local, food supplier (e.g. PeelPioniers, Haagse Zwam).

6.2.2 Grondstoffenmakelaar

Another way to deal with organic waste streams is reusing certain valuable waste streams. This could be a possibility for the pavilions to optimal use their coffee waste. A "grondstoffenmakelaar" can be put into the position to identify potential interesting waste streams for other parties. One way to reach matchmaking for waste streams is to create a map with potential useful waste streams in a certain area. This was for example done for De Binckhorst area in the Hague (Omroep West, 2017).

6.2.3 An underground container system

Currently, beach pavilion owners have their own contracts with different waste companies. This causes a severe amount of waste traffic at Scheveningen beach. A collective waste system is helpful to reduce this significant amount of transport. Key to this solution is that the pavilion owners stay responsible for their own waste streams (storage and collection) but the storage place is shared amongst the owners.

Erik Duffhuis (Stad&Co) is the senior project manager of an underground container collection system with shared ownership in De Bergen/Eindhoven. The underground container collection system has the advantage that it reduces the amount of transport and it is clean and safe. Additionally, there is a possibility to steer on separate collection of valuable waste streams for recycling and reuse purpose.

6.3 Food and packaging

6.3.1 A network of chefs and local or sustainable food suppliers

For sustainable food procurement an effective option could be setting up a network of chefs and food professionals, where these professionals can inspire each other using sustainable food. A collaborative that is already engaged in this practise is Chefs Collaborative, which is a membership-driven community network that shares knowledge to build a better food system through cooking only with sustainable and fair food.

For the beach pavilion owners this can open up a lot of opportunities to improve food procurement in a more sustainable way. For example, if the chefs of the pavilions show interest in working with local farmed vegetables they can may be collaborate on approaching a local supplier more effectively (e.g. discount in collaborative purchasing and an one-time transport). Collaboratively, they can reduce their amount of unsustainable food procurement and foster the economy of local or sustainable products. By doing this they can also possibly reduce transport.

Pavilion owners can also expand the network with other food professionals in the neighbourhood. They could even think about including local sustainable suppliers to the network in order to strengthen connections for local food procurement. Knowledge can be shared by organising round tables and platforms. This concept is exercised by Restaurant Roundtable for Sustainability that aims to understand, identify and prioritise shared sustainability solutions by discussions and a shared learning platform (Restaurant Roundtable for Sustainability, 2019).

6.3.2 Bio-based plastics

There are many opportunities in collaborative procurement, since these provide significant discounts to products that enhance the sustainability of the pavilions and reduce their plastic waste stream. Plastic is mainly used for sugar sachets, cookie sachets, straws, honey cups etc. One of the frontrunners when it comes to bio-based packaging in the Netherlands is Bio Futura, which is situated in Rotterdam. This company can also provide a sample package of bio-based substitutes for plastic (Biofutura, 2019).

6.3.3 Upcycling plastic waste

To clean up plastic trash, collection points could be made for gathering the plastic which could then be processed by local initiatives that turn plastic waste into valuable products, like Precious Plastic The Hague (no longer active) or Community Plastics in Rotterdam. Community Plastics collects, sorts and remelts plastic waste into bird boxes and tiles (Community Plastics, 2019).

6.4 Water

6.4.1 Seawater for heating and cooling

water
Seawater can be used for heating and cooling water and is especially interesting for coastal areas. It is a renewable source alternative for gas use for boilers and floor heating. This is already a decade implemented in Duindorp. In theory the innovation attributes to 50% less carbon emissions in comparison to gas use (Stam, 2004). However, in practise a diesel aggregate was installed to meet heating demand when it could not be reached (Den Haag, 2019). This is not sustainable at all - instead, investments in additional renewable energy sources should make the innovation fully carbon neutral.

Theoretically, 1 kWh electricity is needed to produce 12 kWh of source (Stam, 2004). The operation works as follows: seawater extracted from the harbour side is pumped to the sea water power station. Here a two-step filtering takes place: one to filter out the sand and one to filter out sludge and other organic pollutants. Following, depending on the temperature the water passes a heat exchanger (at temperature > 11°C) or the York scroll-ammonia heat pump of 2,7 MWh (at temperature < 6 °C). This heat pump has a very high efficiency, since it is able to use every temperature difference. If seawater temperatures range between 6-11 °C both heat pump as heat exchanger are used (Stam, 2004).

The infrastructure consists of several elements: the seawater pumps at the harbour side and the seawater power station, containing the big heat pump and heat exchanger, the distribution network and small water pumps (4-5 kWh) at the houses. These small water pumps generate the least amount of electricity needed to heat the water up until 63 °C for boiler purposes and 45 °C for floor heating. The seawater pumps at the harbour side and the heat pump and heat exchanger at the sea water power station are made from titanium.

At the seawater power station heat is transmitted to the distribution network in which fresh water (11 °C) circulates. The distribution network is made out of plastic pipes and lead to the houses. The 750 houses do not have any gas connection, so if there are outages of the system the individual heat pumps can take over heating since they contain an electrical element. The investment costs of the seawater power station and the distribution network were about three million euros (Stam, 2004).

6.5 Conclusions: Best practises

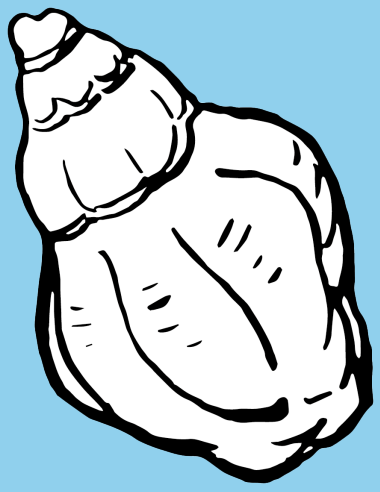
What are the best practises for cooperation that optimise the use of material, energy and water?

To summarise, best practices that the beach pavilions could learn from are:

- Collective bio-digester, such as the examples from Lelystad and Osdorp (Amsterdam West).
- Heated outdoor furniture to replace gas-powered terrace heaters, such as Dragonbench, Sit and Heat and The Hot Seat.
- Renewable energy cooperatives, such as the cooperatively developed and funded windmill “De Coöperwieck” in Leudal.
- Using food waste to create compost for urban farming, as is done in Arnhem.
- Vertical or window farming, for the small scale production of herbs, such as the example by students from the Haagse Hogeschool.
- Cooperative waste contracts, to reduce the cost of waste collection and/or a ‘grondstoffenmakelaar’ that acts as a matchmaker for finding valuable waste streams, such as in De Binckhorst area in The Hague.
- An underground container collection system with shared ownership, such as in De Bergen/Eindhoven.
- Food networks and shared learning platforms such as the Restaurant Roundtable for Sustainability that aim to understand, identify and prioritise shared sustainability solutions by discussions and a shared learning platform.
- Procuring only bio-based products, such as those made by Bio Futura.
- Gathering plastic trash and upcycling into valuable products with local initiatives such as Precious Plastic The Hague or Community Plastics in Rotterdam.
- Using seawater for heating and cooling as an alternative for gas use for boilers and floor heating, as has already been implemented in Duindorp for over a decade.

7. Opportunities for cooperation

In this section, we propose opportunities for cooperation that optimise the use of energy, water and material in the surroundings of Scheveningen. We look at the actors that signed the Haags Klimaatpact and the ‘Green Champions’ of The Hague, as these companies have already show their commitment to reaching the climate goals of the Hague, and are therefore more likely to be open to partnerships.



7.1 Actors that signed the Haags Klimaatpact

The association of beach pavilions was the 301st party to sign the Haags Klimaatpact. In order to find opportunities for collaboration, we begin by exploring the other parties that have signed this agreement, thereby showing their support for a climate-neutral Hague by 2030. It soon becomes clear that the majority of signees are foundations or NGO's, and are therefore not relevant in our aim of finding opportunities for collaboration. There are 42 companies that do have potential to cooperate to optimise the beach pavilions' use of energy, water and material. There companies are summarised in Table 7.1, and the ones that are physically present in The Hague are shown on a map in Figure 7.1.

7.2 'Green Champions' in The Hague

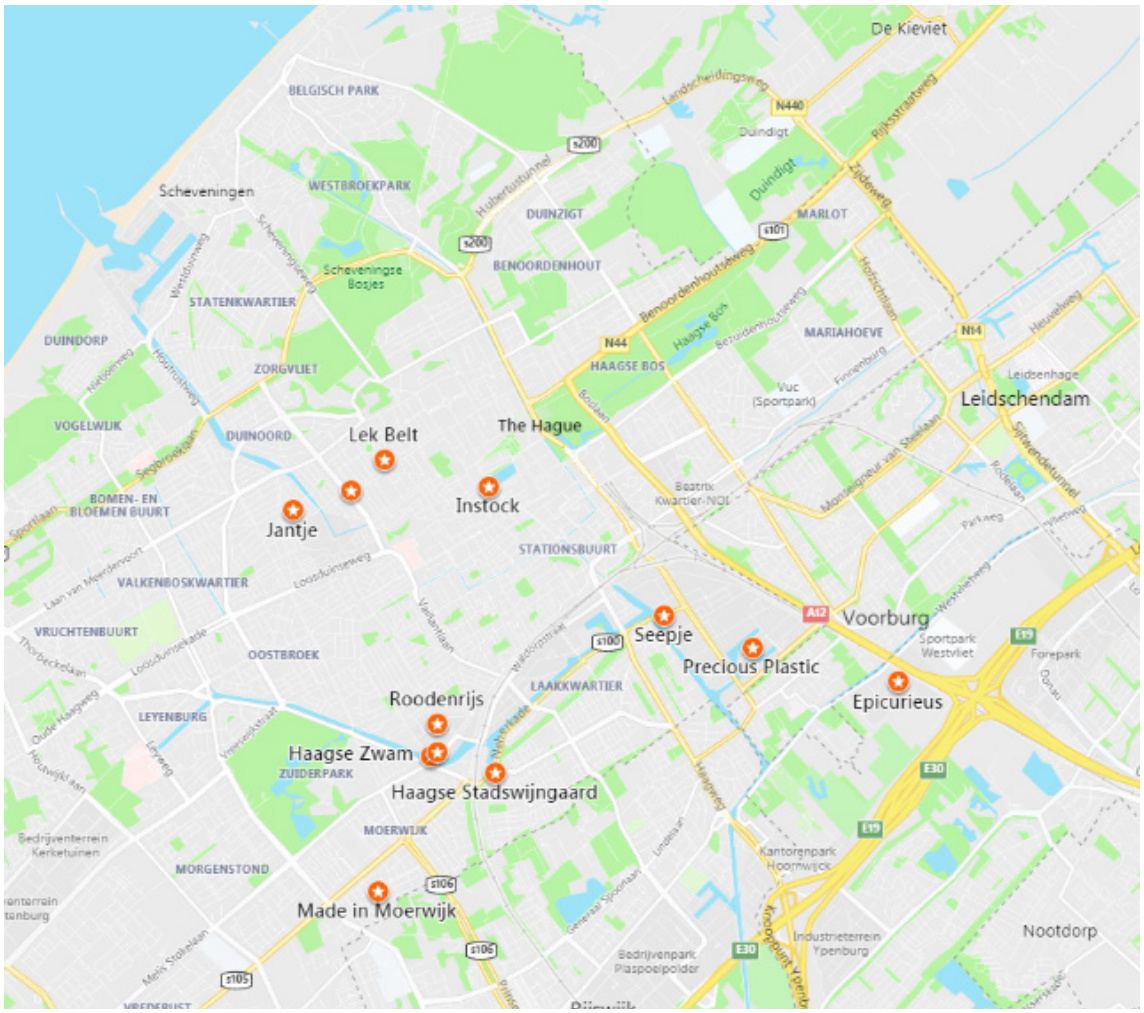
Duurzaam Den Haag has collected 'Green Champions' in The Hague; people that in the surroundings that have set up sustainable initiatives (Duurzaam Den Haag, 2019).

Additionally, they have collected companies that could make good partners for the beach pavilions. These companies are interesting because they have already shown their commitment to reaching the climate goals of the Hague, and are therefore more likely to be open to partnerships. A static image of this map is shown in Figure 7.2, and the companies mentioned in the rest of this chapter that refer to Figure 7.2 were found in the interactive version of the map available on the website (Duurzaam Den Haag, 2019). This websit is interesting for the beach pavilions.

Table 7.1: Clusters of organisations that signed the Haags Klimaatpact

Food	
Epicurieus, Jantje, Roodenrijs	Sustainable cafes, restaurants and catering
Instock, Bag again, Consciouskitchen	Reducing food waste
The new farm, Haagse Stads Wijngaard, Haagsezwam	Vertical/urban farming
Materials/Waste	
Precious plastics (no longer active), Lekbelt	Upcycling
Balkonton	Compost from worms
Straw by straw, Bamboo brushes, Naturalbags, Made in Moerwijk, Paperwise, Marcel's green soap, Seepje	Bio-based products
Energy	
Augustus Warmte	Making buildings energy-neutral
Qurrent, Vandebron, Pure energy, Waka waka, Solar monkey, Gasvrijscheveningen,	Green energy
Logistics	
Juice on wheels, fietskoeriers, cycloon, grondstoffenfiets, Solarskelter, haagsche-schil, eco-mobiliteit	Mobile food, delivery services, alternative forms of transport
Other	
Anne, Timebank, Haagsemakers	Community building platforms
Ecoschilder, DGMR, Rooftop Revolution, Sustainerhomes, Regenwatertoilet	Sustainable building

Figure 7.1: Haags Klimaatpact signees that are physically present in The Hague (Source: own illustration, with underlying map from OpenStreetMap, 2015)



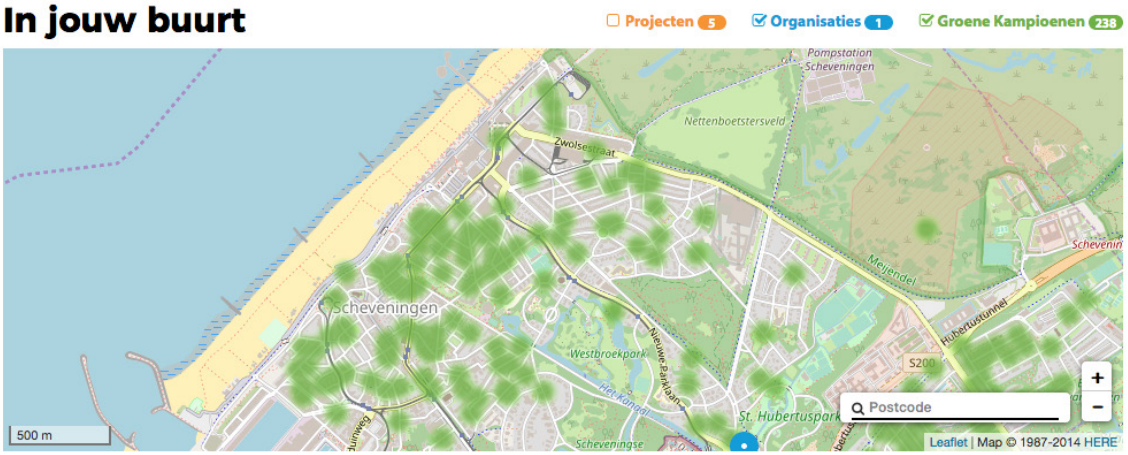


Figure 16: 'Green Champions' in The Hague. This interactive map can be found on the website: www.070groenekampioenen.nl. It shows companies that have a commitment to sustainability, including companies such as: Echte Haagse Honing, Haagse Honing and Stadsboerderij Molenweide. (Source: Duurzaam Den Haag, 2019)

7.3 Conclusions: Opportunities for cooperation

Where are the opportunities for cooperation for optimising the use of materials, energy and water in the surroundings of Scheveningen?

Based on our findings from this analysis, we propose the following opportunities for cooperation:

7.3.1 Food: Symbiotic exchanges of organic waste for food

The Haagse Zwam creates oyster mushrooms out of coffee waste (Table 7.1) They produce vegetarian bitterballen and loempia's made from the oyster mushrooms that are made by people who experience distance to the labour market. Another local suppliers of circular and sustainable products is Beter Brood, who creates bread out of spent grain from beer brewery De Kompaan at the Binckhorst ("Lekker Brood! – 100% biologisch ambachtelijk & onweerstaanbaar," n.d.). There is therefore potential for creating a network in the neighbourhood of Scheveningen beach. Pavilion owners could actually mention the sustainability or circularity aspect of the product on their menu. For example, when mentioned on the menu that oyster mushrooms are farmed from coffee waste, one educates and fosters curiosity about the product at the same time!

7.3.2 Food: Local procurement

Additionally, products other than food can be bought, for example: flowers and soap can be locally sourced at the sustainable flower horticulture Veld & Vaas in Schipluiden (nearby Delft). Or honey can be bought from one of the multiple honey-makers in The Hague such as Echte Haagse Honing, Haagse Honing and/ or Stadsboerderij Molenweide (Duurzaam Den Haag, 2019).

7.3.3 Collective green procurement: bio-based products

There are a number of small-scale companies in the surroundings that make bio-based products: Straw by straw, Bamboo brushes, Naturalbags, Made in Moerwijk, Paperwise, Marcel's green soap, Seepje (Table 7.1). The beach pavilions can collectively make wholesale orders or products, reducing the cost and investing in the future of this sector.

7.3.4 Logistics: A sustainable last mile

The surroundings of Kurhaus will be redesigned to be more friendly to pedestrians (Table 8.1). This could also be a chance to try out a new form of food transport at the last mile: collective green procurement that is transported by alternative forms of transport. If the beach pavilions collectively make wholesale orders for bio-based products, then they can be centrally delivered to one location near Scheveningen, from which a company such as Fietskoeriers (Table 7.1), transports it to each of the pavilions. This drastically

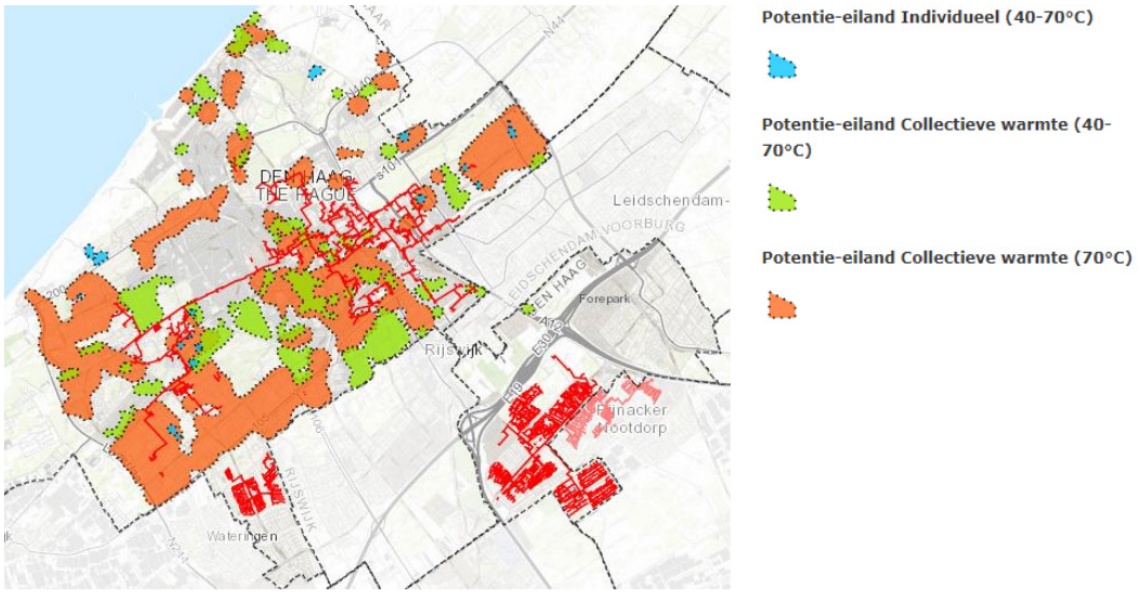


Figure 7.3: Potential for heat networks (Source: Gemeente Den Haag, 2018)

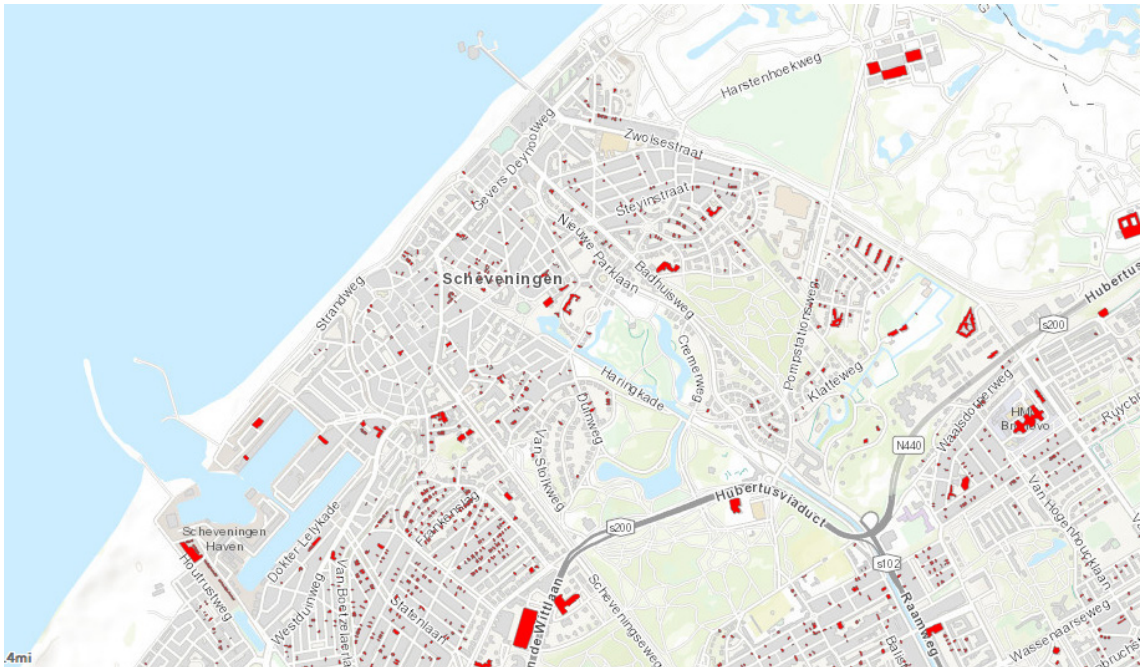


Figure 7.4: Solar panels in the surroundings of Scheveningen (Gemeente Den Haag, 2019)

reduces the time and kilometres that trucks have to drive.

7.3.5 Upcycling plastic waste: cooperation with the Legoland Discovery Centre

A Legoland Discovery Centre is currently being developed along the coast of Scheveningen (Table 8.1). This presents an opportunity for the beach pavilions, Precious Plastics (Table 7.1) and the Legoland Discovery Centre to collaborate. Precious Plastics Den Haag is no longer active, but currently looking for someone to take over their workshop spaces and company. Perhaps Legoland can do so? Legoland Discovery Centre could then upcycle plastic into new local Lego blocks.

7.3.6 Energy: District heat network

The Hague's energy agreement (Energieakkoord) focuses on heat networks, aiming for an open, flexible, independent, predominantly low-temperature heat network (Gemeente Den Haag, 2018). The aim is to support sources such as geothermal and aquathermal. They want to eventually change all the High-temperature networks (above 70 °C) to Mid-temperature networks (70 °C and below). They have carried out an extensive analysis on the potential for heat networks in their Energie Transitie Atlas (ETA). We asked permission to access the ETA in order to support our analysis of the potential for district heat networks in the Scheveningen area, but were not able to receive it. Based on OverMorgens's study, Figure 7.3 shows that there is potential to set up a collective warmth island for either mid- or high-temperatures.

These collective heat networks could be used to heat pavilions in innovative ways that create an alternative to gas-powered terrace heaters. Hot water from the heat network could be used in the pavilions in a number of ways discussed in the best practises: floor heating, wall heating, furniture heating.

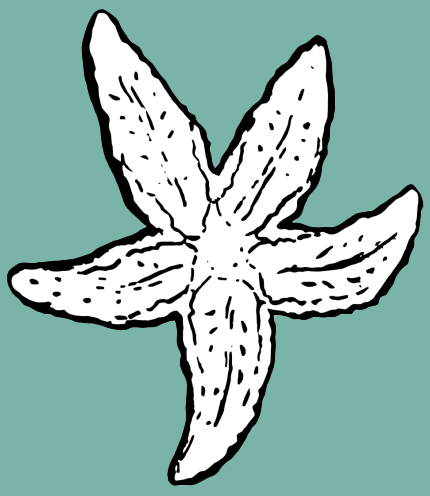
7.3.7 Energy: Sharing solar panels

Instead of buying solar panels, and then having to store them in the winter when the beach pavilions are deconstructed, pavilions could cooperate with local businesses or individuals which may use them in the winter. They could do this by paying for the panels to be placed in the surroundings and then paying 'rent' for the space by giving houses in the surroundings the energy for free. Or they could sell the electricity in the winters. This way solar panel costs may be reduced, while their effectiveness is increased. Figure 7.4 shows the solar panels in the surroundings of the beach pavilions, and shows a concentration at the harbour area. This reveals an opportunity for beach pavilions to collaborate with the Harbour and perhaps rent solar panel space.

8. Opportunities for change

The multiple streams framework proposed by Kingdon (Zohlnhöfer, Herweg, & Rüb, 2015) suggests that in order for an idea to move from concept to implementation, three streams need to encounter: the problem, the solution and the political will. The moments in which this happens are defined as ‘policy windows’. These critical moments can determine whether the implementation of a new project will succeed or fail. Although it is not possible to predict exactly which conditions are necessary for a project to succeed, it is possible to inventorise when critical moments could take place. In this section, we present the results to our question: When are the critical moments that present an opportunity for changes to be implemented?

We review The Hague’s vision documents and implementation programs related to materials, logistics & infrastructure, energy and water and present them here.



8.1 Infrastructure, logistics and climate adaptation

For logistics, infrastructure and climate adaptation, we inventorise windows of opportunity from the municipal and provincial urban vision documents (Table 8.1).

The planned infrastructure projects are illustrated in Figure 8.1.The vision document 'De Kust Gezond' outlines plans for the area of Scheveningen. It is predominantly focused on the plans till 2020. It does not state anything specific for its vision on 2040, or how the coast intends to participate in reaching climate neutrality with changes in infrastructure or logistics.

8.1.1 Clusters

The Strandnota (Den Haag, 2016a) states that they would like the different parts of the beach to embrace their own images and to cluster into certain profiles. In a conversation with Hans, it becomes clear that this clustering of beach pavilions will be a big window of opportunity for self-organised collaborative measures.

Table 8.1: Windows of opportunity for logistics, infrastructure and climate adaptation.

When?	Opportunity	Source
From 2018	Yearly investment of € 3 million euros is available for servicing and maintenance of streets, squares, alleys, street furniture, lighting, greenery etc.	(Den Haag, 2016)
2018	Scheveningen will function as a 'Living Lab' for Smart City Den Haag. This means the exploration of sensors in parking spots, adaptive street lighting etc.	(Den Haag, 2016)
2019	Lijn 1 Gevers Deynootweg: Renovation of tram line 1	(Den Haag, 2017)
2019	Start of renovation in the Kurhaus area: - Surroundings of Kurhaus will be redesigned and made into a 'dune landscape' again - Gevers Deynootplein, Bezaansmast, Palacestraat, Rederserf, Palaceplein (westzijde) will become pedestrian pathways - The final design is currently a work in progress	(Den Haag, 2017)
2020	Claims on ground for underground thermal energy storage will be laid. The aim is that by 2040, this form of ground heat energy (*bodemenergie)* will make a significant part of the energy neutral city.	(DSB Stedelijk Beheer, 2018)
2020	Intersection Zwolsestraat/Gevers Deynootweg: - This intersection will become grade-separated (ongelijkvloers) - A new parking garage will be built under at the Noordboulevard, with which traffic will be redirected	(Den Haag, 2017)
2020	Middenboulevard (part between Scheveningse Slag and the Pier): - There will be new 'attractions' and restaurants developed - For example, Legoland Discovery Centre (LDC) - After the summer of 2020: a 35 metre staircase will come in front of the Kurhaus that will connect the beach pavilions to the Middenboulevard	(Den Haag, 2017)
Upto 2025	'Smart and clean' busses: Investment in public transport, pilots of new technologies	(Provincie Zuid Holland, 2016)
2040	The Hague aims to be 'climate neutral'. By this, they mean net-zero carbon emissions.	

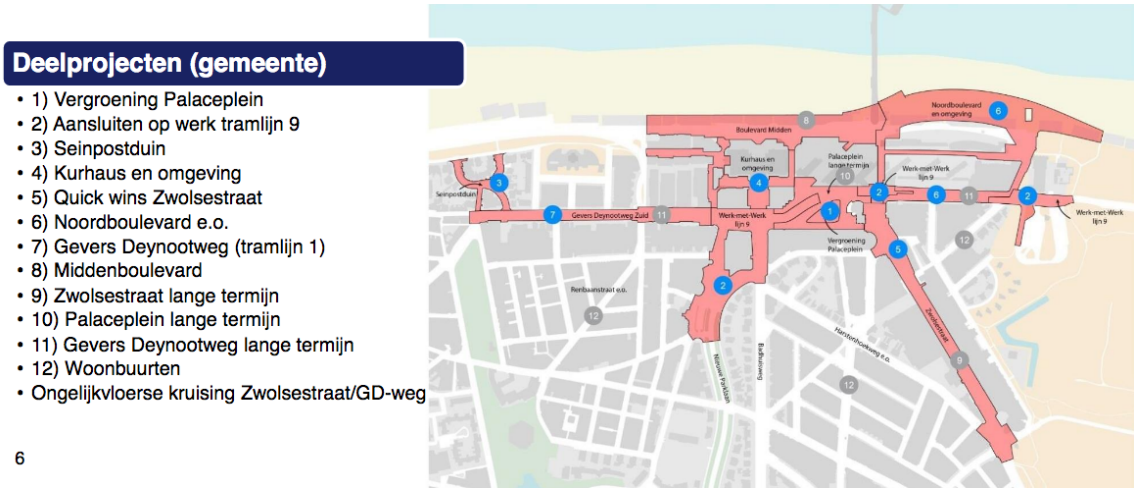


Figure 8.1: Planned infrastructure projects (Horst, 2017)

Table 8.2: Windows of opportunity for collaboration related to materials and waste.

When?	Opportunity	Source
2019 - future	Green Deal financing is available by the national government for projects that demonstrate sustainability	(Green Deal, 2019)
2021	EU directive that bans disposable plastic into action	(European Parliament, 2019)
2025	By 2025, The Hague wants all the business parks to be busy with the circular economy, and Binckhorst should be half circular.	(Den Haag, 2018a)
2025	The Hague aims for 40% of all waste household resources and products to be re-used.	(Den Haag, 2018a)
2030	Non-necessary short-lifespan products are 100% reduced	(Rijksoverheid, 2018)
2030	44% less waste incineration	(Rijksoverheid, 2018)
2030	50% circularity within the Netherlands	(Den Haag, 2018a)
2030	65% of all packaging should be recycled	(Mul, Kool, de Lange, & Steman, 2017)
2030	Maximum 10% of waste dumped/landfilled	(Mul et al., 2017)
2050	100% circularity within the Netherlands	(Den Haag, 2018a)

8.2 Materials

For finding windows of opportunities for collaboration related to materials and waste, we look at the national, provincial and municipal visions on circular economy and waste management (Table 8.2).

It becomes clear from the various vision documents that there are contradictory ideas about what goals should be reached in which year. There is a general consensus that The Hague wants to become a ‘circular’ city, but the details of what the %’s of circularity mean are unclear. In a sense, in the next two decades there is a window of opportunity for initiatives that minimise waste production.

Table 8.3: Windows of opportunity for collaboration related to the energy transition.

When?	Opportunity	Source
2020	National 'Energie innovatiefonds', €35 million are available for energy innovation until 2020	(Provincie Zuid Holland, 2016)
2020	Provincial aim that companies in South Holland should contribute 11 PJ of heat for the district heat network.	(Provincie Zuid Holland, 2016)
2021	Until May 2021, 4 million euros in provincial subsidy is available for projects that reduce CO_2 emissions. There is a maximum of 75,000 per project.	(Provincie Zuid Holland, 2018)
2022	Development of three new geothermal sources in South Holland.	(Gemeente Den Haag, 2018)
2023	National Energieakkord specifies speeding the energy transition towards 2023	(Provincie Zuid Holland, 2016)
2025	Every province should be accounting their CO_2 emissions (CO_2-*boekhouding*)	(Provincie Zuid Holland, 2016)
2025	CO_2 emissions and energy consumption during construction or management & maintenance of South Holland's infrastructure should fall by 25% compared to 2015.	(Provincie Zuid Holland, 2016)
2030	In 2030, all the regional public transport that South Holland is responsible for will ride emission-free.	(Provincie Zuid Holland, 2016)
2040	The Hague aims to be 'climate neutral'. By this, they mean net-zero carbon emissions.	
2050	National reduction of 80-95% of GHG emissions by 2050 (as compared to 1990)	(Provincie Zuid Holland, 2016)

8.3 Energy

For finding windows of opportunities for collaboration related to the energy transition, we examine national, provincial and municipality energy transition agendas (Table 8.3).

8.3.1 The Hague's energy agreement (Energieakkord)

The main points of The Hague's energy agreement (Den Haag, 2018b) are:
Energy neutral housing: The municipality aims to facilitate 100,000 houses to become energy neutral in the next 10 years. They have selected 10 areas to begin, one of which is Statenkwartier/Scheveningen.

District heat networks: In order to stop the reliance on natural gas, there is a focus on heat networks. They aim for an open, flexible, independent, predominantly low temperature heat network. The aim is to support sources such as geothermal and aquathermal. They want to eventually change all the High-temperature networks (above 70 °C) to Mid-temperature networks (70 °C and below).

Collaboration: Working towards an open network where organisations can bring their concerns to the table. The municipality wants to organise thematic conversations (thematafels) for the exchange of information.

It is interesting to note that this energy agreement does not make any statements about (renewable) energy production.

8.3.2 Energy cooperatives in South Holland

The number of so-called energy 'postcode cooperatives' (postcoderooscoöperaties) grew rapidly in South Holland in 2018. Citizens organise themselves collectively into these cooperatives in order to share the benefits of energy production, saving, trade and storage (RVO, 2016). They do this by sharing solar, wind, biogas powered electricity production, district hearing, car sharing and many other activities. As Figure 8.2 shows, there are 60 cooperatives in South Holland, 12 of which were new in 2018. A third of these were coordinated by external project managers, and the rest were locally self-organised.
In South Holland, there is a subsidy of up to 75,000 euros available for setting up an energy cooperative (Provincie Zuid Holland,

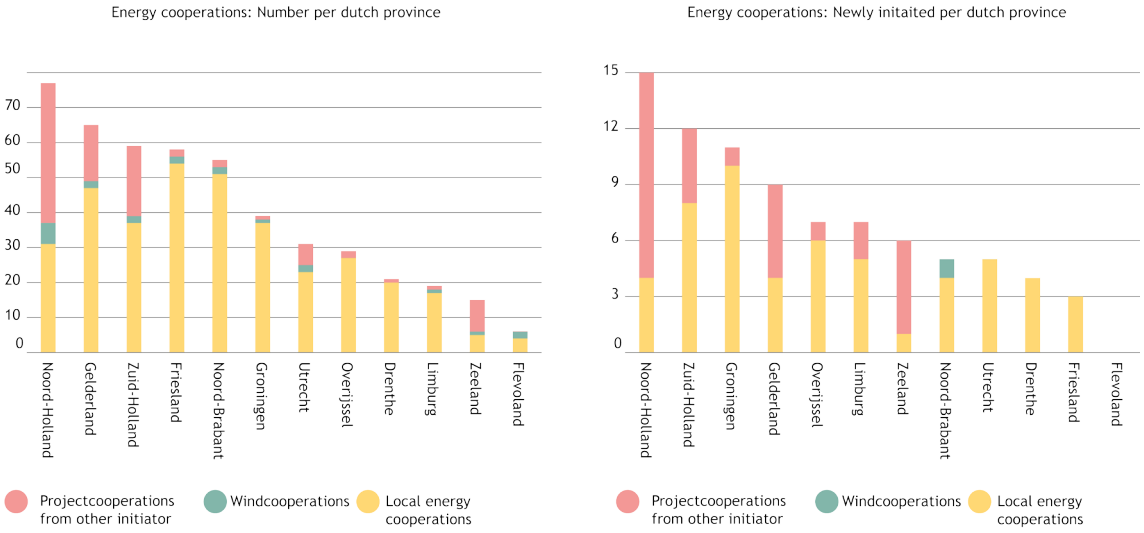


Figure 8.2: Energy cooperatives per province (Hier Opgewekt, 2018a)

2018), as well as a Community of Practice for knowledge-sharing (Hier Opgewekt, 2018b). Therefore, this is a window of opportunity for new energy cooperatives to establish themselves.

8.4 Conclusions: opportunities for change

When are the critical moments that present an opportunity for changes to be implemented?

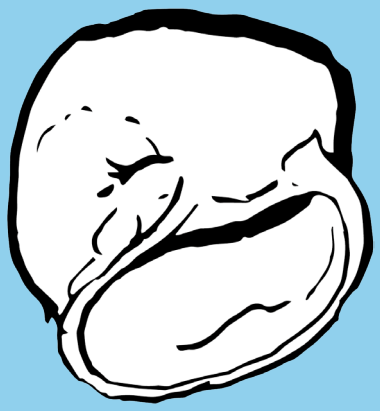
To summarise, the windows of opportunities for collaborative measures that could align the beach pavilions with the Haags Klimaatpact are:

- Scheveningen will function as a 'Living Lab' for Smart City Den Haag. This opens up an opportunity to pilot projects that make use of digital systems in the beach pavilions. Data on the amounts of food used and wasted is currently unknown by the beach pavilions, therefore systems such as ValuWaste or Winnow could rectify this by monitoring food waste.
- Surroundings of Kurhaus will be redesigned and made into a 'dune landscape' again. This opens an opportunity for alternative forms of delivery to beach pavilions, for example FoodLogica for the last mile.
- The national aim is that by 2040, ground heat energy (bodemenergie) will make a significant part of the energy neutral city. Furthermore, South Holland's aim is that companies in South Holland should contribute 11 PJ of heat for the district heat network. This opens an opportunity for moving away from gas infrastructure, and using or producing the heat network of The Hague in creative ways.
- By 2030: Non-necessary short-lifespan products should be eliminated. This opens an opportunity for bio-based solutions for disposable products such as Tapioca starch cutlery or mycelium products.
- Until May 2021, 4 million euros in provincial subsidy is available for projects that reduce CO_2 emissions. There is a maximum of 75,000 euros per project. This opens an opportunity for setting up an energy cooperative amongst the beach pavilions, or producing solar energy/ hot water. Green Deal financing is also available by the national government for projects that demonstrate sustainability.
- The municipality wants to organise thematic conversations (thematafels) for the exchange of information. This opens an opportunity for pavilions to share their successes and needs.

9. Conclusions from analysis

In this first part of the report, the aim has been to find opportunities for collaborative measures that would align the beach pavilions with the goals of the Haags Klimaatpact. In this section, we conclude this first section and answer the research question:

Which collaborative measures can be taken to align the beach pavilions with the goals of the Haags Klimaatpact?



9.1 Summary of analysis

We began by analysing the concerns and requirements of the pavilions and municipality. The concerns and requirements for the pavilions were varied; some did not know where to begin, some needed additional financial support, many lacked space for proper waste separation, many wanted more information about the municipality's plans, better infrastructure and more trust and communication with the other pavilions. On the other side, from the municipality the concerns and requirements were: fears that the pavilions were too entrenched in their own ways, that the current biggest political party has not signed the Haags Klimaatpact and that there was not enough attention to bottom-up support for the pavilions.

This was followed by a technical investigation of the material, energy and water use of the pavilions, where we found that the pavilions have a lack of detailed knowledge about their own energy, water and material use. Nonetheless, we gathered that fridges/ freezers were the most energy-intensive appliance, along with gas-powered terrace heaters. The largest wastewater streams originated from dishwashers (52%) and toilets (31%). In terms of general waste, there was a massive lack of separation, with 73% of the total waste being residual waste.

We then gathered best practises for cooperation to learn how other organisations have optimised their use of material, energy and water use. Using this as inspiration, we inventorised the companies in The Hague that presented an opportunity for cooperation and found that they broadly fell into the categories: symbiotic exchanges of organic waste for food, upcycling plastic waste, collective green procurement, using a district heat network, alternative forms of transport and community building.

Finally, we looked at the windows of opportunities in terms of critical moments and potential funding. We found potential in the 'Smart City' initiative of The Hague, the reconstruction of the area around the Kurhaus, the Dutch transition away from using gas for heating and various provincial funds (75,000 euros per CO_2 reducing project) and national funds (Green Deal financing).

9.2 Opportunities for collaboration

Synthesising all this potential, we present seventeen measures to answer the research question: Which collaborative measures can be taken to align the beach pavilions with the goals of the Haags Klimaatpact?

1.
Upcycled plastic Legos: A Legoland Discovery Centre will soon open at Scheveningen, and this creates the opportunity to collaborate with plastic upcycling partners. Visitors who collect plastic trash from the beach (such as in the bin outside Hans' pavilion) can then upcycle it into Lego blocks!

2.
Heating people, not places: Rather than using gas-powered terrace heaters, we can go back to heating surfaces as they did in the Netherlands in the 19th century: with hot water pipes running under the surface! This could be implemented in outdoor furniture at the beach pavilions.

3.
Pavilions as 'Living Labs' for Smart City Den Haag: The beach pavilions can be pilot projects for collecting data on the amounts of food used and wasted. This information is currently unknown by the beach pavilions, but considering The Hague's ambition to be a Smart City, the pavilions can be frontrunners by implementing systems such as ValuWaste or Winnow in collaboration with the municipality.

4.
Collective green procurement: If the beach pavilions collectively make wholesale orders for bio-based products (such as Straw by straw, Bamboo brushes, Naturalbags, Made in Moerwijk, Paperwise, Marcel's green soap, Seepje), then they can be centrally delivered to one location.

5.
Renewable energy cooperative: The pavilions could buy solar panels and / or a windmill together and use energy in the summer and sell energy in the winter.

6.
A sustainable last mile: The surroundings of Kurhaus will be redesigned to be more friendly to pedestrians. This could also be a chance to try out a new form of food transport at the last mile such as FoodLogica. This drastically reduces the time and kilometres that carbon-

emitting trucks have to drive.

7.
Solar Panel Switcharoo: Instead of storing expensive solar panels in the winter where they will not be useful, cooperate with local businesses or individuals which may use them in the winter. This way solar panel costs may be reduced, while their effectiveness is increased. To increase transportability solar panels may be placed on a boat and put in the sea.

8.
Harbor: Home of the Beach pavilion: To reduce transportation emissions for moving the beach pavilions twice a year, they could be stored locally in the winter. This space could then be used in the summer to cooperatively distribute food and other supplies from. Also; collectively renting a boat to transport the pavilions instead of using trucks.

9.
Knowing your neighbours (and their food): To create more awareness of (sustainably) produced food in and around The Hague, a local farmers market can be organised. On this market, ideas on collaboration with local producers may be shared which will hopefully boost sustainable food use within the restaurants, and could also produce a sink for food waste.

10.
Pavilion of the year 2030: In order to give owners a better idea on what they can do, while not spending too much on subsidies, the municipality could fund a pilot pavilion. This would help get a grasp on what is possible while also creating publicity for a sustainable Scheveningen.

11.
Creating a community: Community building is a field of practices directed toward the creation or enhancement of community among individuals within a regional area (such as a neighbourhood) or with a common interest. If there is trust and communication between the stakeholders, this could benefit every solution proposed in the future.

12.
Online platform for contact with other pavilions: Collaboration between beach pavilions not very present. An online platform could help making connections and giving the ability to share knowledge and ideas. Solutions that only address small part of sustainability are as welcome as the bigger ideas. A whatsapp group could be an example of forming such a platform.

13.
Envision the future: Have interactive sessions with the beach pavilion owners and municipality where they can vision their future of the area. This would be an exercise where everyone first visions the future and afterwards think of steps that are needed to reach this future.

14.
Create more awareness with the customers: In order to create awareness about sustainable menus, pavilions could brand items with stamps e.g. ‘locally sourced in The Hague’, with more information on another part of the menu with the how, what, sustainability. Like Noordzeevis Scheveningen.

15.
Seawater for heating and cooling: Using seawater for heating and cooling as an alternative for gas use for boilers and floor heating, as has already been implemented in Duindorp for over a decade. This can be collectively arranged in Scheveningen as well.

16.
Collective bio-digester: Within the pavilions, paper, glass and residual waste are separated and collected separately. Compost bins on the boulevard could be used to enable pavilions to separate their food scraps. The compost could be used for urban farming in The Hague.

17.
Repurposing valuable waste streams: Create a map of local initiatives that provide circular or sustainable products, build a network of mapped parties, create an inventory database and then create a point system to foster local and sustainable procurement with the goal being: to repurpose valuable waste streams.

9.3 Shortlist of measures

In order to take our research a step further, we wanted to narrow down the long-list into a short-list of three solutions which we could dive into in more detail. This would lead to a valuable deliverable for our commissioners. Therefore, we organised a morning meeting with Hans & Noortje (although, in the end, only Noortje was able to join) in which we pitched each of the fifteen ideas (Figure 9.1).

From Noortje's feedback, we narrowed this list down to the three ideas that were most interesting to them, summarized on the next page. Noortje made these choices based on what she thought would be most feasible and interesting for the beach pavilion owners.

Figure 9.1: We used a combination of pitches and flashcards to brainstorm together with Noortje.

Which measures are most interesting to our commissioners?

Noortje asked us to explore the following three ideas further, considering the implementation requirements and environmental impacts of each one.

1.
Collective biodigesters: Compost bins on the boulevard could be used to enable pavilions to separate their food scraps. The bins should not be located on the grounds of the pavilions, as these would lose space, but also should not be placed too far away, as this would create a too big of a threshold to separate. The compost could be used for urban farming or, for example, a small farm on the beach for local products.

2.
Heating people, not places: Rather than using gas-powered terrace heaters, we can go back to heating surfaces as they did in the Netherlands in the 19th century: with hot water pipes running under the surface! This could be connected to the district heat network that The Hague wants to develop, as water temperatures can be relatively low, usually less than 30°C. Or, if pavilions want to implement this on a smaller scale: heat pumps and solar collectors would be efficient in delivering these low temperatures.

3.
Harbor: Home of the Beach pavilion & A sustainable last mile & Collective green procurement: To reduce transportation emissions for moving the beach pavilions twice a year, they could be stored locally in the winter. This space could then be used in the summer to cooperatively distribute food and other supplies from. The surroundings of Kurhaus will be redesigned to be more friendly to pedestrians. This could also be a chance to try out a new form of food transport at the last mile: collective green procurement that is transported by alternative forms of transport. If the beach pavilions collectively make wholesale orders for bio-based products (such as Straw by straw, Bamboo brushes, Naturalbags, Made in Moerwijk, Paperwise, Marcel's green soap, Seepje), then they can be centrally delivered to one location, from which a company such as FoodLogica transports it to each of the pavilions. This drastically reduces the time and kilometres that trucks have to drive.

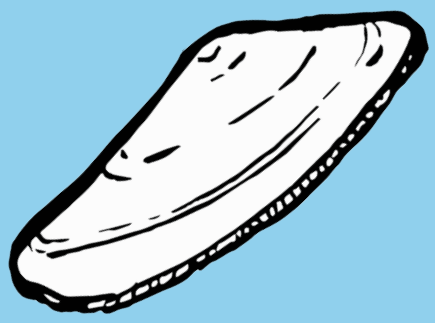
Additionally, they asked that we propose individual sustainable measures that have low risks, high rewards and list all the funds and initiatives that could support the pavilions in implementing sustainable measures. With these aims, we move to the next part of our research.

10. Introduction to collaborative measures

Our commissioners want to know how the beach pavilions at Scheveningen can reach the climate goals for 2030 as stated in the Haags Klimaatpact. In this section, we explore how the sustainable, collaborative measures we proposed in the first part can be implemented by answering the following questions for each of the three chosen measures (alternative terrace heating, biodigesters and a Transport Hub):

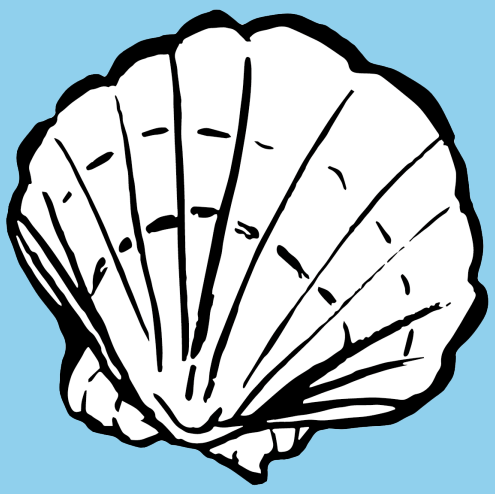
1. What are the requirements for implementation for each measure in terms of practicalities, stakeholders and financing?
2. To what extent will each measure create social and environmental value?
3. Which Haags Klimaatpact objectives are addressed by each measure?
4. To what extent does each measure meet the needs (i.e. requirements and concerns) of the pavilions and municipality?
5. What forms of support are available for sustainable initiatives at Scheveningen?

Then, we provide supporting information for the rest of the sustainable measures that Hans & Noortje showed interest in. This is followed by a list of some low risk, high-reward individual measures that all the pavilions can take. Finally, we enlist all the funding opportunities and initiatives that the beach pavilions could use to further their own sustainable goals, and therefore do their part in reaching the Haags Klimaatpact goals.



11. Transport Hub

Almost a quarter of GHG emissions in the EU come from transportation (EEA, 2019). It can therefore be assumed that a significant part of a beach pavilion's yearly impact comes from trucks transporting goods to and garbage from the pavilion. If the pavilion is only open in certain seasons: trucks transporting the different parts of the pavilion from the storage in winter to its space at the beach in the high season, and back again, should be taken into account as well. On top of that, according to our social analysis, truck transport is often not executed effectively with trucks being only partly filled. Furthermore, truck movement may be dangerous in an area like the boulevard which is dominated by pedestrians and should be limited to a minimum.



11.1 A strategy for sustainable mobility

With this strategy we propose three steps that can be taken to decrease truck movement and increase sustainable procurement. The goal of this strategy is to create a more efficient logistics system.

11.1.1 Step 1: Getting insight into transportation and procurement

Based on our social analysis, we found that currently beach pavilion owners have little insight into the efficiency of the logistics used for the movement of their products, waste and pavilion parts. An important step for gaining insight is creating an overview of these logistics with which beach pavilions can individually assess how they can reduce movement, and thus costs (Figure 11.1). This could be done by the beach pavilions on their own: noting down how many trucks are coming to and from their pavilion every week, where they are coming from and going to, and how full they are. If it proves to be challenging to incentivise beach pavilion owners to record this data themselves, an external party could be hired to quantify the network, or by using smart city technology (Futureproof The Hague, 2017) to monitor the boulevard. Once there is more information about the efficiency of these truck movements, the beach pavilions owners can move to Step 2, in which they solve these inefficiencies through collaborative procurement.

11.1.2 Step 2: Collaborative procurement

From the social analysis, we found that many pavilion owners believe it is too expensive to buy more sustainable alternatives to the food and wares they are using right now. Collaborative procurement could (partly) solve this problem; as buying in bulk can reduce the price of certain products. Additionally, buying

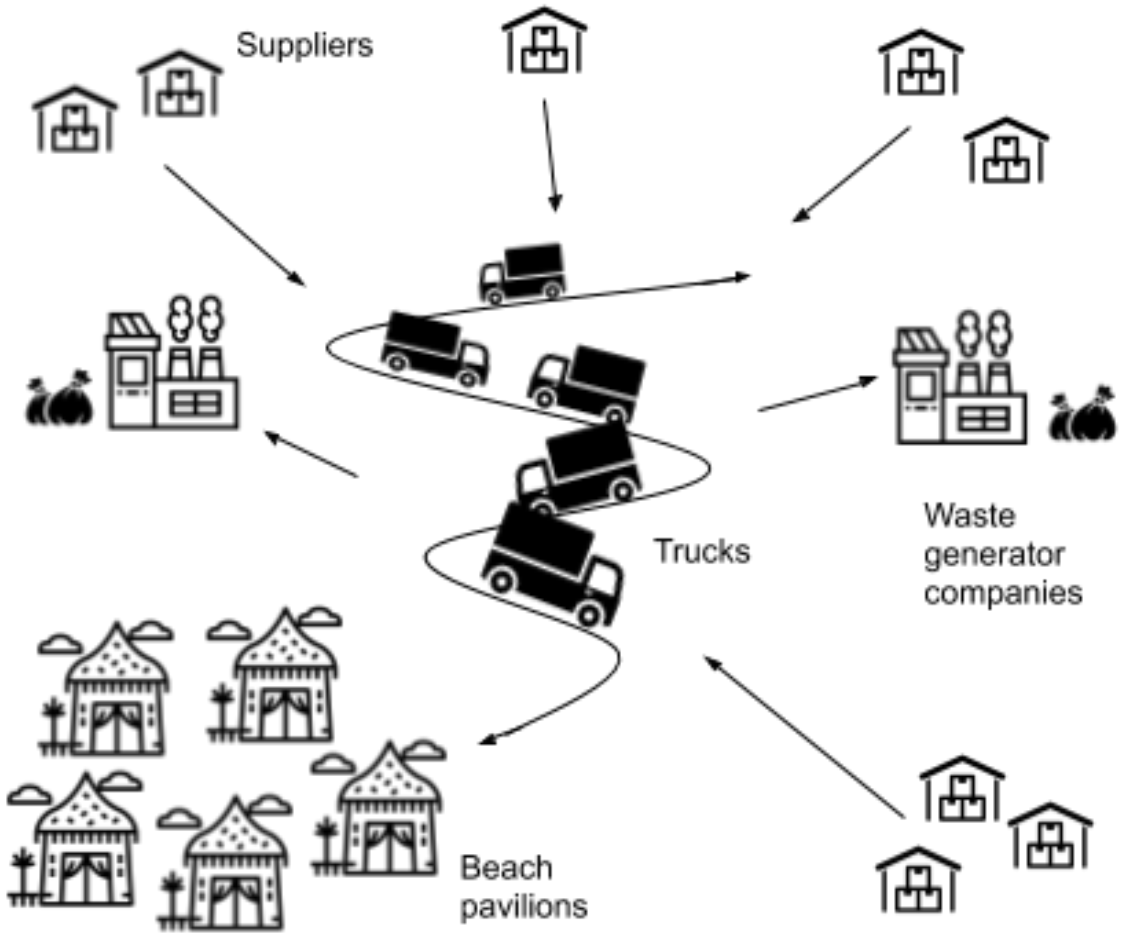


Figure 11.1: Illustration showing the current logistics system. Many different suppliers and waste generator companies are present, resulting in a lot of trucks transporting goods to and from the pavilions. (Source: Own image)

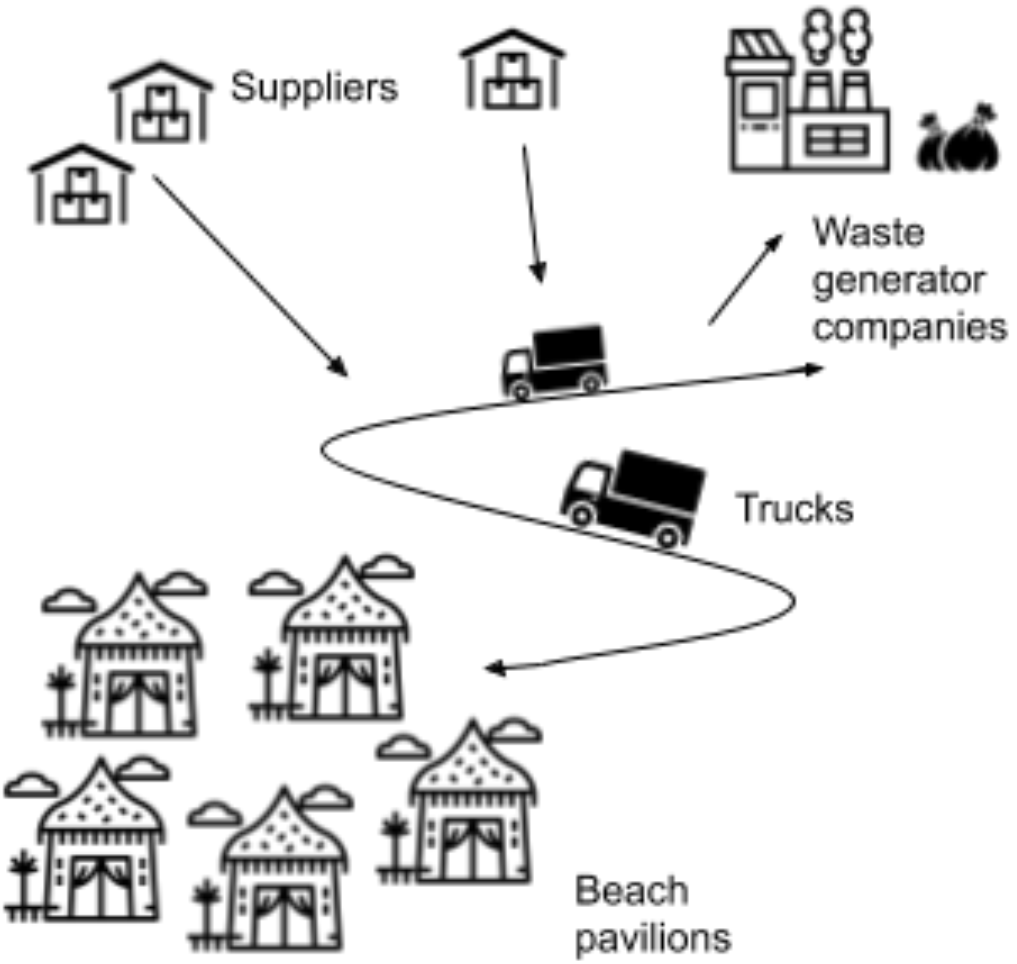


Figure 11.2: Illustration showing the logistics system after Step 2 is implemented. Less suppliers and waste generator companies are present, resulting in less trucks transporting goods to and from the pavilions. (Source: own image).

collaboratively gives the beach pavilions more power to make sustainable demands and results in less suppliers, and so in less trucks driving along the boulevard (Figure 11.2).

11.1.3 Step 3: A Transport Hub

Finally, in the long term, to support collective procurement, a central location can be realised for the temporary storage of products. In other words: a Transport Hub. Suppliers could deliver their products to this Hub. And then, the beach pavilions would organise the 'last mile' from the Hub to each pavilion. If an alternative form of transport is used (for example, electric bikes) this would make transport more efficient and sustainable, and would result in a safer situation at the boulevard (Figure 11.3).

The European Environment Agency (2018) states that electric vehicles emit less GHG emissions over the entire life cycle than petrol and diesel cars do, making the shift towards these electric vehicles desirable. Additionally, this Hub space could be used in the winter to store (some of) the beach pavilions. This would reduce the transportation distance of their building materials.

Currently, a pilot concerning a logistics hub is already taking shape in The Hague, under supervision by the national government (UBR, 2019). While the deadline for participating has already passed, a lot could be learnt from this process, like what barriers for implementation exist when dealing with such a collaborative system. However, more information on the pilot is not yet available, thus exact learnt lessons remain limited.

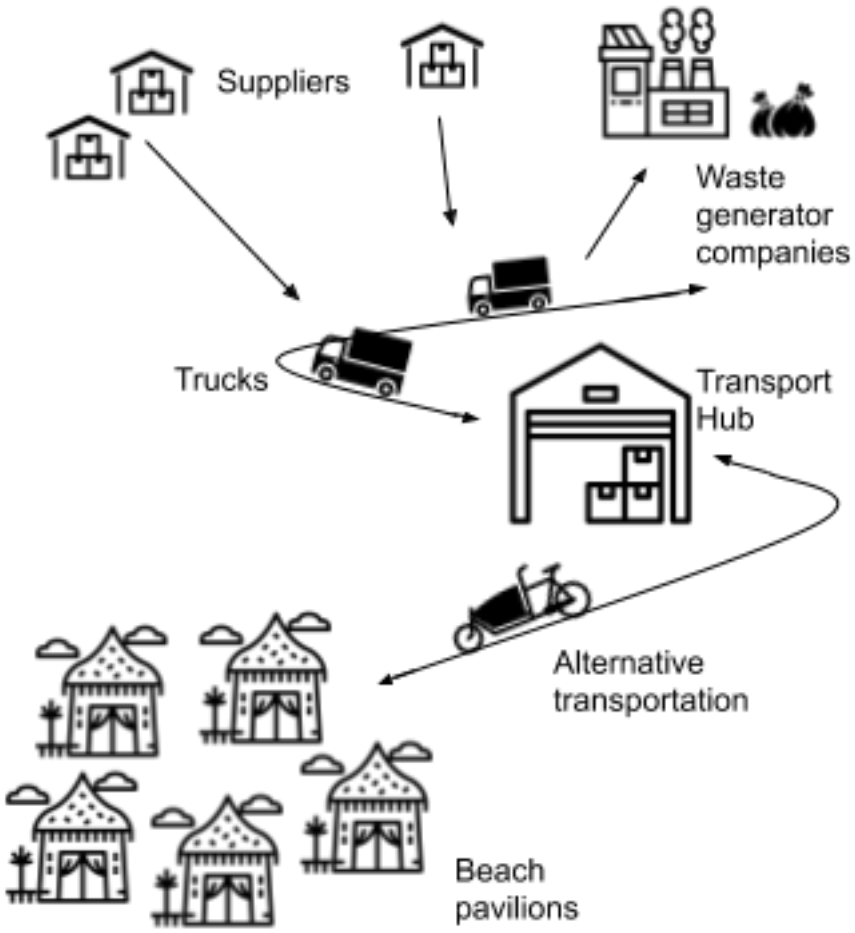


Figure 11.3: Illustration showing the logistics system after Step 3 is implemented. This situation builds upon Step 2, therefore also less suppliers and waste generator companies then in the current situation are present. Products are delivered at the distribution centre, from where the beach pavilions manage the last 'green mile' using alternative forms of transport. Waste is separated and transported to and from the Hub. (Source: own image).

11.2 Implementation: Step 1

Getting insight into transportation and procurement.

11.2.1 Practical requirements

Practicalities concerning this step are small, which is what makes it so alluring. To gather data on what products are going to the beach pavilions, owners can note their own observations considering the amount of trucks, where they are coming from, how full they are and what products they contain. The information on the trucks that collect waste from the beach pavilions can be noted down similarly. This can be done by collaboratively creating a spreadsheet (for example, in Google Docs) which would not cost anything besides time, and would create a platform where pavilions can compare their transport efficiency and possible improvements can be sought.

It would also be possible to hire an expert that conducts this analysis in the interest of the pavilion owners. Therefore it would be straightforward if one pavilion owner takes the lead as project manager, creating an overview of which pavilions would like the expert to conduct the analysis for them, arranging such an expert, and making sure all communications and payments proceed steady. Clustering the pavilions provides an opportunity for the self-organization of this.

11.2.2 Financial requirements

If this project was performed by the beach pavilions themselves, it would theoretically only lead to costs in the form of labour hours for doing the administration that shows the information on their suppliers and waste

generators, trucks going to and from the pavilions, and the products and waste these trucks transport. If the pavilions want a more detailed analysis conducted by an expert, it would cost about 800 euros per pavilion, we found during an interview with De Transportheker (De Transportheker, personal communication, June 6th, 2019). Furthermore, De Transportheker stated that it may very well be possible to get subsidies for the analysis conducted or its outcomes. It is unclear what the potential profits could be until a preliminary scan has been done to assess the current situation.

A result of this analysis could be that awareness among pavilion owners is created, where after due to economic and/or environmental incentives owners could change behaviour, making more sustainable choices. This could lead to more profit made due to less gas costs as of the switch to electric appliances. Lehner, Mont and Heiskanen (2016) state that 'nudging is a useful strategy for inducing changes in context-specific behaviour'. Nudging, by encouraging pavilion owners to compare their findings in the analyses, could enhance the change towards sustainable behaviour.

11.2.3 Stakeholder requirements

The most important stakeholders in this case are the beach pavilions. They provide the required data (Knowledge), effort (Production) and money (Financial) for the inventorisation. If the beach pavilions are not able to or are not motivated to do the inventorisation themselves, or do not have the right knowledge to do so effectively an external consultancy firm could be hired to analyse the situation (Knowledge) as well as to provide the overview table to realise this analysis (Production). The municipality or other governmental bodies could help fund this analysis (Financial) but could also provide legislature support to get more beach pavilions to do an analysis of some kind (Competencies). Motivation for this step must mostly come from beach pavilions themselves and the notion that they will profit from this in the future (Legitimacy).

If more information is needed concerning mapping out logistics, contact may be sought with De Transportheker, an independent logistics consultant who provided us with information during our analysis (info@transportheker.com).

11.3 Implementation: Step 2

Collaborative procurement.

11.3.1 Practical requirements

In order to make collaborative procurement happen, a dedicated pavilion owner or employee from a hired company has to put time and resources into conducting research for collaborative procurement. This person has to find and contact suppliers in order to make arrangements where collaborative procurement by beach pavilions leads to lower purchase costs. A form of communication, like a WhatsApp group or Slack, or regular meetings, which works for all pavilions towards collaboration has to be found and the person in charge needs to be an adequate point of contact towards both the pavilion owners as the suppliers to make this step work.

11.3.2 Financial requirements

Most costs for this step are covered during the inventorisation phase (Step 1). If, however, it is collectively chosen for more sustainable means of transport, governmental subsidies are available that enable emission reductions. Furthermore, there could be savings since there is less truck movement required. The amount depends on the current situation, and can only be indicated after the initial analysis. Savings can also be made through bulk procurement, for example, when buying

Table 11.1: Involved stakeholders for Step 1: Gaining insight into transportation.

Resources	Description
Financial	Beach pavilions, municipality, other subsidies
Production	Beach pavilions, external consultancy firm
Competencies	Municipality
Knowledge	Beach pavilions, external consultancy firm
Legitimacy	Beach pavilions

straws via Straw by Straw, savings of up to 17% can be made when buying through the webshop, and even further savings are imaginable when buying in greater numbers (employee from Straw by Straw; Straw by Straw website (n.d.)).

11.3.3 Stakeholder requirements

Beach pavilions will provide most funds for this step (Financial) and also the required knowledge gathered at step one, possibly together with a consultancy firm (Knowledge). However, if the pavilions can get a position that is strong enough to make demands to their suppliers (Production) the supplier may pay for some of the sustainable solutions (Financial). Furthermore, for some solutions, like electric vehicles, governmental subsidies can be acquired (Financial). The municipality could furthermore provide legislative support to make change happen faster (Competencies). Motivation to change will mostly be given by: visitors who will be safer due to fewer trucks on the boulevard, the municipality who wants to show a sustainable city to its guests and the external consultancy firm which could show what money can be made (Legitimacy). Beach pavilions could become aware of these economic and environmental issues and incentivise themselves for collaborative procurement.

11.4 Implementation: Step 3

Transport Hub.

11.4.1 Practical requirements

The most important physical practicality of the Transport Hub is space. The Hub needs to be close enough to make it worthwhile and big enough to support enough beach pavilions. Furthermore, it needs to be easily reachable. Preferably a sustainable alternative to current logistics should be offered to make the most of the short distance transportation distance. A suitable option of realising this Hub would be to make the 'duurzaamheidscommissie' of the VVS responsible, assuring that the Hub is included in the agenda of the VVS, and that the opinion of all pavilions owners is taken into account. The municipality as well as other interesting parties can be concerned in order to realise the hub itself. Furthermore, some kind of formal agreement between the participants should be composed.

11.4.2 Financial requirements

Creating the space close enough to Scheveningen will probably cost quite some money, since it is an active and popular area within The Hague, especially considering that making the collaboration bigger to spread the costs will also increase the demand for space within the Hub, making it more expensive, meaning scalability is limited. In the Grondprijzenbrief 2019 (Stroosma, 2019) average land prices in The Hague for different endeavours are laid out. For company buildings, this is stated to be between €196,- and €725,-/m^2. However, since we are talking about an area that is not necessarily a business park, the exact price for a plot needs to be determined by the municipality.

For the sustainable last mile, the same governmental subsidies that are available for the collaborative procurement are available to reduce costs when investing in green vehicles like electric vans or transport bicycles. Extra savings are mostly coming from further optimising goods transport and, if combined with garbage collection, collective garbage disposal. Eventually, having a sustainable means of transport will also be cheaper considering the rising fuel costs.

11.4.3 Stakeholder requirements

From The Hague's logistics Hub that is currently in development, we learned that it is important that a central organisation takes the lead to guide the process. This Hub is lead by the Dutch Government, as a governmentally funded pilot. However, it is possible that the

Table 11.2: Involved stakeholders for Step 2: Collaborative procurement.

Resources	Description
Financial	Beach pavilions, governmental subsidies, Suppliers
Production	Suppliers
Competencies	Municipality
Knowledge	Pavilions, external consultancy firm
Legitimacy	Municipality, boulevard visitors, external consultancy firm, beach pavilions

Table 11.3: Involved stakeholders for Step 3: Transport Hub.

Resources	Description
Financial	Municipality, beach pavilions, other businesses in Scheveningen
Production	Municipality, Foodlogica, hub personnel
Competencies	Municipality
Knowledge	Project leader current Hub project
Legitimacy	Municipality, boulevard visitors, beach pavilions

municipality takes the lead in developing a second Hub suitable for Scheveningen (Production). This does not mean that the initiative should not come from the beach pavilions. In the pilot, most funds are sought from the participating businesses, which would in our case be the beach pavilions (Financial), but could be alleviated by the municipality (Financial).

The project leader can try to get more interested parties to the table. These parties would consist of other businesses (Financial) within Scheveningen that want to participate, lessening the costs of the total affair. The municipality may play a big role in providing the space for the Hub within Scheveningen. Experience concerning the execution of the project could be found with the previously mentioned consultancy firm, or with Hans van der Bijl, who is project leader of the current Hub project (Knowledge). An example for sustainable transport over the boulevard may be given by Foodlogica who transports goods by bike for companies in Amsterdam and is planning to extend their services to The Hague as well (Production). Furthermore, the hub should be ran by personnel who guide the loading and unloading of trucks (Production). Support for this step is already quite developed by the municipality (Legitimacy), who want to lessen traffic on the boulevard and visitors (Legitimacy), who would be positively influenced by the lessened traffic. However, it is also possible that beach pavilion owners feel opposed to working in such a hub (Legitimacy), which would hamper its feasibility.

If more information is needed concerning the current Hub project in The Hague, contact may be sought with Hans van der Bijl, project leader of the undertaking (Hans.Bijl@rijksoverheid.nl).

11.5 Impacts

Below we will describe the impacts of this strategy. What are the social and environmental impacts of implementing the steps stated above?

11.5.1 Social impacts

The biggest social impact our strategy could have is de-crowding the boulevard of Scheveningen and other parts of the city because less trucks are deployed. Lessening dangerous traffic situations and general nuisance. Furthermore, if beach pavilion owners are thinking more thoroughly about the goods they buy and where they are coming from, and are sharing these thoughts to other owners and suppliers, they can learn from each other's sustainable solutions. Additionally, these conversations would further increase the cohesion between the beach pavilion owners.

11.5.2 Environmental impacts

The exact environmental impact reduction that may be accomplished by implementing our steps remains to be seen from the inventorisation of movements to and from the beach pavilions. Energy-wise, fuel could be saved by reducing the amount of trucks, reducing the GHG impact of each beach pavilion. Furthermore, the environmental benefits arising from collectively assessing the problem and learning together cannot be determined yet, but would be of big interest. When looking at a change to electric transportation, one should consider the effects of material scarcity and production impact associated with electric vehicles. Furthermore, if beach pavilions manage to collectively procure more sustainable alternatives to disposable plastics, plastic waste would be lessened. Water usage will probably not be affected by implementing this strategy.

11.6 Fit-to-objectives

In this section the Haags Klimaatpact objectives that are addressed by the project are highlighted, as well as the extent to which this project reaches the needs (i.e. requirements and concerns) of the pavilions and municipality.

11.6.1 Haags Klimaatpact objectives

The Haags Klimaatpact objectives that are addressed by the project and the reason(s) why are discussed in Table 11.4.

11.6.2 Needs of pavilions and municipality

The steps within this strategy are compared to the requirements and concerns of the municipality and beach pavilions that were found during the social analysis.

Sustainable choices are considered more expensive

Pavilions want to change behaviour towards more sustainable ways of transport and products. However they think this is more expensive, and they need an economic incentive. The pavilions are as of now buying at a lot of different suppliers. The willingness of the pavilion owners to change suppliers in order to reduce the amount is not fully clear. A lot of pavilions already have closed deals with different suppliers, as well as prefer the food or drinks they buy there the most, and aiming for them to change suppliers might be difficult. The proposed strategy will enable pavilions to work towards these 'better' products by reducing costs when buying in greater quantities, as well as by giving opportunities to collaboratively change suppliers.

Transport is addressed by more efficient ways of dividing products and routes. Furthermore, as single-use plastics are banned in the near future, looking for alternatives for single use plastics is inevitable. When implementing this strategy, beach pavilion owners can for example sit together, make a list of all suppliers that they do not want to change from and name the ones they do not necessarily have to hold on to. This way an overview is created where possibilities are shown for cooperative procurement. Anyhow, the owners will all have to give in a little in order to make this strategy work. More research should be done in order to find out the willingness of the pavilion owners to realise the strategy.

Most pavilions are only present in the summer season

Multiple pavilions want to become year-round pavilions. This strategy will still be of interest when pavilions change from being present only seasonal to year round, as then less pavilions need to be stored in the hub in winter, however more products are supplied, which will take the place of the stored pavilions.

Waste is not separated

Plastic waste and organic waste is not separated by the pavilions due to concerns that it will still be thrown with the residual waste when it is picked up by the waste collectors. This strategy proposes a step where clusters can be made. These clusters can collectively become a customer of waste collecting and processing companies that do separate waste and are willing to pick up different waste fractions when clusters are formed. This would make collecting separate waste fractions economically feasible for the waste collectors as one truck is needed to pick up all waste, and enough waste per fraction is collected to make this separation worthwhile. It is assumed to be economically feasible for the pavilion owners as prices can be reduced by becoming customers in a cluster, as less transport is needed.

The pavilions on the Zwarte Pad cannot separate waste, also not glass and paper, as they do not have the facilities to do this and no good transport route for the waste collector is present. According to the pavilions, this is a problem that is mainly caused by the municipality, as these should arrange the right facilities. With a collaborative movement between pavilions they think they may have a better chance of success. The waste processing costs have been considerably increased, to the annoyance of the pavilions owners. Becoming customer with a big group of pavilions might be an option to reduce costs here as well.

Municipality's needs

The municipality wants to reduce traffic and stimulate green vehicles in order to limit greenhouse gas emissions associated with transport and improve living conditions within the city. This strategy has as sole purpose to reduce this traffic and therefore fits nicely within the agenda of the municipality.

The municipality wants to induce change by stimulating local initiatives. This would be a prime example of companies working together in such an initiative. Change is instigated through knowledge sharing and

Table 11.4: Goals of the Haags Klimaatpact addressed by this strategy.

Topic and goal Haags Klimaatpact	Why the strategy fits the goal
Role of residents and businesses The municipality encourages and supports local initiatives and creates the necessary conditions to make them a success. Entrepreneurship of citizens of The Hague, whether commercial or cooperative, will be one of the pillars of the transition. This includes active support from the municipality.	The steps proposed in this Transport Hub strategy ask for the support of the municipality for local initiatives. Especially the fourth step needs municipal involvement in order to be realised. The municipality has the opportunity to actively support the realisation of the Transport Hub.
Mobility The use of shared and zero-emission cars instead of individual or polluting cars is actively encouraged. We are investigating whether it is possible to differentiate the parking fees and permits according to the emissions of the vehicle.	Within the fourth step, alternative transportation in order to realise a green last mile is suggested. Besides bicycles and other self-propelled vehicles, zero-emission cars could provide an opportunity here. When differentiating parking fees and permits according to the emissions of the vehicle is realised, this last green mile might be a sufficient economic incentive for the pavilions to make a shift towards alternative forms of transport.
Mobility The municipality continues to strive for a sustainable, locally organized distribution chain for deliveries from and to entrepreneurs and citizens.	The fourth step we propose is a Transport Hub, where distribution is locally organized, and the last bit of transportation to the pavilions is realised by sustainable ways of transport.
Municipality as a forerunner There will be a fund / subsidy to accelerate profitable sustainability investments and to support unprofitable sustainability investments where necessary.	The municipality should provide funds / subsidies in order to realise the Transport Hub. Intermediate steps to be taken to realise this Transport Hub can also be supported by funds / subsidies provided by the municipality, for example hiring the external consultancy firm in order to perform the insight analyses.
Mobility There will be differentiated accessibility by area and / or type of vehicle.	With this goal in the Haags Klimaatpact, pavilion owners have to consider sustainable forms of transportation, both for themselves and their products and waste coming to and going from the pavilion. This strategy proposes a sustainable form of transportation of products and waste on the boulevard.
The Energy Transition The Hague relies on the use of fossil fuels and will take steps to become unreliable in the coming period.	Again, the steps where alternative forms of transport are proposed will reduce the amount of fossil fuels that has to be used for transportation, making the pavilions less dependent on fossil fuels.
Sustainable food supply The use of healthy, local, seasonal and sustainably produced food is encouraged in schools and other partners of the municipality.	Within this goal, our focus is on the use of healthy, local, seasonal and sustainable produced food. By encouraging collective procurement where local, seasonal food is preferred, this goal is covered.

working together. Which is exactly what the municipality wants to achieve. It is important for the municipality that measures are agreed on by as many people as possible and that there is a strong foundation for a measure within the municipal council. Our steps touch a lot of points of interest for the municipality positively (economically, environmentally, safety-wise), and can therefore fit a lot of the parties narratives. During our analysis we found that the communication between the municipality and beach pavilion owners was complicated. This is something that should be addressed, especially with regards to step 4. In this step strong collaboration by means of communication is key.

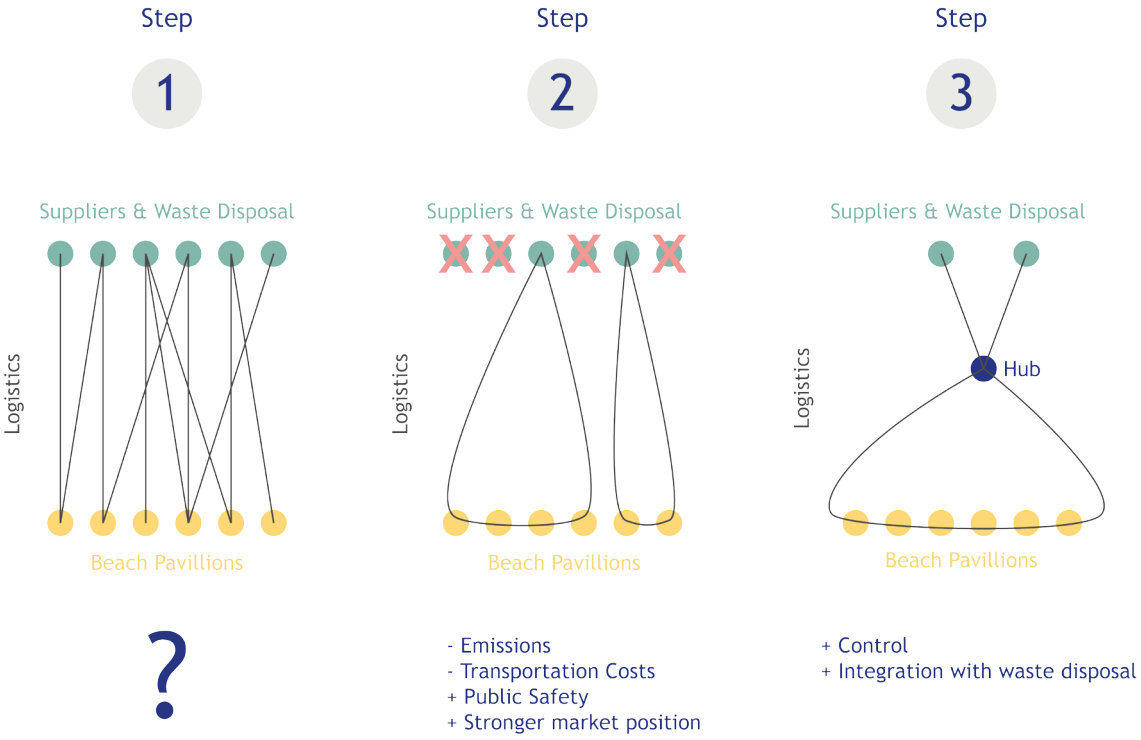


Figure 11.4: Summary of strategy with each step's impact.

11.7 Conclusions and discussion

To conclude, there are three steps that need to be taken in order to realise a Transport Hub that leads to efficient truck movements and a safe boulevard. First, gaining insight into the transportation in the current situation to create awareness among beach pavilion owners. Second, cooperative procurement in order to reduce the amount of suppliers, reduce costs and give pavilions the power to make sustainable demands. Third, realising a Transport Hub to support collective procurement, where alternative forms of transport are used for a last 'green mile'.

Multiple positive impacts can be associated with this strategy that also create support outside the boundaries of the beach pavilions. This makes implementation easier as outside stakeholders can be quickly convinced. Costs for the first two steps are limited, and the monetary value that is retained by them is quickly made visible. This should make it a comfortable solution for beach pavilion owners.

12. Collective biodigester

From the technical analysis follows that around 90% of waste created by the beach pavilions is residual waste, and roughly 50% of this is organic waste. Though this numbers should be taken with caution because they are based on several assumptions, they still indicate that the organic waste stream is a significant portion of the residual waste stream. Currently, this waste stream is not separated and ends its life in normal waste treatment: incineration. This is a waste of ‘waste’ as organic waste contains valuable inputs that could be used more purposefully. For example, the organic waste stream (e.g. swill and organic waste) can be used to create renewable energy. In this section, we explore this option by investigating the opportunities for dealing with the organic waste stream by on-site small-scale anaerobic digester (AD) that can be used by the beach pavilions. Anaerobic digestion is a biological process in which bacteria turn organic waste into biogas and digestate in an oxygen-free environment.

12.1 Anaerobic digestion container systems

There are several options available on the market. We regarded as most interesting option AD systems that can produce decentralized energy on-site, that are fully modular and can be easily extended to higher throughputs. The latter because this feature makes it easy to start of with one or a small group of pavilions and extend the system later on if more pavilion are enthused. We found out that AD systems that are delivered in sea containers really suit these criteria and have a proven business case. This is why we decided to elaborate on AD systems that are housed within containers. However, there was only case-study information available of the UK based company SEaB energy. They offer a so-called Flexibuster. We use this case-study to give the impression of the amount of electricity and heat that can be produced by using an small-scale biodigester.

12.1.1 Flexibuster

The Flexibuster AD system is housed in regular 20ft shipping containers. Flexibusters are especially designed for medium to small-scale sites for a throughput between 400 and 3000 kg of organic waste per day. The Flexibuster system leaves no odour and it is fully safe to process several different types of food waste (SEaB 2019a).

Process flow

The Flexibuster AD container system is a closed-loop system consisting of: a mouth unit, a digester container (or multiple digester containers to increase capacity), a biogas holder container followed by a small combined heat and power (CHP) unit, a digestate tank and water tank. The Flexibuster system is displayed in Figure 12.1. The process starts by putting food waste (and other organic waste) into the mouth unit of a Flexibuster sea container. Then sensors register the waste input and make sure that the organic waste is prepared for digestion in two pasteurization tanks (WRAP, 2011). After preparation the organic waste is transported to the digestion tank, where anaerobic digestion takes place. The created biogas is captured in a biogas storage tank in another container. Next to this container a small CHP unit is situated, here the biogas is converted into electricity and heat. The heat can be used for heating purposes and electricity can be used directly on-site or can be fed back to the grid. Next to heat and electricity water digestate is produced (WRAP, 2011).

The digestate can be used as a high-value fertilizer. However, it can also be separated into water and solid fertilizer (i.e. compost). In the case study of a The Flexibuster AD container system needs water, heat and electricity to operate. In information of the Flexibuster system in Southamption (UK) was reported that the system needed 60-70% of the heat and 5-10% of the electricity to operate, which was gained from the heat and electricity output of the AD system. Additionally, it needed grey water.

Operations

The constructability of the Flexibuster system is easy because the container system is fully

Figure 12.1: Several pictures of Flexibuster AD system. Left: Side view of installation (SEaB, 2015); Right: Flexibuster system at Continente supermarket in Portugal (SeaB Energy, 2016b)

Figure 12.1: Left: Employee Continente filling the mouth unit (SEaB Energy, 2016a); Right: The mouth unit of a Flexibuster (SEaB Energy, 2019a)

Case-study Flexibuster at commercial bakery (SEaB, n.d.-a)
Five days in a week, 500 kg (i.e. 2500 kg/week) of food waste containing old bread, some cakes or sweet bakery; and sandwiches with sandwich filling and spread is fed into the Flexibuster. On yearly basis this produces between 70,000 kWh of heat and 40,000 kwh of electricity. This comes down to 0.84 kWh/kg of food waste.

Case-study Flexibuster at supermarket (SEaB, n.d.-b)
On a yearly basis 216,000 kg waste is transformed into 88,000 kWh of electricity and 158,000 kWh of heat. This is an average of 1.13 kWh/kg. There is no pay-back time reported.

Case-study Flexibuster at Southampton Science Park (WRAP, 2011)
On a yearly basis the Flexibuster container situated at a university site processes between 128,000-182,000 kg organic waste. The organic waste includes cooked and uncooked meat and fish, food waste and grass. The total amount of energy is 70.000 kWh of electricity and 140.000 kWh. This is an average of 1.27 kWh/kg (taking the average of 165,000 kg processed).

Product demo (SEaB, 2010)
With a 500 kg/day throughput (= 182,500 kg/year), 113 m^3 of biogas/day (65% methane) is produced which is converted into 66,158 kWh/year electricity and 132,311 kWh/year heat. This offsets emissions of 70 tonnes of $CO_{2\text{-eq}}$. Together this amounts 198,469 kWh/year. This comes down to 1.08 kWh/kg.

modular, scalable and can be rapidly installed. The system is delivered “plug-in and play” implying that it can be installed quickly on site (SEaB Energy, 2017). Furthermore, the maintenance requirements are low (SeaB Energy, 2019a). The operations of the Flexibuster run fully automatically and are monitored remotely. For the total efficiency of the system (i.e. most energy output) the amount of waste and the composition of the waste are most important.

Output of the Flexibuster system
Below, there are several case-studies of AD systems presented grasp an idea about the output of an AD system in a container.

12.2 Implementation

What are the requirements for implementation of this measure in terms of practicalities,

Table 12.1: Based on Klijn and Koppenjan (2015, p. 268-269), these are the actors that can provide resources for the Flexibuster

Resources	Actors who can provide resources
Financial	Pavilion owner(s), RVO, municipality
Production	Business providing AD units (e.g. SEaB Energy), pavilion owners, project manager
Competencies	VVS, Counselor Sustainability
Knowledge	Annemarie Bodaar (policy advisor)
Legitimacy	Executive Board

stakeholders and financing?

12.2.1 Practical requirements

From these case-studies on the Flexibuster only the case-study of Southampton contained information about the dimensions. The case included a description of the dimensions of the system: one 20-foot container that houses two pasteurization tanks and one biodigestion tank (dimensions: 12 x 2.44x 2.8 m), followed by a biogas storage container (dimensions: 6 x 2.44x 2.8 m) and an 8 kW CHP unit (WRAP, 2011). The area should be surrounded by 1m wide space and a fence, so the total estimated space is approximately 14x7m (i.e. we assumed the area needed for the CHP unit to be around 4x2 m).

12.2.2 Stakeholder requirements

If the pavilion owners would like to implement an AD container system there are several roles to execute for different stakeholders that have different resources. To create support for the idea the VSS can facilitate in the partnering of enthusiastic pavilions and can promote this idea amongst their members (Competencies). Based on the interview with Peggy ten Hoopen & Eite Levinga (Appendix K) the role of the municipality would be a facilitating role to point out suitable areas for the placing of the containers and to give permission for placement (Legitimacy).

Annemarie Bodaar is a policy adviser that can help to improve the implementation proposal such that it becomes more plausible to gain support at the Executive Board (Knowledge) (Conversation Peggy ten Hoopen & Eite Levinga, Appendix K). After the proposal is finalized, the Counselor of Sustainability Liesbeth van Tongeren (Competency) should be approached to ask her to present the idea to the Executive Board that will have to accept the proposal – unanimously. The pavilion owners should either individually or collectively invest in the AD container system (Financial). It is unclear whether there are municipal subsidies available, but on a national level there is the EIA offered by the RVO (Financial). In addition, if there are no municipal subsidies available, the Counselor of Finance can also be approached for a request for subsidies (Financial).

A business should provide the AD container system and should manage operations and maintenance (Production). The pavilion owners are also part of the production process since they deliver the organic waste used (Production). Additionally, to gain more insight in other businesses offering these AD container systems, a consultancy firm with expertise on sustainable energy technologies can be hired to give more insight in other options and their system and cost efficiencies (Knowledge). If a couple of pavilions share the AD system then a project manager or contact person should be selected within the participating pavilions. He or she will coordinate logistics and makes sure that if there are difficulties or technical problems he is in charge of finding a solution (Production). A summary of the stakeholders and their resources related to implementation of an AD container system is displayed in Table 12.1.

12.2.3 Financial requirements

Initial investment costs

The costs of the Flexibuster AD system are dependent on the total size of the AD system and the amount of waste processed. A small-scale system costs around £140,000 = €169.400 (1.21 €/£, 13 June 2019), whereas the biggest system costs around £500,000 = €605.000 (SEaB Energy, 2017). In the Southampton case-study (i.e. 350-500 kg/day food waste throughput per day) was mentioned that also a leasing arrangement is possible (WRAP, 2011). The costs for leasing include £6,500 ≈ €7.800 per year and include maintenance and support (WRAP, 2011).

Calculation example EIA
In 2019, the taxable profit of a company amounts to € 500,000. The corporation tax is 19% for the first installment up to € 200,000 and; 25% above € 200,000 taxable profit. The company makes a new energy investments of € 30,000. EIA amounts to 45% of € 30,000. This comes down to € 13,500. The taxable profit now becomes € 286,500 (€ 300,000 - € 13,500). Without EIA you pay € 75,000 in corporation tax. With EIA you only pay € 71,625 corporation tax. Your tax benefit is € 3,375. The net EIA benefit is 11,25% of the investment costs, when corporation tax is 25%.

Operational costs
The operational costs consist of manpower needed to execute daily tasks and the costs related to maintenance. There is manpower needed to feed the system and there are costs related to general maintenance, cleaning and feeding the containers. In the Southampton case-study was reported that these activities together were around two hours of work per day (WRAP, 2011). The feeding itself was reported to be ten minutes.

Other costs are related to structural maintenance. The Flexibuster AD system needs a check-up after installation after half a year of use (WRAP. 2011). Hereafter, the unit requires a yearly maintenance check-up. There is a two-year manufacturer's product warranty provided. After these two years, you can opt for purchasing an extension of the warranty (Seab Energy, 2019).

Tax deduction options
There is a way to reduce the costs of investment by applying tax deduction, such as using the Energie-investeringsaftrek or Milieu-investeringsaftrek.

The Energie-investeringsaftrek (EIA) is a tax deduction scheme that offers direct financial benefits to entrepreneurs in The Netherlands who invest in sustainable energy and energy-saving assets (Rijksdienst voor Ondernemend Nederland [RVO]a, 2019). Due to the EIA, 45% of the total investment costs of the sustainable energy producing or energy-saving asset is deductible from the entrepreneur's fiscal profit. The total invest costs include: purchasing costs of the investment (i.e. "aanschafkosten"); costs of personnel, materials and activities executed by third parties (i.e. "voortbrengingskosten"); costs for adapting existing company assets; costs for energy advice and customized advise (i.e. about the project details, expected energy payback time).

The requirements for investments which are eligible for EIA:
- The amount of investment for the asset should be at least €2,500
- The asset has not been used before by the company
- The asset is listed in the Energy List retrieved by link below: (see: https://www.rvo.nl/subsidies-regelingen/energie-investeringsaftrek-eia/publicaties-energie-investeringsaftrek-eia) or; assets that are not on the list but do save energy or fossil energy consumptions and meet certain conditions.

One of the projects listed in the EIA Energy List for 2019 is "Swill vergister" (RVOb, 2019) (i.e. digester for processing swill through digestion, consisting of a digestion installation and (potential) after treatment of biogas). Since the Flexibuster does process swill waste, applying for the EIA should be an option.

Additionally, there is also a Milieu-investeringsaftrek (MIA): a tax deduction scheme for entrepreneurs investments in environmental friendly assets (Belastingdienst, 2019). To emphasize possible future confusion about whether this scheme is also interesting for collective biodigesters: it is not applicable to any energy generating assets. With the biodigester the output is electricity and heat, so unfortunately MIA is not suitable for biodigesters.

12.3 Impacts

12.3.1 Economic benefits
The Flexibuster is economically interesting because it reduces expenditures on energy, waste disposal. Reducing these overheads is a direct economic benefit. If our estimation is correct then residual waste consists of around 50% organic waste so pavilions can save up to 50% of their residual waste costs. An indirect economic opportunity can be to communicate

transparently to customers the amount of heat and electricity produced by the food waste of the pavilion owners. For some customers this can attribute to their appreciation of the pavilion, which may lead to more returning customers. The amount of direct cost savings are dependent on the output of the system. Since we do not know the amounts or the composition of the waste of the pavilions, it is not possible to estimate the generated output. However, in section 'Overview of a case-study: Flexibuster' an overview of the output of a demo of the Flexibuster of a throughput of 500 kg/year food waste is provided, to give an idea of the output of an AD container system.

By-products
Obtaining authorization for the by-products (e.g. digestate) for reselling can be difficult. The regulation in the Netherlands is settled. Currently, the digestate cannot be sold as a by-product because the digestate can only be used as a fertilizer when it is made out of 50% animal faeces (Rijkswaterstaat, 2019, see: Artikel 3b). Digestate without animal faeces that is obtained after anaerobic digestion is often fluid and unstable in composition. It should be post-processed to convert it into dry compost that fit composition requirements too. There is no such thing as fluid compost (RVO, 2019c). So there is no business case in selling digestate.

Payback time
The payback time differs per client and is related to the amount of waste processed, the waste composting, tax advantages of subsidies and the amount of savings (i.e. this depends on the avoided waste disposal costs and energy costs). The payback time of the Flexibuster system is reported at around 2-6 years (WRAP, 2011; SEaB Energy, 2019b).

12.3.2 Social impact
Both AD systems will be underused if they would not be used full-year around. If no-year-around pavilion owners are interested in applying an AD system then collaboration with other (year-around) partners. To keep waste transport logistics as short as possible, potential partners should be near restaurants. The stakeholders involved in using the AD system can then for example be pavilions and nearby horeca partners. Collaboration between the pavilion owners will create more cohesion. Looking from a more holistic perspective the AD systems also create job opportunities for daily tasks and maintenance.

12.3.3 Environmental capital
The heat and electricity produced by an Flexibuster AD system offsets on average 385 kg CO2-equivalent for every 1000 kg of waste processed if you take into account the entire carbon footprint of waste disposal (e.g. waste transport to the urban environment) (SEaB Energy, 2010). The electricity and heat produced itself are carbon-free. I

12.4 Fit-to-objectives

12.4.1 Haags Klimaatpact objectives
To provide a structured overview, the objectives of the Haags Klimaatpact met by implementing an on-site AD container system and the reason(s) why are discussed in Table 12.2.

12.4.2 Needs of pavilions and municipality
With this section, we re-examine the concerns described in the Social Analysis, and the effect this sustainable measure would have on those concerns.

Electricity grid is not powerful enough
From the social analysis followed that some beach pavilion owners mention that they had concerns that if all pavilion owners will switch from gas to electricity this is not possible. Especially, since there is not even enough ampere available for one pavilion owner to connect all appliances to.

With a minimal throughput of 500 kg/day food waste, the Flexibuster provides around 181 kWh/day. From one of the MVO scans followed that a pavilion used 62 MWh per season on average (30 weeks), which is around 300 kWh/day. This means that one AD container system with a throughput of around 500 kg/day can produce half of the energy needed per day! This means that the concern of the pavilions to fully switch to electricity can be solved by using an AD container system. The AD system can meet a substantial energy demand for a pavilions that want to switch to only using electric energy, but are not able to do now.

Lack of waste transport infrastructure
Pavilions have little storage space for waste inside, which makes separating waste streams difficult. Some pavilions like to separate but the transport route infrastructure is not there to facilitate this (e.g. pavilions on the 'Zwarte Pad'). The AD container systems can be installed on-site, and so need no to little transport infrastructure.

Food or organic waste collection
The municipality has a very clear vision for the boulevard and the beach: if you look out over the boulevard and the beach the sight should be “bright & light”. Eite & Peggy are worried that a container AD system would distort this view (Appendix K). Thereby, almost all interviewed pavilions stated that they do not want to have a food waste bin on their ground, because this comes as the expense of operational space of the pavilion (e.g. terrace area). Also, the location of the bins should be near the pavilion location otherwise the effort to bring the food and organic waste to the bins is too high. However, there is an indication of motivation of pavilion owners to work towards a collaborative solution because for waste disposal, because processing costs have been considerably increased. Nevertheless, this collaborative waste solution should take into account the space area concerns and concerns about the convenience of waste separation.

To meet these concerns and requirements it

Table 12.2: Goals of the Haags Klimaatpact addressed by this measure.

Topic and goal Haags Klimaatpact	Why the project fits the goal
Role of residents and businesses The municipality encourages and supports local initiatives and creates the necessary conditions to make them a success. Entrepreneurship of citizens of The Hague, whether commercial or cooperative, will be one of the pillars of the transition. This includes active support from the municipality.	This project needs support from the municipality. As follows from the role of the Boulevard managers and the municipality it is utterly important that they support the idea before it gets implemented. This projects needs unanimous support from the Executive Board, otherwise it will not be implemented.
Role of residents and businesses In order to get citizens involved, it is necessary for them to come into contact with the transition and all the opportunities for participation everywhere in their environment. To this end, the municipality makes good examples of local sustainability initiatives visible to strengthen the flywheel effect.	Like explained in the text, pavilions could communicate the total amount of heat and electricity produced from organic waste. This makes customers more knowledgeable about considering organic waste as a valuable resource. Especially in het Waste Transformers case: considering that the by-product fibres are used to create paper and textiles.
The energy transition The Hague relies on the use of fossil fuels and will take steps to end this in the coming period.	Using an AD container system to convert food waste as a resource to convert it into heat and electricity that can be used by the pavilions is a step forward in moving away from fossil fuel based resources.
The energy transition The energy transition is essential to make The Hague sustainable, and to achieve the sustainability objectives set in The Hague.	Using an AD container system will reduce energy supply from the National Grid, which is currently only 6.6% of the energy mix consists of renewable energy (Energieopwek, 2019).
Circular Economy The municipality helps to identify and link companies that can work (together) towards circular business.	Implementing an AD container system will highly likely involve cooperation between pavilion owners (and near restaurants).
Exemplary role of the municipality The Hague must clearly profiles itself as ‘sustainable’ to the outside world.	With the an AD container system Scheveningen can really profile itself as working towards a circular city The Hague. Mind that there is a national goal of achieving a full circular economy by 2050.
Circular Economy To prevent used raw materials from turning into a waste resource, the municipality is working on a platform for 'material passports'. This way we know how many raw materials are used where.	In the AD container systems run input and output streams can be estimated or calculated. This means that by the end of the year the municipality will have a more clear overview of the food waste generated by the participating pavilions and the amount of heat and electricity this can produce.
Circular Economy As little waste as possible is incinerated. The municipality regards waste as a raw material that can be reused for high quality purposes.	By using an AD system the pavilions can save probably around 50% of their residual waste streams from incineration.

Table 12.3: Overview of a case-study: Flexibuster (throughput of 500 kg/day). All numbers are rounded to 1000 kg, because of uncertainty (≤500 kg was rounded down). Note: the digestate output was unknown and is therefore not included in the table.

	Flexibuster
Assembly	United Kingdom
Throughput (kg/day)	500
Output (kWh/day)	Electricity: 181 Heat: 362 Total: 543
Overall cost-efficiency (incl. EIA) (kWh/€)	1.32
Cost-efficiency electricity (incl. EIA) (kWh/€)	0.42
Operational costs (hours manpower)	2
Efficiency (kWh/kg)	1.08

Table 12.4: A comparison of the Flexibuster and Waste Transformer AD system per annum (throughput of 500 kg/day).

	Flexibuster
Assembly	United Kingdom
Throughput (tonne)	182
Output (kWh)	Electricity: 66.000 Heat: 132.000 Total: 198.000
Amount of emissions saved (tonne CO2-equiv)[1]	70
Investment costs (€)	169.000
Investment costs incl. EIA (€)[2]	150.000
Operational costs (hours manpower,€)[3]	13.000
Avoided electricity costs (€)[4]	13.000
Avoided disposal costs (€)[5]	7.000

1 This number is based on the 385 tonne $CO_{2\text{-eq}}$ by processing 1000 tonnes of food waste. This is 0.385 tonne $CO_{2\text{-eq}}$/tonne food waste (SeEB Energy, 2010). This number only involves life-cycle emissions related to waste disposal (Sanders, 2017).
2 11.25% EIA assumed. No other related costs that are eligible are included beside the investment costs, because of uncertainty. For all eligible costs see section 5.2.1. Energie-investerings aftrek (EIA).
3 Hans Van Den Broek (The Shore) stated in a conversation that the costs to employ one person for one hour is all in all €17.50. The amount of hours per year is 730 hours.
4 We assumed the average electricity price of €0.20/kWh (Pricewise, 2019).
5 We assume a waste production of 500 kg/day for 365 days. If we take the calculating density of swill: 1000 kg/m^3 (Stichting Stimular, 2013) then 500 kg/day will generate around 0.5 m^3 of waste. This amounts more or less a 660 L (0.66 m^3) container. According to information of Hans Van den Broek the waste disposal costs of a 660 L container are €20 per emptying. For simplicity we calculated the avoided waste disposal costs assuming the avoidance of emptying one 660 L container per day.

would be helpful for implementation of the AD container system that the municipality provides support by making space available, so that this does not go at the expense of the total rent area of the beach pavilions. Ideally, this area is situated near the participating pavilions. Here a pilot can be executed, to see whether the logistics are doable. Say for example that five pavilions join the pilot. Per day they should collect around 100 kg waste each. If you take the density of swill waste is 1000 kg/m3, then only a 100 L waste bins each. Let us take the measurement of a standardized 120 L container (50.5 x 55.5 x 115.5 cm). So only an area of 0.5x0.55 is then needed at the pavilion rented area.

Diverse opinions in the Executive Board
Currently the Executive Board consist of Counsellor that origin from parties range from progressive to conservative attitude towards sustainability. The biggest party within the city council is the only one that did not even sign the Haags Klimaatpact. This is a concern for gaining support for sustainable initiatives like an AD container system. To meet this concern a strong case should be created on why the AD system is an improvement that meets also conservative perspectives. One recommendation here is to use the lack of ampere available for the pavilion owners to fully switch to electrical energy as a pro-argument. Additionally, the fact that waste disposal costs and energy costs are saved should also suit pro-entrepreneur parties, since the pavilion owners will actually have less overheads after the payback period. From that angle the AD container system is not only

a green solution, but also economically wise. Furthermore, if the pavilion owners propose the idea, they can possibly better start with introducing the idea as a pilot. There is possibly more support for a pilot in the Executive Board because it executing a pilot does not feel as a permanent choice.

12.5 Conclusions and discussion

12.5.1 Overview the output of a case-study: Flexibuster

The outputs and costs of a demo case of the Flexibuster is displayed in Table 12.3 and Table 12.4.

12.5.2 Discussion

Tables 12.3 and 12.4 contain quite a lot of assumptions with respect to cost savings and averages. Another limitation of this section is that we only described one container AD system. This was partly due to time limitations and partly because a company we reached out to withdrew their support regretfully.

12.5.3 Suggestions

To get a more realistic picture about the exact numbers and the business model we recommend to get in contact with companies that provide AD container systems. Furthermore, possibly a financial consultant can help to find additional opportunities for funding and can assist in creating a shared investment cost construction if the pavilions want to collaboratively purchase an AD container system. For the latter it will be helpful that the consultant is knowledgeable about how the EIA works in the case of collaborative investment. To address the requirements and concerns of the municipality with respect to the esthetical aspects, we have two recommendations. First, to improve the aesthetics of the containers. They can be adapted to the wishes of the stakeholders involved. For example, the design can include logos of the municipality, the company involved and the VVS (see Figure 12.3 for an artistic impression). Via logo display the AD container system can also be used to signal that the Beach of Scheveningen is working towards carbon-neutrality or circularity. Another suggestion is to place the AD container system indoors. The system can be situated in the 'Transport Hub' as proposed in the previous chapter or indoors in a hangar in the Harbor of Scheveningen. In this case, the accompanying logistics will be extended, but an electric van or caddy can be used to move around the waste bins.

12.5.4 Contact details

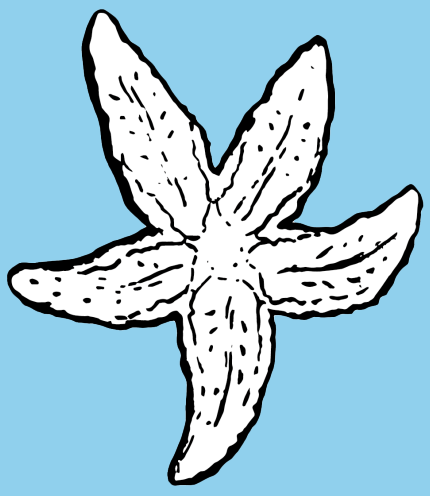
For SEaB Energy they can visit the website: https://seabenergy.com. For phone contact they can call: +44 2380 111 90. If calling is not an option, there is contactform available on https://seabenergy.com/contact/ to ask questions.

For questions on EIA the website Rijksdienstvoor Ondernemend Nederland www.rvo.nl/eia can be addressed. There is a contact form available on www.rvo.nl/contactformulier. For additional questions the phone number 088 042 42 42 can be reached and; for email contact: klantcontact@rvo.nl. For all the application form of EIA see: https://mijn.rvo.nl/energie-investeringsaftrek-eia.

Figure 12.3: Artistic impression of upgrading the aesthetic and marketing value of the container units. (Source: Own image).

13. Alternative terrace heating: Heating people, not places

Businesses in the hospitality industry with a terrace have been using terrace heaters to attract customers, to make their establishment look cosy and warm. The heaters run on gas or electricity. Most of the pavilions in Scheveningen use both the gas and electrical heaters such as fireplaces running on gas and electrical heaters in parasols (Figure 13.1). These heaters radiate heat that warms the air around a certain area. If the customer is not sitting close to the heater, it can still be quite cold. Furthermore, the heaters are often left on whilst there is no one sitting near, to attract possible customers. The consumption of energy of terrace heaters is unnecessary and inefficient (KWINK, 2018a), as also described in the energy section of the technical analysis.



13.1 Transition to alternatives

Alternatives have been popping up to replace traditional air heaters such as heated pillows, heated blankets and heated tables. The philosophy behind the alternatives is to heat people directly and not the air in between the heater and person ("heating people, not places"). Nevertheless, the traditional heaters are still predominant on terraces in the Netherlands. The amount of alternatives, suppliers of alternatives and entrepreneurs using the alternatives are still limited (KWINK, 2018a). In other words, the transition from the traditional heaters towards alternatives is still in an early phase (KWINK 2018a). This is due to a lack of familiarity with the alternatives and the fear of losing clients if the terrace next door has visible heating.

13.1.1 Collaborative approach towards alternative terrace heating

Therefore, we propose five alternatives to the traditional terrace heaters, based on the consultancy report by KWINK (2018a,b) and our best practices analysis, with a focus on collaborative action. The five alternatives and two traditional heaters that are discussed, compared and analysed are described below and displayed in Figure 13.2.

Figure 13.1: Terrace heating: fireplaces on gas and parasols with electrical heating (Source: openhaard n.d.; Parasol verwarming, n.d.).

1. Heated table (Mensa Heating, n.d.). The heated table VIREOO PRO has a shortwave infrared element in the leg of the table, thus heats the lower part of the body. They table has a sensor, therefore it is only on when there are customers at the table.

2. The heated cushion for a chair (Sit & Heat, 2019a). The custom-made cushion heats the torso. As organs are located in this part of the body, users experience overall warmth. These cushions are equipped with a rechargeable battery.

3. The heated cushion for a bench (Sit & Heat, 2019b). The custom-made lounge cushion heats the torso. As organs are located in this part of the body, users experience overall warmth. The lounge cushions can be easily plugged into sockets.

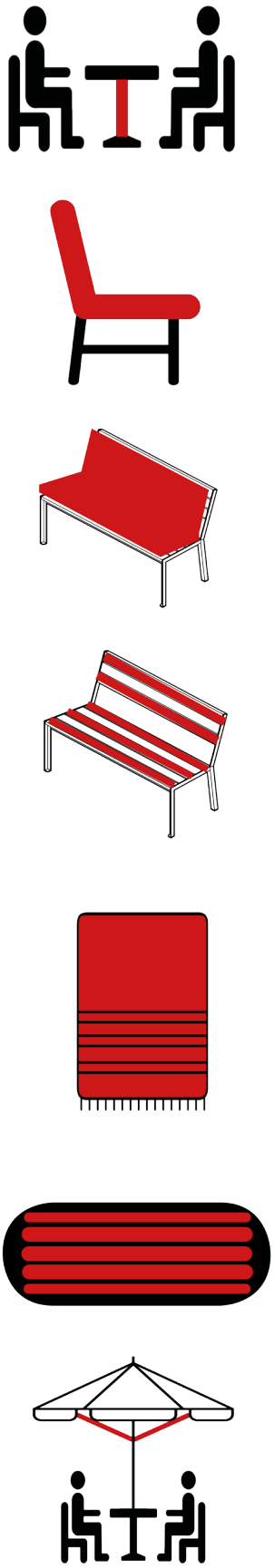
4. Heated bench (EDDYBOY, n.d.). The bench is heated with warm water, for example the waste water from the dishwasher can be used. The heated EDDYBOY bench offers extra comfort for customers in any season. It is maintenance-friendly, vandal-proof, reliable and easy to use: just plug and play.

5. The blanket (Elliz in Company, n.d.). The blankets are made by Elliz in Company. This is a foundation where people work together on the manufacture of textile products. Everyone is welcome, this means that people from all corners of society work and learn with attention and respect for each other. This means there is no heating of the terrace, if it is too cold outside the customer would have to sit inside the pavilion.

6. The gas heater (terrasheater.nl, 2019a). The ‘Alke Gasheater 101 Aardgas Asymmetrisch’ is provided with a thermoelectric protection.

7. The electrical heater (terrasheater.nl, 2019b). The Solamagic 1400 basic is an infrared terrace heater. The heater can be attached to a wall, up to 2 meters.

Figure 13.2: Illustrations of heating systems. (Source: Own image)



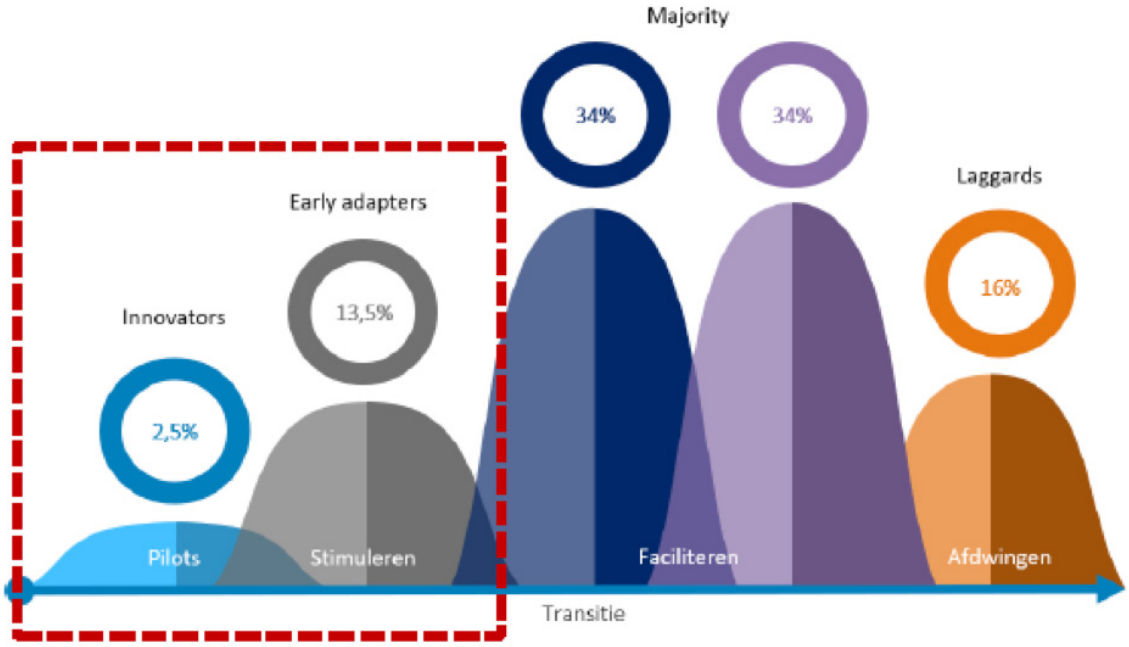


Figure 13.3: The transition phase of the alternatives for terrace heaters (KWINK, 2018b)

13.1.2 Fostering the transition

The government can use various instruments to foster the transition, depending on the phase of transition (KWINK, 2018a). Figure 13.3 displays the different phases of this transition, and indicates which type of policy instrument fits the corresponding phase, based on the experience of the consultancy (KWINK, 2018c). Based on the percentage of market share the alternatives are in the first two phases, only innovators and early adapters are using the alternatives at the moment (Figure 13.3).

The corresponding policy instruments in the first two phases are conducting pilots and stimulation with subsidies. The municipality of The Hague already conducted a pilot with the cushions of Sit & Heat, multiple cafes in the centre were involved. Pilots can also be conducted within the clusters of pavilions that will be developed. In addition, the municipality subsidises part of the alternative (KWINK, 2018a). At last, in order to spread the knowledge about alternatives the municipality can organise an awareness campaign for visitors of The Hague.

13.2 Implementation

What are the requirements for implementation of this measure in terms of practicalities, stakeholders and financing?

13.2.1 Practical requirements

The advantages and disadvantages of the installation, safety, usability and attractiveness for customers for each option is discussed in Table 13.1. Installation is important because it is the first practicality one runs into when installing a system. The safety is important because the owner must be aware of the safety when owning a system with risks. The usability are the aspects that are of relevance when using the system, for instance the maintenance is considered in this practicality. The attractiveness for customers is an important aspect, since the visibility of heating is a reason to keep the traditional heaters.

Table 13.1: Practicalities of the alternatives for terrace heating

Option	+/-	Installation	Safety	Usability	Attractiveness for customers
Heated table	+	- Easy to assemble. Varies table tops are possible.	- Safe to use, burning of skin is not possible.	- Easy to use, same as regular tables.	- Lower part of the body heated. - Visible that the terrace is heated.
	-	- Connection to electricity grid.			- The style of the table leg could mismatch the rest of the interior.
Chair cushion	+	- Connection to electricity grid not needed.	- Safe to use.	- The cushions can be secured with a cable attached to the chair.	- Customer can adjust the heat. - Torso is heated. - Logo and name on cushion.
	-			- Batteries need to be charged. - The cushions are sensitive for cigarette butts.	- Customers cannot directly see the terrace is heated.
Couch cushion	+		- Safe to use.	- The cushions can be secured with a cable attached to the couch.	- Customer can adjust the heat. - Torso is heated. - Logo and name on cushion.
	-	-Connection to electricity grid.		- The cushions are sensitive for cigarette butts.	- Customers cannot directly see the terrace is heated.
Heated bench	+		- Safe to use.	- Metal is treated, limited maintenance.	
	-	- The bench should be connected to water. - Not possible to connect to district heating.			- Customers cannot directly see the terrace is heated. - The style of the bench could mismatch the rest of the interior.
Blanket	+	- No installation to batteries, electricity- or gas grid needed.	- Safe to use.	- Can be moved easily.	- The costumer can determine what part of the body is covered.
	-			- Needs to be washed often.	- Blanket could be considered unhygienic. - The heat of blanket is not as strong as the other options.
Gas heater	+				- Visible that the terrace is heated.
	-	- Mechanic needed to connect to the gas grid.	- Often not moisture resistant. - When in contact, risk of burning skin. - A (very small) risk of fire and explosion.	- Can only be used in open space. - Relatively high amount of maintenance needed.	- Relatively high amount of noise compared with electrical heater. - Does not provide targeted heat, the customer cannot influence the direction of heat.
Electrical heater	+		- Relatively safe to use in comparison with gas heater.	- Parts and filters do not need a lot of maintenance.	- Visible that the terrace is heated.
	-	- Connection to electricity grid.	- Not all electrical heaters are moisture resistant.	- Can only be used in open space.	- Does not provide targeted heat, the customer cannot influence the direction of heat.

Concluding from Table 13.1, in terms of installation the blanket is the best option with no installation. Gas is the least favourable option since a mechanic is needed. For safety, only the gas heater is considered unsafe. The usability of the table and bench is the same as a regular ones, thus they are the best options. The chair cushions need newly charged batteries often, and are therefore the least favourable option for usability. The table, cushions and bench directly heat the body and the customer is thus warmer. The table, gas and electrical heaters are visible when on, this can attract customers when walking by. The blanket is probably the least attractive for customers, since they do not actively heat.

13.2.2 Stakeholders
The important stakeholders involved in implementing the solution are discussed in this section. Every stakeholder has a 'resource' that contributes to the solution of having a joint pilot with alternative terrace heating, supported with a campaign and subsidies. The resources are financial, production, competencies, knowledge and legitimacy (Klijn and Koppenjan, 2015). The stakeholders that are discussed play a big role in the implementation and maintenance. If they are not willing to join the solution, they immediately form a barrier for implementation.

Cluster of pavilions
As we explain in the section 'Opportunities for Change', the pavilions will form clusters on the beach in the future, with a physical distinction between different clusters. This forms a great opportunity for a joint pilot. In principle, all clusters can participate in a pilot, but it is assumed not all clusters will show interest. The pavilions participating must buy, maintain and recycle an alternative heating system of choice (Financial). In addition they need to facilitate the connections if needed to implement the alternative system (Production). The clusters must have a mutual agreement to no longer have the traditional terrace heating (Competencies), similar to the 'Plastic-vrij terras' agreement. The pavilions can spread knowledge about the inefficiency of traditional heating and the existence of alternatives by hanging posters in the pavilion. The willingness of the clusters of pavilions to join the pilot is essential to the success of the project (Legitimacy). In addition, the pavilions can determine what information they want to gather during the pilot. For instance, the staff can evaluate the satisfaction of the customers.

The municipality
The second 'group' of stakeholders are employees of the municipality The Hague. The municipality is fragmented, thus it should be noted that although it is referred to as one entity, there is a diversity of stakeholders within this entity.

The municipality can support the pilot by providing a subsidy (Financial), from the previous pilot in The Hague it is proven that this is the last push the entrepreneurs need to join (Appendix L). In addition, the municipality can support the transition of alternatives by organising and paying for an awareness campaign (Financial). Eite and Peggy already expressed their enthusiasm for this idea (Appendix K). The posters can be displayed along the boulevard and at other clusters of terraces, for instance 'de Grote Markt' and 'het Plein'. The campaign can inform the visitors about the inefficiency of traditional heating and the existence of alternatives, which are not visible (Knowledge). In this phase of the transition it is unfavorable to forbid the traditional terrace heating, time to adjust is needed (KWINK, 2018c). Perhaps this is an option in the future when a larger portion of the terraces have an alternative (Competencies).

Besides the fact that forbidding is unfavourable, it is also not possible legally (Appendix L). The municipality of Zutphen and Amsterdam both had to withdraw their policy of forbidding traditional heaters. It is an option to check whether it is possible to not allow traditional heating when a new permit is arranged (Competencies). Policy advisor Annemarie Bodaar can help to prepare and identify sensitivities of the project and determine points of attention (Knowledge) (Appendix K). In order to cooperate with the municipality a counselor must be motivated to propose the idea to the executive board (Legitimacy). After this, the entire executive board must understand the usefulness and necessity of the project (Legitimacy). The board is not progressive, getting the unanimous support could be a hurdle (Appendix K).

The VVS
The VVS could propose the alternative heating system for the Energielijst 2020, this must be done before September (Financial). The VVS could organise the mutual agreement to have no traditional terrace heating at the coast of Scheveningen, similar to the 'Plastic-vrij terras' (Competencies). Furthermore, the campaign mentioned above can be spread via the platform of VVS (social media) (Knowledge).

The manager of the pilot
In order for the pilot to succeed there must be a manager of the project (Legitimacy). This manager can be someone from the clusters of pavilions. Someone needs to be willing to be and stay the leader until the evaluation. The 'pilot manager' is responsible for the evaluation of the project and spreading the knowledge afterwards (Knowledge).

Table 13.2: Summary of the resources and corresponding stakeholders for the implementation of alternative terrace heating, based on Klijn and Koppenjan (2015, p. 268-269). The most important stakeholders are the cluster of pavilions and a variety of stakeholders within the municipality.

Resources	Stakeholders
Financial	The municipality, cluster of pavilions, VVS
Production	Producers of the alternative systems, cluster of pavilions
Competencies	Municipality, VVS, cluster of pavilions
Knowledge	The municipality, VVS, cluster of pavilions, manager of the pilot
Legitimacy	Cluster of pavilions, manager of the project, customers, municipality

Table 13.3: Overview purchase costs and operating costs per year of the terrace heating options

Options	People heated	Purchase costs [€ / person heated]	Operating costs [€ / year / person heated]
Heated table	4	88	14
Chair cushion	1	178	6
Couch cushion	3	133	2
Heated bench	3	496	36
Blanket	1	99	0
Gas heater	2	329	160
Electrical heater	2	122	100

Producers of the terrace heating systems
The alternative options need to be produced, the producers are responsible for this (Production). Sit & Heat for instance already considers the after-life of the products and how to increase the life of the product (Appendix L).

Customers
Customers can support the transition by visiting pavilions (and other terraces) with one of the alternative heating systems.

13.2.3 Financial requirements

Purchase and operation costs
The purchase costs and the costs per hour of the options are displayed in Table 13.3, see Appendix M the detailed overview of the calculations. The assumptions to calculate the costs are that the price of electricity is 0.168 €/kWh (Nillesen, 2014), the price of gas is 0.6246 €/m3 (Zakelijke Energie Tarieven, 2019) and that the heating options are turned on four hours per day per season (seven months). The washing of the cushions and blanket is not considered, this would require too many assumptions. The heated table has the cheapest purchase costs per person heated, second cheapest is the blanket. The heated bench has the most expensive purchase costs per person heated, second most expensive is the gas heater. The blanket has the lowest use costs per hour per person heated, second lowest is the couch cushion. The gas heater has the highest operation costs, second highest is the electrical heater. From Table 13.3 it can be concluded that the blanket is the best option considering purchase and operation costs. Additionally, the traditional heaters have high operation costs in comparison with the other option.

Campaign costs
Depending on the scale of a campaign (from simple posters to hiring people to talk to entrepreneurs), the costs would be somewhere between €5,000 and €50,000 according to the consultancy group KWINK (2018a).

Revenue
It can be argued that traditional heating is visible for customers that walk by and thus generates more revenue. A study in Amsterdam finds that entrepreneurs who have terrace heaters state that this terrace heating is generating more sales in comparison to no (visible) terrace heating (Cohen, 2011). Entrepreneurs who are not allowed to have terrace heating indicate that they experience

a negative impact in revenues due to the terrace heating of neighbouring terraces (Cohen, 2011). Entrepreneurs who do not have a terrace heater and also do not want it, notice no difference in their turnover (Cohen, 2011). These three statements are subjective, the information is collected via a survey.

The pilot we propose offers the opportunity to collect information on whether the statements above are true or not.

Subsidies municipality
As mentioned above, a subsidy for alternatives can be provided by the municipality. This is recommended from a pilot study about the alternative Sit & Heat cushions at The Hague (Hogeschool van Nijmegen, 2019). Having a subsidy program can also increase the awareness of entrepreneurs that alternatives exist. The consultancy group KWINK (2018a) states that if a terrace is approximately 30 m2 and there are around 100 of these types of terraces in The Hague, the required subsidy amount is € 102,900.

Energy Investment Allowance
The Energy Investment Allowance (EIA) gives an average 13.5% tax advantage if a company wants to invest in energy-saving technology, depending on the annual revenue (RVO, 2019a). The Energy List 2019 provides an overview for the energy-efficient and environmentally friendly techniques that can give the fiscal advantages (RVO, 2019a). The alternatives for terrace heating are not on the Energy List 2019. Anyone can submit a proposal for a product to be added to the Energy List, proposals can be submitted until 1 September 2019. The total costs should at least be € 2,500, the maximum reporting amount per calendar year per company is a maximum of € 121 million.

Energy
The environmental impacts associated with the energy consumption of the options for terrace heating are given in Appendix M, with a detailed overview of the calculations. The assumptions are that gas contains 31.65 MJ per m3 (Zijlema, 2017), natural gas in the Netherlands emits 0.0566 kg $CO_{2\text{-eq}}$ per MJ of natural gas (Droge, 2014), electricity emits 0.0569 kg $CO_{2\text{-eq}}$ per kWh (More, 2018) and that the heating options are turned on four hours per day per season (seven months). It should be noted that the washing and drying of the blankets and cushions is not taken into account, since there are too many assumptions needed the calculation would not be reliable. The blanket is the best option, there is no kg $CO_{2\text{-eq}}$

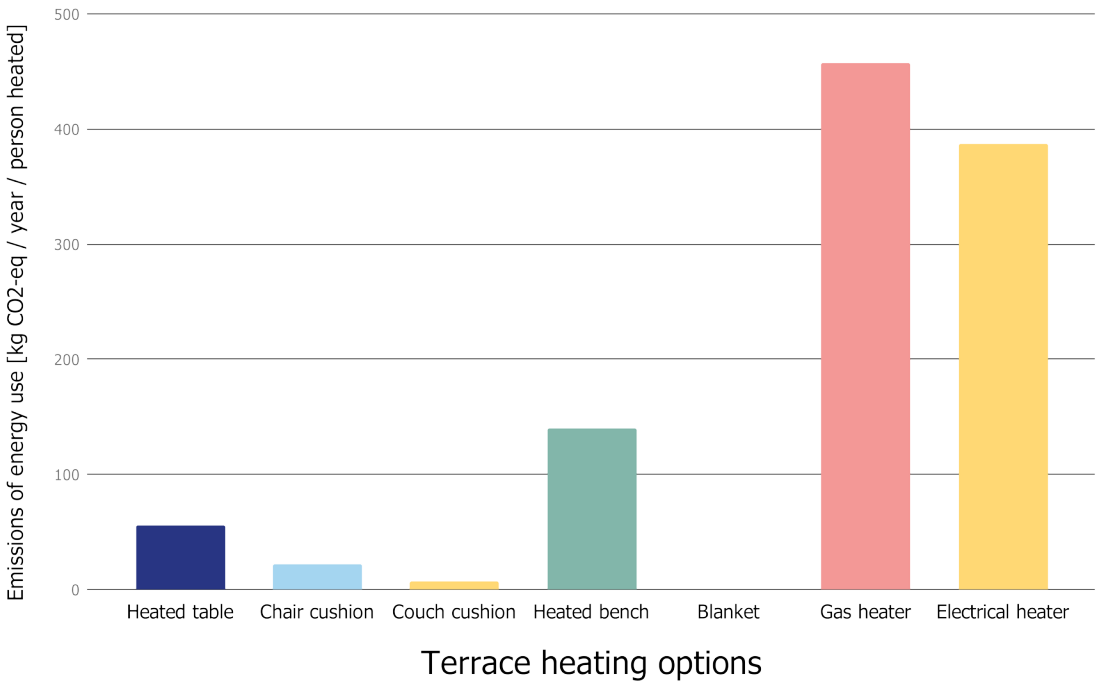


Figure 13.4. Bar graph of the $CO_{2\text{-eq}}$ emissions per year per person associated with the energy use of the options for terrace heating. (See Appendix M for calculations).

Table 13.5: Material-use of the options for terrace heating

Options	Material/parts	Lifetime	Recyclability
Heated table	Electricity cable, plastics, metal, infrared heating element	Infrared element lasts 5000 - 7000 hours, can be replaced.	The plastics and metals can be separated for recycling.
Chair cushion	Fabric is Durain, sensor, lithium-ion battery, battery charger, filling	First cushions are implemented 5 years ago, they are still good. The batteries can easily be replaced at end-of-life.	Parts are recycled, research about the battery at the moment, covers can easily be taken off
Couch cushion	Fabric is Sunol, sensor, electricity cables, filling	First cushions are implemented 5 years ago, they are still good.	Covers can easily be taken off
Heated bench	Metal (with an anti-rust treatment and powder coated), heat exchanger, grease filter, circulation pump, pipes for the water	20 years or longer	Metal is recyclable. The system surrounding the bench is probably more difficult to recycle, consists of multiple components
Blanket	Previous used fabric	First blankets are made 4 years ago. There has been no return of blankets.	Fabrics are mixed in the blankets, so not fully recyclable
Gas heater	Cast iron, coated steel, stainless steel, ceramic, brass	About 7 years	Almost all parts can be separated, with the exception of the ceramics of the stones and the electrical ignition.
Electrical heater	Coated aluminium, galvanized steel, stainless steel, aluminum with reflective coating, coated steel	About 5 years	Most parts can be dismantled and all metals can be recycled. Only the lamp and the casing of the cord cannot be recycled.

emission. Hereafter, the chair and couch cushions are the best options. The gas heater emits the most kg $CO_{2\text{-eq}}$ per year per person heated. Hereafter, the electrical heater emits the second most kg $CO_{2\text{-eq}}$ per year per person heated. From Table T4 (Appendix M) it can be concluded the blanket is the best option. See Figure 13.4 for a visual representation of the $CO_{2\text{-eq}}$ emissions associated with the energy use of the options for terrace heating.

Water

There is no direct water use, with the exception of the heated bench. The more material intensive the option, the more water is probably used during the production. It is beyond the scope of this report to calculate how much water is used. The heated bench uses water from the dishwasher. However there are dishwashers that reuse their water already and by pumping the water to a bench, efficiency could be lost. It is not possible to draw well-founded conclusions for this section.

Material

The material of the options for terrace heating are given in Table 13.5, the material itself, the lifetime of the product and the recyclability are discussed (Appendix L and website). All suppliers mention that the lifetime depends on how well the products are maintained, the uncertainty is therefore very high and therefore the lifetime is not considered in the conclusion. From Table 13.5 it can be concluded that the blanket is the best option, it does not contain any other materials than fabric which itself is already recycled.

13.4 Fit-to-objectives

In this section the Haags Klimaatpact objectives that are addressed by the project are highlighted, as well as the extent to which this project reaches the needs (i.e. requirements and concerns) of the pavilions and municipality.

13.4.1 Haags Klimaatpact objectives

The Haags Klimaatpact objectives that are addressed by the project and the reasons why

are discussed in Table 13.6.

13.4.1 Needs of pavilions and municipality
With this section, we re-examine the concerns described in the Social Analysis, and the effect this sustainable measure would have on those concerns.

Electricity grid is not powerful enough
With this project there is a transition from gas to electricity, this is something the pavilions are interested in “the owner wanted to switch from gas to electricity” (Appendix H). Nevertheless, multiple pavilions raised the concern that this transition is not fully possible. The capacity of the electricity network is not big enough to connect all appliances to the grid. The municipality could support the transition by putting bigger cables in the ground. Choosing the alternative blankets is also an option for the pavilions.

Sustainable choices are considered more expensive
“The costs are a very important factor” (Appendix H). Considering the purchase and operation costs, the costs of the alternatives are lower. This meets the requirement of having an economic incentive.

The pavilions do not know where to begin
The owners are often uncertain where to start implementing sustainability. This project can address this by giving an opportunity to implement a sustainable measure. The pavilion can either implement an alternative by itself, or speak with their cluster and propose the joint pilot. In this section a bulk of information of the alternatives and their pros, cons and costs are provided.

Will the municipality support this measure?
It is difficult to predict whether the municipality will support this project. On one hand the municipality requested and thus paid for the consultancy report of KWINK about

Table 13.6: Goals of the Haags Klimaatpact addressed by the project.

Topic and goal Haags Klimaatpact	Why the project fits the goal
Role of residents and businesses The municipality encourages and supports local initiatives and creates the necessary conditions to make them a success. Entrepreneurship of citizens of The Hague, whether commercial or cooperative, will be one of the pillars of the transition. This includes active support from the municipality.	With this project, the municipality has the opportunity to actively support a local initiative in the form of a pilot.
Role of residents and businesses In order to get citizens involved, it is necessary for them to come into contact with the transition and all the opportunities for participation everywhere in their environment. To this end, the municipality makes good examples of local sustainability initiatives visible to strengthen the flywheel effect.	The campaign will involve the citizens by spreading the knowledge of alternatives. Citizens, who are also customers can choose terraces with alternative heating.
Municipality as a forerunner There will be a fund / subsidy to accelerate profitable sustainability investments and to support unprofitable sustainability investments where necessary.	It is recommended that the municipality supports the alternative terrace heaters with subsidies.
Boost function municipality Agreements are made with the Haaglanden Environment Agency on effective enforcement of the duty for companies to invest in cost-effective energy savings.	The alternative terrace heating products are cost-effective energy savings.
The energy transition The Hague relies on the use of fossil fuels and will take steps to end this in the coming period.	This project will replace gas terrace heaters with no heating or electrical heating. This supports the energy transition.
The energy transition The energy transition is essential to make The Hague sustainable, and to achieve the sustainability objectives set in The Hague.	This project will replace gas terrace heaters with no heating or electrical heating. This supports the energy transition.

alternative heating of terraces (2018a,b). This shows an interest in the transition towards alternative terrace heating. Furthermore the boulevard managers Peggy and Eite were excited about the campaign, which can be used as a marketing tool (see social analysis). On the other hand, the Executive Board is ranges from a progressive to conservative attitude (see social analysis). Consequently, it is difficult to find enough support.
Connection between municipality and pavilions
Policy advisor Inge feels that “the beach pavilion owners are at a disconnect with each other and the municipality” (explained earlier in our social analysis). This is a concern for the project, since it requires cooperation between all parties.

13.5 Conclusions and discussion

Conducting a joint pilot with a cluster of pavilions, with the support of the municipality is an opportunity to reduce the energy use of these pavilions. The pavilions switch to alternatives together, this reduces the risk to lose customers because neighbouring terraces have visible heating. The awareness campaign also enlarges the awareness of the inefficient traditional heating. The subsidy is considered the last push the pavilions need to join the pilot. By considering the collaboration between stakeholders, it is possible to achieve more and support the transition towards alternative (or no) heating.

There is still the question ‘what alternative is the best?’. When considering the environmental impact of energy use and the purchase and operation costs, the blanket is the winner. In an ideal world all the pavilions discard their terrace heating, and customers are fine with sitting inside when it is cold. Does this mean the pavilions consider this the best option? Perhaps not, since the blanket does not actively heat the customer and it is possible customers complain about this. Furthermore, the other alternatives could for example mismatch the interior, this is a factor that cannot be argued with a cost-effectiveness or something similar. Taken into account that all alternatives reduce the energy use, they are considered an option in the pilot. The pavilion has the freedom of choice and can take into account requirements they find important.

It should be noted that the amount of hours the alternatives are turned on are assumed the same in this section. It is unsure how many hours the options are on in reality, this depends on the use which is very difficult to predict. The pilot offers the opportunity to collect information on the real energy use of the alternatives.

14. Additional opportunities

Who can the pavilions contact to explore the other cooperative opportunities further?

Due to the limited scope of this research, we have described three solutions in depth. For the other solutions, however, we would like to still help the pavilions make a first step to implementing them if they should choose. Therefore, we have collected contact details of people that we think would be the first person to call to introduce each idea.

Note to reader: The contact details mentioned in this section were publically available: we have not asked permission to share them here. The contacts do not have any knowledge about the cooperative opportunities, and have not been informed that they are on this list.

14.1 Pavilions as 'Living Labs' for Smart City Den Haag

The beach pavilions can be pilot projects for collecting data on the amounts of food used and wasted. This information is currently unknown by the beach pavilions, but considering The Hague's ambition to be a Smart City, the pavilions can be frontrunners by implementing systems such as Leanpath or Winnow with support from the municipality.

Who could facilitate this?

- Programmamanager Smart City Brian Benjamin: brian.benjamin@denhaag.nl

Which companies could provide the service?

- Leanpath: support@leanpath.com / +44 (0) 207 509 0474
- Winnow: info@winnowsolutions.com / +44 (0) 203 637 2690

14.2 Solar Panel Switcharoo

Instead of storing expensive solar panels in the winter where they will not be useful, cooperate with local businesses or individuals which may use them in the winter. This way solar panel costs may be reduced, while their effectiveness is increased.

Who could facilitate this?

- Hannah Witteveen from 070Energiek: hannah@070energiek.nl
- Reinder Boon from DDH: reinder@duurzaamdenhaag.nl / +31 (0)6 51 57 63 93

14.3 Knowing your neighbours (and their food): Farmers market

To create more awareness of (sustainably) produced food in and around The Hague, a local farmers market can be organised. On this market, ideas on collaboration with local producers may be shared which will hopefully boost sustainable food use within the restaurants, and could also produce a sink for food waste.

Who could facilitate this?

- Duurzaamheidscommissie Vereniging van Strandpaviljoen Scheveningen
- Cristien from Lekkernassûh: info@lekkernassuh.org / +31 (0)6 43 87 18 91
- Afdeling Markten Den Haag: markten@denhaag.nl / +31 (0)7 03 53 93 20

14.4 Pavilion of the year 2030

In order to give owners a better idea on what they can do, while not spending too much on subsidies, the municipality could create a pilot pavilion. This would help get a grasp on what is possible while also creating publicity for a sustainable Scheveningen.

Who could facilitate this?

- Charlotte Bos from DDH: charlotte@duurzaamdenhaag.nl / +31 (0)6 10 65 31 53
- Scheveningen De Kust Gezond: dekustgezond@denhaag.nl

14.5 Community building

Community building is a field of practices directed toward the creation or enhancement of community among individuals within a regional area (such as a neighbourhood) or with a common interest. If there is trust and communication between the stakeholders, this could benefit every solution proposed in the future. Two ways of doing this are:

14.5.1 Online platform for contact with other pavilions

Collaboration between beach pavilions can be improved further. An online platform could help making connections and giving the ability to share knowledge and ideas. Solutions that only address small part of sustainability are as welcome as the bigger ideas. Recommended platforms are Whatsapp or Slack.com.

Who could facilitate this?

- Vereniging van Strandpaviljoen Scheveningen

14.5.2 Envisioning the future

Have interactive sessions with the beach pavilion owners and municipality where they can vision their future of the area. This would be an exercise where everyone first visions the future and afterwards think of steps that are needed to reach this future.

Who could facilitate this?

- Ellen Schep from CE Delft: schep@ce.nl

14.6 Seawater for heating and cooling

Using seawater for heating and cooling as an alternative for gas use for boilers and floor heating, as has already been implemented in Duindorp for over a decade. Theoretically, 1 kWh electricity is needed to produce 12 kWh of source. Seawater extracted from the harbour side is pumped to the sea water power station. Here a two-step filtering takes place: one to filter out the sand and one to filter out sludge and other organic pollutants. Following,

depending on the temperature the water passes a heat exchanger (at temperature > 11 ˚C) or the York scroll-ammonia heat pump of 2,7 MWh (at temperature < 6 ˚C). This heat pump has a very high efficiency, since it is able to use every temperature difference. If seawater temperatures range between 6-11 ˚C both heat pump and heat exchanger are used. At the seawater power station heat is transmitted to the distribution network in which fresh water (11 ˚C) circulates. The distribution network is made out of plastic pipes and lead to the pavilions.

Where to get more information?
- Vestia: +31 (0)8 81 24 24 24
- Deerns: Paul Stoelinga +31 (0)8 83 74 04 38

14.7 Repurposing valuable waste streams

This solution will foster collaborative procurement and dealing with waste streams by visualising all possibilities for dealing with valuable waste streams and local, sustainable procurement in the area of Scheveningen.

14.7.1 Creating a map of local initiatives that provide circular or sustainable products

The first step towards match-making of interesting parties would be to create a map that shows all parties in the area involved in processing waste into valuable products or offering sustainable and local options for regular products and food.

Who could facilitate this?
- Gerko Brouwer from Circulare zaken is the 'grondstoffenmakelaar' of Gemeente Den Haag: info@circulairezaken.nl / +31 (0)6 53 14 58 96
- Circle Economy: +31 (0)8 55 36 63 00

14.7.2 Creating a network

Next, all these mapped parties become part of a network that could catch-up once in a while to get in touch with each other, share knowledge and create valuable bonding. All the partners of the network get a label on their window signalling that they are part of this network. This signalling creates curiosity and awareness at customers. Besides the pavilions can group together, acting as one partner for contracting new, local, sustainable suppliers.

Who could facilitate this?
- Vereniging van Strandpaviljoen Scheveningen
- Ger Kwakkel from Gemeente Den Haag: ger.kwakkel@denhaag.nl
- Charlotte Bos from DDH: charlotte@duurzaamdenhaag.nl / +31 (0)6 10 65 31 53

14.7.3 Creating an inventory database and creating local loops

Ideally, one should have a database that holds track of the (different) amounts of waste of the members of the network. Then matchmaking for exchanging valuable waste stream is much more easy. However, if it is not feasible to estimate the exact composition of waste of the pavilions, one could think about the opportunities in the surrounding for one cluster of waste. For example, composting "food waste" or using "food waste and fatty oils" as biodigester supply.

Who could facilitate this?
- Programmamanager Smart City Brian Benjamin: brian.benjamin@denhaag.nl
- Gerko Brouwer from Circulare zaken is the 'grondstoffenmakelaar' of Gemeente Den Haag: info@circulairezaken.nl / +31 (0)6 53 14 58 96

14.7.4 Point system to foster local and sustainable procurement and repurposing valuable waste streams

Additionally, to foster being active in creating sustainable and local loops of waste streams and procurement in the area, the network could introduce a point system. By being in the network and active being active in repurposing your waste streams or buying your food and products locally (e.g. vegetables from local urban farms instead of vegetables from big corporations like Sligro and Hanos) and sustainably (e.g. bio-based disposables, instead of single-use plastic disposables) a restaurant or pavilion can earn points. The VVS, together with the municipality can reward the pavilions that earned the most points in that year. Thereby, they can offer a certificate to every pavilion that has at least five points earned.

Who could facilitate this?
- Vereniging van Strandpaviljoen Scheveningen
- Ger Kwakkel from Gemeente Den Haag: ger.kwakkel@denhaag.nl

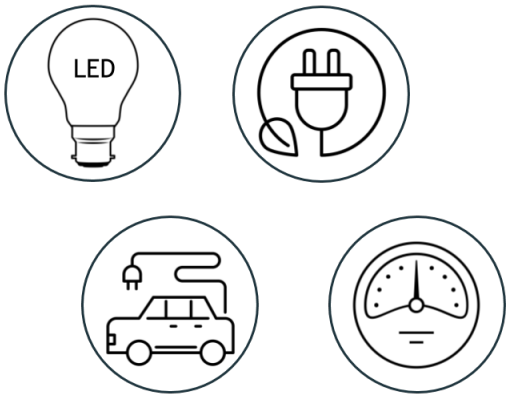
15. Individual measures

What are individual measures that the pavilions can take to align themselves with the Haags Klimaatpact?

At the beginning of this research, we decided to focus on collaborative solutions considering that the Green Key already provided many ideas for measures that each pavilion could take. However, over the weeks and through our conversations with Hans and Noortje, it has become clear that there are still pavilions who do not know where to begin. Noortje asked us to still recommend ‘individual’ measures. Therefore, we combined ideas from Green Key with our own ideas, and propose the following measures.

Energy

1. Change all possible lighting to LED.
2. Buy green energy from local sources.
3. Use energy saving technologies such as: voltsaver, heat pumps, PV panels, solar boilers, heat-cold storage, dishwashers with heat recovery, dishwashers with pre-washes that reuse waste water, thermal heating.
4. Improve insulation, fix air leaks.
5. Work with suppliers that are consciously trying to reduce their CO2 emissions.
6. Use a smart metre tracks the pavilion's gas and electricity use and automatically send this information to the energy supplier, to nudge pavilions to be smarter with their energy use. Feedback from the smart meter can have serious impact on the behaviour of the consumers.
7. Replace old appliances with energy efficient appliances.



Materials

1. Buy bio-based products (such as Straw by straw, Bamboo brushes, Naturalbags, Made in Moerwijk, Paperwise, Marcel's green soap, Seepje).
2. Serve smaller dishes in order to reduce food waste, or allow refills so that people only get as much food as they want.
3. Buy 'sustainable' branded cleaning materials, and inventorise how much is used where.
4. Measure how much of total waste is made out of recyclable material, and how much of it is actually being separated so it can be recycled.
5. Collect plastic, organic, Swill, coffee cups and coffee grounds separately.
6. Buy biological food and/or local produce where possible.
7. Increase the share of vegetarian/vegan items on the menu.

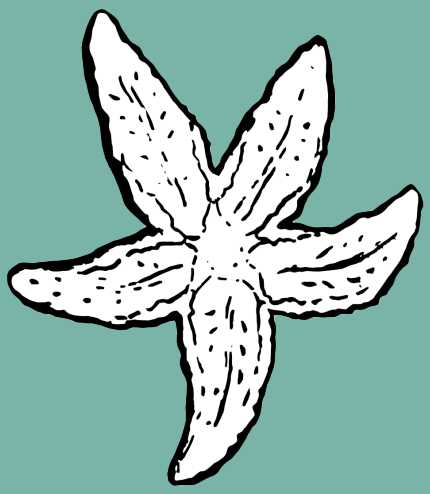
Water

1. Offer tap water instead of bottled water. Dunea has a campaign to support this.
2. Reduce the water stream from taps to a maximum of 4 litres per minute.
3. Use grey water/rainwater for flushing toilets. Rainwater can be collected via tanks.
4. Install efficient toilets, such as vacuum-flush toilets, to reduce overall water consumption.

16. Funding and projects

What forms of support are available for sustainable initiatives at Scheveningen?

In addition to the collaborative measures we propose, Hans and Noortje were interested in an inventory of the existing funds and initiatives that are available for the beach pavilions to support sustainable initiatives. In this section, we summarise all the funds and initiatives mentioned throughout our report, supplemented with other opportunities we could find.



16.1 Funds

- Energie Investeringsaftrek and Milieu-investeringsaftrek: The Dutch government gives companies tax advantages for investing in assets that have environmental advantages. Examples include: LED-lights, warmth exchangers, heat pumps, thermal heat collectors. The full list can be found on their website: https://www.rvo.nl/subsidies-regelingen/milieulijst-en-energielijst/huidig-jaar/2019

- Kleinschaligheidsinvesteringsaftrek (KIA): It is possible to get a tax advantage of upto 28% on small scale investments on company assets. More information can be found on: https://www.belastingdienst.nl/wps/wcm/connect/bldcontentnl/belastingdienst/zakelijk/winst/inkomstenbelasting/inkomstenbelasting_voor_ondernemers/investeringsaftrek_en_desinvesteringsbijtelling/kleinschaligheidsinvesteringsaftrek_kia

- Salderingsregeling: This initiative makes it possible to offset energy that is generated by solar panels on a property from energy that is purchased from a supplier. This is useful if electricity is being generated but not immediately used. More information can be found on: https://www.rijksoverheid.nl/onderwerpen/duurzame-energie/zonne-energie

- Lokale initiatieven energietransitie: Until May 2021, €4 million in provincial subsidy is available for projects that reduce CO2 emissions. There is a maximum of € 75,000 per project. Contact: zuidholland@pzh.nl / 0704416622. More information can be found on the website: https://www.zuid-holland.nl/loket/subsidies/subsidies/@16784/energietransitie/

- Klimaatfonds: For non-profit foundations funding can be provided for energy saving measures that reduce CO2 emissions by at least 100 tons. Maximum of € 15.000. Contact: klimaatfonds@duurzaamdenhaag.nl

- Fonds 1818: Doubles the funding from Klimaatfonds for energy saving measures. Contact: info@fonds1818.nl

- Subsidie groene daken: It is possible to receive 25 euros/m2 of green roof, upto a maximum of €10.000. Pavilions can apply for this subsidy on this website: https://www.denhaag.nl/nl/subsidies/subsidies-wonen-en-bouwen/subsidie-groene-daken-2019-aanvragen.htm

- Energietransitie in mobiliteit: For innovation in the mobility sector, the Province of South Holland has funding available. This could be used to fund electric/alternative forms of transport. Contact: zuidholland@pzh.nl / 0704416622. More information can be found on the website: https://www.zuid-holland.nl/loket/subsidies/subsidies/@17991/energietransitie/

- Fietsprojecten: In order to stimulate the use of bicycles, there is provincial subsidy for bicycle infrastructure. This is only for large scale interventions, but if the pavilions wanted to move to centralised supply of products, this would eventually be a way to finance routes to and from a hub. More information can be found on the website: https://www.zuid-holland.nl/loket/subsidies/subsidies/@8165/fietsprojecten-14/

- Investeringssubsidie duurzame energie ISDE: An allowance for buying pellet stoves, heat pumps, solar boilers and biomass boilers. For example, pellet stoves can receive € 50,- per KW power, biomass boilers can receive € 2500,- for a boiler with 40 kW. Heat pumps can receive € 1000,- to € 2500,- More information can be found on: https://www.rvo.nl/subsidies-regelingen/investeringssubsidie-duurzame-energie-isde

16.2 Initiatives and projects

- Green Deal Initiatives: Support for ‘green’ initiatives from the Dutch government. It aims to be an accessible way for companies, stakeholder organisations, local and regional government and interest groups to work with the national government on green growth and social issues. The aim is to remove barriers so that sustainable initiatives get off the ground. More information can be found on this website: https://www.greendeals.nl/

- Wetchecker energiebesparing: A government initiative for companies to self-check whether they meet all the

legal requirements when it comes to energy saving. It can be done online: https://regelhulpenvoorbedrijven.nl/wetcheckerenergiebesparing/

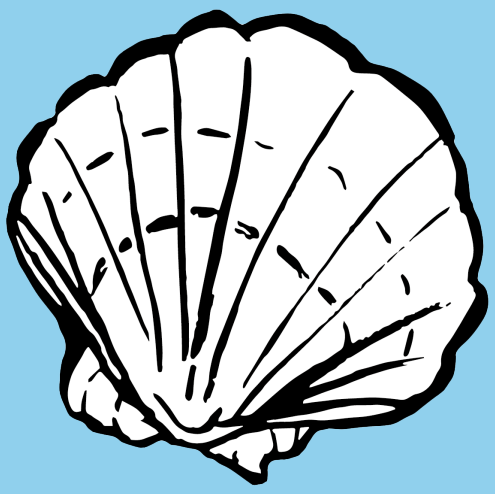
- Loket Hou van je Zaak: Hou van je Zaak does free energy scans (that have a value of 350 euros) for companies to help them optimise their energy use. Contact: houvanjezaak@denhaag.nl. More information on their website: https://www.denhaag.nl/nl/algemeen/advies-voor-ondernemers-over-duurzaamheid.htm

- Smart City Den Haag: Scheveningen will function as a 'Living Lab' for Smart City Den Haag, which can be used to the advantage of the beach pavilions for putting more emphasis on using and collecting data. Contact: Programmamanager Smart City Brian Benjamin: brian.benjamin@denhaag.nl

17. Conclusions

How can the beach pavilions at Scheveningen reach the climate goals for 2030 as stated in the Haags Klimaatpact?

Hans and Noortje commissioned us to research how the beach pavilions in Scheveningen can become more sustainable, using the Haags Klimaatpact as a starting point. Our aim with this report was to propose sustainable measures, suggest how they could be implemented, and then evaluate their social, economic and environmental impacts in relation to the Haags Klimaatpact. The focus was on collaborative measures, though we also proposed an additional list of individual measures.



We conclude our report and answer the research question with Table 17.1. For each of the eleven topics within the Haags Klimaatpact, we list the measures that the beach pavilions could take to align themselves with the Haags Klimaatpact and therefore participate in reaching the climate goals set for 2030. This is a summary of all the collaborative and individual sustainable measures we have discussed in this report.

Table 17.1: Sustainable measures the beach pavilions can take to align themselves with the goals of the Haags Klimaatpact.

Climate goals from the Haags Klimaatpact	Sustainable measures the beach pavilions can take to align themselves with the goal
Municipality as a forerunner *(Voorbeeldfunctie gemeente)*	✓ Transport Hub ✓ Alternatives to terrace heating: Heating people, not places ✓ Biodigester ✓ Pavilions as 'Living Labs' for Smart City Den Haag ✓ Pavilion of the year 2030
Role of residents and businesses *(Rol van bewoners en bedrijven)*	✓ All the proposed measures in this report
Boost function municipality *(Aanjaagfunctie gemeente)*	✓ Alternatives to terrace heating: Heating people, not places ✓ Biodigester ✓ Pavilions as 'Living Labs' for Smart City Den Haag ✓ Renewable energy cooperative ✓ Knowing your neighbours (and their food) ✓ Pavilion of the year 2030 ✓ Creating a community ✓ Seawater for heating and cooling ✓ Repurposing valuable waste streams
The energy transition *(De energietransitie)*	✓ Transport Hub ✓ Alternatives to terrace heating: Heating people, not places ✓ Biodigester ✓ Renewable energy cooperative ✓ Solar Panel Switcharoo ✓ Pavilion of the year 2030 ✓ Seawater for heating and cooling ✓ Change all possible lighting to LED. ✓ Buy green energy from local sources. ✓ Use energy saving technologies ✓ Improve insulation, fix air leaks. ✓ Work with suppliers that are consciously trying to reduce their CO_2 emissions. ✓ Use a smart metre ✓ Replace old appliances with energy efficient appliances.
Heat *(Warmte)*	✓ Alternatives to terrace heating: Heating people, not places ✓ Seawater for heating and cooling

Climate goals from the Haags Klimaatpact	Sustainable measures the beach pavilions can take to align themselves with the goal
Electricity *(Elektriciteit)*	✓ Biodigester ✓ Renewable energy cooperative ✓ Solar Panel Switcharoo
Housing *(Woningen)*	✗ Not applicable to any measures
Climate adaptation *(Klimaatadaptatie)*	✓ Pavilion of the year 2030 ✓ Envision the future ✓ Creating a community ✓ Online platform for contact with other pavilions ✓ Offer tap water instead of bottled water. ✓ Reduce the water stream from taps to a maximum of 4 liters per minute. ✓ Use grey water/rainwater for flushing toilets. Rainwater can be collected via tanks. ✓ Install efficient toilets, such as vacuum-flush toilets, to reduce overall water consumption.
Mobility (*Mobiliteit*)	✓ Transport Hub
Circular economy *(Circulaire economie)*	✓ Transport Hub ✓ Alternatives to terrace heating: Heating people, not places ✓ Biodigester ✓ Repurposing valuable waste streams ✓ Creating a community ✓ Procurement of bio-based products ✓ Measure how much of total waste is made out of recyclable material, and how much of it is actually being separated so it can be recycled. ✓ Collect plastic, GFT, Swill, coffee cups and coffee grounds separately.
Food *(Voedsel)*	✓ Transport Hub ✓ Alternatives to terrace heating: Heating people, not places ✓ Biodigester ✓ Knowing your neighbours (and their food) ✓ Create more awareness with the customers ✓ Serve smaller dishes ✓ Buy biological food and/or local produce where possible. ✓ Increase the share of vegetarian/vegan items on the menu.

18. Discussion

18.1 The Haags Klimaatpact and climate neutrality

The Haags Klimaatpact states that The Hague strives to be 'climate neutral' by 2030, which means that it wants to achieve a net-zero carbon footprint. In itself, this goal raises some questions: Is this for all the energy used The Hague? Or only the energy produced in The Hague? What about emissions from transport coming in and out of The Hague? And the embodied energy of all the products and construction materials used in The Hague, do they also have to have net-zero carbon emissions?

Although it does not have answers to any of these questions, the Haags Klimaatpact formalises the intent of many political parties and companies to work towards a common goal. In itself, this makes it an important document because it shows that they accept the complex task, and the necessity for change, even if they do not yet know how to achieve its goals. Nonetheless, the disadvantage to staying vague to have large-scale consensus is that the Haags Klimaatpact does not offer directly implementable actions for its signers to take. This makes it difficult for its signers (including the beach pavilions at Scheveningen) to measure whether they are making steps in the right direction.

These points are important to keep in mind while considering the solutions we have proposed in this report. Each of our sustainable measures can bring the pavilions a step closer to the goals of the Haags Klimaatpact, but their exact impact on reaching climate neutrality cannot be measured. Furthermore, carbon emissions are not the only villain, and working only towards net-zero carbon emissions can create a blind spot to the deeper, underlying problem: an irresponsible and wasteful use of natural resources. This is why we have considered materials and water as well as energy in our environmental assessments; we hope that our holistic perspective can help make pavilions more aware of their impact on the environment.

18.2 Limitations of research: scope and data availability

We met the most obstacles during our analysis with the technical analysis, in which we aimed to analyse the material, energy and water inputs and outputs of the beach pavilions. The original aim was to perform a static material flow analysis. However, due to a lack of data from the beach pavilion owners and academic literature we had to make many concessions.

First, we could not take a life cycle approach; the total energy and water needed to produce and retrieve the food was not taken into account, nor the energy used for transporting the goods. Second, for the material inputs and outputs, we were only able to retrieve information from one pavilion and a few case studies (not all in the Netherlands) making its suitability to the pavilions at Scheveningen questionable. Third, the MVO scans were an important source of information for us. However, only a small fraction of the 25 MVO scans that will be conducted by Sander

Verschuren were performed at the time of our research. Therefore, the information in the technical and social analyses only represents a few pavilions. The more MVO scans are conducted, the more the average would represent the true average of the pavilions at Scheveningen.

In short, the shortage of data and its low resolution made it difficult to accurately map the material, energy and water inputs and outputs of the beach pavilions. For a better overview of these numbers, we recommend that future research considers a life-cycle approach to the material inputs and outputs, and that all 25 MVO scans are used to collect data.

Furthermore, we recommend that the MVO scan and Green Key analysis can be improved by including information about the electricity, gas and water use per m2 of floor area when calculating a pavilion's 'score'. By converting this information per m2 of floor area, the data would be collected more objectively (rather than in a questionnaire) and leave less room for pavilions to shape numbers to their advantage.

18.3 If we had 100,000 euros to invest, how would we spend it to make the most environmental impact?

The main lesson to be taken from our research is that there is no single measure that can be the 'silver bullet' for net-zero carbon emissions. As with all complex tasks, this transition needs many steps to be taken in parallel. We recommend that the first step is gathering insight: the beach pavilions currently know very little about their own resource use and waste, so they should collect data to understand it better.

Therefore, if we had 100,000 euros, we believe it would be best spent on monitoring the energy, material and water use of the pavilions. Giving the pavilions owners insight into their own use-patterns would be valuable in making them aware of the value they are currently losing through inefficient operation of their businesses. By measuring these aspects, it would beach owners opportunities for the creation of value, economically and environmentally. As recommended within our report as well, a few examples to start would be:

- Installing smart meters to monitor the exact use of electricity, water and gas.
- Hiring a consultant to analyse the current logistics system, or using digital modelling software to infer it.
- Install food-waste monitoring software.

There has to be a balance between bottom-up action with top-down support in order for the 100,000 euros to have the most impact. The data that comes out of these measures would make it possible to understand which collaborative measures would have the most environmental impact, which in turn would have to be supported by municipal and national government in order to spread the risk and initial investments needed. Armed with this knowledge, the next step can be formulated, bringing the beach pavilions closer to the climate goals of the Haags Klimaatpact.

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Appendix A

Comparison Haags Klimaatpact and Green Key certification

The Haags Klimaatpact consists of a list of 50 goals, divided into 12 topics. These topics are 1) clear objectives, 2) municipality sets an example, 3) role of residents and companies, 4) municipality facilitates actions, 5) energy transition, 6) heat, 7) electricity, 8) dwellings, 9) climate adaptation, 10) mobility, 11) circular economy and 12) food.

Before comparing the Haags Klimaatpact and the Green Key certification we make a pre-selection. The goals (18) that are not relevant for beach pavilions are left out of this analysis, for example "Duurzaam Den Haag (and/or other organisations) will be given more room te actively attract people from The Hague to sustainable behavior in general, the sustainability of their homes and the greening of their living environment in particular." (Haags Klimaatpact, 2018, p. 6).

After the pre-selection, it is checked whether the 32 goals of the Haags Klimaatpact are already mentioned in the Green Key certification. For example, "Energy saving also reduces the overall task for the transition to 100% sustainable and non-fossil sources." (Haags Klimaatpact, 2018, p. 7). Energy savings is also a goal in the Green Key certification. If a statement of the Haags Klimaatpact is mentioned in the Green Key certification it is not relevant for our research, since the Green Key certification will be implemented in the coming years. If a statement of the Haags Klimaatpact is not mentioned in the Green Key certification it is relevant, since it is not yet being considered (see Table T2). In the Green Key certification there are only requirements for one business, in this case a pavilion. Hence, most goals that are not both in the Haags Klimaatpact and the Green Key certification need a bigger scope to be accomplished.

Twenty-one goals are mentioned in the Haags Klimaatpact and not in the Green Key certification. These 21 goals could easily be divided in the following categories: 1) opportunity for collaboration (9 goals), 2) responsibility of municipality (10 goals) and 3) has potential in Green Key certification (2 goals). The category 'Opportunity for collaboration' contains goals that are dependent on collaboration between parties. The category 'Responsibility of municipality' contains goals that are also dependent on collaboration between parties, but specifically need leadership from the municipality. The category 'Has potential in Green Key certification' contains goals that, in our opinion, fall within the boundaries of the Green Key certification, and could be included in future requirements. We will not make any further use of this category.

Table T4: Goals Haags Klimaatpact not represented in the Green Key certification, divided in three categories. Note: The Haags Klimaatpact is only available in Dutch, hence the goals in Table T2 are in Dutch.

Category	Topic	Goals Haags Klimaatpact
1	Rol van bewoners en bedrijven	De gemeente stimuleert en ondersteunt lokale initiatieven en creëert de noodzakelijke voorwaarden om deze tot een succes te maken. Ondernemerschap van Haagse burgers, of dat nu commercieel is of coöperatief, wordt een van de pijlers van de transitie. Daarbij hoort actieve ondersteuning door de gemeente.
1	Aanjaagfunctie Gemeente	De gemeente organiseert in elke sector een duurzaamheidskring, waarin ondernemers tips uitwisselen om te verduurzamen.
1	De energietransitie	De gemeente neemt de regie over de energietransitie op zich, waarbij partijen bij elkaar gebracht worden en gekoppeld worden aan de benodigde investeringen. De gemeente hoeft niet alles zelf te doen, maar moet zoveel richting geven zodat de energietransitie wel binnen de beschikbare tijd zal plaatsvinden, duurzame initiatieven altijd kunnen aankoppelen en de leveringszekerheid is geborgd.
1	Elektriciteit	Bij elektriciteit vormen duurzaam en niet-fossiel de uitgangspunten. Elektriciteit is een Europees netwerk. Lokaal gaan we een gebalanceerde duurzame elektriciteitsvoorziening stimuleren.
1	Klimaatadaptatie	De stedelijke omgeving wordt aangepast aan de veranderende klimaatomstandigheden: meer regen en meer hitte.
1	Mobiliteit	Het gebruik van deel- en zero-emissie auto's in plaats van een eigen of vervuilende auto's wordt actief gestimuleerd. We onderzoeken of het mogelijk is de parkeertarievenen vergunningen te differentiëren naar de uitstoot van het voertuig.
1	Mobiliteit	De gemeente blijft streven naar een duurzame, lokaal georganiseerde distributieketen

		voor leveringen van en aan ondernemers en burgers.
1	Circulaire Economie	De gemeente helpt bij het inventariseren en koppelen van bedrijven die (samen) circulair kunnen werken.
1	Voedsel	De gemeente gaat via duurzaamheidskringen in overleg met organisaties en horeca om een meer aantrekkelijk plantaardig menu op de kaart te zetten en de vleesconsumptie te verminderen.
2	Voorbeeldfunctie Gemeente	Duurzaamheid wordt een belangrijker aandeel bij gunningen en aanbestedingen.
2	Voorbeeldfunctie Gemeente	Er komt een fonds/subsidie om rendabele duurzaamheidsinvesteringen te versnellen en onrendabele duurzaamheidsinvesteringen waar noodzakelijk te ondersteunen.
2	Voorbeeldfunctie Gemeente	De gemeente gaat in gesprek met fossiele energiebedrijven om hun activiteiten te verduurzamen en realiseert daarnaast een duurzaam energiecluster.
2	Voorbeeldfunctie Gemeente	De gemeente behandelt gunningen en aanbestedingen volgens de total cost of ownership methode, waarin niet alleen de directe maar ook de indirecte kosten worden meegenomen.
2	Voorbeeldfunctie Gemeente	Den Haag moet duidelijk het duurzame profiel naar voren brengen in de communicatie naar buiten toe.
2	Aanjaagfunctie Gemeente	De gemeente gaat organisaties waarmee ze een subsidierelatie heeft actief aansprekenen ondersteunen om te verduurzamen.
2	Aanjaagfunctie Gemeente	Met de Omgevingsdienst Haaglanden worden afspraken gemaakt over effectieve handhaving van de plicht voor bedrijven om te investeren in rendabele energiebesparingen.
2	Elektriciteit	Aandacht is nodig voor de omschakeling van vraag naar aanbod en de afwegingen wanneer in huis, en wanneer in het lokale netwerk extra investeringen gedaan moeten worden. Daartoe stimuleert de gemeente pilots met flexibele elektriciteit- en transportprijzen.
2	Woningen	Waar mogelijk stimuleren we verduurzaming door eisen te stellen bij vergunningsverstrekking
2	Mobiliteit	Er komt gedifferentieerde bereikbaarheid naar gebied en/of type voertuig.
3	Rol van bewoners en bedrijven	Het is noodzakelijk bewoners, woningeigenaren en bedrijven mee te nemen in de opgave waarvoor we staan. Keuzevrijheid en flexibiliteit zijn daarvoor belangrijk. Voor iedereen zal er iets veranderen. Belangrijk is om waar mogelijk aan te sluiten bij natuurlijke momenten. Bij iedere verhuizing, iedere verbouwing en iedere investering kunnen zij hun kansen grijpen.
3	Circulaire Economie	Om te voorkomen dat gebruikte grondstoffen afval worden, werkt de gemeente aan een platform voor 'materialenpaspoorten'. Zo weten we hoeveel grondstoffen waar inzitten.

Appendix B

Template interview pavilions social analysis

Onze studie!
Wij studeren Industrial Ecology, een studie aan de TU Delft en Leiden Universiteit. We bestuderen materiaal, energie en water systemen, om de inkoop, het gebruik en de afvalverwerking van grondstoffen te optimaliseren. Het afval van de een, kan een grondstof zijn voor de ander bijvoorbeeld. Alle systemen/problemen/oplossingen bekijken we vanuit verschillende perspectieven, vanuit een natuur, een sociaal, technisch en economisch perspectief. Er wordt naar gestreefd om het gehele plaatje te bekijken.

Het project!
Voor onze studie doen we dit halfjaar een project in opdracht van de gemeente en de vereniging van strandpaviljoens Scheveningen. Het klimaatpact was hiervoor een initiator. Het is de vraag aan ons hoe de strandpaviljoens de doelen van het klimaatpact kunnen behalen, en welke rol de gemeente hierin speelt. Het resultaat van ons project zal zijn; een rijtje ideeën die, in samenwerking, zullen helpen in het optimaliseren van het kopen van materiaal, water en energie, het gebruik van materiaal, water en energie en hoe er na het gebruik hiermee wordt omgegaan. Eten en drinken beschouwen wij als materiaal.

Visie van de eigenaar
- Wat zijn jouw beweegredenen bij het runnen van jouw strandtent?
- Met welke partijen/personen heb jij te maken met het runnen van je strandtent? (kopen, samenwerken, verkopen)

Toekomst eigen paviljoen
- Zie jij zelf kansen om de inkopen, het gebruik van en …. van materiaal, energie en water te optimaliseren?
- [vervolgvraag] Zijn er voor jou obstakels op de weg om die kansen te realiseren (het optimaliseren van materiaal, water en energie gebruik?)
- [vervolgvraag] Waarom is dit een obstakel?
- [vervolgvraag] Hoe denk je deze optimalisatie het runnen van jouw strandtent gaat beïnvloeden?

Samenwerking met derde partijen
- Heb je contact met jouw buur strandpaviljoen eigenaren?
- [vervolgvraag] Zo ja, hoe is het contact? (Doorvragen als er sommige minder zijn of juist meer contact, hoe komt dat zo?) Zo nee, waarom geen contact?
- Speelt competitie om klanten met andere eigenaren een rol? Zo ja, hoe?
- Zie jij zelf kansen om de inkopen, het gebruik van en …. van materiaal, energie en water te optimaliseren in samenwerking met derde partijen?
- [vervolgvraag] Zijn er voor jou obstakels op de weg om die kansen te realiseren (het optimaliseren van materiaal, water en energie gebruik?)
- [vervolgvraag] Waarom is dit een obstakel?

Samenwerking met overheidsorganisaties
- Heb je contact met de gemeente?
- [vervolgvraag] Zo ja, hoe is het contact? Zo nee, zou je dit wel willen?
- Heb jij verwachtingen hoe de gemeente of andere overheidsorganisaties MOETEN helpen met het optimaliseren van materiaal, water en energie voor strandpaviljoen eigenaren?
- Hoe zou de gemeente jou KUNNEN helpen met het optimaliseren van materiaal, eten, water en energie en waarom?
- Krijgen jullie subsidies?

Oplossingen / feasibility analysis
- Als wij een idee aanbieden aan jou, in welke informatie zou je dan geïnteresseerd zijn? [bijv payback time]
- Onze ideeën zijn gericht op samenwerking, in het algemeen wat zouden zorgen zijn bij het samenwerken met derde partijen? [noem samenwerking voorbeeld als dit nog niet benoemd is] (third party, between pavilions, between alle pavilions)

- Als wij een rijtje ideeën hebben, hoe zou je het fijn vinden dat we deze communiceren? Voorbeelden: een boekje, of door middel van een presentatie samen met andere eigenaren, of een website.

Praktische dingen

- Is het goed als jou paviljoen benoemen in ons verslag als een nummer? [Laat een stakeholder diagram zien waarom]

- Hoe vond je het gesprek? Heb je nog tips voor ons in communicatie? Wij bekijken alles vanuit ons perspectief, komt het over?

Appendix C

Interview Questions Noortje

Current situation
- How would you describe your relation to the beach pavilions in general? What is in general the function of the municipality?
- Who are currently involved in realising the goals of the Haags Klimaatpact?
- How effective is the communication between the municipality and the beach pavilions?
- What do you want to get out of our research?
- What was the motivation of the municipality to finance 25 pavilions?

Expectations Municipality
- Can you give us a future outlook of the Scheveningen beach in 2030 from the municipality perspective?
- What actors are involved in this vision?
- What are the biggest structural changes that need to be made to reach this vision?
- Have some beach pavilions already changed according to these perspectives?
- What do you expect the role of the municipality is in reaching the Klimaatpact?

Biggest barriers concerning the municipality
- What does the municipality currently thinks what the biggest hurdle(s) will be for the beach pavilions to reach the Klimaatpact?
- What do you think the biggest hurdle(s) will be for the municipality?

Plans of the Municipality
- Are there any structural changes the municipality plans to make to Scheveningen in the coming years (e.g. infrastructure, contract renewal requirements)?
- Is the municipality planning on or willing to provide any additional financial incentives or support (e.g. subsidies, tax reductions) to aid companies in measure implementation in order to reach the Klimaatpact?

Project implementation
- Are there any concerns (zorgen) with regards to measures that should be taken in order to reach the Haags Klimaatpact with respect to the beach pavilions (e.g. lack of information, communication problems, concerns about feasibility, scope of change)
- Are there any requirements with regards to measures that should be taken in order to reach the Haags Klimaatpact with respect to the beach pavilions (e.g. project proposals in line with Haags Klimaatpact, end result: circularity)

Timeline analysis
- Which government authorities have a stake in this beach area?
- There is quite a lot of funding (p29 of Watt Anders), what is the scale of companies that can ask for this funding? Is the process complicated? Who decided who gets funding? What is the timeline of these subsidies

Materials: the Hague's vision on circular economy, waste management and logistics
- Are there any upcoming policies or agreements that will be made for waste management/recycling/packaging?
- For logistics/infrastructure → any large scale changes in this area? (apart from Boulevard renewal)

Energy: we look at the national, provincial and municipal energy transition agendas
- In the Hague, there is a large focus on the heat transition, what about producing renewable energy? Reducing energy demand? Optimising usage of energy?
- Smart grid: are there plans/policies for this?
- apart from the Energie-innovatiefonds, what is the municipality doing?

Water: climate adaptation vision of the Hague
- Coastal defense at Scheveningen?

Appendix D

Template interview pavilions technical analysis

Algemeen

- Hoeveel maanden is het laagseizoen?
- Hoeveel maanden is het hoogseizoen?

Materiaal IN (het materiaal dat binnenkomt)

- Inkopenlijst per maand of per week? Vlees, vis, groente, thee, koffie, rietjes, toiletpapier, servetten, schoonmaakmiddel, etc.
- *Menu (zelf opzoeken)*
- Hoeveel er van het menu wordt verkocht, kassa lijst (kunnen we aantal * gewicht gerecht/drankje)
    - Voedsel: hoeveel wordt er per gerecht weggegooid (schil ananas, …) in %
- Afval voedsel lijst (geen btw). Voedsel weggegooid (mislukt/bedorven/..)
- Zijn er materialen die wij over het hoofd zien, die op reguliere basis ingekocht worden. Bijvoorbeeld nieuwe glazen (want gebroken). We bedoelen dus niet het meubilair.

Materiaal OUT (het materiaal dat eruit gaat)

- Aantal containers 1) papier? 2) Glas? 3) Restafval? 4) andere?
- Volume 1 container 1, 2, 3, 4?
- Hoe vol zit een container 1, 2, 3, 4 ongeveer gemiddeld als deze geleegd wordt (in%)?
    - Laagseizoen
    - Hoogseizoen
- Hoe vaak wordt de container 1, 2, 3, 4 geleegd per week?
- Waar bestaat je restafval uit?
    - Plastic, weinig/gemiddeld/veel?
    - Voedsel resten, weinig/gemiddeld/veel?

Energie IN (energie die binnenkomt)						
Gasverbruik / jaar		UNIT				
Elektriciteitsverbruik / jaar		UNIT				
Energie OUT (energie die eruit gaat)	Model/merk	Hoeveel	W/m3	Gebruik hoogseizoen (uur per week of dag)	Gebruik laagseizoen (uur per week of dag)	Elektriciteit of gas
LED lampen						
TL buizen						
Andere soorten lampen?						
Staande heaters						
Hangende heaters						
Andere soorten heaters?						
Boiler / cv ketel						
Welke apparaten zijn er aangesloten op je boiler?						
Radiatoren						
Open haarden						
Koffiemachine						
Waterkoker						

Chocomel machine						
Blender/smoothie machine						
Koelcel						
Vriescel						
Koelkast						
Vriezer						
Kookplaat						
Oven						
Magnetron						
Frituur						
Warmhoudplaatjes (kaasfondue?)						
Blender						
Staafmixer						
Ijsblokjes machine						
Ijsmachine						
Tosti apparaat						
Vaatwasser						
Stofzuiger						
Gekoelde leidingen taps?						
Kleine koelkast bierfusten						
Warmtepomp						

Water IN (het water dat binnenkomt)		
Drinkwater		
Regenwater		
Water OUT (het water dat binnenkomt)	Hoeveel	L/day
Toilet		
Urinoir		
Kranen toilet		
Kranen keuken		
Kranen bar		
Waterslang keuken		
Waterslang buiten		
Waterkraan buiten		

Vaatwasser		
Douche		
Wasmachine		
Andere apparaten die water gebruiken?		

Appendix E

MVO scan 1

De eigenaar van de dit paviljoen werkt al 34 jaar hier. Zijn motivatie om mee te doen aan de MVO scan was om zo een idee te krijgen waar te beginnen om duurzaamheid te implementeren. Hij handelt met name vanuit een economisch perspectief, kosten zijn een erg belangrijke factor. Verder is het opvallend dat er vooral wordt gesproken over problemen in plaats van oplossingen.

Dit paviljoen was het eerste paviljoen op strand scheveningen waarbij een MVO scan werd uitgevoerd. Wij hebben de scan bijgewoond om een idee te krijgen van wat er precies gevraagd wordt en hoe het in zijn werk gaat. Dit interview was dus niet gestructureerd en er waren niet van te voren vragen opgesteld. Interessante opmerkingen die tijdens de scan benoemd zijn staan hieronder genoteerd. De opmerkingen konden worden verdeeld over drie categorieën, namelijk energie, materiaal en contact met derde partijen.

Energie
Afgelopen jaar is de paviljoen flink verbouwd. Het bleek niet mogelijk om volledig van gas naar elektriciteit over te stappen, hier is niet genoeg capaciteit voor. In de keuken is er wel overgestapt naar inductieplaten om zo het gasverbruik te verminderen. De eigenaar heeft subsidie ontvangen voor de boiler, wat vreemd is aangezien het niet strookt met de overtuiging om in 2030 van het gas af te zijn. Het niet volledig kunnen overstappen naar elektriciteit wegens capaciteit tekort werd gezien als gemiste kans vanuit de eigenaar, want de intentie was er wel.

Er wordt geen energie met zonnepanelen opgewekt. De reden hiervoor is dat de strandpaviljoen niet jaarrond is. De panelen zouden elke winter in de opslag moeten, maar ze zijn erg kwetsbaar en geen opslag plaats?.

Er is sprake van enkel glas, met de reden dat de paviljoen niet jaarrond is. Dubbelglas is te zwaar om elk jaar op en af te bouwen.

Verder heeft de eigenaar interesse om gezamenlijk met de paviljoenen energie op te wekken. Er is bijvoorbeeld gesuggereerd om een windmolen neer te zetten bij het zwarte pad (noordelijkste gedeelte van Scheveningen). Deze windmolen wordt dan gekocht met alle paviljoenen en die energie wordt lokaal gebruikt. Echter de gemeente staat dit niet toe vanwege de natuur.

Materiaal
De afvalverwerkingskosten zijn flink verhoogd, vandaar dat de eigenaar is overgestapt naar een nieuwe afvalverwerker. Ongeveer 20 paviljoenen waren klant bij de afvalverwerker, sommige zijn overstapt en sommige zijn gebleven. Het is niet gelukt om als groep verlaging van de kosten te krijgen.

Er is gezocht naar alternatieven voor sommige single-use plastics. Een voorbeeld is een alternatief voor de plastic rietjes, maar deze zijn 7 keer zo duur. De koekjes zijn ook verpakt in plastic, dit is vanuit hygiëne oogpunt. Zodat de koekjes kunnen worden hergebruikt als ze niet zijn opgegeten.

Een deel van de vis wordt lokaal ingekocht. Het is namelijk vis die voor de deur wordt gevangen. Dit wordt ook specifiek aangegeven op de kaart.

Het afval mag niet buiten bewaard worden van de gemeente, vanwege het zicht. Er is dus weinig opslag ruimte voor afval.

De paviljoen is niet jaarrond dus wordt elke winter afgebroken. Het hout wordt opgeslagen bij de fabriek. De rest staat in een container.

Contact met derde partijen
Het contact met de gemeente wat betreft jaarrond open kunnen zijn of niet verloopt niet soepel. De eigenaar snapt dat de gemeente geen jaarrond vergunning kan geven aan 60 strandpaviljoens. Maar een concreet antwoord (ja of nee) vanuit de gemeente zou fijn zijn. Tot nu toe blijft het vaag, en wordt er verteld dat het onderzocht wordt.

De boulevard van Scheveningen wordt verbouwd. Het stuk bij dit paviljoen is nog niet verbouwd, het is ook niet duidelijk wanneer dit wel gaat gebeuren.

Appendix F

MVO Scan 2

Visie van de eigenaar
Wil weloverwogen keuzes maken bij het verduurzamen. Kwam over alsof ze zich schaamt dat ze nog niet helemaal duurzaam is.

- Wat zijn jouw beweegredenen bij het runnen van jouw strandtent?

Intrinsieke overtuiging om te verduurzamen. We moeten beter voor de wereld zorgen. Niet voor marketing redenen. Stel ze krijgen een Green Key certificaat in de toekomst, dan zou dit niet gecommuniceerd worden naar de buitenwereld. Ze zouden het certificaat nemen om te weten wat ze kunnen doen om te verduurzamen. Het is geen marketingtool. Zo veel mogelijk willen voor een zo laag mogelijke prijs past niet bij haar overtuigingen dus verandert van baan.

- Met welke partijen/personen heb jij te maken met het runnen van je strandtent? (kopen, samenwerken, verkopen)

Bijvoorbeeld Hanos als supplier. Ze geven aan bij Hanos dat ze plasticvrij willen en hoe meer ondernemers dit zouden doen hoe meer kans dat dit gebeurt. Lindehof; vragen welk stuk vlees niet veel verkocht wordt, dan kopen zij dat stuk vlees zodat het niet weggegooid wordt.

Toekomst eigen paviljoen

- Zie jij zelf kansen om de inkopen, het gebruik van en …. van materiaal, energie en water te optimaliseren?

Plastic gebruik en energie gebruik. Minder gas.

- [vervolgvraag] Zijn er voor jou obstakels op de weg om die kansen te realiseren (het optimaliseren van materiaal, water en energie gebruik?)

Duurzaam inkopen doen is duur, vaak 10x zo duur.
Als we alleen maar producten uit nederland op de kaart zetten verliezen we mensen, een deel van de klanten wil gewoon die zalm uit idk.

- [vervolgvraag] Waarom is dit een obstakel?

Heeft geen zonnepanelen want dak kan het waarschijnlijk niet aan en met opslag is het erg duur. Minder kwetsbare panelen nodig, ivm zand & opslag. Al 2 keer naar gekeken.

- [vervolgvraag] Hoe denk je deze optimalisatie het runnen van jouw strandtent gaat beïnvloeden?

Samenwerking met derde partijen

- Heb je contact met jouw buur strandpaviljoen eigenaren?

Contact met het puntje en sommige andere strandtenten. Een groep eigenaren gaat ook op skivakantie elk jaar.

- [vervolgvraag] Zo ja, hoe is het contact? (Doorvragen als er sommige minder zijn of juist meer contact, hoe komt dat zo?) Zo nee, waarom geen contact?

Contact is gebaseerd op elkaar kennen en aardig vinden. Meer op persoonlijk vlak dan zakelijk.
Contact met Hans, ziet hem als een pionier.

- Speelt competitie om klanten met andere eigenaren een rol? Zo ja, hoe?

Nee, competitie speelt geen rol. Mochten ze weinig klanten hebben ten opzichte van anderen dan zouden ze bij zichzelf kijken wat ze beter kunnen doen.

- Zie jij zelf kansen om de inkopen, het gebruik van en …. van materiaal, energie en water te optimaliseren in samenwerking met derde partijen?

Zou het leuk vinden om samen te werken met anderen strandtenten.

- [vervolgvraag] Zijn er voor jou obstakels op de weg om die kansen te realiseren (het optimaliseren van materiaal, water en energie gebruik?)

- [vervolgvraag] Waarom is dit een obstakel?

Samenwerking met overheidsorganisaties

- Heb je contact met de gemeente?

Ja

- [vervolgvraag] Zo ja, hoe is het contact? Zo nee, zou je dit wel willen?

Goed contact met Peggy.

- Heb jij verwachtingen hoe de gemeente of andere overheidsorganisaties MOETEN helpen met het optimaliseren van materiaal, water en energie voor strandpaviljoen eigenaren?

- Hoe zou de gemeente jou KUNNEN helpen met het optimaliseren van materiaal, eten, water en energie en waarom?

Ze zouden een deel van de Green Key certificaat financieren.

- Krijgen jullie subsidies?

Nee, geen subsidies. Voor bijvoorbeeld het in dienst hebben van personeel met een rugzakje moet je veel formulieren invullen. Ze hebben wel mensen in dienst met een rugzakje maar dit regelen ze gewoon zelf en hier krijgen ze geen subsidie voor.

Oplossingen / feasibility analysis

- Als wij een idee aanbieden aan jou, in welke informatie zou je dan geïnteresseerd zijn? [bijv payback time]

- Onze ideeën zijn gericht op samenwerking, in het algemeen wat zouden zorgen zijn bij het samenwerken met derde partijen? [noem samenwerking voorbeeld als dit nog niet benoemd is] (third party, between pavilions, between alle pavilions)

- Als wij een rijtje ideeën hebben, hoe zou je het fijn vinden dat we deze communiceren? Voorbeelden: een boekje, of door middel van een presentatie samen met andere eigenaren, of een website.

Presentatie bij de vergadering van de duurzaamheidscommissie.

Kok: meest belangrijke is bewustzijn creëren bij de consumenten → duurzaam koken is gewoon nog steeds iets duurder, en consumenten vinden dat moeilijk.

Appendix G

MVO Scan 3

Belangrijke punten
De locatie van de dit paviljoen is het Zuiderstrand en het paviljoen is in 1947 opgericht. Kritische blik op de Green Key scan, ook zonder de cruciale dingen aan te pakken kan je Gold halen. Ook kan er worden vals gespeeld worden, zoals sommige dingen verstoppen (chloor oid). Dan krijg je het certificaat en zijn ze voor drie jaar klaar. Kunnen niet volledig over op elektriciteit (ze hebben 3x 63 Amp), hebben dikkere kabels nodig. Plastic verzamelen ze niet apart in, want als het wordt opgehaald wordt het toch bij de rest gegooid.

Visie van de eigenaar

- **Wat zijn jouw beweegredenen bij het runnen van jouw strandtent?**

Overgenomen van een vorige eigenaar, toen was de tent al duurzaam.

- Met welke partijen/personen heb jij te maken met het runnen van je strandtent? (kopen, samenwerken, verkopen)

Zijn geen samenwerkingen met andere paviljoenen oid. 50 leveranciers.

- **Wat was jullie reden om een de Green Key scan af te laten nemen?**

Ze wilde dit zelf. Er zou een verschil moeten zijn tussen een Green Key scan die jaarrond is en een Green Key scan die niet jaarrond is.

- Waren jullie naast de Green Key scan al veel bezig met duurzaamheid?

Ja, voor Green Key waren ze al bezig met duurzaamheid. Ze kijken zelfs verder dan de Green Key scan. De cruciale dingen zijn niet mogelijk als je niet jaarrond bent als strandtent, zoals kiertjes en goede isolatie (dubbel glas). Of een gehandicapte kunnen niet in dienst worden genomen omdat ze geen vast contract kunnen aanbieden.

- Wat is er verandert na de eerste afname van de Green Scan?

Er is bijna niets verandert na de afname van de Green Key scan.

- We zagen op facebook en jullie website dat er gepromoot wordt met bijv vegan friday. Heb je het idee dat jullie meer klanten hebben gekregen dankzij het duurzame imago?

Misschien wel, moeilijk te zeggen. Je zou het de klanten moeten vragen. Het is wel drukker geworden. Ze hebben vooral locals als bezoekers, bijna geen toeristen. Green Key scan kan een extra zijn.

Toekomst eigen paviljoen

- Wat zijn jullie volgende stappen die jullie aan het ondernemen zijn? Wat zijn jullie toekomstplannen?

Ze willen vooral jaarrond worden, dan kunnen ze grote stappen maken. Nu werken ze binnen de marges wat kan.

- [vervolgvraag] Zijn er voor jou obstakels op de weg om die kansen te realiseren (het optimaliseren van materiaal, water en energie gebruik?)

Niet jaarrond.

- [vervolgvraag] Waarom is dit een obstakel?

Samenwerking met derde partijen

- Heb je contact met andere strandpaviljoens?

Niet echt veel contact. Wel steeds meer contact via de vereniging van strandpaviljoens Zuiderstrand.

- [vervolgvraag] Zo ja, hoe is het contact? (Doorvragen als er sommige minder zijn of juist meer contact, hoe komt dat zo?) Zo nee, waarom geen contact?

- Zijn er oplossingen waarvoor jullie samenwerken met andere partijen/strandpaviljoens? (Bijv samen koffieprut verzamelen en wegbrengen naar de koffieboer)

Nee.

- Speelt competitie om klanten met andere strandpaviljoens een rol? Zo ja, hoe?

Samenwerking met overheidsorganisaties

- Heb je contact met de gemeente?

Ja.

- [vervolgvraag] Zo ja, hoe is het contact? Zo nee, zou je dit wel willen?

Op zich wel goed. Ze zagen eerst de paviljoen eigenaren als cowboys, van de tijd dat lang niet alles werd aangeslagen. Ze zouden wel meer open kunnen staan voor verandering.

- Heb jij verwachtingen hoe de overheidsinstanties of andere overheidsorganisaties MOETEN helpen met het optimaliseren van materiaal, water en energie voor strandpaviljoen eigenaren?

Hoogheemraadschap zou toestemming kunnen geven om jaarrond te zijn.

- Hoe zouden overheidsinstanties jou KUNNEN helpen met het optimaliseren van materiaal, eten, water en energie en waarom?

Gemeente: Ze kunnen meer meehelpen met het implementeren van ideeën. Ze hadden bijvoorbeeld een idee om een elektrisch golfkarretje heen en weer te laten gaan om mensen op te halen die niet goed ter been zijn ipv diesel auto. De gemeente vond het een goed idee maar het kan niet want een golfkarretje heeft geen kenteken en er is dan een elektrische laadpaal nodig. Ze helpen dan niet om dit idee te implementeren.
Hoogheemraadschap Delft: houden tegen dat de paviljoen jaarrond kunnen

- Krijgen jullie subsidies?

Nee, wordt nog uitgezocht.

Oplossingen / feasibility analysis

- Gedurende het project gaan we ideeën zoeken om materiaal, energie en water gebruikt te optimaliseren. We gaan deze ideeën presenteren aan de strandpaviljoens in Scheveningen.
- Stel wij presenteren een idee, in welke informatie zou je dan geïnteresseerd zijn? [bijv payback time]

- Onze ideeën zijn gericht op samenwerking, in het algemeen wat zouden jullie zorgen zijn bij het samenwerken met derde partijen? [noem samenwerking voorbeeld als dit nog niet benoemd is, samen een biovergister]

- Als wij een rijtje ideeën hebben, hoe zou je het fijn vinden dat we deze communiceren? Voorbeelden: een boekje, of door middel van een presentatie samen met andere eigenaren, of een website.

Praktische dingen

- We noemen jullie niet bij naam maar als een strandpaviljoen in Zuiderstrand, is dat okay?

Ja.

- Hoe vond je het gesprek? Heb je nog tips voor ons in communicatie? Wij bekijken alles vanuit ons perspectief, hoe komt het over?

- Zijn jullie geïnteresseerd in ons verslag als we klaar zijn met het project in juni?

Ja, zeker.

Appendix H

Overview information from interviews

	Interview 1	Interview 2	Interview 3 Zuiderstrand
Ways of thinking towards sustainability	The owner of this pavilion joined the MVO scans of Sander in order to get an idea of where to start implementing sustainability, as he finds this hard. It is striking that problems are discussed rather than solutions.	The owner wants to make considered choices when it comes to sustainability. She says 'We must take better care of the world'. She states as well that this should not only be done for marketing reasons. An example: Suppose they would receive a Green Key certificate in the future, this would not be communicated to the outside world. They would take the certificate to find out what they can do to make the pavilion more sustainable, it is not a marketing tool. Also wanting as much as possible for the lowest possible price does not fit her beliefs.	The owner would like to be year round with its pavilions, then big steps towards sustainability can be made. Now they are working within the margins of possibilities. The owner is, within these margins, trying to look further than only the Green Key scan.
Switch from gas to electricity	The pavilion is renovated last year, and while the owner wanted to switch from gas to electricity, this was not fully possible. The capacity of the electricity network in the pavilions was not big enough to connect all appliances to the grid. This is seen as a missed opportunity.		It is not possible to fully switch from gas to electricity. The pavilion has 3 times 63 Amperes, and to get a bigger connection to the grid, they will need thicker cables, which they have to provide and lay down themselves.
Solar panels	Solar panels to generate electricity are not used within this pavilion, as the owner states that this is not possible when a pavilion is not standing year round. The panels have to be stored every winter, but they are very fragile which makes using solar panels impossible according to the owner.	The pavilion does not have solar panels yet, because the roof cannot handle these and storage is very expensive, according to the owner, who looked into options for these panels already twice. Less vulnerable panels would be needed, due to sand that is blown against the panels by stormy winds at the beach and vulnerability during storage.	Energy Guards provided the pavilions with sedum plants and solar panels for on the roofs, to contribute to sustaining the Dutch coast.
Subsidies	The pavilion got subsidies for the new boiler they purchased during the renovation, which is kind of odd, as this boiler is using gas. This is inconsistent with the aim of the Hague to not use any gas anymore in 2030.	The owner does not get subsidies. For employing staff that have working limitations for example you have to fill in many forms to get the subsidies, which takes time and keeping the overview is difficult.	The pavilion does not get subsidies.
Single-use plastics	Alternatives to some single-use plastics have been sought. An example is an alternative to the plastic straws, but these are seven times as expensive according to the owner, and therefore it is impossible to fully replace the plastic straws. The cookies are also packaged in plastic, this is from a hygiene point of view, as the cookies can be reused if they have not been	The owner indicates at their supplier that they want plastic-free supplies. She states that the more entrepreneurs would do this, the more likely this will happen. At another supplier, for meat, they ask which piece of meat is not sold much, then they buy that piece of meat so that it is not thrown away. The pavilion is not using any single use plastics anymore. They are	

	eaten. It also creates a more elegant representation.	finishing their last teabags with plastic packaging and plastic straws.	
Waste general	The waste may not be kept outside, as stated by the municipality, due to visibility pollution, which creates little storage space for waste.		Plastic waste is not collected separately, as this would be thrown with the residual waste when it is picked up by the waste collectors anyways.
Local products	A part of the fish that is served on the menu is purchased locally. It is mainly fish that is caught in the Noordzee (the Scheveningen part). This is also specifically indicated on the menu.	The owner states that if they only serve local products from the Netherlands they would lose customers, as some of the customers just want e.g. that salmon. The pavilion has multiple dishes with local Noordzee fish (Scheveningen part) on the menu, as well as they have their own filter system for water.	Multiple local products are served on the menu of this pavilion. An example are the bitterballen from the De Haagse Croquetterij.
Costs	The owner acts primarily from an economic perspective when looking at sustainable solutions, costs are a very important factor here. The owner would for example be interested in participation in the initiative 'Plastic Vrij Terras Scheveningen', however this would be expensive.	Buying sustainable products is expensive according to the owner, often even 10 times as expensive as when not taking into account sustainability.	
Contact and cooperation other pavilions	The pavilion owner is interested in opportunities for generating electricity together with other pavilions. There was already an idea for a windmill as part of an energy cooperation, but because of nature the municipality did not allowed this plan.	The owner has contact with other pavilions at the beach of Scheveningen, and says that a group of owners also goes on skiing holidays every year, which she joined previous years. The contact is based on knowing and liking each other, and more on a personal level than on a business level. The owner would however be interested in working together with other pavilions to work toward sustainable solutions. Competition between pavilions does not play a role. If they had few customers compared to other pavilions, they would see for themselves what they can do better.	There are no collaborations with other pavilions. According to the owner, of the reasons would be that there are more than 50 suppliers per pavilion, and for example buying in collaboration is not possible. There is not a lot of contact with other pavilions, as this does not really give added value. Also no collaborative solutions with other pavilions are present. More and more contact though through the Vereniging van Strandpaviljoens Zuiderstrand (Zuiderstrand beach pavilions association).
Municipality	The owner would like to have its pavilion open year round. However, contact with the municipality regarding being open year round or not is not going steady. The owner says that he understands that the municipality cannot permit 60 beach pavilions to be open year round, but a concrete answer (yes or no) from the municipality would be nice. So far it remains vague, and the owners is told	There is also good contact with the municipality of The Hague. In order to help the pavilions towards a more sustainable environment, the municipality could for example finance a part of the Green Key assessment.	The contact with the municipality is in itself good. The municipality first saw the pavilion owners as cowboys, based on the time where owners did not always noted what was sold. This now changed. According to the owner, the municipality could be more open to change. They can help more with the implementation of ideas. For example, the owner had the idea to have an electric

	that the situation is being investigated. As of now, the boulevard of Scheveningen is being renovated. Some parts have not yet been rebuilt, however it is not clear when this will happen. Therefore pavilions do not know where they stand and what they can expect for the near future. Will there be a sufficient electricity network, and how about transportation options, etc.		golf cart going back and forth to pick up people who are not walking well, to transport them to their pavilion. This would enable visitors to come to the pavilion, and an electric vehicle would be used instead of a diesel car. The municipality thought it was a good idea but stated that it would not be possible to be implemented, as a golf cart has no license plate and an electric charging station would be required. After stating these problems, they did not help to find possible solutions.
Best practices noted	One interesting sustainable solution that the owner has thought of is using a device for making a hole in the cap of a glass bottle that can hold a straw. This means that the cap of the bottle is not taken of and therefore cannot end up in waste.	The pavilions is donating all leftover furniture and clothing etcetera to the thrift shop. Also, all working clothes are made from organic cotton, as well as all their interior is second handed.	

Other individual comments by the pavilions are:

- When not being year round, it is impossible to have double glass windows, as these are too heavy to be carried around year in, year out. (1)
- The waste processing costs have been considerably increased. Getting a reduction in costs when staying customer with the same waste processor with a big group of pavilions was not possible. Some pavilions switched, some stayed. (1)
- Creating awareness among customers when working towards a sustainable menu is essential, as sustainable cooking is simply still a little more expensive, and customers find that difficult. (2)
- Looking at the Green Key scan, it is possible to retrieve the gold label even when you are not addressing the critical things when working towards sustainability. Examples of critical things that you cannot address when you are a part time pavilion are the gaps (kiertjes) between windows and doors and walls as well as sufficient insulation. Also for example the use of outstanding sustainable materials is difficult, as the pavilion has to be build up and taken down every single year. It would also be possible to cheat, as the Green Key scan is conducted once every three years, and getting rid of for example all 'bad' cleaning products for a day to create a false image is possible. (3)
    - The Green Key assessment is not per se of interest in our project, but it is interesting to see the difficulties that the pavilion runs into because it is not a year round business.
- Hoogheemraadschap Delfland (at Scheveningen beach this is Rijnland), the water board, is responsible for the permits to be year round, and for now prevents the pavilion from being there all year. Communication from the water board should be more clear, for example on why exactly a pavilion cannot be year round, and if this would change in the near future. (3)

Appendix I

Stakeholders

Name	Description	Resource availability	Possible goal with respect to the Haags Klimaatpact	Relevance to our project
Scheveningen				
Beachpavilions	Restaurants located at the beach of Scheveningen	Legitimacy, Financial	Continue making money, also in the future	Subject of our research
Vereniging van Strandexploitanten Scheveningen (VVS)	Association of Beach Pavillion Owners	Legitimacy, Knowledge	Make collective decisions concerning the Klimaatpact	Construct through which we can reach the beachpavillions
Noortje Schrauwen	Hired by the municipality to guide the sustainable transit	Knowledge	Help the beach pavillions reach the goals of the Klimaatpact	Can connect us to the right people at the municipality
Beach and Boulevard managers (Peggy ten Hoopen and Eite Levinga)	Contact person of beach entrepeneurs to the municipality	Knowledge	Realise the practical measures of the municipality within Scheveningen	Can inform us on roles the municipality can play concerning our solutions
Municipal building				
City Council	Formal Authority of The Hague	Financial, Knowledge, Competency	Realize the goals of the Klimaatpact	
Program manager Sustainability (Aartijn Kosterman)	Head of sustainability projects within the municipality	Knowledge	Lead the different projects to reach the Klimaatpact goals	
Policy advisor Circular Economy (Ger Kwakkel)	Expert on Circular Economy	Knowledge	Give advice concerning circular economy goals of the Haags Klimaatpact	Can give feedback on solutions concerning cirular economy
Policy advisor Energy Transition (Pieter van Genuchten)	Expert on the Energy Transition	Knowledge	Give advice concerning energy transition goals of the Haags Klimaatpact	Can give feedback on solutions concerning sustainable energy
Policy advisor Sustainable Entrepeneurship (Inge Helder)	Expert on Sustainable Entrepeneurship	Knowledge	Give advice concerning sustainable entrepeneurship goals of the Haags Klimaatpact	Can inform us on the vision of the municipality and relevant stakeholders
Project manager Spatial Planning (Ruben Strauss)	Project leader of the Scheveningse boulevard renewal	Knowledge	Take into account the Haags Klimaatpact goals during spatial planning	Can give insight in future infrastructural changes in the coming years
Dispersed				
Fossil Free The Hague (Joeri Oudshoorn)	Drafted the Haags Klimaatpact	Legitimacy, Knowledge	Making the energy transition happen	Give information on how they perceive the Klimaatpact should be executed and what t
MVO	Developed the sustainability measures and inventorisatie	Legitimacy	Making companies more socially responsible	Provide us with information on their assessments
Living Lab Scheveningen	Testing Smart City projects within stadsdeel Scheveninge	Knowledge	Testing sustainable smart city technologies or gathering data on sustainable solutio	One of their projects could be used to make beach pavillions more sustainable
Duurzaam Den Haag	The sustainability portal of the municipality	Knowledge, Financial	Informing companies on possible solutions and the associated subsidies	Give information on existing projects and what does or doesn't work
Third Parties				

Appendix J

Technical analysis calculations

Table AT1: Overview electricity and gas use of four MVO scans.

Pavilion	Floor area [m^2]	Electricity [kWh/year]	Electricity [kWh/m^2/year]	Gas [m^3/year]	Gas [m^3/m^2/year]
1	865	70498	82	8386	10
2	700	50000	71	9500	14
3	1200	76000	63	25000	21
4	900	49725	55	28433	32
Average 4 MVO scans	**916**	**61556**	**68**	**17830**	**19**
Standard deviation	**208**	**13688**	**11**	**10367**	**10**

Table AT2: Average energy input of four pavilions at Scheveningen including CO_2 emissions and economic costs.

Electricity		**Gas**		**Total**	
#	Unit	#	Unit	#	Unit
61556	kWh/year	17830	m^3/year		
68	kWh/m^2/year	19	m^3/m^2/year		
3.6	MJ/kWh	31.65	MJ/m^3		
222	**GJ/year**	**564**	**GJ/year**	**786**	**GJ/year**
244	**MJ/m^2/year**	**599**	**MJ/m^2/year**	**843**	**MJ/m^2/year**
0.569	kg CO2 eq/kWh	0.0566	kg CO2 eq/MJ		
35	**ton CO2 eq/year**	**32**	**ton CO2 eq/year**	**67**	**ton CO2/year**
39	**kg CO2 eq/m^2/year**	**34**	**kg CO2 eq/m^2/year**	**73**	**kg CO2/m^2/year**
0.168	€/kWh	0.6246	€/m^3		
10341	**€/year**	**11136**	**€/year**	**21478**	**€/year**
11	**€/m^2/year**	**12**	**€/m^2/year**	**23**	**€/m^2/year**

Table E1: Calculation for different waste fractions in kg/year and average waste total per pavilion.

WASTE					
			Hoogseizoen	Laagseizoen	Total
Paper		kg/year	10349	2218	12,566
	Amount containers	-	1	1	

	Volume [m3]	m3	1.1	1.1	
	Density [kg/m3]	kg/m3	120	120	
	How full container?		0.8	0.8	
	How many times emptied	-/week	7	1.5	
	Weeks open per year	week/year	14	16	
Glass		kg/year	2722	1037	3,758
	Amount containers	-	1	1	
	Volume [m3]	m3	0.24	0.24	
	Density [kg/m3]	kg/m3	300	300	
	How full container?		0.9	0.9	
	How many times emptied	-/week	3	1	
	Weeks open per year	week/year	14	16	
Residual waste		kg/year	115046	399148	154,959
	Amount containers	-	2	2	
	Volume [m3]	m3	0.66	0.66	
	Density [kg/m3]	kg/m3	468	468	
	How full container?		0.95	0.95	
	How many times emptied	-/week	14	4.25	
	Weeks open per year	week/year	14	16	

1. Assumed with sources, given in text
2. See Table E2 for a more elaborated overview of how this number is calculated

Table E2: Calculation density of residual waste fraction in kg/year. To calculate the density, the different fractions have to be taken into account.

Within residual waste						
% of different fractions in residual waste	>use for density of residual waste in table E1.					
				1 m3 resiudal waste	density in g/m3 residual waste	total density in g/m3 res. waste
Paper/ cardboard	19.10%		-	-	-	-
Glass	22.60%	41.70%	-	-	-	-
Food	28.20%		48.37%	0.4837049743	763510	369313.5849
Plastic	17.10%	58.30%	29.33%	0.2933104631	1259	369.2778731

Metal	2.20%		3.77%	0.03773584906	400000	15094.33962
Textile	1.10%		1.89%	0.01886792453	250000	4716.981132
Oil	1.60%		2.74%	0.02744425386	900000	24699.82847
Fines	8.10%		13.89%	0.1389365352	387814.75	53881.63765
		100.00%	100.00%			468075.6497
IN FOOD:		1 m3 food	density in g/m3 food	total density in g/m3 food		
Meat	8%	0.08	800000	64000		
Fish	7%	0.07	593000	41510		
Vegetables and fruits	32%	0.32	400000	128000		
Starch	15%	0.15	1000000	150000	(potatoes rice pasta)	
Bread	25%	0.25	1000000	250000		
Others	13%	0.13	1000000	130000		
				763510		

1. Stimular (n.d.)
2. Aqua-calc (n.d.)
3. Engineering Toolbox - *Polymers-Physical Properties (*n.d.)
4. As this flow consists of all different kinds of fractions, this is assumed to be the average of the densities of all other fractions, for the sake of simplicity

Appendix K

Gespreksverslag Eite & Peggy

07-06-19 - 15.00 te Stadsdeel Scheveningen

Eite: Voor een project beschouwen wij de tijd die nodig is, de ruimte, wat de invloed van het project is op de omgeving etc. Er komen bezoeken 16 miljoen mensen de boulevard op jaarbasis dus het project moet ook voor hen aantrekkelijk zijn. Het mag bijvoorbeeld geen overlast bezorgen in de vorm van geur en lawaai en het moet ook esthetisch aantrekkelijk zijn.

Onze klanten zijn: badgasten, bewoners, ondernemers en de gemeenteraad. Vooral de gemeenteraad moet de nut en noodzaak van het project inzien. De verschillende partijen in de raad moeten daarbij allemaal hun eigen achterban tevreden houden.

Eite geeft aan zelf al vijf jaar in zijn functie als boulevard manager te zitten en benadrukt dat we ondernemers niet moeten onderschatten. Zij denken bij elk project ook: wat schiet ik ermee op? En vooral: wat is het verdienmodel?

Peggy: Je ziet bij Hans dat zijn manier van ondernemen eigenlijk ook een way of life is. Dat trekt dan weer een bepaalde groep mensen aan. Maar ondernemers die niet zo te werk gaan als Hans die moeten echt meegenomen worden. Op de vingers tikken is daarbij de verkeerde strategie. Daarnaast zal het ook van de klanten moeten komen, als zij geen koekjes met koekwikkels willen en geen rietjes dan gaan de ondernemers wel mee.

Eite: De VVS vertegenwoordigt een grote, verscheiden groep van ondernemers. Als je eens bij de vergaderingen van de VVS bent dan zul je zien dat de thema's de worden aangeraakt heel divers zijn. Veel ondernemers denken vrijwel standaard dat iets heel veel geld kost. De focus moet dan verlegt worden naar wat een project op de lange termijn oplevert. "*Het is gewoon geld verdienen*" .

Maakt de biovergister kans als een optie voor de strandpaviljoenen?

Eite & Peggy: Onze hoofdklant is het gemeentebestuur. De boulevard van Scheveningen is de grote economische spil van Scheveningen. Wij dienen onze politieke baas en er is op dit moment nu eenmaal geen progressief college.

Peggy: Een strandpavilioen kan zelf inschatten of het een biovergister wil neerzetten op zijn perceel. Maar dit gaat hoogstwaarschijnlijk ten koste van terrasruimte. Peggy denkt hardop na wat een tafeltje inleveren zou kosten: toe: al snel toch wel zo'n 2500 euro op een goede dag. Dan wordt het project meteen een stuk onaantrekkelijker.

En wat betreft open ruimten?

Eite: Dat wordt wel heel lastig. Wat is de uitstraling van een biovergister? Die past waarschijnlijk niet in de visie en strategie van hoe de boulevard er moet uitzien, op dit moment. Als je uitkijkt vanuit de boulevard moet het er licht en ruimtelijk uitzien, een biovergister past daar waarschijnlijk niet bij. En dan is er nog het logistieke aspect: er mag absoluut niet meer verkeer bijkomen.

Quirien: Er komt niet meer verkeer bij het vervangt restafval verkeer ten dele en er kan ook een gezamenlijke efficiënte logistiek worden opgezet.

Eite: Oke, in dat geval is dat misschien minder een probleem dan gedacht bij dit idee, maar ondernemers moeten dit dan wel zelf afspreken.

Wat kan de rol van de Gemeente zijn?

Quirien: zou de Gemeente geen eigenaar kunnen worden van een pilot project?

Eite: Nee. De Gemeente zou dan de rol van energieleverancier aannemen en geld genereren: de Gemeente is geen ondernemer dus die rol past haar niet.

Peggy: De Gemeente kan wel een faciliterende rol spelen maar dan moet je denken aan de situering en het aanwijzen van gunstige plekken voor de biovergister.

Quirien oppert dat het misschien ook interessant kan zijn voor de haven van Scheveningen. Eite denkt dat het idee van een biovergister niet met applaus ontvangen zou worden. De Haven wil zich ook graag profileren als een plaats waar evenementen kunnen plaatsvinden en richt zich ook steeds meer op de pleziervaart. Daar past waarschijnlijk geen biovergister bij.

Peggy denkt dat een biodigester misschien wel interessant voor de visafslag. Daar hebben ze misschien ook de ruimte inpandig en het is een particulier deel is van de Haven.

Peggy denkt overigens dat een biovergister, als deze ook ondergronds kan, dan misschien wel een interessante optie is. Voor de openbare ruimte is het minder geschikt, vanwege de visie past het slecht op het strand.

Marin: Maar kan de biovergister niet een mooi visitekaartje zijn voor Scheveningen?

Eite: Een visitekaartje… voor sommigen! Het is een erg gespleten College van Bestuur op dit moment en zij willen allemaal hun de belangen behartigen van hun achterban. Nogmaals: dat werkt voor zo'n initiatief niet mee.

Eite legt daarbij uit dat ambities wel worden geformuleerd voor op de lange termijn, maar dat daar in kleine stapjes naartoe moet worden gewerkt. Peggy geeft aan dat daarbij tijd, ruimte en de stakeholders een belangrijke rol spelen.

Quirien: Maar zou een pilot niet kunnen?

Peggy: Eigenlijk legt een pilot ook een precedent voor de toekomst. Je moet daarbij goed duidelijk hebben wat de volgende stappen zijn als de pilot 100% succesvol blijkt te zijn.

Quirien: Tessa heeft onderzoek gedaan naar "Heating people not places" en ze had een aantal vragen. Kunnen jullie bijvoorbeeld terrasverwarmers op gas verbieden?

Eite: In ieder geval niet binnen een jaar.
Peggy: Ik kan me ook voorstellen dat de elektrische alternatieve ten koste kunnen gaan van het comfort van klanten. Zij willen op een koude dag waarschijnlijk ook dat er een warme luchtstroom hun schouders en hoofden verwarmt. Dat krijg je niet met een kussen bijvoorbeeld.

Eite: De rol van de Gemeente kan vooral zijn: informeren en prikkelen.

Quirien: Zou een voorlichtingscampagne een optie zijn?

Eite: Dat zou de Gemeente zeker kunnen faciliteren, maar het is ook hier belangrijk weer in acht te houden wat een dergelijke campagne dan oplevert aan bewustwording. Deze visie kan wel worden aangedragen aan het College van Bestuur maar de visie moet dan wel onder het bestuur voldoende draagvlak hebben. Het thema moet goed worden ingekleed, dusdanig dat je een Wethouder warm krijgt om het voor te leggen aan het College van Bestuur. Het zou wel interessante marketing kunnen zijn: "Scheveningen eerste strand in Nederland zonder gas heaters".

Eite vervolgt: vergeet niet het hele college moet een dergelijk project of initiatief steunen. Dit betekent zowel de Wethouder Strandbeleid, Wethouder Duurzaamheid, Wethouder Financien, Wethouder Openbare Orde en Wethouder Economie etc.

Quirien: Zijn er subsidies?

Eite: Geen idee. Dat ligt aan wat er beschikbaar is op gemeentelijk en landelijk niveau. En als er niets beschikbaar is: of de Wethouder Financien er wellicht wat voor voelt om subsidie te geven.

Quirien: Hoe werkt het eigenlijk als je een dergelijk project zoals een biovergister of een campagne erdoorheen wil krijgen?

Eite: Voor maximale impact zul je eigenlijk een met een collegebreed gedragen idee moeten aankomen en dan is de hamvraag: hoe krijg je je verhaal daar ingemasseerd?
Alle wethouders hebben een samenwerkingsverband met elkaar. Je zou een dergelijk duurzaam initiatief misschien kunnen laten inbrengen via Wethouder Duurzaamheid Liesbeth van Tongeren, dan volgen de voorvisies van de wethouders, dan het spel met de bestuursadviseurs die het project ook zullen analyseren. Al met al, ben je zo een half jaar verder.

Peggy: Probeer een idee eerst voor te leggen aan een beleidsadviser, dat is Annemarie Bodair, om te peilen of het idee uberhaupt kans maakt. Zij kan je helpen met de voorbereiding door je alvast de gevoeligheden en aandachtspunten aan te wijzen.

Marin legt het idee van transport en logistiek uit. Eerst inzicht geven in de logistiek as it is. Dan mogelijkheden tot samenwerken voor inkoop. En dan toewerken naar een gezamenlijk overslagpunt met de laatste kilometers duurzaam.

Peggy en Eite reageren enthousiast. Peggy benadrukt dat die eerste twee stappen erg belangrijk zijn. Het is ook vooral erg interessant dat de pavilioenen inzicht kijken in de transportstromen van hun buren, voegt ze toe.
Marin: wat zou jullie rol in dit project kunnen zijn?

Peggy en Eite: De mensen bij elkaar zoeken die uit kunnen vinden wat een goede plek zou kunnen zijn voor een dergelijk overslagpunt. Interessante contactpersonen aanleveren. Peggy en Eite geven aan lijntjes te hebben met de beleidsafdelingen waar projectleiders en gebiedsadviseurs werken. De route is hetzelfde als bij de biovergister en terrasverwarmers. Ze zouden ook een meeting kunnen organiseren met betrokken stakeholders.

Eite: Uiteindelijk gaan ondernemers voor de laagste prijs. En waarschijnlijk ook voor kwaliteit natuurlijk. Vanuit ons perspectief: wij moeten de boulevard veilig houden en files creëren onveiligheid, dus die hebben we liever niet.

Peggy voegt toe dat er al wel een mooi haakje is op dit moment voor een dergelijk plan: de visie van de boulevard is momenteel: veiligheid, goede bereikbaarheid en het verminderen van vervuiling.

Volgens Eite moet het plan moet wel echt aantrekkelijk zijn voor de ondernemers: het moet ze ontzorgen en het moet geld opleveren. Op drukke dagen lopen de hoofden van ondernemers over.

Wat het idee ook interessant maakt is dat het een bekend concept is voor de Gemeente: de Gemeente werkt zelf ook met overslagpunten.

Peggy: Dat is ook een minder punt aan de biovergister: onbekend maakt onbemind.

Quirien: Dus misschien de biovergister in het overslagpunt: op de heenweg worden dan producten en voedsel aangeleverd en op de terugweg wordt het voedselafval meegenomen?

Eite: Kijk dan wordt het ineens een stuk interessanter!

Peggy: Maar vergeet niet: de bestuurlijke realiteit blijft ook hierbij heel belangrijk

Appendix L

Additional information terrace heating options

Vireoo
Email correspondentie met Erik van Beek (info@mensa-heating.nl)

- Uit welk materiaal bestaat de Vireoo?

De Vireoo is gemaakt van diverse materialen: kunststoffen (thermoharders zoals ABS) en metaal. De voet is van metaal evenals een deel van het binnenwerk. Dit is om de stevigheid en stabiliteit te waarborgen. De buitenzijde (zuil en grill) als wel het bovenstuk (waar het tafelblad op wordt vastgezet) is van kunststof. In de Vireoo bevindt zich een infrarood warmte-element, geplaatst in een kunststoffen lamphuis.

- Hoe lang gaat het product mee?

Bij "normaal gebruik" bepaalt het infrarood element eigenlijk de levensduur. Deze gaat tussen de 5000 en 7000 branduren mee, maar kan daarna vervangen worden. Dus eigenlijk zijn de Vireoo's gebouwd om vele jaren plezier van te hebben.

- Is het mogelijk om de materialen te recyclen? Als in zijn onderdelen uit elkaar te halen?

Het is zeker mogelijk om de Vireoo's te recyclen (net als de andere Mensa Heating producten). De Vireoo kan volledig uit elkaar worden gehaald, zodat kunststoffen en metalen kunnen worden gescheiden. De kunststoffen kunnen worden gerecycled net als de metalen onderdelen.

Sit and Heat
Telefoongesprek met Jeroen (jeroen@sitandheat.com)
Het project in Den Haag over alternatieve terrasverwarming is goed verlopen, de kussens als alternatief zijn goed ontvangen. Er is nu ook een project gaande in Nijmegen, eerst deden 20 terrassen mee, nu zijn het er al 35. Ondernemers hebben een duwtje in de rug nodig. Omdat ze op korte termijn denken kiezen ze voor de traditionele heaters, maar op lange termijn zijn de gebruikskosten van de alternatieven zoveel kleiner. Een subsidie kan ze het duwtje geven dat ze nodig hebben, want ondernemers willen wel. KWINK consultancy heeft een onderzoek gedaan over het project. De Hogeschool van Nijmegen heeft over het project een verslag over geschreven. Steeds meer vragen klanten zich af waarom er heaters aan staan als niemand er zit. De klant is bewuster geworden. De kussens van sit & heat worden goed ontvangen, klanten zijn warmer dan gas heaters omdat de rug wordt verwarmd. De rug verwarmen is dan ook het basisidee van de kussens. De kussens worden op maat gemaakt zodat ze een toevoeging zijn voor het bedrijf. De kussens bestaan uit hoezen (van sunbrella stof), vulling, lithium ion batterijen. De eerste kussens zijn 5 jaar geleden geïmplementeerd, deze liggen er nog goed bij. De kussens hebben een dubbele hoes, zodat de buitenhoes makkelijk te wassen en wisselen. Als kussens worden teruggestuurd, kan de binnenkant worden versnipperd en gebruikt voor de plofkussens. Als de batterij kapot is, is vaak alleen een deel kapot en een groot deel functioneert nog. We zijn nu bezig om batterijen uit elkaar te halen en de onderdelen makkelijker te scheiden.

Eddyboy
Email correspondentie met Eduard Bartels (info@eddyboy.be)

- Heeft u enig idee hoe lang de banken mee gaan?

De banken zijn anti roest behandeld en gepoedercoat, bij normaal gebruik gaan deze zeer lang mee, 20 jaar tot langer. Vergelijkbaar met een radiator in huis, alleen de banken zijn beter beschermd tegen roesten omdat ze buiten staan. Roesten van binnenuit gaat niet want het is een gesloten circuit, er komt geen zuurstof bij, dus kan het niet gaan roesten. Mocht de lak door het gebruik hard afzien, dan kan je altijd overwegen om de bank opnieuw te laten lakken. Kosten +/-€150,- excl. dan heb je weer een nieuw bankje en eventueel in een andere frisse kleur.

- En als de bank aan het einde is van zijn levensduur, kan hij dan goed gerecycled worden of is dit lastig?

Recyclage, de banken zijn gemaakt van metaal, dus gewoon naar de oud ijzer handel en daar wordt deze gerecycled tot nieuw ijzer.

Elliz in Company
Email correspondentie met Elze Frie (elze@ellizincompany.nl)

- Onze dekens die geheel op maat/naar wens gemaakt kunnen worden kosten vanaf €50,- euro per vierkante meter. Voor grotere hoeveelheden gaan we in overleg.
- We hebben gebreide dekens en stoffen dekens, gevoerde dekens en enkele dekens. Alle dekens worden gemaakt door mensen die op weg zijn richting vooruitgang.
- Hartstikke bedankt voor de informatie, hier heb ik zeker wat aan! Wat wordt beschouwd als een grote hoeveelheid en hoeveel zou het schelen? Bijvoorbeeld 30 dekens? En wellicht een gekke vraag maar weet u misschien hoe lang de dekens mee gaan?
- Het scheelt misschien iets omdat we wat zekerheid hebben qua inkomsten bij een grotere productie maar het zijn kleine bedragen omdat het handwerk blijft. Dus je moet denken aan hoogstens 45 euro per deken ex btw. Voor afnames als meer dan 50 stuks.

- De dekens gaan lang mee. Alles kan kapot natuurlijk maar ze worden met aandacht en met de hand gemaakt. Hoe lang, dat durf ik niet te zeggen. Ik heb er in de afgelopen 4 jaar, nog nooit een teruggekregen omdat er iets mee was.

Gas + elektrische heater

- Uit welk materiaal bestaat de gas heater?

Deze heater bestaat uit de volgende materialen: Achterkant brander: gietijzer, Reflectorkap (voorkant): gecoat staal, Rooster en lijsten rondom brander: RVS, Stenen: keramiek, Gashuis/aansluitmateriaal: messing

- Uit welk materiaal bestaat de elektrische heater?

Deze heater bestaat uit de volgende materialen: Behuizing: gecoat aluminium, Rooster: verzinkt staal, Boutjes/schroeven: verzinkt staal/RVS, Spiegel achter lamp: aluminium met reflecterende coating, Beugel: gecoat staal

- Hoe lang gaat de gas heater mee?

Bij gasheaters zien we regelmatig een toestel voor onderhoud aangeboden worden van 10 jaar oud. Dit is bij normaal onderhoud en in het binnenland een normale levensduur. Aan de kust wordt metaal veel meer aan getast, wat ten koste gaat van de levensduur. Hier zal eerder het een en ander vervangen moeten worden, maar alsnog blijft het toestel een jaar of 7 prima bruikbaar.

- Hoe lang gaat de elektrische heater mee? 5000 uur toch?

Voor elektrische heaters wordt een verwachte levensduur van de lamp afgegeven. Dat is bij Solamagic inderdaad 5000 uur. Dit is echter geen garantie dat de lamp deze tijd haalt. Gedurende de 5000 uur zou een lamp dezelfde warmte moeten geven en mag na die branduren afnemen in capaciteit. Bij horeca is een levensduur van een jaar of 5 realistisch. Net als bij de gasheaters, aan de kust worden sommige delen eerder dof (spiegel) en kunnen boutjes/schroeven wat eerder gaan roesten.

- Is het mogelijk om de materialen van de gas heater te recyclen? Als in zijn onderdelen uit elkaar te halen?

Ja, dit is mogelijk. Alle metalen zijn te recyclen. Het keramiek van de stenen niet, net als de elektrische ontsteking. De laatste is gegoten in hars en is nauwelijks uit elkaar te halen.

- Is het mogelijk om de materialen van de elektrische heater te recyclen? Als in zijn onderdelen uit elkaar te halen?

Ja, dit is mogelijk. Het gehele toestel is te demonteren en alle metalen kunnen gerecycled worden. De lamp en de mantel van het snoer zijn niet te recyclen.

Municipality Zutphen

Telefoongesprek met Tom Vaartjes

- Zijn terrasverwarmers verboden in de gemeente Zutphen?

Eerst waren alle soorten terrasverwarmers niet toegestaan, maar hier zijn we op teruggekomen. Nu mogen er alleen geen verwarmers aan de muur, de pilaren mogen wel. Deze pilaren moeten ‘s avonds worden opgeborgen.

- Wie heeft het verbieden geïnitieerd?

Dat is niet bekend.

- Waarom zijn de terrasverwarmers in eerste instantie verboden

Om energie te bezuinigen en waarschijnlijk omdat de aan de muur hangende heaters monumenten beschadigen. Er zijn veel monumenten in Zutphen.

- Om welke reden is het verbod weer teruggetrokken?

We zijn teruggefloten door de Koninklijke Horeca van Nederland. Zij melden dat de gemeente terrasverwarming niet mag verbieden

- Zou ik deze informatie mogen benoemen in het verslag

Ja dat mag.

Appendix M

Terrace heating calculations

Finances
See Table T1 for a more detailed overview of the calculations of the purchase and operation costs.

Table T1: Detailed overview purchase and operating costs of the terrace heating options.

Options	Notes	Energy	People heated	Use [energy / hour]	Purchase costs [€]	Purchase costs [€ / person heated]	Operating costs [€ / hour]	Operating costs [€ / hour / person heated]	Operating costs [€ / year]	Operating costs [€ / year / person heated]
Heated table	power cable and table top	Electricity [kW]	4	0.4	351	88	0.07	0.02	57	14
Chair cushion	sensor, battery and charger. Washing covers is not included	Electricity [kW]	1	0.04	178	178	0.01	0.01	6	6
Couch cushion	washing covers is not included	Electricity [kW]	3	0.04	399	133	0.01	0.00	6	2
Heated bench	2.00 m	Electricity [kW]	3	0.76	1487	496	0.13	0.04	109	36
Blanket	washing is not included		1	0	99	99	0.00	0.00	0	0
Gas heater	manual inflammation, 12 m^2, gas hose set	Gas [m^3]	2	0.6	659	329	0.37	0.19	319	160
Electrical heater	cable (180 cm) and bracket	Electricity [kW]	2	1.4	243	122	0.24	0.12	200	100

Energy
See Table 2 for a more detailed overview of the calculations of the CO_2-eq emissions associated with the energy use per year per person heated of the options for terrace heating

Table T2: Detailed overview of the CO_2-eq emissions associated with the energy use per year per person heated of the options for terrace heating.

Options	Energy	People heated	Use [energy / hour]	Emissions [kg CO2-eq / hour]	Emissions [kg CO2-eq / year]	Emissions [kg CO2-eq / year / person heated]
Heated table	Electricity [kW]	4	0.4	0.26	221	55
Chair cushion	Electricity [kW]	1	0.04	0.03	22	22
Couch cushion	Electricity [kW]	3	0.04	0.03	22	7
Heated bench	Electricity [kW]	3	0.76	0.49	420	140

Blanket	Electricity [kW]	1	0	0.00	0	0
Gas heater	Gas [m^3]	2	0.6	1.07	915	458
Electrical heater	Electricity [kW]	2	1.4	0.91	774	387

Appendix N

Booklet: Deliverable for commissioners