

BE TEXEL: BE SELF-SUFFICIENT

A report on the future
socio-technical system for Texel



TU Delft, 16 January 2015

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Engineering for Sustainable Development
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 The People of Texel



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PART I: Introduction



We are a group of master's students from TU Delft taking a course called Engineering for Sustainable Development. All of us come from different countries, schools and bachelor programs, but have a common interest in sustainability. This combined with the course leads to a project about transition toward a more sustainable future. Since the whole world is a little too big for the scope of such a project, Texel was chosen as focus location since there are currently many initiatives on the island that can be further developed. The island of Texel has expressed a desire to become self-sufficient in energy in 2020. This gave room for new initiatives which would try to help to reach a self-sufficient Texel, and that is what this project is about.



Sustainability is a word that has many different meanings for different people. We recognize this, for that reason we're taking the complete socio-technical system into account, since taking the current cultural, economical and social situations into account will result in the most feasible proposal. The goal is to think of solutions for a more environmentally, economically and socially sustainable Texel.



This results in the following research goal:

"How can we use the resources available on Texel to accelerate the transition to a sustainable Texel?"



We want to propose something that could actually work on the island and with the inhabitants, not just a collection of ideas which will be lost in paperwork.

During the fall of 2014 we have researched sustainability related to Texel in 8 different sub-systems related to subjects like water, waste, mobility, health, leisure and much more. We have read articles and had interesting lectures with people who in some way work with sustainability. These studies ended up in 8 designs for how to make Texel more sustainable, and all of these preparations during the autumn ended in one week of field studies on Texel. During that week we got to talk to people who are involved in the development of the island, both entrepreneurs and local inhabitants. By doing this we got a better perspective of the social structure and community of Texel. With their ideas and input compared to our initial designs we have made a proposal for a related group of actions that will make Texel more sustainable.



In part 2 each different sub-systems will be discussed. Chapter 1 will discuss the leisure and knowledge. Subsequently Texel as host will be discussed in chapter 2. The next chapter, chapter 3, will be about food and chapter 4 about the waste and materials. Chapter 5 will discuss the water cycle. Next the mobility will be discussed in chapter 6 and the public space will be addressed in chapter 7. Finally chapter 8 will be a result of named subjects and will discuss the health and happiness.



With all sub-systems discussed, the result in the form of a proposition is shown in Part III. This will be a combination on the different propositions of each sub-system, taking into account the everything that has happened on Texel in the week we were there. Finally the conclusion will be given in Part IV.





LEISURE
KNOWLEDGE



TEXEL
AS HOST



FOOD &
MORE



WASTE &
MATERIAL



WATER
CYCLE



MOBILITY



PUBLIC
SPACE



HEALTH &
HAPPINESS

PART II: Sub-Systems

1. Leisure & Knowledge
2. Texel as host
3. Food & More
4. Waste & Materials
5. Water cycle
6. Mobility
7. Public space
8. Health & Happiness



1. Leisure & Knowledge

The subsystem leisure and knowledge focuses on (current and future) leisure activities for both tourists and Texelaars as well as increasing and spreading knowledge regarding a more sustainable Texel and the means to achieve this. This means this sub-system will look for a more sustainable future while keeping or improving the current economical benefits from tourism.

1.1 Current Situation

The nature and the collection of activities on Texel is what attracts tourists to the island. The main objective of leisure is fun, the island is known of its nature and beaches and is a perfect place for vacation or to get rest. The main objective of knowledge is to gain knowledge and to educate. On the island there are knowledge institutes such as the NIOZ. The main function of the institutes and the schools are to educate and to gain knowledge.

Regarding leisure activities for tourists wanting to tour the island, there are several possibilities. First of all there's touring around on themselves via bike, car or walking, enjoying the nature and tranquility. Texel is known in particular as a bird island. However, Texel's nature has much more to offer than just birds. Approximately one third of the surface on Texel is nature reserve. Many unusual plants and animals are also found outside of this area, while there are still things to be discovered in the nature on Texel. New species are reported practically every year.

Besides going along themselves the Tourist information (VVV) has several themes routes. These include a 'lammetjesroute', asparagus route and a food route. These routes are popular among tourists arriving at Texel and initially not knowing where to go.

Besides traveling around Texel there is a wide variety of activities. These include hayrides, oyster searching, several excursions, surfing, fishing, golf, carting, sailing, shopping, Ecomare, several playgrounds, wellness locations, restaurants, beach houses, cafes and about ten museums. There are also several festivals organized throughout the year like Sarasani pop music, Long June culture, Struûn Texel, Texel Blues, Texel culinary and countless smaller events.

Regarding knowledge on the island, there are nine primary and two secondary schools. Besides educational institutes there are also several activities focusing on educating peo-

ple in an informal and sometimes playful way. These are museums like Ecomare, which has an interactive part, but also more classical museums like the lighthouse, the shipwreck-museum, the museum for war and aviation and more.

But somewhat away from the public is the more die-hard knowledge. Research locations like NIOZ provide quite some knowledge for the scientific and governmental community. NIOZ has its base at the south part of Texel and the researches, which are being carried out, include dust-collection of a buoy, tracking of nitrogen-fixing cyanobacteria and many more. Students are involved in the research as interns or within special courses of Dutch Universities (Amsterdam University).

Besides Institutes like NIOZ there's also initiatives like TexelEnergie. The energy company TexelEnergie is not from itself a knowledge institute, but the role they play in Texel you could argue that they are a link between the consumer and the knowledge about sustainable technology. They give information about different ways of production, mainly solar energy, but also bio digesting, wind energy, biomassa, et

1.2 Future Situation

In the near future, the stream of tourists will be increasing slightly (Wadden, 2008). Also for the population of Texel this industry will remain important (VVV, 2014), so this will be an important fact to take into account. Besides this, the current trends and developments should be taken into account. Trends, developments and initiatives show what is already happening on the Island of Texel and what the vision and ideas of the future are. Some ideas come from the mainland and are hard to apply, but some ideas are already applied by the inhabitants of Texel. The initiatives and trends are not always direct applicable for the sub-system leisure and knowledge, but indirectly influence it. Also a distinction is made between what is done or already hap-



Figure 1.1: Visualization of the application for the knowledge routes

pening on the island and ideas and visions for the future.

Current initiatives involve TexelEnergie, which gives information about production of renewable energy, also advising inhabitants, organizing excursions and give tools to advise in buying pv-panels. Sustainable development aims at producing renewable energy and contributes to the goal of energy neutral Texel. Also Texel team (Duurzaam ondernemen in Noordwest Holland), which is a team of people who put their strength together to accelerate the sustainable development on Texel.

Also Urgenda has some ideas to make Texel more sustainable like a hall/walk of fame, testboat, new dikes and Texel energy online (Urgenda, 2009).

When taking all in account (what is already there, what attracts tourists, current initiatives) we came up with two specific ideas. First is the construction of something called the TexeLAB. This will be a sort of attraction teaching visitors with a focus on (new) sustainable technologies in a playful way. It also showcases relevant technologies, initiatives and local knowledge. Second is more

focused on the already present initiatives on the island. By means of predetermined (but noncommittal) touristic routes with specific themes tourists can get more information regarding sustainable initiatives and linking them to each other.

1.2.1 TexeLAB

In our system we propose the construction and exploiting of TexeLAB, which is based on the idea of de Ontdekfabriek in Rotterdam and somewhat like the Science Centre in Delft, in order to mainly involve children and let them make their own sustainability. Constructions, small systems, games, etc will make the visitors understand their contribution to the ecological footprint and how to decrease it and save/produce energy as well as why it is so important to have such knowledge. And all in a playful and attractive way.

These ideas will grow and mold the child to work towards a sustainable future. These children will grow up with these habits or ideas, appreciate the sustainable way and possibly spread them. Or like the Dutch saying goes "Jong geleerd, oud gedaan" (learned young is done old).

Besides the learning experience the facilities will host an exhibition for NIOZ, Texel energy, individual entrepreneurs and others that cannot accept visitors at their working place. So that will be a great chance to show what they are doing and share their outcomes. It will be a 'showcase' of knowledge, researched on Texel, giving Texel an extra incentive for people to visit Texel.

The TexeLAB will probably be a new building being constructed near the south harbor of Texel. This way the tourist coming from the ferry will immediately see the lab, increasing its publicity. Besides the location, the TexeLAB will be actively promoted within the tourist information. This area is currently not used for anything and quite an ugly first sight of Texel for the tourists. Combining the TexeLAB with other ideas for the current ferry

landing harbor will have a positive influence on the charisma and character of the location where tourists arrive.

1.2.2 Specific touristic routes

We also create the planning of touristic route system with the 'green energy route', the knowledge route' and we add on the 'local food route' that already exists. These routes are similar to the named touristic routes named in the current situation. With their specific theme they'll focus on the, in this case, sustainable part of Texel and link them together. This will have a positive impact on participants on these tours, not only in recreational values.

An additional consequence of these kind of routes is that people interested and participating in these routes might have some innovative idea of their own. When they'll visit relevant locations they might share these idea(s) with the Texelaar on location, who then can adopt this idea and improve the business/location/action on its own. So it works both ways. These routes can in theory act as a knowledge catalyst.

Along with the tourist routes, there will be an application. This application will be supporting the routes by providing additional information. When visiting a location, for example, it will be possible to obtain additional information on the location, but also on related (sustainable) elements on the island. This will give Texel as an island a common identity as a sustainable island.

The 'green energy route' has elements like the TexeLAB, the wind mills, a PV panel parking that is being build now at the south part of the island, the 'Solar Village Texel' when it will be ready, the bio-digester and as final stop the Kaap Skil in Oudeschild that will show how Texel will look like in the future after the implementation of all the energy innovations. The knowledge route' will have stops like the TexeLAB, Ecomare, the saline testing and the other relevant educational elements named in this book. The focus will lie on educating

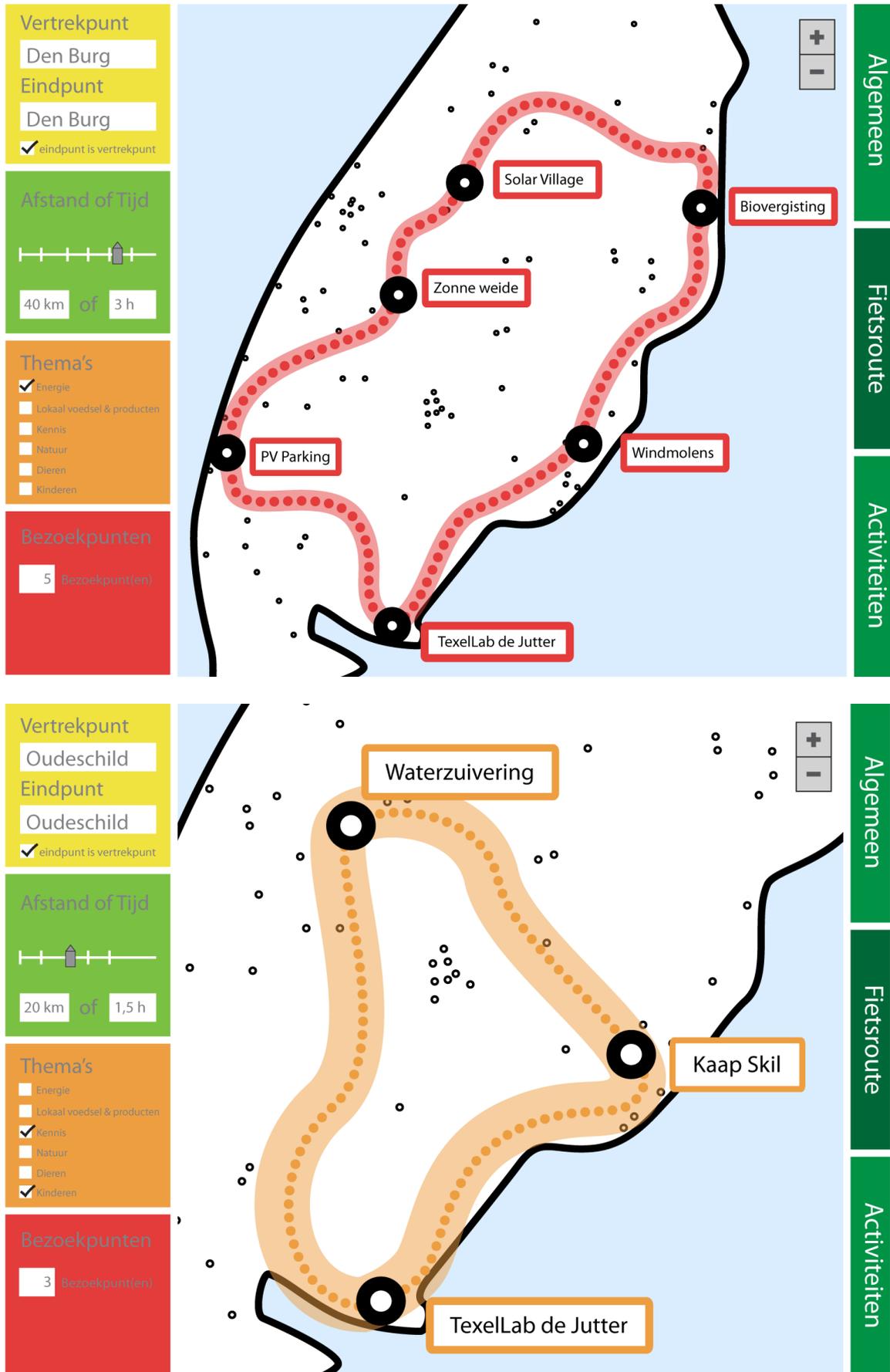


Figure 1.2: Examples of themed knowledge routes (top: energy, bottom: knowledge, children)

participants on high end technologies developed on the island in a playful and recreational way as much as possible.

The 'local food route' will combine elements of the existing route with new from the sub-system 'Texel as host'. So it will include elements like saline agriculture, abalones and the seaweed centre if possible.

1.3 Transitions

For realizing these initiatives, the TexellAB and the touristic routes, there's a clear difference between the current and intended future system. While the required action for the TexellAB will be much more, the tourist routes can be implemented a lot earlier, but initially with less elements.

1.3.1 Transition on TexellAB

Since the TexellAB is currently non-existing, there are quite some actions to take. The concrete plans should be constructed after a solid business plan. Since the goal of the TexellAB is creating awareness regarding sustainable technologies as well as local initiatives, the chances are high to receive subsidies from, for example, the Waddenfonds. This will decrease the load on governmental institutes for financing the project. One can also think of partners and private funders.

Getting the Texelaar along

Since the TexellAB will involve a somewhat rigorous change to the life on Texel it is important to get the inhabitants of Texel along with the project. There were some thoughts which crossed our minds regarding this. One was the involvement of inhabitants themselves in the development, construction and exploitation of the project. While the main construction of the Lab will involve public tending, smaller services might be granted to local contractors to stimulate the local economy and gain support along Texelaars.

Besides this stimulant to the local economy, it will also be stimulated with the prospect of

new jobs, required to keep the Lab working. The exploitation of the Lab will lie somewhere between the municipality, the community Texel and TexellAB as a company. This means TexellAB will most probably handle in the interest of Texel. Also the possibility to show the rest of the world what can be accomplished on Texel, without showing off, might have an interesting incentive on Texelaars.

Possible problems which may arise are mainly financial and possible (dis)approval of the plans.

1.3.2 Transition on specific touristic routes

In contrast to the TexellAB, the touristic routes don't require much action and don't involve many Texelaars. In cooperation with local entrepreneurs and businesses the routes will be finalized and produced for the VVV tourist information. First the VVV should comply with selling/handling out these route maps and providing additional information with it. This will be just like the other already consisting routes.

Next every element of the routes should comply (if possible), since they will probably be getting more visitors from tourists. This may also be a way to get them involved, since this is likely to positively reflect on their financial situation. It will not have an extra impact on the lives of Texelaars, since it will be a shift in participants of already tourist routes towards these routes.

1.4 Conclusion

Seeing that there is not a concrete problem within the leisure and knowledge, we sought to improve the sustainable share in this industry. What if the tourist became more aware of the research on Texel and how this knowledge is used for a more sustainable Texel? And what if the tourist can take this home, spread the knowledge and apply it in their lives. This will really improve the sustainable share in the whole world, while promoting Texel as a sustainable island.



Figure 1.3: Ontdeklab in Eindhoven, The Netherlands

For this we thought of two possible tools: a special institute focusing on teaching people through an playful, interactive way and showcasing new, high-tech and high-end technology: the TexelLAB. The other idea was the development and planning of touristic routes with a specific theme: a green energy route and a knowledge route focusing respectively on the production of renewable energy and energy-saving technology and applications and the knowledge of sustainable technology and processes (on Texel).

With these implementations the awareness regarding sustainable technology and processes of the Texelaar as well as the tourist is expected to increase. In an interactive way they will see how Texel is involved in sustainable technology and how they for themselves are able to take this into account and take it home and involve it in their lives. And who knows, maybe the tourist themselves will bring new knowledge to the island.



TEXEL
AS HOST



2. Texel as Host

Tourism can cause physical, ecological, economical and socio-cultural harm to the environment of islands and can result in the ecological deterioration of island systems [Baorong, et al., 2008]. In other words, the sustainable tourism system of an island needs to have environmental balance.

2.1 Current Situation

General data

The average age of the Texel tourist was in 2010 42.1 years old. One third of these people were Germans, around two third were Dutch.

Their main interests are actively enjoying nature, beach eating and drinking. People on holidays on Texel mostly come in small groups, in 2010 the average of a group was 2,9 persons. The most common way to spend the night is sleeping in a bungalow. the average duration of a holiday on Texel is 4,7 days (VVV Texel, 2013).

It appears that tourists are in general very enthusiastic about the island, they valued it with a 8,6 in 2010 (VVV Texel, 2010). This is also visible in the fact that a lot of the visits are return visits, for instance 86 percent of the tourists had been on the island before.

Actors

In the subsystem of Texel as Host, there are important actors. Actors are the groups of people involved in the system. On the island there are four kind of actors: inhabitants, guests, tourists and visitors.

The inhabitants - defined as a person or animal that lives in or occupies a place (Oxford Dictionaries, 2015)

Guests - people staying at a certain place because they were invited there. It is possible that guests will use the facilities made for the tourists.

Tourists - traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes (WTO, 1995)

Visitors - people going to a certain place for a shorter period of time, who visit for a different reason than guests or tourists, for example to go to a business meeting.

In this work the focus is mainly on tourists, because Texel serves as a host mainly for tourists, because most people visiting Texel are tourists.

There are other sectors that are closely related to the tourism sector, such as the food sector, accommodation sector, entertainment sector, cultural sector and infrastructural sector. The actors of these sectors are: restaurants, hotels, entertainment, cultural organizations and institutions.

Activities and facilities

Texel position itself as a touristic place. A lot of activities are offered for people coming to the island, such as cycling, Excursions and events

Present sustainable initiatives

Some of sustainable initiatives related to the current sub-system have already being implemented on the island.

Food sector

One of the examples is that some restaurants on the island make use of ingredients grown on the island as much as possible. Those ingredients come from some ecological local initiatives like dairy products and vegetables from Farm the Novalishoeve.

The Texelse Brouwerij is a brewery that produces local beer and is a famous brand of Texel. Brewery uses local ingredients such as water that comes out of the dunes and the malt grows in the polders on Texel. The used barley, hops and yeast are imported to the island, because it is not possible to produce them locally. Texel beers is served in many restaurants and bars along the island.

The Zelfpluktuin is another example of sustainable facilities for tourists and guests of the island. The philosophy of the Zelfpluktuin is that people can pick their own fruit, vegetables and flowers directly from the garden.

Accommodation sector

Moreover, accommodation sector is trying to apply energy saving solutions and increase use of renewable resources. Examples are Hotel de Lindeboom and Hotel Greenside

Impact on other subsystems

The total amount of money that tourists spend on the island in 2014 reaches 275 million (VVV Texel 2014) euro, there is an economical value. Moreover, another positive impact of tourism on the island is that it creates more jobs for local people.

Tourists also have a huge ecological pressure on the island, think of drinking water. The consumption of water increases during summer seasons, Water supply is provided by two water pipes from the mainland. Nowadays the total drinking water consumption of the island is 1.6 million m³, this is three times more than needed for local people. This ecological pressure is reduced by limiting the amount of beds on the island (Hercules, 2012)

Host/Guest relationship

The host-guest relationship is one of the main factors that influence the social-cultural aspect of tourism. This relationship is very important in order to make sustainable transitions possible and establish relationship of trust. According to the Doxey's Irridex Model(1976) suggests that: residents' attitudes toward tourism may pass through a series of stages from "euphoria," through "apathy" and "irritation" to "antagonism", as perceived costs exceed the expected benefits. (Figure 1), [curve of Doxey's model]

According to the results of the interviews that have been performed on the Texel Island, it can be concluded that most probably, the tourism industry on Texel Island is in the exploration and involvement state. According to the data collected from the interviews, local people are very tourist oriented and happy about tourist presence on the island. This is a very great advantage that can be used as a

tool to make sustainable transitions possible.

YUTPA Analysis

Making a YUTPA analysis we considered the importance of all aspects for both tourists and Texelaars in terms of our sub-system "Texel as host". The YUTPA analysis shows how important the Texelaars/tourists find the specific topic. We did the analysis twice. Once for the tourists and once for the Texelaars. The analysis is divided into four parts: place, time, relation and action. These four parts are again divided into aspects. These aspects were given a number between 0 and 10, according to how important the specific aspect is to the concerned people. We specified that the value of 6 will represent the average importance of each aspect and then divided all our assumptions according to that scale.

For both the groups place is a main factor, it is why islanders are Texelaars and "overkanters" become tourists. The main difference is that Texelaars worry about the long term environmental impacts of their actions because it is about their home. Tourists feel not enough connection to the island to change their behaviour.

Time. For both sides the engagement with others will be short term because the average duration of stay is around 3 days. Integrating rhythm is for the islanders very important because their main source of income is tourism, it is important for them to plan their time so that it resonates with the rhythm of the tourists. The other way around, there is no reason for tourists to do the same. Making moments to signify is more important for tourists because that is their goal for that timespan, for the islanders this is of less importance because it is their everyday life.

Relations are important for the islanders; it is about their own neighbourhood, their reputation towards tourists determines the tourist's view on the island. Because they are all Texelaars the feeling of communion is high. For the tourists their everyday role and reputation are not so important being on holidays, still the feeling of communion plays a big role being on holidays with your friends or family.



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The quarter of action. The main difference is that both parties give something in return for something else, but it is mainly the case that tourists give money and the islanders give the opportunity of an experience in return. There is no equal relation of giving experiences. Another difference in this topic is the quality of deeds, this should be high for tourists but for the islanders it is just their everyday life and therefore quality of deeds is no main goal.

2.2 Future Situation

Based on the research regarding the current sub system, following conclusions can be made:

1. In order to propose sustainable hosting/tourism system for Texel, it is necessary to keep the environmental and ecological balance in mind. The main obstacle that prevents Texel from being self-sustainable are tourists themselves. Because of the size and small capacity of the Island, tourism sector has impact that is hard to handle relying only on local resources.
2. Local people of Texel Island are very positive about tourists. This aspect can and should be used in order to make the sustainable transitions on the island happen.

Our aim is to propose a solution where on one hand the impact of tourism on economy will be high, but on the other hand, the burden on the ecological level will be minimal. It is not wise to minimize the number of tourists, but it might be possible to change the way they think about the island. Therefore a tool is needed to raise the awareness of tourists about what happens on the island and what are the sustainable goals and how they can contribute towards achieving them.

A group as big and diverse as tourists on Texel that do so many diverse activities is hard to make sustainable. It would be necessary to make all the activities they do and all the places they visit energy efficient. The only way to do this is to start with the core, the

mindset of people. Tourists need to be aware of sustainability.

Our solution will be a mobile application. It will be a digital map and all the different themed bicycle routes are in there, like the Lammetjesroute, the Jan Wolkersroute. So people don't have to buy all the different routes anymore and can choose on the day itself which route they feel like doing. The tourist information is already planning to get rid of the paper vouchers and make it digital, so this idea resonates. In the year statistics of 2013 it appears that 86 percent of the visitors has been before on the island and 70 percent claims that they will come back for sure. So Texel is a place where people come regularly, they will keep the app on the phone and the next time could start cycling again without having to go to the tourist information. Whichever route they choose, the tourists will follow the route via their smartphone and along the way there will appear dots on their screen which means a restaurant, farm, shop or other place with local products. When people click on the dot they will get a small informative screen with in the case of a farmer shows the companies he delivers his cheese to.

There could appear a small video where the farmer explains how he treats his sheep. The other way around the cyclist can click on the button of a restaurant and will get information about the opening hours and see the connections with all the farmers he gets his products from. Also the videos of the farmers will appear again, so that people can see where the cheese came from they just ate and how the cows are treated, maybe they will decide to visit the farmer or find a place where they can buy the cheese themselves.

The goal is to make tourists aware of all the local food chains, show them how beautiful it is to use local products and show how satisfying it is to eat so pure. They will get more feeling with the products, products of the season, and differences in taste. This knowledge, feel-

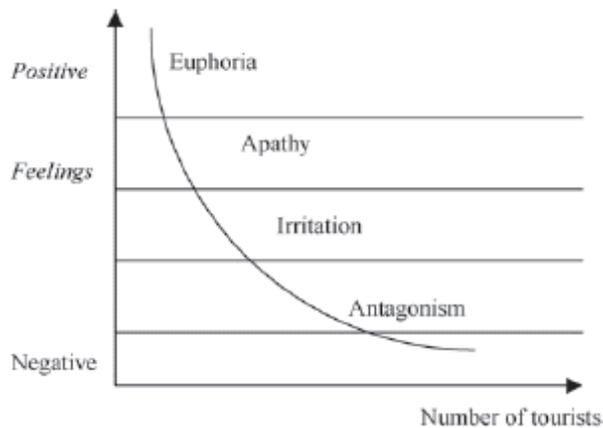


Figure 2.1: curve of Doxey's model

ing and awareness they will take with them to their normal everyday lives and be more aware of what they buy in the supermarket.

2.3 Transitions

To make the transition from current sub-system to the future sustainable one, following aspects have to be taken into account:

1. Existing sources available on the island that can be used to make transitions happen;
2. Willingness of companies to participate;
3. Involvement of tourists

What is the best legal way to approach companies to convince them that it is a good idea to make the information public? This question is very important for our design proposal, because our concept is based on the willingness of companies to participate. But what if it will be hard to convince them to do so? Therefore we decided to analyse what are the strategies to get people involved for collaboration.

Tom Wolf, the PhD, who specializes in the community psychology made some research on how to maximize the involvement of the community in the process. Some of his ideas are interesting and can be adapted and used for the research.

Tom Wolf describes the community as those, who are the mostly affected by the issue, and according to him the main key of involving any community is to do with the community and not doing for the community.

He describes main elements which are essential for true collaboration

1. Building the trust
2. Providing safe place.
3. Accommodating the members
4. Being inclusive
5. Honoring diversity of membership through understanding and practice.
6. Sharing governance and decision making.

To make the involvement of the community possible, it is important to answer following questions:

- Who might you engage?
- Who cares about the issue?
- What are strengths and gaps?
- How much you go about engaging them in your work?

Also Tom Wolf states, that this is important to define the formal and informal community sectors. Formal sector is part of the community that represents the major institutions such as government, education, health, business. Informal Sectors: parts of the community best connected to the residents themselves, such as neighbourhood associations, PTO's and church groups. These sectors have different influence on the community and to make the engagement of the community possible, it is important to involve grassroots organizations and their leaders. It is important, because according to Tom Wolf: "The main reason for someone to participate is that someone they know asks them."

Other aspect is to keep community involved in the process, because it is very common that people lose their interest in the participation



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or their expectations do not match the reality. To handle this problem Tom Wolf presents 6R's: Role, Respect, Relationship, Reward, Results, and Recognition. These 6 aspects create the motivation of community members. Moreover, the community has to be in charge of the norms and changes, because only then norms and changes stop being someone else's program and are adapted more easily. A good example of community being in charge of norms and changes are smoking and seatbelts.

2.4 Conclusion

A group as big and diverse as tourists on Texel that do so many diverse activities is hard to make sustainable. It will be necessary to make all the activities they do and all the places they visit energy efficient. The only way to do this is to start with the core, the mind-set of people. Tourists need to be aware of sustainability. The answer to this is letting them experience the value of using local products. On Texel a lot of companies are already sustainable and using local products, this should only be more visible to tourists so that they will notice and take this information back home. The visualisation of local use will be realised by making a digital cycling map showing all connections between producers and sellers.



FOOD &
MORE



3. Food & More

This sub-system deals with the food that is being grown on the island as well as its transport around the island. The present scenario explains how the food industry on the island is competing with the mainland. The future scenario describes new ideas and these are debated in the transitions section.

3.1 Current Situation

The sub-system agriculture has a productive aspect, i.e. farms and a consumptive aspect, such as restaurants, hotels and deli shops. The producing category consists of agricultural farmlands, dairy farms, sheep farms, slaughterhouses. The production is mainly for the islands own use, however, some products are sent to the mainland as well.

There are 321 establishments in the department of Agriculture, Forestry and Fisheries. This sector accounts for 10.4 % of the jobs on Texel. About 65% of the area is used for agriculture. (Gemeente Texel, 2014). Texel earns its maximum revenue from the food sector with a turnover of about 30 million Euros. This is due to the fact that there has been considerable field enlargement and land consolidation since the 1960s. The island has around 220 farms focusing on dairy, vegetables, sheep and a mix of all of these. The farms are united with a promotional organization PR Landbouw Texel. This organization has to improve the image of the sector. (PR Landbouw, 2014)

3.1.1 Prevailing Technologies

It is hard to say which specific technologies are prevailing, since there is a wide variety of farms. However we can indicate what general types of agriculture are present on the island.

There are a lot of sheep kept on the island. They mostly graze on poor soils in the dunes and dykes. There are some sheep dairy farms, which make cheese. There are not so many dairy farms anymore on Texel, because the competition with farms on the mainland makes it less profitable. Many dairy farms switch to arable farming or horticulture for economic reasons. As a result there are less meadows on the island than before. Many arable farmers try to maintain biodiversity at the borders of the acre. And the municipality decided that there has to be a minimum of 4000 hectares of grassland to preserve the habitat for birds and other animals. (Eco-

mare, 2014)

In general we can state that the agricultural sector is using the same techniques as on the mainland. Large machines are used to work the land. The big difference compared to the mainland is the lack of irrigation. Due to the lack of fresh water sources on the island the municipality does not allow irrigation as this can affect the ecosystem negatively. The only way to obtain this fresh water is by transporting it from the mainland. (Ecomare, 2014)

3.1.2 The actors and their interests

PR landbouw/Farmer:

The organization PR Landbouw improves the image and visibility of agriculture. It focuses its campaigns on citizens, member farmers and policy makers. Doing agriculture on an island is rather difficult, due to higher costs for supplies. Watering the land is forbidden even during dry summer days. Many farmers have multiple side jobs to earn some extra money. They start enterprises like making the farm into a camping site or producing shower gel based on sheep wool. (PR Landbouw, 2014) The farmer is more likely to be interested in harvesting profitable crops so that the necessity of having side jobs is smaller.

Tourist

Tourism is the big motor of Texel. Their needs and interests are of great importance to the future of Texel. The tourists come for the special character of the island. Which are the beach, fresh air, 'the island feeling', natural beauty of the island and the ability to make long walks and cycle tours. From this we can conclude that the character and nature of Texel are the main attractors. (Factsheet Toerisme op Texel, 2014)

The local people are an important group. They want a prosperous future. Their future depends on tourism. The needs of the tourists are therefore also important factors for the locals. But we also think that the special island feeling and the beautiful landscape are important reasons for people to live there.

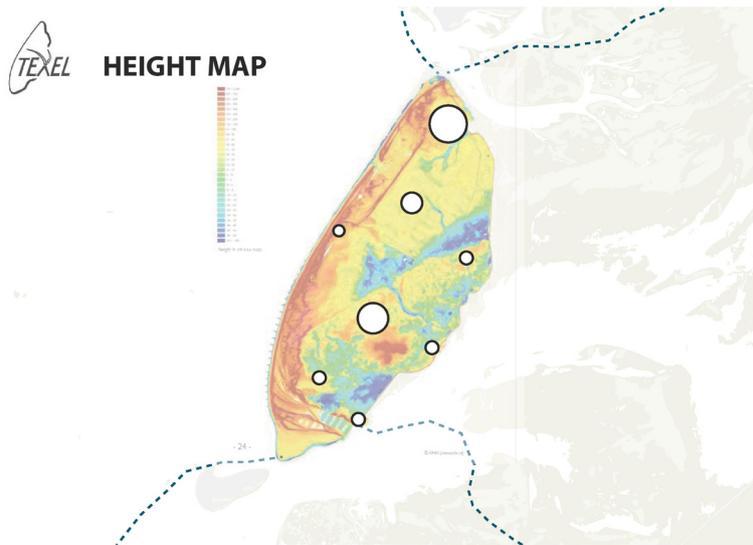


Figure 3.1: Height Map



Figure 3.2: Agricultural Map of Texel (in the Future)



FOOD & MORE

These reasons are in line with the interests of the tourist. The contradiction is in the food consumption. The tourist comes for the local cuisine, but the locals would probably rather eat exotic products, just like an ordinary Dutch inhabitant. Many tourists are also willing to pay more for food than the locals.

Municipality:

The municipality thinks that tourism is important and they recognize that the landscape has a very important role to play in this. The government wants to keep the rustic character of the rural landscape. They try to prevent following trends. Although they try not to affect the character of the island too much,

they cannot neglect European regulation.

The Texel municipality made a policy document with the active participation of the local inhabitants. They want to profile themselves as a ‘nature’ island with energy independence through sustainable measures. The tourism industry and the fishing industry is still an important part of the island community. The municipality recognizes that the agricultural sector is not so profitable. They want to encourage farmers to broaden their professional scope to other aspects of farming, like growing crops/food that is unique when compared with what is available on the mainland. (Texel, 2009)

2.2 Unsustainable mechanisms in the current system

Many farmers have to switch from dairy and cattle breeding to arable farming, because the competition on the mainland is too strong. However, arable farming isn't really cost-effective either and the land is not always suitable for it. The irrigation prohibition is not making it easy either. The biggest problem is the higher costs for transport from the island to the mainland. This is disadvantageous for the competition; especially with the rather cheap bulk goods the farmers produce now. The switch to arable farming has a negative effect on the ecosystem, because the area of meadows is getting less and less. Birds that live on the meadows have less space to breed, which is affecting their population.

Another unsustainability is the production of relatively cheap bulk goods that are exported and sold for a low price. Products are then imported for a high price, due to the transport costs.

3.2 Future Situation

Saline agriculture is performed in Texel by the company called 'Salt Farm Texel'. This is mainly a testing ground to test the resistance of vegetables to salinity. So far potatoes have been successfully grown.

The height map the low lying areas are shown in blue (below sea level). The highest areas are shown in red (above sea level).

Combining these two unrelated concepts of 'Saline Agriculture' and a 'Height Map' an idea of a controllable dyke which can give rise to a testing ground for saline agriculture had come up.

3.2.1 Controllable Dyke Idea

The controllable dyke shown as a 'yellow dotted line' in the north east can either allow water to flow in or out depending on how much is required. The area in the north east of the island shown in 'dark and light blue' can be used in the future as a saline agricultural re-

search lab where research on saline crops can be conducted. This will create a transition region between saline areas inside and outside the dike. Considering the increase in area of salty land around the world the research conducted here can be shared with the world and new strains of salt resistant crops could be created.

The white dots shown in the map are the cities and towns. The most fertile land is shown in 'red' and here is where mixed agriculture can be practiced. The green patch running from the North West to the South West of the island is where the sheep can be reared and is called the dunes. Since Texel is a home to many unique bird species and its island ecosystem is critical for its survival there is a minimum limit of 4000 hectares to be empty grasslands so birds can use them as nesting grounds.

3.2.2 Producing high end products and eating locally

To define Texel as a brand we need to highlight its unique products. Texel is known for its sheep meat and cheese. The meat has an uncanny salty taste and the cheese is fresh; it doesn't need preservatives as the island is so small and transportation is minimal.

Texel presently, is not using a few of its resources to the fullest. For instance, there is abundance of clams and mussels. However, very few people have cultures and are breeding them.

Encouraging the Texelaars to eat locally can be beneficial for the government because import costs can be cut down. It also helps to improve the Happy Texel (see chapter 8) Index as people live a longer life and are more satisfied eating healthy food. To promote this the government can provide subsidies on the food local food being sold in the local markets.

3.2.3 Food Swap

There needs to be a transition from bulk prod-

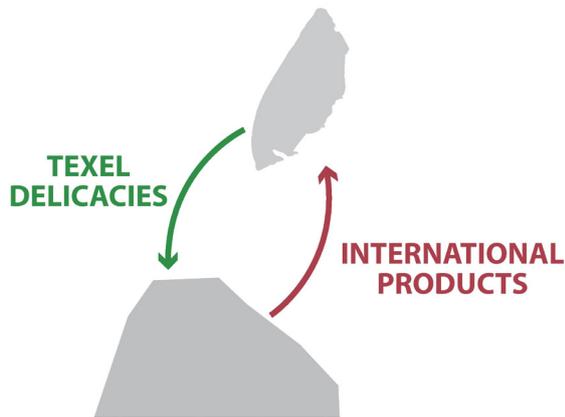


Figure 3.3: Food Swap

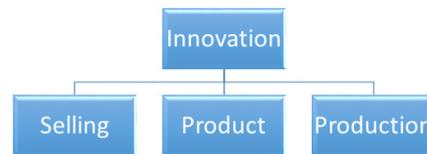


Figure 3.4: Innovation Model

ucts to more high-end products, like delicacies, in order to make the agricultural sector more profitable. These high-end products are attractive to tourists. They can also be exported to the mainland. There can be a special market on the mainland which sells Texel's exotic goods. This includes, the saline potatoes, Texel sheep, cheese, abalones, mussels and beer. The ferry which transports these goods to the mainland can also bring back food from the mainland to Texel – a possible 'food swap' as shown in Fig 3.3. This idea will reduce the transportation costs tremendously and also prevent the Texel farmers from competing with the farmers from the mainland. This sort of marketing will get the people from the mainland interested to purchase these exotic Texel goods and in turn Texel will benefit from this.

3.3 Transitions

To identify if the project was moving in the right direction it was decided to present the ideas of each sub – system to a few of the Texelaars. The proposal of the controllable dyke was This would make the land a floodplain that could have been used as a saline agricultural research laboratory.

This proposal would involve making a certain part of the land unusable for regular agriculture and sheep rearing. The proposal led to many reactions from the Texelaars. Especially the older Texelaars who are protective about their land. They believe that every bit of land is precious to them and they don't want any

invasive methods to affect the landscape. However, the younger Texelaars were of the notion that they must have such new unique ideas to have job prospects and reasons to settle down in Texel.

3.3.1 Understanding the Texelaar

To know more about the Texelaars and their sustainable farmers we interviewed the owners of 'Zelfpluktuin' and after speaking with them we could gather that they were really innovative with their approach to give a totally new feel to the people of Texel and the tourists. In half a hectare of land they have fresh strawberries grown in a sustainable way by using soil rich in coconut fibres. In another part of their farm they have green vegetables like kale, spinach, mint etc. Here, people can come and pick up the fruits/vegetables that they like and pay almost as much for these products in the supermarkets. The 'Zelfpluktuin can make this economically feasible because traders are left out of the circle. The producer and consumer are directly connected to each other. The distribution of the customers is 50% tourists and 50% Texelaars. Even though the establishment was promising and showed immense potential for growth, the owners were not interested in expanding their idea to other areas of Texel and they were happy with what they were doing.

There has been a recent rise in popularity of Marc Van Rijsselberghe, the founder of the company Salt Farm Texel in Den Hoorn. Within this farm different kind of crops are tested on their growth on salty ground. Different



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kind of salt levels are applied. This enables testing of which species are resistant to which quantity of salt in the soil. One of the most important crops that are tested right now are the saline potatoes. The potatoes which grow in saline soil do not produce as much as when they're grown in normal soil, but according to the Salt Farm Texel the potatoes taste sweeter than the normal potatoes due to a natural resistance that the potato plant has against salt. This is present in the research conducted by Wageningen University.

Some of the farmers on Texel choose not to embark on this line of research. They think that the saline agriculture is not profitable and it is based on research that doesn't affect Texel's agricultural economy directly, in the near future. They think it is a shame to make good healthy ground salty, just to experiment. According to these people the quality of the ground will be destroyed.

By talking to different Texelaars it became clear that a lot of Texelaars and farmers has their own sustainable innovations and initiatives on the island. This leads us to believe that the majority of Texelaars are highly innovative and individualistic. These need not be seen as threats to our research but a way for us to modify our work to make it more effective so that the sustainable Texel idea can be realized. The change in plans would involve focusing more on what Texelaars accept and how the role of the tourists can be incorporated.

3.3.2 Suggestions for a Sustainable Texel

Texelaars mingle with each other socially but not technologically. They do not exchange ideas and concepts with each other and usually prefer to work alone. This causes an atmosphere of tension among them and this manifests itself in not working together as a community. To encourage the Texelaars to work together we need to unite them to focus on a greater cause. A possible solution can be to encourage development of high end products that are exquisite to the rest of the

Netherlands but available in abundance here; like the Texel Sheep or encourage growth of Abalones. Abalones are a species of clams that can be cultured on land with the use of sea water and sea weed. These Abalones sell for €100 a kilo in Hong Kong. Trade of these exotic products can put Texel on the global map. (De Wilde Keuken - Fruit De Mer, 2012) To enhance interaction technologically an innovation center can be created where the farmers can share their knowledge with each other.

The plans henceforth will be based upon Fig 3.4. The innovation for the Food and More sub – system for the future can be sub – divided in three different aspects. It all start with the idea of innovation. It is a bottom up system from the farmers up till the municipality.

Selling:

The strategy we insist on, is to 'Innovate your product and sell it as an experience'. This strategy involves the farmer and the tourist/ Texelaar interacting closely with each other. The farmer innovates his product and can sell his products as an experience which the tourist can feel and empathise with.

Product:

The farmer can sell high end products like Texel sheep meat and cheese, home-grown Texel Abalones and saline potatoes. These products can be either be sold on Texel for the locals or transferred from Texel to the mainland. For instance, these products can then be sold in an authentic Texel products shop in Amsterdam. If this model is followed the need for Texel to compete with the mainland will be erased. A market for Texel will be created where Texel products can be appreciated. An added benefit for selling these products can be reduction in carbon footprint. Through the 'food swap' scheme where the products are sent to the mainland on a truck, which can then bring back goods from the mainland in the same vehicle.

By using the 'Echt Texels Product' brand the people from the mainland are aware from

where the food is coming from and this quality will bring up Texel's reputation. This is maximising usage of Texel's available resources.

Production:

The products should be produced sustainably, with innovative techniques such as usage of treated wastewater for farmland irrigation. The slaughter of sheep and cow is done in a sustainable way on Texel. An interview with the butcher at the slaughterhouse showed us how sustainable it is.

Beyond this, a knowledge route can be created where every farm is listed in no particular order of preference. This route can provide information about the farmer and his practices. This route can also include information about how the meat circle is a closed loop on the island. Right from the slaughterhouse where the meat is cut by hand and not by machines. The butcher also has the power to say 'no' to his buyers if they just want specific cuts of meat so that every part of the meat is sold so there is no wastage. All of this information mentioned above can be given on flyers to the customers.

3.4 Conclusion

Texelaars need to start eating locally produced food, producing high end products that can be sold on the mainland and interacting with the tourist. This will ensure that carbon footprint due to the transport costs can be reduced and Texel can be known as a brand on the mainland increasing demand for authentic Texel products.

Considering that the Happy Texel Index is presently low for Texel there needs to be way to improve this. Texelaars need to start thinking sustainably and living healthy. This can bring about a positive atmosphere and the HTI can increase.

By selling high end products like sheep meat, cheese, abalones etc. Texelaars need not compete with the products that are being sold on the mainland.

By following 'Innovate your product and sell it

as an experience' the Texelaars can get close to their buyers (majorly tourists). The buyers can empathise with the Texelaars, this will improve business through word of mouth.



FOOD &
MORE

WASTE &
MATERIAL

4. Material & Waste

The sub-system of materials and waste focuses on the material flows on the island. The purpose of the plans is to encourage a new way of thinking about waste. Material that is seen as waste by one person, can in fact be useful for another person. We want to stimulate Texelaars to keep valuable waste on the island, by connecting their needs and offers. By using what is locally available, self-sufficiency is stimulated. This way of thinking is called the blue economy.

4.1 Current Situation

4.1.1 Some numbers on waste

Texel has a higher average of household waste per person per year: almost 700 kg. It is likely that the presence of the tourist industry has a large share in that waste. Tourists consume a lot and produce lots of waste. Numbers on the type of household waste are shown below. Data on waste produced by companies on Texel are not known.

Type of Waste Kg p.p./year

Residual waste: 278

Construction waste: 11

Organic Waste: 106

Paper, cardboard: 64

Glass: 51

Textiles: 0

Bulky garden waste: 97

Wood waste: 24

Bituminous roofing: 3

Total: 8

4.1.2 HVC operations

The household waste on Texel is collected separately by HVC, the cleaning services of the municipality. Waste is separately collected in residual and organic waste which is collected every other week by the municipality, but residents can also use the public containers. These are not always very close to their home though. In every neighborhood, separated public containers are located for paper/cardboard, plastic, glass and textile and small chemical waste. Bulk waste will be collected on request on Tuesdays (Gemeente Texel, n.d.). Something to notice is that an initiative to chip the containers of the Texel civilians was cancelled because of privacy reasons.

Texel does not have a place to process their waste: the waste is shipped to the main land to be processed. Not all 'waste' is brought to a container however: there are several second hand shops on Texel that buy and sell used articles.

4.1.3 Current initiative: De Uitdaging

When we interviewed Valerie Jongeneel of

De Verzamelpost, we found out that she is working on a project that is called "De Uitdaging". It is a platform that facilitates exchange between services and resources in the community. "De Uitdaging" anticipates on the existing trade of resources among Texelaars that find each other through the grapevine. An example of how Texelaars are currently helping each other out already in some kind of blue economy way (although Texelaars call this "The Texel Way"), is the example of the "island management services" which is dropping the twigs and branches they cut off the bushes on Texel at the specific sites near the road where the farmers with a riding school can collect the wood and use it in the stable where the horses are asleep. However, this way of working is inefficient she told us. Although Texelaars feel like they know everyone, they often do not know what someone is actually doing. Sometimes this was even confirmed by statements of Texelaars that we interviewed like: "How strange that I do not know him/her". "De Uitdaging" tries to connect inhabitants through a platform that controls supply and demand.

The initiative "De Uitdaging" is not a unique project for Texel. The initiative is being executed in several municipalities around The Netherlands, but it is not standardized. For this reason, there are a lot of different websites, all having the same purpose but with slightly different layouts and possible actions. Since this website is not online yet, we make a proposal in the 'Future Situation'-part that explains our vision on this project that could strengthen the current proposal.

4.1.4 Government programs: MyBeach & "Van Afval naar Grondstof".

A good campaign that is already active on the island and along the entire coast is "My beach". Thanks to it, the beaches are cleaned out of the waste plastics coming from touristic activities before they can get into the sea and pollute it, and they are used to decorate big and fancy sculptures. The people involved

are volunteers and the owners of the pavilions located on the beaches. The idea has a double effect: it cleans the beaches, while it contributes for social engagement and creation of a funny activity, where also kids can be involved. In summer, when the tourism rate is higher, the collection of waste is organized weekly (MyBeach, 2014).

On a national level, several initiatives are organized which include the policy program van afvalstof naar grondstof (from waste to resource, VANG-program). The VANG program has as goal to improve the sustainable sourcing, resource efficiency, eco-design and substitution of non-sustainable materials and increasing recycling and repair rates of objects (DPI Value Centre, 2014).

This program is interesting, since it will stimulate initiatives that are ahead in their time. Therefore, the initiatives that arise from the platform proposed in the next section could potentially benefit from subsidiary aid (Rijksoverheid, 2014).

In the end of September, the execution of the VANG program was evaluated. Some key recommendations that are also interesting for Texel were made. One recommendation was that the program misses an exploration of how the circular economy could look like. If Texel starts implementing initiatives that evolve from the platform we propose in the next section, Texel could become an example for the rest of The Netherlands. Another recommendation was that current policy is focusing too much on the end of the chain (recycling) instead of the chances at the beginning of the chain (waste prevention). Innovations should also become more socially accepted which should be a focus of the VANG program. The final comment mentioned that local best practices should be better shared and scaled up. We incorporate these thoughts in the proposal of the next chapter. It should be considered that current investments are already done, for instance in waste incineration centrals. If the waste stream is reduced,

these centrals become less financially viable. Therefore, the current infrastructure should also be addressed in the proposal (PBL, 2014).

4.2 Future Situation

4.2.1 The Blue Economy way of thinking
Although not always correct, the green economy is associated with expensive products. Therefore Pauli Gunter introduced the economic philosophy ‘The blue economy’ in 1994. The blue economy strives towards local production and consumption by making use of what is locally available. This eliminates transport costs and pollution. Local production and consumption is not only more sustainable, but also generates a local economic boost. It creates jobs, which again leads to more purchasing power. The blue economy eliminates everything that is not needed and requires a new way of thinking (Pauli, 2014). In preparing this week on Texel, we designed a blue economy scheme which hypothetically could be deployed on Texel. It can be found in the Appendix B.

4.2.1. Anticipating on what is already on the island

After several visits on Texel, our group discovered that Texelaars are very inventive themselves, have a great entrepreneurial spirit and a strong sense of social cohesion. Besides this, they are curious for innovation and are proud on what they have discovered themselves. It made us realize that Texel does not need to have the wheel invented for them by TU Delft students, but that a more suitable way would be a meta-designs that facilitates local innovation which can be executed on “The Texel Way”.

Therefore, our group wants to anticipate on the already existing strong points of Texel. Although versions of “De Uitdaging” in other cities anticipates on the word of mouth selling of waste by creating a platform, they do not create transparency. In the current design of “De Uitdaging”, companies who have something to offer or are in need of some-



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thing, must fill out a form. Subsequently, “De Uitdaging” connects the companies. The problem is that with this organization, only “De Uitdaging” knows what is available. For locals, the availability of is still unclear which results in an inefficient process.

4.2.2 Room for improvement – The JUT-program

Creating transparency

By creating transparency among locals on what is wasted, you kickstart what is already available. Instead of filling in forms, a set-up as marketplace creates a trigger to join the program since you can see what is offered and you can have direct contact with the one who offers it. ‘JUT: van prut naar nut’ gives entrepreneurs the opportunity to be more economical feasible, while at the same time helping the local community by creating a virtual waste auction. Figure 4.1 gives an example of how this ‘JUT’ website could look like. The company who offers its waste gives information on: the type of waste, the quality and quantity. Companies can negotiate on the price, of which a percentage of 5-10% goes to the municipality for the ‘JUT-fund’. Companies are responsible to pick up the waste from the other company themselves.

Provide knowledge on value of waste

To increase waste selling ‘De Uitdaging’ could hire a material expert on the value of waste. This material expert could collect data on ‘waste-innovation’. An example is the discovery that when making coffee only 0.2% of the biomass is used. Since coffee spent can be used to grow shiitake mushrooms on, there might be more opportunities. By using knowledge of local research centers and international research, more data can be collected on how waste can be turned into valuable products. The material expert can promote this on the website and contact companies who offer this waste.

Stimulate separation

In case a company needs waste of households, the municipality can ask the inhabi-

tants to separate a specific type of waste. For example, ‘Company A’ needs orange peels to produce a new liquor. Since the orange peels come from the inhabitants, ‘Company A’ has to pay the municipality. The money goes to the ‘JUT-fund’, which is explained later.

To stimulate separation, separation tips and tricks are put on the website as well. Besides this, the municipality could invest money on a trash bin that stimulates separation at home. To make it feasible companies can buy the waste of the household from the municipality, a collection bin in every town is needed to collect this specific waste. By putting a sticker on the collection bin of what needs to be collected, required waste types for collection are easy to adapt. To prevent that the municipality has to set up a transport system, the company that buys the waste can collect the waste at the collection bins with a key they received from the municipality.

The JUT-fund is controlled by the municipality. To stimulate sustainable innovation on Texel, the JUT-fund can be used to support sustainable entrepreneurs. To stimulate sustainable innovation the TexellAB and “De Uitdaging” are connected to an incubator for sustainable entrepreneurship. Entrepreneurs that join the incubator can showcase their innovations to inhabitants in the TexellAB or on a yearly event. Once a year the inhabitants can vote to which of these sustainable initiatives the JUT-Fund goes to. With this JUT-fund a starting company is able to execute their ideas, which again can be showcased in the TexellAB.

Figure 4. Visualization of the link with the TexellAB incubator

Incentives for stakeholder to join the initiatives

The incentive for the municipality is to stimulate self-sufficiency and independence of the main island. The more local resources can be used, the more self-sufficient the island will be. The more waste is used as a resource, the less money is spilled. By creating transparen-

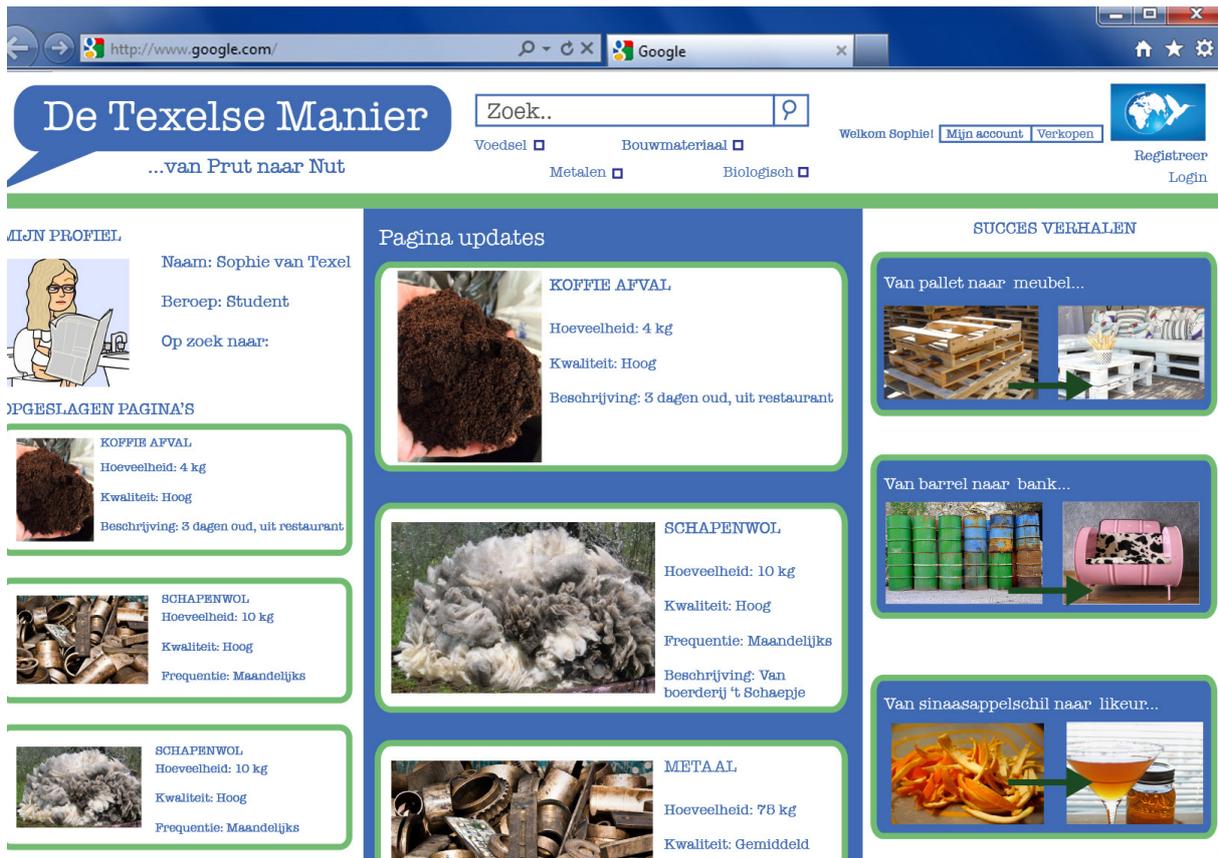


Figure 4.1: A visual representation of the 'JUT-website'



WASTE & MATERIAL



Figure 4.2: Visualization of the bin in the street.

cy on how the waste is used and how the JUT-fund is used, inhabitants of Texel are showed that waste has a value. This could stimulate waste-separation (a goal of the municipality, (Gemeente Texel, 2013)) and create a more sustainable island. Since companies collect the waste themselves from another company or the collection bins, there is no need to in-

vest in a transport system.

The incentive for companies to join the initiative, is that they can either sell their waste increase their income or it is valuable to show that you collaborate with local entrepreneurs, to create more economic activity. We believe this is something the Texelaars are searching for.

The incentive for entrepreneurs to join the initiative is that displaying their innovative ideas can lead to receiving the JUT-fund if they received the most votes of inhabitants. These funds can be used to further grow their business. The attention they receive from the inhabitants during the election is also valuable for the entrepreneurs.

The incentive for inhabitants of Texel to join the initiative and separate waste, is that inhabitants can vote to which project the JUT-fund goes to. With this, inhabitants influence which projects are more likely to be deployed and are shown to the world. It gives them the opportunity to decide what is important for Texel. Also, Valerie mentioned in the interview that the low collection rate of the waste is sometimes perceived as a problem by the inhabitants.

Capital to start the initiative

In the interview with Valerie it became clear that funding for “De Uitdaging” is already available. Additionally to the funding that has already been received, there is also potential for the proposed additions to gain support from the government via the VANG lokaal program. Although the original VANG plan says that this program is scheduled to be started in the beginning of 2015, there is no information to be found on the governmental websites yet. But, the website of the federal government clearly states that there is room for financial support. This is something to further investigate (Rijkswaterstaat Leefomgeving, 2014).

Business model

The total design can be summarized and illustrated using the business canvas, which not only gives insight in the added value of the design, but also displays how the initiative finances itself.

Figure 5. The business model of the JUT-project.

4.3 Transitions

The first step for the realization of ‘JUT’ has already been taken: the funding by the municipality for an online platform. The figure below illustrates the next steps in the process as proposed by our team. First of all the website has to be designed and constructed. Simultaneously, an employee responsible for the website has to be found and contracted. It is of importance that this person has knowledge of materials, (sustainable) new technologies with waste materials and has a large network on the island. The first main task of this ‘material expert’ is to create a ‘waste fund’ where the money earned via the website is stored and managed. Once that is finished, the website opens for public and companies can start using it. The first income of the fund can be used to place public bins (for the special waste) in the villages.

4.4 Conclusion

By interviewing several people on the island, we found out that the blue economy initiatives that we initially developed are already in some form deployed on the island. Therefore, the thoughts of the blue economy principles; using what is locally available are already widely deployed on the island. We identified that although this mindset already lives on the island, the people from Texel are fairly private and therefore not aware of all the opportunities that are available. For this purpose, we developed the JUT-platform that connects with initiatives already being deployed on the island, like “De Uitdaging”.

The goal of the JUT-platform is to increase transparency on the availability of waste streams on the island, show that these streams can be very valuable and stimulate waste separation. It connects with the other proposals of this book via the JUT-fund, which enables local citizens to vote upon donating money to sustainable innovations that are developed in the TexelLAB incubator.

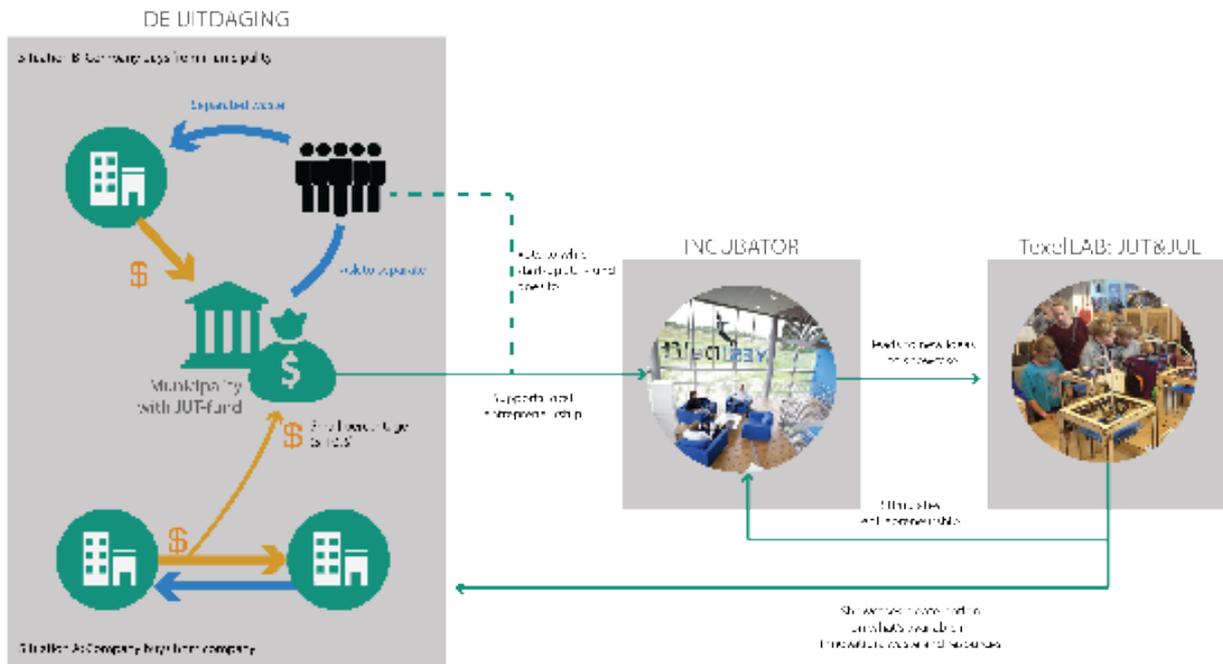


Figure 4.3 : Visualization of the link with the TexelLAB :JUT&JUL and the incubator



WASTE & MATERIAL



fig.4.4: The business model of the JUT-project.



WATER
CYCLE

5. Water Cycle

The Water Cycle sub-system is dealing with the flow of the water in Texel Island and how the right planning for each element of water services, such as drinking water, sewage, rainwater and groundwater, can merge to provide more sustainable solution for the Texel island achieving economic, social and environmental benefits.

5.1 Current Situation

General figures: The municipality of Texel consists of 170km² land and 416km² of water (sea and inland water). These figures show that there's plenty of (saline) water on or nearby the island. Furthermore, according to the holiday website Zoover, the average annual rainfall is 996mm. (Zoover, 2015)

Current water use: According to the website of PWN, the average water use is 125L/person/day. Assuming 13640 permanent inhabitants and 40.000 tourists would mean an average use of $(13600 + 40.000) \times 125 = 6700\text{m}^3$ per day. (Duurzaam Texel, 2015)

The yearly amount of distributed water on the island is about 1.600.000m³ according to data of the PWN (PWN, 2013). Moreover, PWN states that on hot days during the tourist season the average use per day of the whole island is 7500m³ of drinking water.

Actors:

- PWN (Provinciaal Waterleidingbedrijf Noord-Holland). This institute is responsible for all water supply systems in the province of Noord-Holland, including Texel. The 2 pipelines that connect the island with the mainland for waters supply and all other drinking water supply lines are owned and maintained by this institute.
- HHNK (Hoogheemraadschap Noorderkwartier). This governmental body is responsible for water management, maintaining dikes, treatment of wastewater and maintenance of the sewage system.
- Municipality of Texel. The municipality is partly owner of the sewage system and takes care of the maintenance of some parts of the system.

Prevailing technologies: Unlike in the past and other Wadden islands, Texel does not produce any drinking water on the island. Because of the large number of tourists during the summer season not enough water could be generated on the island. The maximum capacity of drinking water production

was already reached in 1966 and was about 540.000m³. However, this amount was not enough for there demands resulting to connect the island with the mainland through 2 pipelines that supply the island with drinking water.

Since July 2012 Texel has one big water treatment facility in Eversteekoog. (croon|TBI, 2015) Before this, there were five smaller ones. Every larger village has a storage tank for the wastewater of the households before it is transported to the treatment plant Eversteekoog. Totally, there are eleven storage tanks. The sewage system does not separate waste-water and rainwater, which results in need for more capacity during rainfall. The smaller villages have a tank of 20m³, the biggest town, Den Burg, 100m³. The water is pumped to the treatment plant from these tanks according to the amount of water inside. This allows a changing distribution of wastewater, according to the intensity that is required, creating a very useful feature for the water management on the island.

The treatment facility Eversteekoog treats wastewater from all the villages on the island and has a capacity of 8 million litres or 8024m³ water per day. The water spends about 1-2 days in purifying tanks where the water is purified and cleaned by a totally natural way through billions of bacteria. After this first processing the water is already clean, but more nutrients have to be added. This process takes place in the halophyte filter on a constructed wetland of 9 hectares for 3 more days. After these 5 days, the water is released to the ditch system. A surplus of treated water can be released in 2 directions and this effluent is powered by 2 pumping stations on both sides of the island that end up in the sea. The flowrate can be up to 350m³/minute. The treatment process is already very sustainable, except the fact that rainwater also enters the treatment system and that not all cleaned water is stored in situations of a surplus.



Figure 5.1: Pictures from our visit to HHNK facilities

The ditch-system acts as one big water buffer. The water level in winter is on average 40cm lower than during summer. In February they start stacking the water in the ditches by means of 900 locks (of which only 56 are automated) to create this buffer and install a natural stream. This water is then used in the summer to irrigate the land.

Houses and smaller communities that are far away from the cities are not connected to the centralized sewage system. A total of 11 smaller IBA's (small scale water treatment facility) accommodates the treatment of the waste water here.

Relations: In 2005 the municipality of Texel and HHNK agreed to start collaborating in the waste water processing and interventions to improve the water system.

In the interview with Nico Tessel (employee of HHNK) we concluded that cooperation only exists in case of emergency. This means that municipality and HHNK work closely together in periods of extensive rainfall to minimize the effects.

Rules & regulations that organize the system: This can be divided into agreements between actors or goals set by the municipality and governmental legislation. After 2009 most legislation regarding water and all its aspects are now combined in the waterwet.

- Waste water agreement 2005 (Noord Topics, 2005)
- Masterplan Water for Texel (2006). (Gebiedscommissie Texel, 2003)
- Water footprint Texel (2012)

Current unsustainability: Texel does not have its own drinking water supply, but is supplied with drinking water via 2 pipelines that are connected to the mainland. In the summer of 2013 one of these pipelines broke down. This event happened in the middle of the tourist season and on top of that a heat wave hit the Netherlands. Because of water shortage fear, PWN sent 10 tank-cars containing 30.000 litres of water to the island every day to make sure there was enough water available. The fixing of the pipe took about 3 months because the pipes are 25m below sea



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level, which makes it an expensive and labour intensive job. (Noordhollands Dagblad, 2013) The failure of the pipeline illustrates the drawback of the lack of their own water supply. On the other hand, it is now not economically feasible to have a drinking water facility due to the low population density and the high demand during tourist seasons.

Furthermore, the sewage system is not able to cope with extensive rainfall. In August 2014 heavy rainfall caused flooding of some parts of the island. At some places the water was half a meter high, causing a lot of inconvenience. (Gebiedscommissie Texel, 2003) Due to climate change precipitation patterns will change causing more rain to fall in shorter periods, but also longer dry periods. Events of extensive rainfall or longer periods of drought are more likely to occur in the future. This indicates that a bigger buffer capacity is needed to have sufficient fresh water supply during periods of drought.

Another major drawback of the current sewage system is that the water is not clearly separated into waste-water and rainwater, as it mentioned above. Due to out-dated systems in parts of the island rainwater enters the sewage system. This increases the amount of water the treatment plant has to treat, while the rainwater does not need any treatment and it can be used as it is as grey water.

Finally, the new water treatment facility releases the water to the surface water after processing mainly for irrigation. This relatively clean water (as Nico Tessel during the interview, the treated water is so clean that you can even swim in it!) might be (re)-used in a more efficient way to cut down the average water use.

5.2 Future Situation

According to the current situation, the existing water treatment plant is already using a very sustainable way to clear the wastewater. However, we still think that there is need for

improvements. This proposal design is divided in three phases and three levels. The phases are reduce, re-use and re-cycle and the levels are personal, building and island level. Our main focus, according the final integrated design for the Be Texel- Be Sustainable content is on the first phase in personal and building levels, which although they seem the most obvious concept, it is the easiest, cheaper and most efficient solution.

5.2.1 Water Reduction

Since Dutch water is relatively cheap (approximately 60euros/person/year (PWN, 2013)), saving water won't lead to enormous savings on the financial field. However, cleaning water consumes lots of energy and has several environmental impacts, so it is important to pay attention to your water usage.

The Dutch average daily water usage is 125litres per person. Washing, cleaning and flushing the toilet consumes the biggest part of this water. The reduction phase is divided in two parts: awareness on a personal level and small technological changes but also new water regulations on a building level.

5.2.1.1 Awareness

In order to involve the Texelaars, but also the visitors of the island, to their new sustainable- water future, we will start by raising their awareness and responsibility. The campaign should teach them, that through very small action, they could create a lot.

Another special function lays with the owners of hotels and other tourist accommodations; they will not only be responsible for their own water use but must also inspire their guests to do so. This should be done in a similar way though some cards that we're already familiar with (such as re-use your towel).

Infographics (posters, advertisements or leaflets) or even informative meetings should provide the inhabitants and tourists with tips in order to save drinking water. Small changes on a large scale can have big impacts.

Some of these small changes could be:

- Taps run with approximately 12 L/min (maw, 2014), so don't forget to close it in between actions. Closing the tap while you brush your teeth, for one minute, twice a day, will save 20% of your water usage!
- Leaking taps can consume enormous amounts of water; by checking all taps in your house you can prevent unnecessary waste of water. A dripping tap often wastes around 5 liters a day, a leaking toilet sometimes even 300 liters a day.
- Showering 1 minute less, assuming you shower on a daily basis, will reduce your water use by more than 7%.
- A bath consumes twice as much water (110 L) (duurzaam thuis, 2013) compared to a five-minute shower.
- Fill up the (dish) washing machine in order to use it as efficiently as possible. An average dishwasher uses 22.5 litres (treenhunger, 2009) each turn, a clothes washing machine even 150 L. Assuming that by filling your machine you can prevent one wash a month and one dish a week you'll save 240L of water in a month, 8L of water per day, so another 7%. In conclusion, just by reducing their showers by one minute, closing the tap while brushing their teeth and filling up their washing machines in order to reduce their amount of washes, they can already reduce their water use by 25% (duurzaam thuis, 2013).

5.2.1.2 Technological changes

To enhance the water savings on a building level, several small technological changes can be incorporated to the existing building system. We are proposing two packages, the basic (low-cost solution for existing building) and the advanced (which is referred to newly or renovated building). These two packages can reduce the consumed water about 20 and 40% respectively.

Basic Package: It costs 70 euros, saving 20% of consumed water and includes:

1. Water saving showerheads, which consume 5 L/min instead of 8,7 without a reduction in comfort. Specifically, water saving tap heads can save up to 3000 L/year and cost only 2

euros. (Water Source, 2015)

2. Toilet Displacement Devices: Plastic containers (such as plastic milk jugs) can be filled with water or pebbles and placed in a toilet tank to reduce the amount of water used per flush. By placing one to three of such containers in the tank, more than 3,8 litres of water can be saved per flush, which is translated in 18liters/person/day and 6570liters/person/year. This device cost only 5euro. (Water Save, 2014)

3. A simple water harvesting system, which will collect the rainwater from the roofs of each building and then storage it in a water tank outside of it, can be easily installed. This rainwater can be used for irrigation and other outside activities like washing cars etc. (which are estimated as 3% of our daily needs) saving 1500L/year. The needed equipment consists of the existing roof, pipes and a water tank of 300liters with a total cost of 50 euros. (BREA, 2015)

Advanced Package: This package is aiming to save 40% and incorporating new modern devices such as washing machines and toilets with grey water systems combined and precipitation collection.

1. Modern toilets: Older toilet cisterns with a siphon-flushing system hold between 9 litres and 12 litres of water. Modern toilet cisterns hold about 6 litres of water. (IANR, 2013)

2. Modern washing machines, both for clothes and dishes, are often much less energy and water consuming.

3. Heat exchangers can be applied to make use of the waste heat after a shower.

4. The use of wastewater for flushing toilets, which can save 25% of the yearly water consumption.

5. Rainwater harvesting: The roof of an average Dutch house catches 80.000 litres (water.nl, 2008)of rainwater on a yearly basis, this is nearly enough for an average two person household. Rainwater harvesting is beneficial because provides an independent water supply during regional water restrictions by reducing the existing water supply and simultaneously providing water during the whole

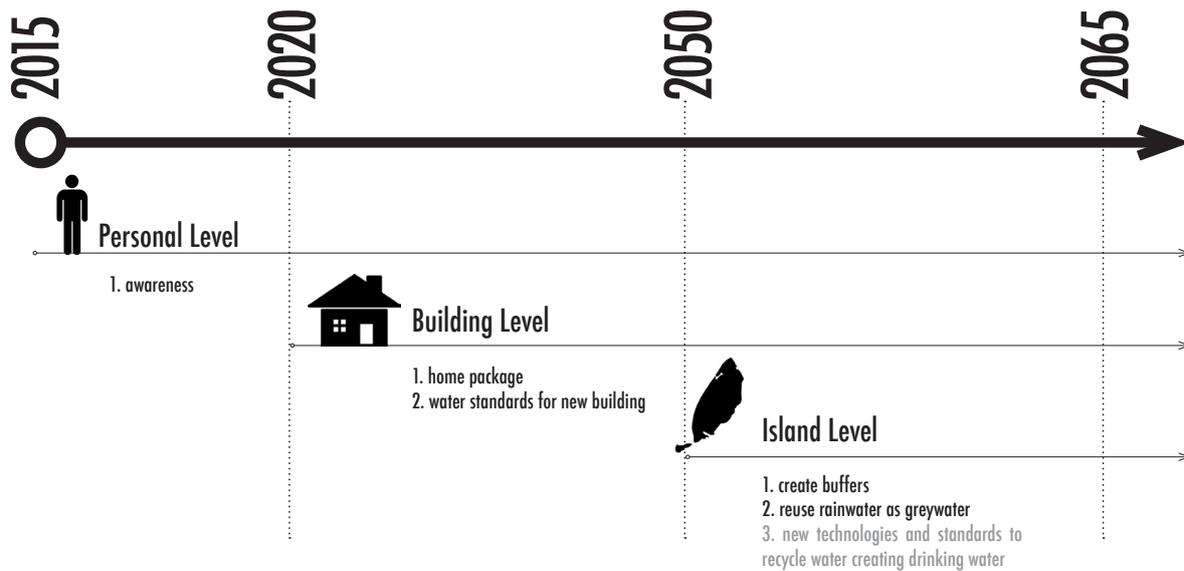


Figure 5.4: The transition from present to 2010

year, especially in drought seasons by reducing the run-off, the erosion and the contamination of surface water.

5.2.1.3 New regulations for newly building.

5.2.2 Water Re-use

As we've seen Texel deals with large amounts of atmospheric precipitation. Collecting and using this fresh water can reduce tap water use to a large extend. This phase is mainly applicable to the re-use of the rainwater on the building (as it is already mention in previews phase) and island level, creating grey water for uses such as filling swimming pools, showers and washing machines on camp sides and in general for all other taps which aren't used for drinking water.

5.2.3.

Re-cycle

The last step in order to provide independency for the Texelaars is to create their own drinking water cleaning facility. Existing technologies such as water desalination etc. are rejected because of their cost. Although, a sustainable production of drinking water from wastewater could be an option, it seems to be a far further goal.

5.3 Transitions

The first step for the transition process is related with reduction. Although, it might seem a small step, creating awareness and changing habits will be a time-consuming task, especially due to the fact that a big part of Texel population are tourists. Luckily, there are no big investments involved in this step, so it is possible to start as soon as possible. In order to reach tourists, firstly, we have to convince locals. By organizing events and campaigns and promoting all the things that are mentioned in previews part, in a period 5 years (2020), a reduction of 25% of the consumed water will be possible.

Furthermore, in order to help the Texelaars reducing their water use technical interventions need to be applied. As is stated in chapter three, there are techniques on all kinds of scales, from tap heads and rainwater tanks, which can apply in building level. In five years the packages should be available for all households willing to participate to a sustainable Texel. This will contain tips but also some of the small household technologies in order to enhance a reduction in water use by investing low budget.

With this reduction campaign, a market has evolved around further water reduction, creating more and more demand for the start-up companies that evolved at Texel which pro-



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vide sustainable solutions on a building level. In the next 45 years such companies will be involved in all projects on the island so almost every building has a more sustainable water system in the end.

On the larger scale, the improvements demand more time and some new innovations. We propose to collect more (rain)water in new buffers and maybe even to improve the existing water cleaning by separating the rainwater and the waste water. The location and planning for these systems needs time and should be made by or in cooperation with municipality and Tesselaars. This action will not only help to create support among them, it will also enhance the awareness the project needs to succeed. The planning of the system will probably take some time, but the aim is to start building as soon as possible, since there have recently been problems with the water system during droughts and heavy rainfall, being able to complete until 2050.

Nowadays, there is no closed water cycle, mainly because legislation does not allow drinking water to be created from waste water. The planning and building of the new treatment plant will thus take some more time.

If they create expertise on the sustainable market this can become an important export product for Texel. This will also create awareness among the tourists and might even attract a new kind of visitors to the island, interested in their sustainable solutions.

So by creating awareness within the next 5 years (2020), developing household systems, planning an improving water treatment plant and creating new buffers within maximum 35years (2050), we will be able to fully improve the water cycle of Texel within 35 years, maybe even faster!

5.4 Conclusion

Our final proposal focuses mainly on the re-

duction and re-use of the limited amount of fresh water on Texel. We want to offer packages that enable the inhabitants to reduce their water use and inspire the community to use and collect the rainwater. We will start on a personal level; awareness will be created amongst the inhabitants to motivate them to reduce their water consumption. There will be a basic package which will enable the Texelaars to make small adaptations to their house, it will cost 70 euros and lead to a reduction of 20%. The next step will be to improve the water system on a building level. The advanced package will provide a new or renovated house with the best (future) water saving systems like modern toilets and rainwater harvesting systems. The final improvements should be applied on an island level, rainwater should be collected separately so it can be used and to prevent the unnecessary cleaning of it.

In order to increase the awareness of both the Texelaars and the tourists the water cycle on the island should be more visible. Therefore the important locations in the water system, for instance the treatment plant we visited, should be nodes on the route. When the visitors realize the amount of work that is put into the guaranteed supply of fresh water they will start thinking about their spoiling behavior. Good ideas on water reduction can be shared in the Jutter center to spread around on the island and beyond.

Though our initial plan was to close the loop and recycle the fresh water available on the island, we experience that, with the current technologies, this will not be feasible. Since building a new big machine will be too expensive and probably won't improve the sustainability of the island, our future goal will not be self-sufficiency. By declining the water use on the island, as an example for the rest of the Netherlands, the amount of water that needs to be processed can be decreased drastically. If the demand is declined, the future innovators of Texel should be able to come up with a solution in the near future to make the island



MOBILITY

6. Mobility

Sustainable mobility is field of study about how transportation can be more economically, socially and ecologically feasible. The mobility system on Texel is constantly evolving to become more sustainable. This chapter presents some ideas to consider for the mobility system in the future.

6.1 Current Situation

The current means of transportation on Texel consist of both private modes (car traffic, bike, taxi) and public modes (Texelhopper). The ferry connecting Texel with the mainland on Den Helder is an important link with the mainland. The current ferry (Dokter Wage-maker) can hold about 1750 passengers and 300 cars (TESO). A new ferry called Texelstroom will start taking passengers in the spring of 2016. The new ferry will hold 1750 passengers and 350 cars. TESO (Texels Eigen Stoomboot Onderneming) has made environmentally friendly choices in the design of the new ferry that will have solar panels, back-up ion batteries and be propelled by compressed natural gas (Piellisch, 2014).

There are many initiatives on Texel to make the mobility system more sustainable. An initiative that is very topical is the Texelhopper, which is a public mode consisting of minibuses that hold about 8 passengers. In addition to the fixed bus routes, the Texelhopper will be a mix between a regular bus service and a “dial-a-ride service”. The Texelhopper will provide a service with more frequent stops than the regular busses and travelers need to request their trip one hour in advance and indicate where they want to embark and where they need to get off again (Texelhopper).

Other initiatives are taken by Urgenda and New Motion to promote the use of electric vehicles (e-vehicles) that are becoming more and more popular on the island. Currently there are around 20 charging poles for e-vehicles on the island (Chargemap). Electric bikes (e-bikes) are also becoming more popular since they let people who for multiple reasons do not choose the bike as a means of transport enjoy the benefits of biking, without the drawbacks. Drawbacks can be having to shower at work, feeling too tired, not getting to the destination quick enough, etc.

6.2 Future Situation

As the previous chapter concluded, there are

many projects currently taking place on Texel to make the mobility system more sustainable. But there is always room for improvement, and looking further into the future there is a chance that other kinds of vehicles will be available. This section presents ideas that work both for short time and long-time planning, to make Texel even more sustainable and give Texel the reputation of being an island with cutting edge mobility technology.

The mobility concepts for the future are clustered in three modes of mobility. The first two modes are the private and the public mode. Both of these modes describe the transportation of people in their daily life. The difference between these modes is that in the private mode people use ways of transportation that is their (temporary) property like their own cars and bikes but also rental vehicles. The public mode describes ways of transportation that are publicly available, and that is shared with other people. Please note that for some initiatives the barrier between these modes will be low. For instance, a rental bike may be publicly available, but a rental bike is still considered a private mode since it does not have fixed routes, timetables or is shared with other people.

The third mode is the transportation with driverless and automated vehicles. Looking into the future, driverless vehicles will most likely become more present in our everyday lives. Having a facility with driverless vehicles on Texel could also serve as a tourist attraction. It is an idea that could enhance the mobility while showing tourists some sustainable initiatives on the island.

Private transport

Carpooling

A good starting point towards a more sustainable Texel would be to try to reduce the amount of personal vehicles. An initiative that could easily be implemented with low cost is carpooling to and from the ferry. Carpool-



Figure 6.1: Two examples of driverless vehicles. Sources: (Curmudgeon) & (Gannes, 2014)

ing is sharing your car with another person that needs to travel in (approximately) the same direction. This therefore decreases the amount of cars on the road. Although Texel is a small community, it might be that someone from De Koog doesn't know that another person from Den Burg works in the same neighborhood. A website or an app could help to bring these people together. This app could also function as a sort of mediator between both parties that keeps track of costs. Once on the mainland, people can continue carpooling or transfer to public transport.

“Greenwheel”-style Rental

Carpooling could be combined with a “greenwheel”-styled rental service. Greenwheels is a company that offers subscribers the possibility to frequently rent a car at relatively low costs. People reserve a car via the website or by using an app. Both Texelaars and tourists could use these cars, which of course will be sustainable electric vehicles. These vehicles will be used exclusively on the island and since travelling distances on the island are small, they can be fitted with smaller battery packs. This would reduce the weight and therefore the energy consumption of the car as well as the purchase price. A possible downside of this project is the large amount of initial investment in the purchasing price of the vehicles and the adaptation of the infrastructure (installing charging poles). Crowdfunding combined with a partnership with a car man-

ufacturer could be possibilities to finance this project. Similar to the TESO Company, Texelaars could also be asked to invest in this project for which they get shares in return. This immediately also involves the Texelaars in the project and they will have an incentive to promote the use of these cars to tourists.

Bike system

A decision to take the car instead of the bike can sometimes be due to the fact that goods need to be transported, for instance grocery bags from the store. To solve this problem while promoting biking as a mode for transport, a number of “bakfietsen” (bikes with boxes to carry goods) could be present on the island for rent at certain locations. The bikes can be stationed to certain spots on the island where people who are in need of a bike can rent one and return it to whichever other station. The stations should preferably be located close to shops. The fee for renting a bike should be small, just to cover the maintenance. By using the same payment system/fare system as with the Texelhopper, it will be easy to use the bakfietsen in combination with the Texelhopper, and the use of cars can be avoided as far as possible. It is an option that stores on the island, such a grocery stores, could sponsor this service and in return get rental locations close to their shop and space for ads or other commercial messages on the bakfietsen.



MOBILITY

Public transport

Public modes of transport should be present on the island to offer everybody the possibility to transport himself or herself in a sustainable way on Texel. The service needs to be affordable to ensure that inhabitants with differing situations can travel in an environment friendly way. Currently, a bus service is present on the island; the Texelhopper service. This can be used both by local residents and tourists. The benefits of sharing a ride are congestion relief, noise and emission reduction. For elderly people who live alone it can also be a way of socializing. The service needs to be booked in advance (although there are still two fixed routes), which is a drawback when unsuspected things happen, but then other alternatives for transport are available (bikes, rental cars etc.). The minibuses could hopefully in the future be powered by a hybrid engine of biofuel and electricity, and also become fitted with a bike rack so that multi-modality in that way is promoted.

Transport with driverless vehicles

For the near future, stretching from 2015 up to 2030, plans and regulations will have to be made for driverless and other types of automated vehicles. These vehicles will enable lightweight direct on-demand cargo, increasing its efficiency and thus the sustainability of the field. It is not to be ruled out that in the coming years several big enterprises will already start deploying driverless vehicles for package delivery, especially in the more rural areas where land infrastructure is missing (Frey, 2011).

A suggestion for making the island as interesting as possible from a tourist point of view is to add a way of transport that also functions as a tourist attraction. This could be part of some sort of sustainability tour across the island. Driverless vehicles could be used for this purpose, in addition to transporting goods. A test location with driverless vehicles can be a fun and futuristic part of the tourist mobility,

and make Texel an interesting developing site for automated vehicles.

Something important to take into consideration is the legal structure for these vehicles. Texel will definitely need to invest time and money in clarification of the legal boundaries for these new ways of transport.

6.3 Transitions

Being on Texel gave us a lot of input, especially talking to people about how they deal with transportation on the island. After talking to Pieter de Vries of Gemeente Texel, who is working with the Texelhopper project, we realized that the public transport sector on the island involves more aspects than we thought upfront. The Texelhopper project has just started, but it is innovative and has a promising future. We also found out that there is interest in making Texel a test location for new technologies. Riding the Texelhopper and speaking to the driver, we realized the importance of the social role of the drivers on the buses. Moreover the bus drivers fulfill a very important in the local community, by bridging the different subgroups and the different villages.

Based on our analysis, we foresee a future mobility system that slowly transitions into a mobility system where electric mobility will become more and more important. Furthermore, we foresee a future where the client (people using the mobility system) becomes more demanding. Just as they can find anything they want to know, at any time, wherever they are as long as they have an Internet connection, people will require more and more of this same kind of flexibility and tailor-fit solutions in other areas of life. Mobility is not an exception to this.

Another trend that has been described is the emergence of the lease economy. With the tendency that people lease their assets whenever they need them, instead of owning them and having a regular monthly bill to pay

for using it, this will have an effect to the mobility and transportation system of people as well. It is probable that in the future less people will own a car for instance, but lease the car whenever they need it. And why would people need to drive a car to get from A to B, when the car can drive them to their desired location on its own? Driverless vehicles are slowly getting to the market and within 20 years these cars might become mainstream. This means that at any time of the day or night, you can order such a car to bring you from A to B and since no driver is required, personnel costs can be maintained relatively low. As personnel costs are usually the highest costs in an enterprise, it does not necessarily have to be expensive.

After conducting the research, the conclusion is that driverless electric vehicles form a crucial part of the future subsystem. However, before Texel as a whole can transition into this new future sub-system, the island will have to go through certain phases just like any innovation.

The initial focus for the driverless sustainable mobility system is on the tourists. By doing this, Texel can stand apart from other tourist destinations and emit its innovation ambience to the world. They will be able to make use of driverless vehicles that can transport the tourists along certain routes over the island. These routes connect points of interest that showcase sustainable products and companies that enhance the identity of Texel. At the beginning, this could be on a small closed track where no other traffic is allowed. When successful, it can be expanded to larger areas of the island. When the Texelaars got used to the idea, the electric rental cars for lease could then also become driverless. This would result in a final transition into an almost completely driverless vehicle island.

6.4 Conclusion

It is apparent that Texel already has many initiatives to make the mobility system more

sustainable. Texelhopper, the new ferry, and the Urgenda project – a lot is happening! That is why it is important to keep looking forward, to keep the momentum of this positive change. We've proposed some ideas to make the everyday mobility more sustainable, for example by making sure the Texelhopper vehicles are propelled by renewable resources, that carpooling becomes easier, that bikes that can carry goods are available by the shopping areas, etc. We have also looked at ways to make the mobility system cutting edge by introducing driverless vehicles. These types of autonomous cars may not be ready to use in everyday traffic, but as a tourist attraction combined with research it can work. This way Texel can position itself as an innovative island that is in the forefront when it comes to research on the vehicles of the future.



MOBILITY



7. Public Space

Public space is defined as a meeting place, a market place and/or a traffic place. For Texel, the interventions at Public space will act as a Support system that allows exchange between other sub-systems mentioned in this book.



PUBLIC
SPACE

7.1 Current Situation

The first thing that we learn from the locals is the fact that it was hard to define any public space. This is because there is no formal place “defined” for them to meet. However, the common ground between Texelaars and Tourists is normally a square or plaza located generally in front of the Church. These are also areas where weekly markets take place and it attracts a lot of tourists and locals who are searching for special things that they don’t find normally in supermarkets.

However, on speaking to the locals, we realise that these common places are also becoming more and more tourist oriented and the true identity is slowly hiding away due to touristic demands. It is important to realise that the Texelaars are proud islanders. They are still innovative people with high motivation, but since the tourist brings money, they want to provide comfort to tourist. This predominantly defines the character of the public space and also the activities on them.

Although we do observe social exchange, when we focus on exchange of innovation, between the Texelaars there is little to nothing but the social exchange does exist. This happens only in events, if at all. Between tourists and Texelaars, it is even worse. Although tourists are involved in many markets and events, their knowledge of innovation lacks.

7.2 Future Situation

It is clear that we want to achieve no intervention at natural landscape areas that include beach and dunes. We propose to preserve these and focus on the built environment and use it more efficiently, keeping in line with Ecomare. We propose to use areas where there is infrastructure already existing and enhance the interaction of tourists and Texelaars. The focus is on showing the innovation on the island and sharing the knowledge and the targets groups are both the islanders and the visitors (Fig. 7.2)

The aim for the future system is to use public space as a connection node within the other subsystems. This is done with two methods: A First Ever “SUSTAINABLE MARKET” (and events) and “Markers indicating innovations”

7.2.1 Sustainable market:

On speaking to the locals, we realised that the weekly markets are mainly aimed at tourists. The Texelaars prefer to buy their local needs from the shops. However, they do visit these markets when they want to buy something specific from a market, for example when they hear about some special cutlery from olden times. They also confirm that if there was an innovation market every week, they would visit it much more often to check if there was something for them.

“The First Sustainable Market” at Texel once a week will initially begin with a stall at the market selling innovative sustainable products from Texel. We selected De Koog as a starting point of these markets. Once this idea takes flight and gets more popular among the people, it can be even expanded to other villages. The reason of selecting De Koog is simple, it has a high influx of tourists, and hence, best to make a good first impression, because the foot fall will be high. The church square (where market is located) is a common passing point and the place will definitively make the passerby curious.

To develop this system, the time of the year is going to be very important factor. The market is more oriented towards the tourists during summer-time whereas in wintertime the products on the market are relating more Texelaars and outsiders visiting island for special purpose. The characteristic difference between this market and another market is that, this one will also invite young and not fully mature innovators to come and demonstrate their idea.

The major advantage of this is the fact that no



Figure 7.1: Current situation: landscape and markets, parts of public space

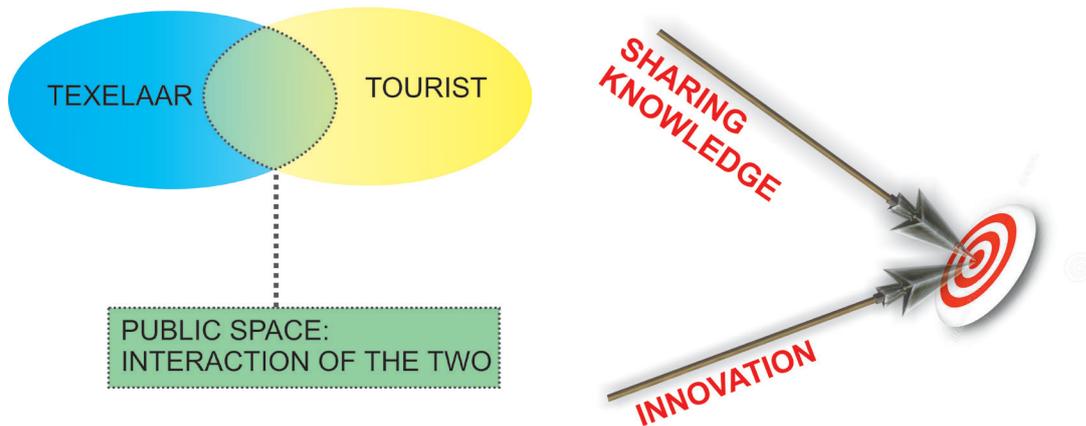


Figure 7.2: Focus of intervention: common ground where Texelaars meet tourist (most common being public plazas; each village has one plaza)

Figure 7.3: Diagram indicating focus of intervention.



Figure 7.4: Marker indicating innovations



additional infrastructure is required for building it. The tents and market already exists, the living quarter around it also exists, and also the websites where these are informed to tourists. However, a managing committee is required that helps small and medium scale innovators by providing them this platform.

As more and more tourists are getting aware to the innovations and the growth of the new sub-systems, the public spaces should also be extended to annual events which should be organised in squares and public buildings and related innovators (in addition to the general visitor) should be invited to conference/seminars/workshops. With these events, also the younger people should be involved and children should be encouraged in workshops to start young with sustainability education. The fundamental difference between the culinary event (which is already in practice) and the proposed event is that innovators are invited and workshops should take place that will make people more involved with the real Texel, below the surface of what they see as a tourist.

7.2.2 Markers for the route.

This solution is aimed at the tourists. The fact that they see the physical markers for the food just eaten from the restaurant will make the visitors curious to follow and find out how it actually looks like. These markers show the nodes (which are the innovations of Texel) that participate in the sustainable Texel route. Tourists can visit the innovative ideas of Texelaars by using the app, and learn more about them. This builds memories of actions created and will bring them back, to explore the other knowledge centres.

The TexelLab Jut&Jul is a node on the route and the markers will give a clear physical presence of the nodes on the route. It is suggested that the markers should be of same visual appearance and this should be designed in coordination with the community, as they know best. An example of this marker/sign

can be viewed in Figure 7.4.

The fact that this sub-system is the connecting node to other sub-systems essentially means that the Connecting “node” or Public space is dependent on how well are the other sub-systems: how many people want to visit the other subsystems. Furthermore, it is proposed to use public space not just like a connection point, but a place that supports and promotes the other subsystems.

In fact, public space subsystem is totally dependent on the development of the other subsystems, due to the fact that it represents a node that connects them. The strategy is to highlight the nodes on the sustainable Texel routes, where the sub-systems are highlighted.

7.3 Transitions

The market would take time for large scale recognition. However as a beginning point, we can already start using the innovations that are developed on the island by markers and events, and even starting the pilot “Sustainable Market” project that can showcase the innovations from various researchers and events.

The aim is to improve public space within the island through showing the identity of Texel and its villages, so people will have a feeling of attachment to the Texel land and will bring them back, both the young and the visitors. Moreover, we realized that the Public Space as a subsystem completely depends on the other subsystems: the success of those systems is going to allow the success of the “Sustainable Market”, that will allow the interchange of knowledge and products among tourists and inhabitants. By using designs from the locals, the sign (or marker) becomes a recognition point for the sustainable Texel route. Every node on a route will have such a sign (or marker).

The strategy is to promote the innovations

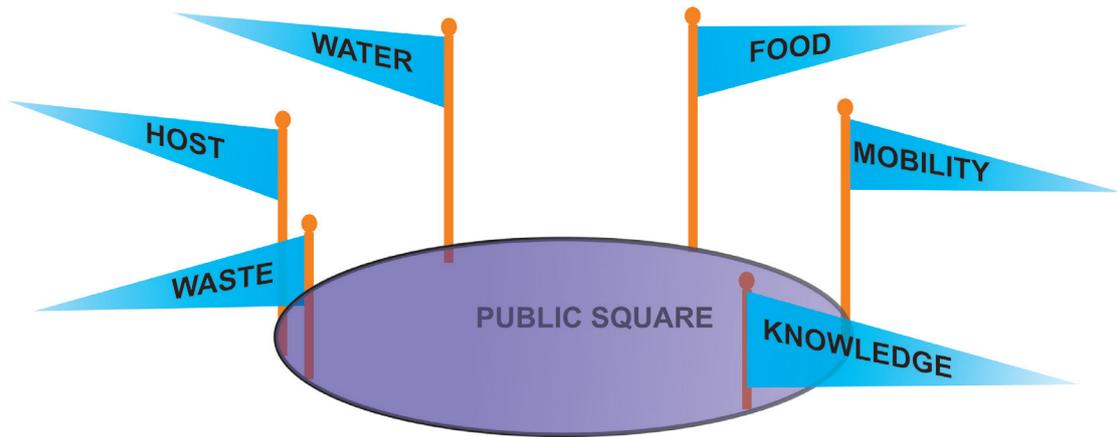


Figure 7.5: Schematic showing linkage of public place highlighted with markers to nodes of other sub-systems on map

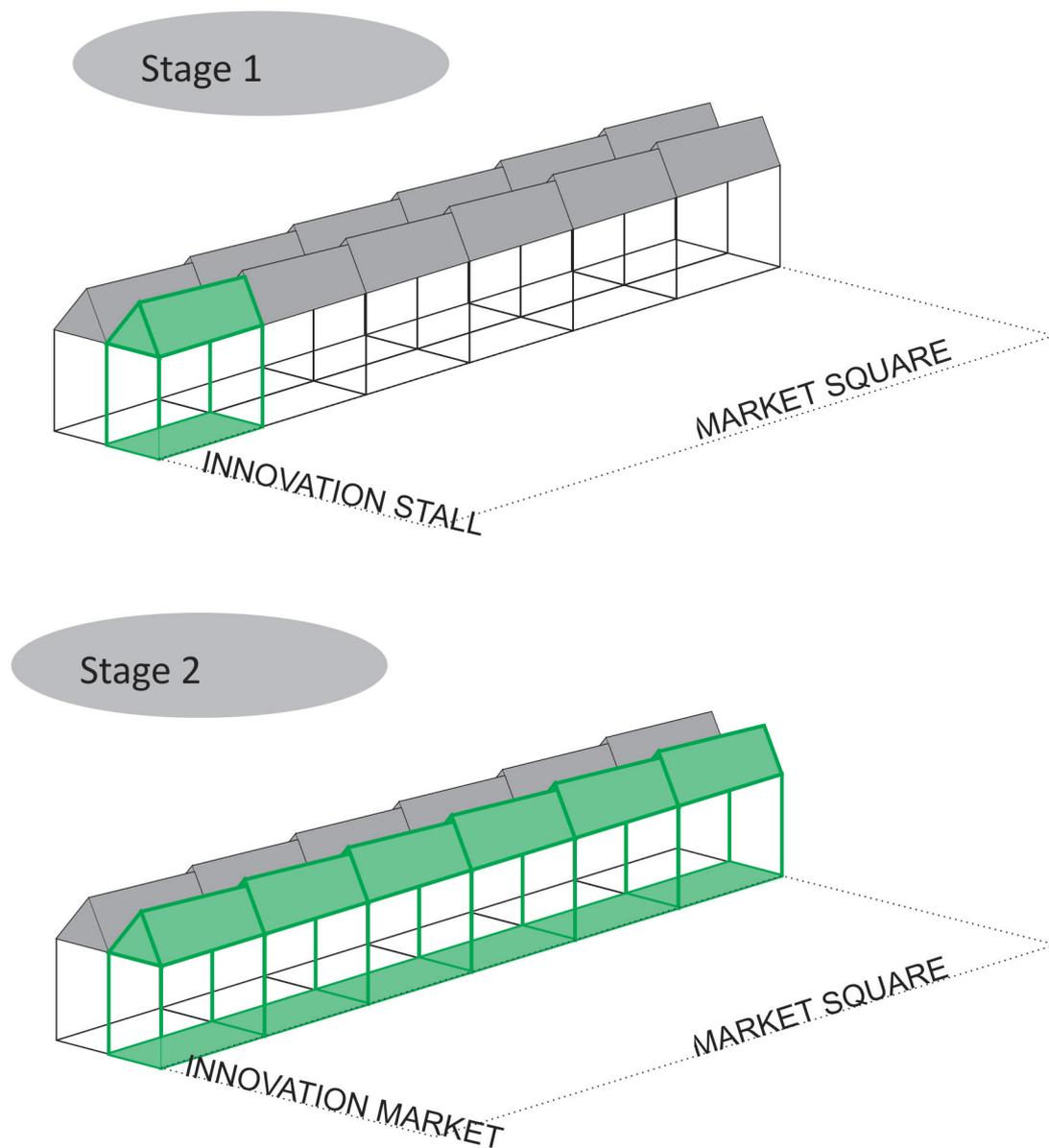


Figure 7.6: Two step growth process of “ First ever Sustainable Market”



PUBLIC SPACE

and therefore the identity of the island by integrating the knowledge centres relating to the other sub-systems, and attach them through connections that promote their essence.

It is highly suggested that in order to achieve the goal of a sustainable subsystem and/or island, environmentally friendly technologies and strategies need to be supported by the integration of cultural, social, educational and environmental policies that create the ethical and intellectual knowledge, skills, attitudes and behaviours of citizens.

As already mentioned, the markets and events will not need extra infrastructure, but just re-use of the existing infrastructure. However, it should be initiated at De Koog as a pilot project or “the first and hence test project” because of the influx of tourist. Starting from a stall, it can extend to a weekly “Sustainable Market concept” where the whole market is focused on sustainable and inventive innovations. After its success/learnings from the project, it can be further taken to other villages.

These markets should extend as an exhibition to workshops and innovation events. People from other places with expertise on similar topics should not be excluded, especially young researchers and children. Fresh innovative ideas are relevant to the local population.

The local community should develop the design for markers and locations on the public plaza and the nodes on the route. However, it should be implemented only after the TexelLab Jut&Jul functional. These should be visible enough to make a presence but not too many that they begin to dominate the beautiful landscape. An example of such a design is presented in Figure 7.4.

7.4 Conclusion

Public space will thereby provide a physical common ground for the sharing of this knowledge and showing up the innovations. We observe that Texelaars are proud to be a part of the island. To be a part of an innovative island and be known by the outsiders as the innovative people re-initiates the sense of pride and public space proposals like these will help in providing a physical platform and a visual voice there. With these strategies, it is expected that the role of visitors on the island will change from being mere tourist to more aware individuals.



8. Health, Happiness & Well-being

This sub-system refers to the analysis of Texelaars' happiness and well-being based on their life quality standard and their relation with sustainable behaviors and values.



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8.1 Current Situation

As a starting point of analysis, the sub-system was divided into two main topics to define what it means for the Texel case: Life quality standards and Citizens' empowerment towards sustainability. On one hand, life quality standards are related to the general well-being and living conditions of the population. On the other hand, citizens' empowerment towards sustainability refers to the level of involvement and awareness of citizens with the sustainability goals, and the development of individual or collective initiatives to support the goal's achievement. Moreover, nine criteria were selected to provide insights into the sustainable values in Texel: transition to sustainable/renewable energy, reduction of CO2 emissions, maintenance of nature, air quality, saving food product, saving energy, saving water, availability of local products, and taking actions to be sustainable

The island of Texel is already quite concerned with sustainability. Initially, due to the negative effects related to tourism, in 1996, a working party was set up by the municipality with the goal to reduce the environmental impact of large-scale tourism. Currently, Texel aims to become completely self-sufficient in sustainable energy and water facilities by 2020. Consequently, the focus of Texel, and therefore its prevailing technologies, are sustainable technologies related to generating its entire energy and water demand in a sustainable way. Energy-wise, this means that not only technological systems such as solar panels and tidal energy are prevailing to ensure the demand is met, but also technological systems related to reducing demand are prevailing.

“I am convinced it is possible. Without doubt, it is technically possible. A lot is dependent on the support of the population. If there is a will, there is a way” Mw. Mr. C.J. Geldorp-Pantekoek, Mayor of Texel.

The current socio-technical subsystem can be described as a top-down system in which the sustainable development ideas come from governmental bodies, such as the European Union, the Dutch government and the municipality of Texel. Due to this mechanism, even though the values of Texelaars are not directly determining the systems' goals, they have a high influence in the success of such endeavor. As the health, happiness and well-being sub-system focuses on the people in Texel, further analysis will be focused on them.

8.1.1 Texelaars

Looking at Texelaars interrelation with prevailing resources and technologies, the relation between financial resources, jobs, and tourism can be identified. Most job opportunities and entrepreneurship projects are linked to leisure activities (mainly focused on tourists) and the hotel and catering industry (Cafés and restaurants). In relation to the island's water and energy goals, inhabitants influence the energy consumption patterns mainly through housing and transportation, and they influence the water consumption patterns mainly through agricultural activities and housing. Note, however, that the agricultural sector have a strong connection with technologies related to water management.

On the other hand, when analyzing emigration data for inhabitants of Texel, it can be noticed that such exodus is especially trendy to inhabitants of Texel within the age group of 20-40 years (CBS, 2015). From 1998-2008, 33% of the inhabitants between 20-30 years left the island. This rather large proportion can be attributed to the challenges the island is facing to retain its young people: diversifying possibilities for entertainment, improving opportunities for education and job stability.

8.2 Future Situation

When envisioning the future desired state of the sub-system, the necessity of a transition towards more sustainable values and

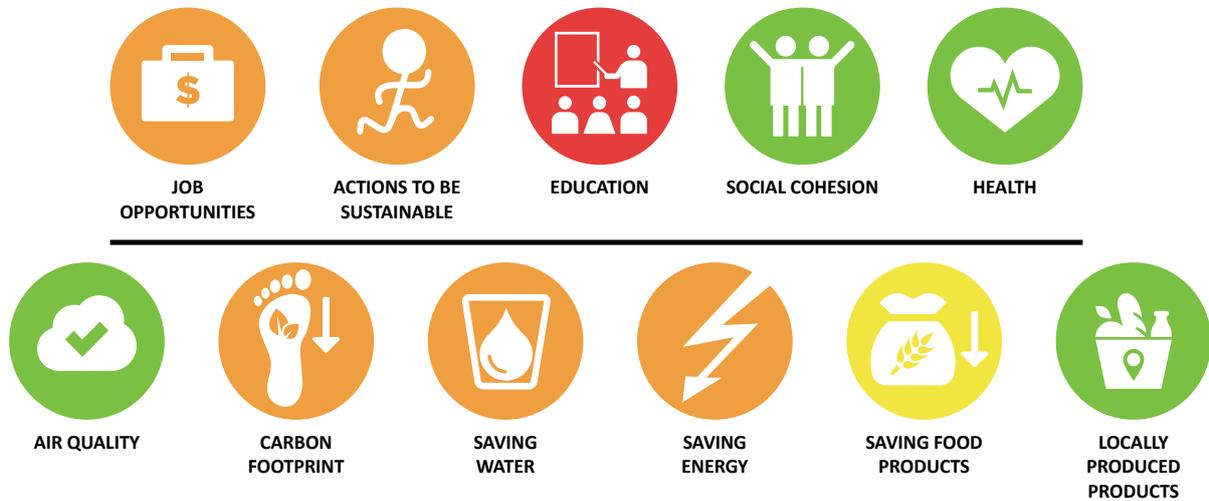


Figure 8.1: Survey results related to sustainability criteria for the Happy Texel Index

behaviors in Texel’s society was identified as a key factor to have a positive influence on the island’s goals achievement. However, a clear measure of success was still missing in order to assess if the results of sustainable initiatives’ implementation were leading Texel towards the desired transition. At that point, the Happy Planet Index (HPI) was referenced as the leading measure for sustainable well-being, and it was evaluated as an appropriate tool to measure the success of the implementation of sustainable happiness in Texel. Generally, the HPI is used for countries; however, it would be ideal to adapt the measure to the island scope in order to ensure a proven good measurement tool and enough data to compare Texel’s development with global standards in terms of sustainability.

8.2.1 The Happy Texel Index (HPI, 2015)

The HPI measures “the extent to which countries deliver long, happy, sustainable lives for the people that live in them”. It is an efficiency measure on how many long and happy lives countries are capable to produce per unit of environmental input. It has a scale

from 0 to 100 with a proposed target value for nations of 89 based on reasonable levels for the criteria used for the calculations, and it recommends to use complementary measures in order to not to lose focus on other relevant objectives related with well-being and sustainability.

$$Happy\ Texel\ Index = \frac{Life\ Expectancy \times Life\ Satisfaction}{Ecological\ Footprint}$$

lup World Poll, the respondents are asked to locate themselves in a scale that goes from zero (worst possible life) to 10 (best possible life). Secondly, life expectancy is a globally used measure of health. Finally, the ecological footprint of resources consumption promoted by WWF is used, and it is a measure of the amount of land, per capita, required to



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sustain a country's consumption patterns. On the other hand, it is important for the index to be implemented prior to the starting point for the implementation of a sustainable plan to have a baseline scenario to compare future developments.

8.3 Towards the sustainability transition

Transitioning towards a more sustainable Texel is a lengthy process. To ensure the success of this process, it is essential that the Texelaars do not only accept this transition, but that they also support it. Creating support and acceptance from the community is twofold. On one hand, it focuses on creating local enthusiasm and active support for this transition, and on the other hand, it is also about anticipating on resistance from the inhabitants or other stakeholders connected to this transition (Mourik, Feenstra & Raven, 2007).

8.2.1 Completing the overview of the current sub-system

Based on the vision for the future, it is necessary to complement the information regarding the values related to sustainability of inhabitants. Such goal was achieved during an on-site research in Texel through interviews with inhabitants and the execution of a value survey with a quota sample of 30 inhabitants at Den Burg. Moreover, a raw calculation for the HTI was made based on available information. As no data was found for Texel, the life expectancy of the Netherlands (80.7 years) was taken as a basis. In addition, as calculations for the ecological footprint for Texel would require a considerable high amount of data regarding its consumption patterns, an estimation was computed taking as reference the value for the Netherlands and the differences in land use and population of the island compared with national levels.

The HTI calculated for Texel is 50, which is higher than the national average (43.1). However, it is still far from the goal of 89, so it must focus on creating the necessary well-being to

increase life expectancy and life satisfaction, and taking measures to decrease its ecological footprint by at least 60%. Overall, Texelaars give a high value to the island's green environment and the amount of tourists is a driver of their life quality. Furthermore, they have a high life satisfaction level, which is a clear indicator of the overall social cohesion, Texelaars' pride to be islanders and the good conditions provided by the island to make a living. However, such high level has the potential to become a bottleneck when proposing a transition towards sustainable behaviors because a strong incentive will be required to change the current inertia. On the other hand, the importance that young people's future has for the islanders was confirmed, they focus their concern on the opportunities available for them to develop personal and professional. Finally, there are still challenges related to the transition to green energy and the Texelaars' satisfaction with their access to such service.

Figure 2, Figure 3 and Figure 4 present the analysis of values related to sustainability comparing age groups. Even though the overall life satisfaction is high, there are differences among groups. The group with highest life satisfaction is the middle-aged and the least satisfied are the elderly, results also reflected by the HTI. Moreover, the value of taking action to be sustainable lacks of importance among inhabitants, with the middle-aged people having the highest interest on it. This situation increase the challenge of starting a transition towards a more sustainable society. Finally, the age group giving more importance to sustainable values are the elderly and the ones giving the less importance are the young people. This fact increases the complexity of young people circumstances on the island and the importance of focusing on shaping the values of this generation towards more sustainable ones in order to achieve and sustain Texel's sustainability goals.



Figure 8.2: Value assessment for young people (-30 years old)



Figure 8.3: Value assessment for middle-aged people



Legend: Color scale goes from dark green (high) to red (low)

Figure 8.4: Value assessment for elderly people (+60 years old)

8.2.2 Proposed design to drive change in the sub-system

How can the Happy Texel Index be increased while maintaining the current life satisfaction?

According to the HPI equation, The Happy Texel Index is related to life expectancy and ecological footprint. The current life expectancy on Texel is quite high, so the factor that needs to be lowered is the Ecological Footprint. Moreover, what lies at the basis of this challenge is the value Texelaars give to sustainability. Such values are strongly related to their knowledge on how their behavior influence their surrounding environment, for example, on how saving energy will decrease their carbon footprint. This means the key to make the transition to become a self-sufficient island is to educate people about the consequences of their actions, fact reflected in The Happy Texel Index.

The next step to consider is how to implement the Happy Texel Index so it will be visible to the public. According to Pieter de Vries, a policy worker on the department of Sustainable Development at the Municipality of Texel, the HTI could be a vital part of the 2020 goals. The municipality, however, appeared to

be reluctant to facilitate the measuring and the guarding of the HTI because of the high life satisfaction already existing:

“Why should we push our inhabitants to live differently if they are already happy?”

This confirmed the idea that the municipality of Texel would not be the main driver of the HTI. The municipality will support but not facilitate.

Because HTI monitors the effects of the other sub-systems on the island, it will be measured and guarded by one organization. An organization to which the people of Texel can come for consultation on how to run or start their sustainable business. Initially, a HTI advisor will be appointed to accurately measure the current index. Afterwards, the index and its influencing factors will be made visible on the website of this organization. As a first insight, the texelgeeftenergie.nl website could be a good start for this.

Finally, in the future system, as the HTI will assess the behavior of the people of Texel and foresee unsustainability mechanisms rising in the island, starting sustainable entrepreneurs will get to know the possible market value of



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their business and their contribution to Texel's sustainable goals. Part of the design is to host the HTI consultation in the Jut Platform, which connects the Knowledge Route, the waste and water cycles. It is the place where all the sustainability mechanisms come together, a place where people work together to make profit by being innovative to create more jobs for young people. Located in the harbor, it will be the jewel of the Island. Visible from "the other side", it will function as a showcase of the technological and social development Texel is undergoing. Revealing to the world how Texel is leading in sustainability.

8.4 Conclusion

After spending nearly a week on Texel, we can draw many conclusions related to our subsystem research and our design on which we had worked in the previous weeks. We were surprised of the many different initiatives related to sustainability that were already active on Texel. Even more surprising, was that many of these initiatives, which hadn't been found previously, eventually became part of our research and therefore part of our report. Looking back at our preliminary research, our previous analysis confirmed the assumptions used for the previous design and provided new insights on challenges to face during the transition. These new insights helped to find a place where the Happy Texel Index (HTI) would be implemented and in what way it would contribute to the overall system and the sustainable transition of Texel. By assuming a moderating role from within the Innovation Center (JUT), the index will help to shape and to guide the entire transition towards a more sustainable future.

8.4.1 Recommendations

For the HTI to accurately guide the sustainable transition of Texel, then the index should be measured properly by the Innovation Center (JUT) themselves.

Since the HTI can also assume a guiding role directly connected to the inhabitants of Texel, the index should also be made accessible to the inhabitants. Media such as the internet would serve in providing this information in an accessible fashion.

Ecohof Texel

“Our main goal is to be an example for sustainable lifestyle. We do not only want to create only ecological houses but also want to stimulate social interaction. For example when you are in a big school you don't know each other. But by scaling down, we can create freedom in connection.

In an interaction, energy is exchanged, when I give my high energy to people with low energy it will influence their immune system. When somebody is out of the circle, he will become ill. It is both a spiritual and a physical approach.

Texel is an island, and on an island there is always more interaction. However, what happens on Texel is a more superficial interaction. People talk about each other without having a profound interest in one another.

Getting started

Everyone will have their own house, and there will be a shared space where people come together. The composition of the houses will be circular, where the center is the communal area. But not only the houses, but also the material we use will benefit well-being of the inhabitants, this means we want to focus on bio materials such as straw and wood. We expect that after the realization of the project, it will start growing very fast, because people appreciate living in a more social and natural environment.

Social strength

The essence of such a community is to provide the opportunity for people to speak their heart. When a person is bothered with something he can step up and talk to people about his problem. It is called a 'forum', in a group this person will say everything that he is feeling. The others don't say or ask anything, so this person can say anything he wants. Afterwards the others in the community tell him what they heard and what they have seen they to give a reflection. After that they will know what needs to be changed. At this moment when people share their issues with others, they are being told to act in a certain way, they will be comforted to make the issue feel less bad or people start talking about their own experiences regarding this situation. By changing the way we interact, people feel heard and people feel understood. People feel safe to share their irritation, so people will talk with each other. And it will prevent people from talking behind each others backs.

Well-being and sustainability

We want to focus on the education on a sustainable lifestyle. The young can inspire the elderly and the elderly can in turn inspire the young people. Eventually the sustainable lifestyle will become a habit. People need to change, and we want to be an example for them to make the transition happen. On Texel there are already so much initiatives, take Lets Texel for instance, it is a Local Economic Transition System. When I buy something I don't need anymore I can give it to someone else and pay in money or in "Boetjes" which is equal to a euro. In this way, it becomes a trading system of a product. Although this is digital, it shows that the people on Texel already are thinking in the right way.

Our idea is to build a test environment where people could rent a house for a month or a week at the EcoHof, here they can experience for themselves what it will be like to live a more sustainable lifestyle. At this location, the HTI could be applied so people can see how their actions have an influence on the index. Because the people on Texel are willing to change but the transition towards taking action remains a difficult one. This test environment will make this transition a lot easier, because people will experience what a nice environment they can live in and can decide for themselves that they want this as well. Luckily, the people of Texel already value living in and with nature, because that is mostly the reason people come to Texel. In the end, the goal is to provide the area with its own energy and water supply.

Essentially, what we can do is, offer an example for a change in a sustainable lifestyle, living environment and expenditure. In that way, we see that the Happy Texel Index can grow from 50 to 70. So the Happy Texel Index can really contribute to revealing the importance of our design to the public. We really like how the different generations are addressed and how the index shows what core sustainability values need to be addressed.

The proposed Innovation Centre "Jut" also really appeals to us because it is needed to catch peoples attention right away, when entering the island. This place could really be a starting point for us to set up workshop for young and old and to get started with the HTI." – Luciette van Hezik and Peter Kieft (www.ecohoftexel.nl)





PART III: The Proposal, Jutter 2030



1. Introduction

During the research week on the island, we found that Texelaars could best be described with words like ‘innovative’ and ‘individualistic’ or synonyms of these words. Contrary to our original beliefs, we decided that there is no need for a rigorous intervention in Texel. The inhabitants are already very innovative themselves, but there is so much potential that has not been used yet. We believe that the individualism on Texel is a barrier for increasing the innovation on Texel, which leads for instance to the exodus of youth mentioned in the health and happiness platform. In this part of the book we will introduce the proposal that we decided upon while being here on Texel. The main goal of the intervention is to capitalize on the strong points of Texel, by using the innovative possibilities that are already on the island, to increase the sustainable aspects of Texel.

2. The Jutter 2030 Network

We call our overall proposal for Texel “Jutter 2030”. The Jutter 2030 network (see fig. 5) connects tourists, locals, young entrepreneurs and the Happy Texel Index to accelerate the transition to a self-supportive and a sustainable Texel. The Jutter 2030 is composed of the three initiatives described in this part of the book; the JUT, the route generating app and the Happy Texel Index.

These three facets strengthen each other, which is visualized in figure 1. The initiatives that arise from the JUT can be showcased in the app, which will give them more attention and therefore chance to succeed. The JUT increases the amount of entries in the app and thereby makes Texel a more attractive island. Finally, the overall goal is to increase the happiness of people on the island. Whether this goal is achieved can be measured and evaluated by the Happy Texel Index which has been explained in the Health and Happiness chapter.

3. JUT

‘JUT’ stimulates entrepreneurship in the Texel manner: creating opportunities by using what is already available. The incubator stimulates local entrepreneurship by providing entrepreneurs with space, knowledge and experts that can accelerate the growth of the company. As explained in the chapter ‘Materials and waste’ the three initiatives ‘De uitdaging’, ‘Texellab: Jut & Jul’ and the incubator form ‘JUT’. JUT (see fig. 2) aims to improve the transparency on what is already available on the island concerning knowledge, waste with value and innovation. Doing so, it tries to reveal more of the unused potential on the island to create and reach economic feasibility for local entrepreneurs.

JUT could combine initiatives that are already or are planned to be on the island. During our stay, ‘De Verzamelpost’ indicated they are already planning to start a kids lab for innovation. The Texellab:JUT&JUL, where local entrepreneurs showcase their ideas to children, tourists and locals connects to this idea. As described in the Materials and Waste chapter, the virtual waste market can be represented by ‘De Uitdaging’. This initiative already received the funding and could be extended to the proposed design which contains incentives to join the program (for more information see chapter Materials and Waste). The incubator could be represented and integrated with the project ‘Werken op een eiland’, which tries to reveal jobs on the island to the mainland in order to get the youth back. The incubator could attract young people who desire to become an entrepreneur.

4. Texel route creation app

In the sub-systems leisure and knowledge, public space and Texel as host there was a common idea of so called knowledge routes. The combination of this resulted in an idea for an application that will be able to create similar but individual routes with one or more themes.

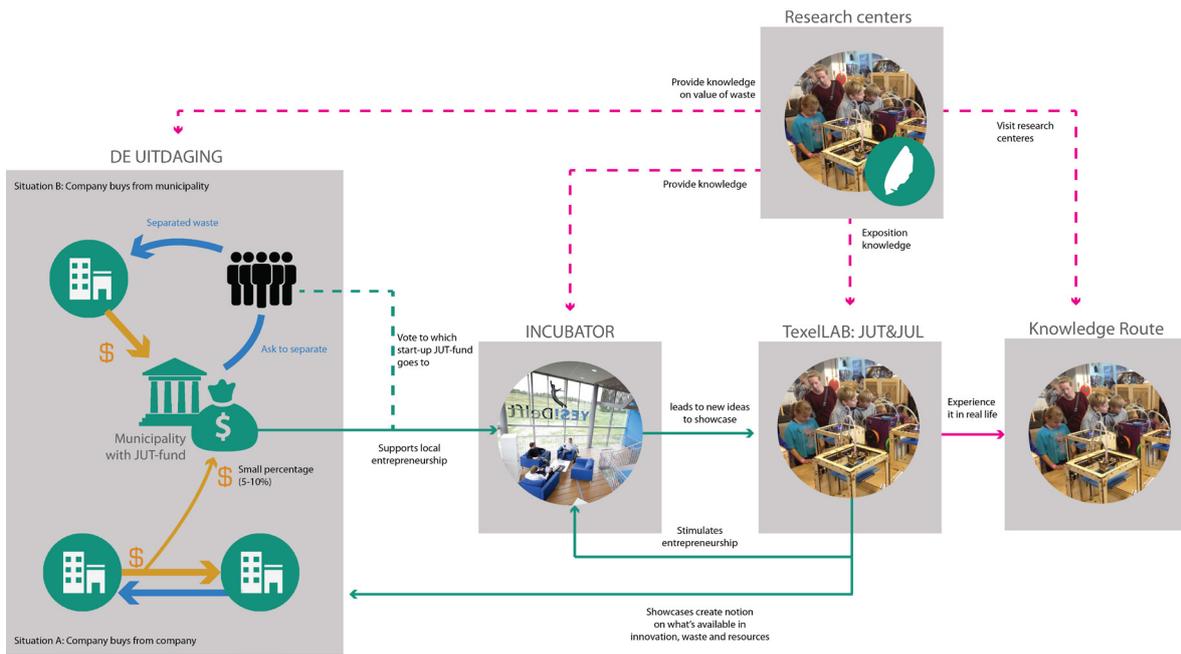


Figure 1. An overview of the Jutter 2030 intervention.

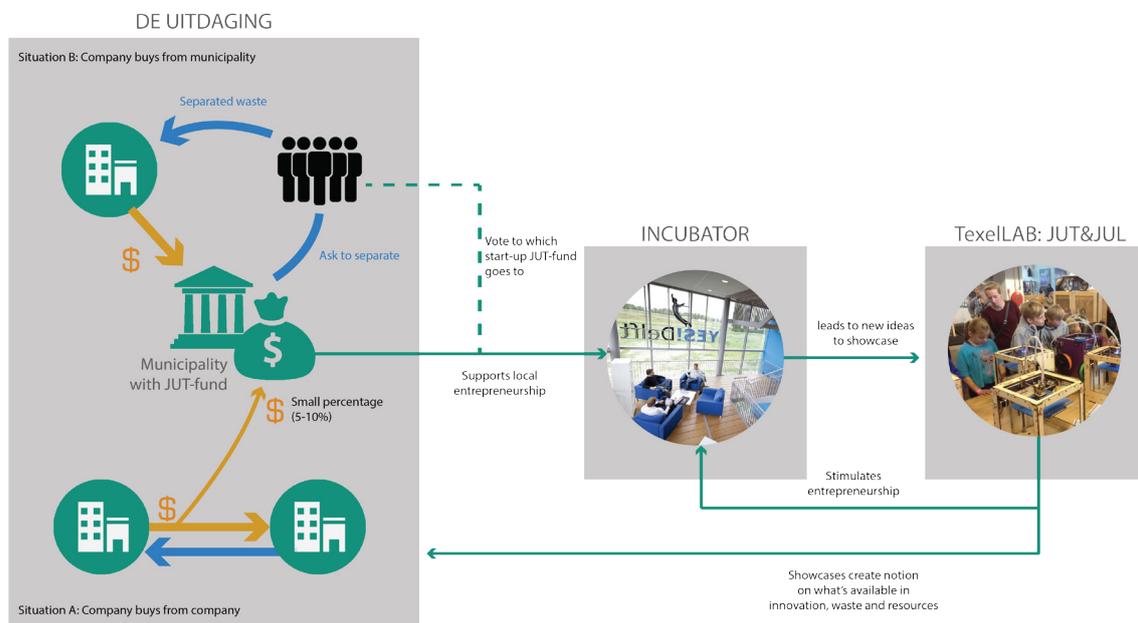


Figure 2. An overview of JUT

This application will lead to a different experience for the tourist. It will mainly make the tourist very independent, while having a lot more information directly available. The tourist will be able to be more aware how the production on Texel is connected to the consumers and how this is environmentally and economically more sustainable. This will help advance Texel, mainly the touristic part, in the transition towards a more sustainable future.

Next to more access to knowledge and information about the island and its processes, the tourist will also have more insight in the research performed on the island. This will increase the character of Texel as a sustainable (knowledge) island. It can also spark the interest of the tourist for sustainable technologies and processes. This inspiration may result in the tourists taking this home and applying it in their lives. It may also result in a synergy between tourist and Texelaar that may lead to an increase in technologies, economical situation or experience of the tourist in itself.

Next to these effects for the tourist, it will increase the visibility of the self-sufficiency and sustainability of Texel in general. This will positively affect the reputation of Texel and will probably influence the pride of Texelaars.

Application use

The application can be started really easy with the mobile phone, tablet or with the computer. When you start the route generator app you will see the starting screen explaining how it works. Next you can start to create a route and you will come to the page seen on figure 1. From here you can start to give your personal preferences, such as: start and end point, time and distance, themes (e.g. nature, local food and products, green energy, etc) and the amount of activities you want to visit.

The application generates multiple routes on the basis of the given input. You see different nodes/elements (activities, institutes, etc) on the map that are connected in different routes. You have the possibility to choose one

route. Also there is a possibility to tweak the route a bit by removing a node or changing the course of the route (like in Google maps). Your location is also shown when using a mobile phone or tablet with GPS. Some examples of routes that are generated with different preferences you can see in figure 2.

If you want more information about a specific node, you can click on it. For example the water treatment plant shows the map where the wastewater is collected and what is done with it. Also if you are interested where the food is served when you visited a cheese farmer on the island, this is possible (figure 3). When clicking on a business that produces locally food, it will turn red and green links towards its customers will appear. This also works the other way around, so it is always visible where used products come from.

Also possible to click on activities to get a full list of all the activities on the island sorted by theme. Idea could be to also rate the activity and make a ranking.

Already existing routes and activities are loaded into the app. So it is also possible to choose an already existing route such as the Jan Wolkers route, the asparagus route, the local food route, etc. The app gives the extra possibility to create your own route.

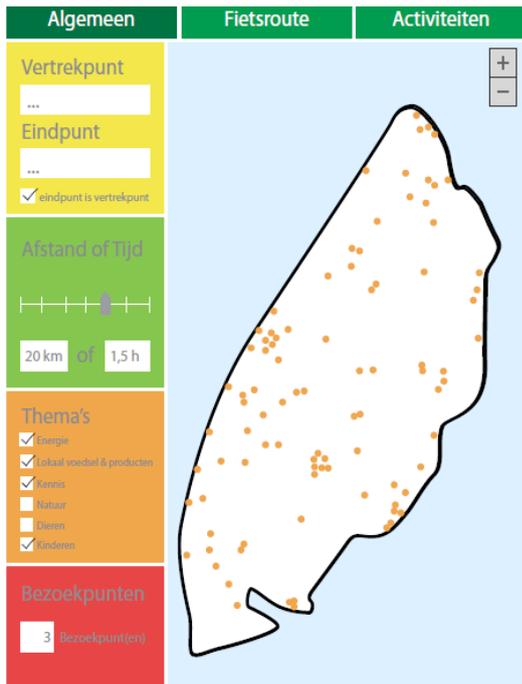


Figure 3: Main page of the app

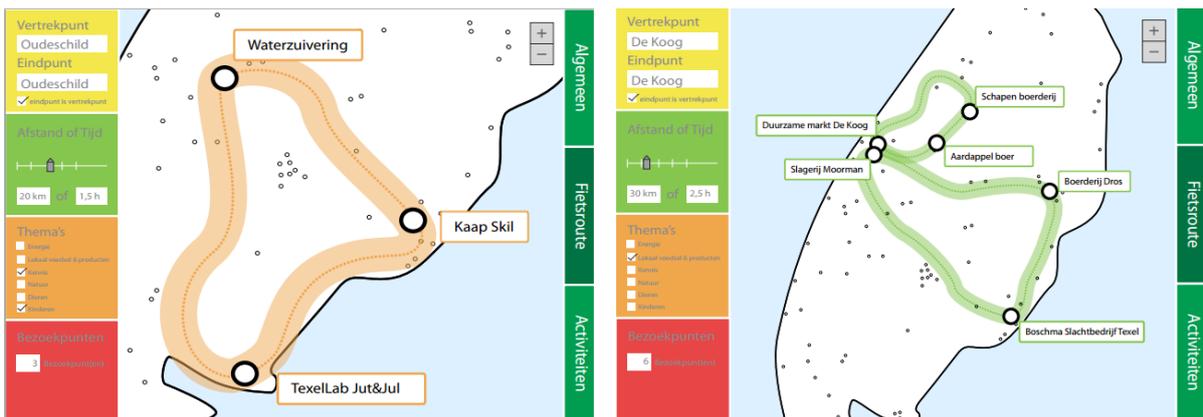


Figure 4+5: Route examples: knowledge & children (2) and local food (3)



Figure 6: Texel product links example (here: cheese farm)





PART IV: Conclusion



The research goal described at the beginning of this book was to answer the question on “How can we use the resources available on Texel to accelerate the transition to a sustainable Texel?” The work on the individual sub-systems has given interesting results and the findings of the research has resulted in some general observations. We introduced a general outline for each sub-system, starting by evaluating the current situation and then proposing a future situation. Finally, a transition route to the future situation was suggested. We found a lot of similarities within the different subsystems that are summarized below. Based upon these similarities we proposed a plan that makes sense in the bigger picture. This was explained in Part III of the document.



A lot of the subsystems describe the Texelaar with words like ‘innovative’ and ‘individualistic’ or synonyms of these words. The interview conducted by the ‘Water Cycle’ sub - system with Mr. Nico Tessel showed a sense of this innovativeness; it was shown how the use of bacteria substituted the use of chemicals to clean phosphate from wastewater. An example of the individualism could be found in the interview with the owners of the Zelfpluktuin. They have an innovative idea of eating the food you pluck, however, they would prefer to work alone and not expand to other areas of Texel.



We found that the Texelaars interact with each other regularly, but these conversations are often limited only to pleasantries instead of exchanging their ideas with each other.



Given these causes of the current situation in Texel, we believe that a few actions are necessary. The first action is to increase the connectedness of ideas and people, because we hypothesize that this would fully use the potential of the innovativeness of the Texelaars. We believe that increasing the connectedness of the individual entrepreneurs could lead to increased combination of innovative ideas and increased collaboration between the Texelaars. Ideas for this action build upon the proposals that are described in the Materials and Waste, Food and More, Public Space and Leisure and Knowledge subsystems.



The second action would be to create a stage where these new and innovative ideas can be showcased to both strengthen the first action and share these ideas with tourists to inspire this group and improve tourism. The first action is strengthened because Texelaars could become inspired by this showcase of ideas. Ideas for this action build upon the proposals that are described in the Materials and Waste, Public space, Food and More, Texel as a Host and Leisure and Knowledge subsystems.



The third action is to further exploit the potential of increasing the sustainable practices. Within the chapters on the subsystems, several opportunities for doing this have been explained. For instance in the mobility chapter, where it is proposed to explore the opportunities to create an increase in the usage of carpooling. This also follows from the initial research goal that was explained in the introduction. Ideas for this action are described in the Water Cycle, Mobility and Leisure and Knowledge subsystems.



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2. Texel as Host

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Appendix A

A.1 Life expectancy

Territory	Life Expectancy	Life satisfaction (0-10)	Happy Life Years	Footprint (gha/capita)	Happy Planet Index	Population
The Netherlands	80,7	7,5	65,1	6,3	43,1	16.616.000
Texel	80,7	8,4	70,6	5,7	50,0	13.552

A.2 HTI measurement

HPI Rank	Country	Age group	Life Expectancy	Well-being (0-10)	Happy Life Years	Footprint (gha/capita)
67	Netherlands		80,7	7,5	65,1	6,3
Current	Texel	Total	80,7	8,4	70,6	5,7
		Young	80,7	8,4	70,5	5,7
		Middle	80,7	8,8	73,1	5,7
		Old	80,7	7,9	67,8	5,7
Future		Total	84	9	77,5	1,9



A.3 Survey Results Life Satisfaction

Age	Gender	Occupation	Education level completed	Inhabitant of Texel since
16	Female	Student	High School	7
17	Female	Store Sales woman	Pedagoge	17
17	Female	Store saleswoman	Healthcare and Well be	16
18	Female	Unemployed	HAVO	18
18	Male	Host	Hospitality	18
18	Male	Instructor	Economics	18
20	Male	Salesman	HAVO	20
22	Male	Farmer	None	5
25	Female	Store saleswoman	Hairdressing/MBO	25
28	Male	Retail	Retail	5
29	Male	ICT-specialist	MBO-4	27
Average Young				
32	Male	Preacher	Theology	4
33	Female	Waitress	VBO	33
34	Male	Store salesman	MBO Cooking	34
35	Male	Salesman	University	7
36	Female	Teacher	SPW	7
41	Male	Marine Technician	MTS	41
41	Female	Graphic Designer	sch Lyceum Amster	41
43	Female	Civil Servant	Social Sciences	7
44	Female	Horeca	Healthcare	44
54	Male	Disabled	None	44
Average Middle				
62	Male	Pedagogue	Academical	6
62	Female	Administration	HBSA	60
63	Male	Netmaker	chool & Train operat	63
65	Male	Unemployed	None	30
66	Male	Retired	HBS Atheneum	56
73	Female	Retired	MuLo	73
80	Female	Retired	MAVO	7
80	Female	Retired	Housewife	80
84	Male	Farmer	High School	66
Average Old				
Average				

Exodus of young people	Amount of tourist	Amount of used water	Amount of nature	Current state of nature
6	6	6	7	7
7	9	7	10	10
7	9	8	10	10
6	10	6	8	8
7	10	9	10	10
3	8	7	10	10
8	9	8	9	7
	9	8	10	9
5	10	7	9	8
8	10	7	9	9
6	8	7	9	9
6,3	8,9	7,3	9,2	8,8
12	2	8	1	3
4	8	8	9	9
8	10	6	9	9
2	8	7	10	8
7	9	8	8	8
5	10	7	10	10
5	8	5	8	9
5	9	9	10	9
3	9	8	9	8
5	9	7	10	9
6	8	7	8	8
5,0	8,8	7,2	9,1	8,7
15	2	9	1	3
	8	6	10	8
6	8	8	7	7
5	7	6	9	8
5	9	7	10	10
	8	8	8	8
7	7	7	8	7
	8	7	9	
	7	8	4	8
	8	8	4	8
5,8	7,8	7,2	7,7	8,0
14	3	8	5	1
5,7	8,5	7,2	8,7	8,6
15	3	9	1	2



Exodus of young people	Amount of tourist	Amount of used water	Amount of nature	Current state of nature
6	6	6	7	7
7	9	7	10	10
7	9	8	10	10
6	10	6	8	8
7	10	9	10	10
3	8	7	10	10
8	9	8	9	7
	9	8	10	9
5	10	7	9	8
8	10	7	9	9
6	8	7	9	9
6,3	8,9	7,3	9,2	8,8
12	2	8	1	3
4	8	8	9	9
8	10	6	9	9
2	8	7	10	8
7	9	8	8	8
5	10	7	10	10
5	8	5	8	9
5	9	9	10	9
3	9	8	9	8
5	9	7	10	9
6	8	7	8	8
5,0	8,8	7,2	9,1	8,7
15	2	9	1	3
	8	6	10	8
6	8	8	7	7
5	7	6	9	8
5	9	7	10	10
	8	8	8	8
7	7	7	8	7
	8	7	9	
	7	8	4	8
	8	8	4	8
5,8	7,8	7,2	7,7	8,0
14	3	8	5	1
5,7	8,5	7,2	8,7	8,6
15	3	9	1	2

Current state of the public space	Amount personal recycling	Available facilities for recycling	Personal energy use	Available facilities to apply or buy green
5	5	6	6	6
9	8	10	9	4
9	5	8	9	4
6	5	6	4	5
8	4	10	7	8
10	3	5	4	6
7	6	5	6	6
7	3	6	9	2
5	6	6	7	6
8	7	8	6	7
7	6	7	7	5
7,4	5,3	7,0	6,7	5,4
7	14	9	11	13
7	8	8	9	7
7	4	6	5	6
6	5	9	8	6
8	8	6	7	8
7	5	6	6	6
8	8	7	8	8
9	9	8	9	9
7	7	6	7	5
8	7	8	8	8
7	7	7	7	6
7,4	6,8	7,1	7,4	6,9
7	12	10	7	11
7	9	8	6	7
7	5	6	9	7
8	8	8	7	5
8	10	9	3	3
8	8	8	6	5
6	8	7	7	6
7	7		7	
8	8	8	7	
8	8	8	7	
7,4	7,9	7,8	6,6	5,5
7	2	4	10	15
7,4	6,6	7,2	6,9	6,0
6	11	8	10	13



Education for young people	Job opportunities	Current life satisfaction - Sustainability criteria	Values	
			Transition to sustainable /renewable	Reduction of CO2 emissions
3	6	6,3	6	6
5	7	8,1	8	9
3	7	7,9	8	9
5	6	6,8	3	2
9	10	8,7	10	7
5	6	7,2	9	8
5	8	7,1	7	6
2	2	6,1	8	7
6	9	7,4	8	7
6	7	7,6	8	6
6	7	7,4	7	6
5,0	6,8			
15	10			
5	5	7,6	7	8
7	8	7,1	6	4
9	7	7,8	8	10
7	6	7,5	7	7
5	8	7,7	8	8
7	7	7,5	8	8
9	5	8,6	9	9
4	4	6,8	9	9
8	7	8,3	5	5
6	6	6,9	7	5
6,7	6,3			
13	14			
	7	7,8	9	8
8	6	7,2	8	
6	5	7,0	5	6
6	5	7,4	8	8
4	5	6,9	10	10
7	7	7,2	7	7
4	6	6,6	7	7
7	6	6,7	8	8
7	6	7,1	8	8
6,1	5,9			
12	13			
5,9	6,4	7,3	7,5	7,2
14	12			

Maintainance of nature	Airquality	Sparing food products	Sparing energy	Sparing water
6	7	5	6	5
8,5	8,5	7	5	5
9	9	7	5	5
2	2	5	5	5
10	10	10	10	9
9	10	8	6	5
8	9	9	6	7
9	10	9	4	
9	9	7	7	6
7	7	6	8	6
8	9	7	8	6
7	7	8	9	9
4	4	5	5	5
9	9	9	10	10
8	8	8	8	8
10	10	7	7	7
9	9	8	8	7
9	10	10	10	10
9	9	9	9	9
9	9	6	4	4
7	8	7	7	7
10	8	9	8	8
5	10	8	7	7
7	7	7	6,5	7
6	9	5	5	5
10	10	9	9	9
8	8	8	8	8
8	8	8	8	8
8	8	9	9	8
7,5	8	9	9	8
7,9	8,3	7,6	7,2	7,0



Availability of locally produced products	Taking actions to be sustainable	Sustainability awareness
5	7	5,9
5	7	7,0
6	7	7,2
2	2	3,1
8	8	9,1
7	2	7,1
8	9	7,7
8	5	7,5
9	6	7,6
8	7	7,0
9	7	7,4
7	7	7,7
9	4	5,1
9	7	9,0
8	8	7,8
8	6	7,9
9	8	8,2
10	8	9,4
10	10	9,2
8	2	5,8
8	7	7,0
9	9	8,7
8	7	7,5
6	7	6,5
4	2	5,8
7	9	9,2
9	8	7,9
	7	7,6
9,5	4	7,8
9	4	7,8
7,6	6,4	7,4



Appendix B

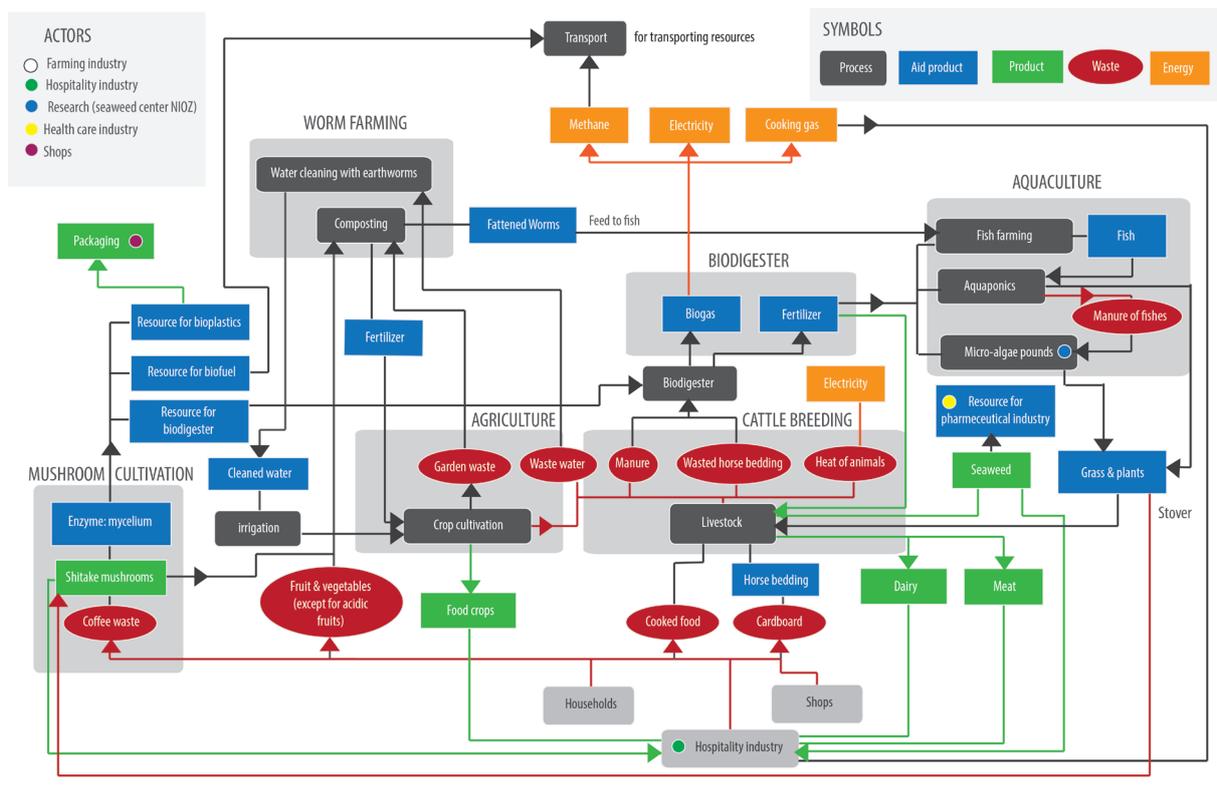


Figure: A hypothetical blue economy design for Texel.

The design exists of subsystems that are interconnected and contribute to the total closed biocycle system. In the figure the system is translated into an image to display all connections between the systems. As can be seen the systems delivers products that can provide in the basic need: food. Besides this the system delivers aid products that are needed as resources to produce products. The system also provides energy, which supports the goal of Texel to become energy self-sufficient. Although it is unknown how much energy can produced, our goal is to make this system energy self-sufficient. If more energy is produced than necessary it can contribute to the energy generation for the whole island.

The system starts with waste of the hospitality industry, farming and households. We found that residual waste, organic waste, bulky garden waste and paper/cardboard are the largest waste streams. Residual waste can be lowered by increasing the waste separation rate and re-using or sharing products of the techno-cycle to increase the product life span which reduces waste.

The subsystems can be divided in five categories: Agriculture, cattle breeding, worm farming, biodigester, mushroom cultivation and aquaculture. These categories all are supported with facilities that are either existing, like farms or the seaweed center of NIOZ, are still need to be build such as the bio digester and mushroom cultivation facility.