Environment Case Study

“Innovations for Wasteless Consumption”

MSc Environmental and Energy Management

MEEM 15
Environmental Stream

Supervisor: Dr. Yoram Krozer
April 17th, 2014
Introduction

Case Study was made for Vlieland island, Netherlands.

UNESCO World Heritage Site

It was conducted from February 22nd till April 17th
Defining the Case Study

Main Objective: Food Waste

Mapping:
- Retailers: Hotels, Restaurants, School, Butchery and Bakery
- Consumers: Households, Camping Sites and Visitors
- Disposal: Municipality and Omrin
- Other key players:
  - Business Council
  - Lab Vlieland
Methodology

- Theory on Circular Economy & Food waste management
- Development of Questionnaires
- Preliminary Research
- Stakeholder Perspective
- Assumptions
- Document Review & Observation
- Result of Analysis
- Solutions (Recommendations)
- Conclusion
**Food waste & Zero Waste Management**

- **Definition: Zero food waste management**
  - Waste is a resource and symbol of inefficiency
  - Technical, Environmental, Financial, Social, Cultural, Institutional, Legal

- **Definition: Zero Waste City**
  - Avoid and Eliminate waste
  - Recover all resources from waste stream

- **Definition: Food Waste**
  - Avoidable & Unavoidable waste
  - Discarded, lost, degraded
  - 1/3 of food is lost (Fox, 2013)

---

MSc Environmental and Energy Management (MEEM15) University of Twente
Vlieland Findings - Retailers

- **Supermarkets (2)**
  - Inventory management based on experience
  - Garbage sorting implemented (even though is then mixed)

- **Hotels and Restaurants (4)**
  - Mostly food waste is bread, fruits and vegetables
  - 5% of food is thrown away
  - No waste segregation
  - Some have tried to make smaller portion plates
  - Most of the food waste is leftovers

- **School**
  - About 60% of the children throw “lunch” away
  - Main waste: Bread
  - No compost, no campaign,

- **Butchery**
  - No waste

- **Bakery**
  - Left bread is thrown away (small quantity)
  - Impossible to predict future consumption
Vlieland Findings - Consumers

Households (20) and Visitors (5)
- Respondents (100%) support the idea of separating waste but Vlieland has no segregation waste policy
- Practice of preventing and reducing: household (85%), visitors (60%)
  ✓ kliekje, plan a head before shopping, regular shopping
  ✓ left over
- Household waste (low) vs visitor waste (high)
- Like gardening (65%) vs composting (45%)
- Shopping = buying + interaction with others
- Family dominated: prefer to cook, buy more

Camping Sites (2)
- Do not separate waste
- But they do have awareness campaigns regarding waste
- A lot of waste in peak season

<table>
<thead>
<tr>
<th>Category</th>
<th>Reasons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>Religious</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Life value</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Saving cost</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Self-awareness</td>
<td>60%</td>
</tr>
<tr>
<td>Visitors</td>
<td>Saving cost</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Self-awareness</td>
<td>80%</td>
</tr>
</tbody>
</table>
Vlieland Findings - Disposal

Municipality
- No awareness campaigns have been conducted
- There is a problem but not considered priority
- Communal composting was introduced once
- Low volume, odor

OMRIN
- Waste treatment plant and incinerator are located in mainland
- 640 kg waste produce per person per year
- Waste collection cost is higher in Vlieland than other islands such as Schiermonnikoog

Schiermonnikoog
- Waste produced per year:
  - 715 tons household waste
  - 261 tons companies waste

No waste segregation
Main concern:
- Collect waste in a more effective and efficient way
- Proposed magnetic underground bins

Transportation cost
€450 per container
14 tons/container

MSc Environmental and Energy Management (MEEM15) University of Twente
**Vlieland Findings - General**

**SUMMARY**
- There is a food waste problem (not a big one)
- Different waste management from mainland
- No waste segregation (organic & inorganic)
- Households & Visitors have a high sense of awareness
- Costly to send waste to mainland

**Business Representative**
- No financial incentive to reduce waste amongst retailers
- Collection of waste is expensive
- No awareness campaigns for reducing waste
- More communication between gov. And business

**Lab Vlieland**
- Food waste is a problem
- Waste neutral festival (I.T.G.W.O.)
- Neither inputs or outputs are controlled

MSc Environmental and Energy Management (MEEM15) University of Twente
Solutions

1. Order
2. Processing
3. Sale
4. Disposal
5. Buying
6. Cooking
7. Eating
8. Disposal
9. Collect
10. Transport

Food Waste

Supplier

Retailer

Consumer

Disposal

Waste Treatment

MSc Environmental and Energy Management (MEEM15) University of Twente
See PDF file (Solutions Table Update) for the list of:

- Generic Solutions
- Retailer Specific Solutions
- Consumers Specific Solutions
- Disposal Specific Solutions
Generic Solutions

Waste Segregation at Source

Awareness
Creation/Campaigns
- Need Municipality involvement
- Raise workshops
- Eco days in community
- Cookery Demonstration (Glasgow, project)

“Waste Free Lunch” School Contest
- Posters and classes about food waste
- Monitor food waste during a week
- Give prizes to the class
- with less weekly waste
Composting & Communal Gardening

- Backyard composting: most HH have garden and they are already doing it.
- Green cone solar composting (Hawaii)
- Communal Composting:
- On-site Composting:
- Rocket acelerator composter:

Policy:

- Subsidies for composters
- Providing separate containers for waste segregation
- Changing from a “fixed cost” system to a “semi-variable” cost system
- EPR
Retail Specific Solutions

E-solutions
• Leftoverswap
• Leanpath
• Wise up on Waste App

Plate Size Reduction
• Go from plates of 24cm to 21 cm
• 19.5% reduction of leftovers

Providing social cues
• 20.5% reduction of leftovers

Re-useable, Durable, Airtight Packaging

Tourist Information sharing
• Helping retailers to have better inventory management

Demand Side Management
• Better product display (small quantities but more often)

School
• Flexibility and change in recess time
• + the awareness campaign

MSc Environmental and Energy Management (MEEM15) University of Twente
Detailed Solutions – Consumers

**Smile Market**
- Local production for local consumption
- Based on donations

**Barter Market**
- Sharing foods
- Trading food
- Give out the excess

**Prevention Tips**
- Do not peel
- Eat the leaves and stems
- Eggshells for the garden
- Store in the freezer
- Coffee Grounds for the soil
Detailed Solutions – Disposal

Pay as you throw
- Volume based waste fee system (Korea)
- Buying certified bags for disposal
- This encourage people to reduce waste

Restrict use of plastic bags
Promote the reusable container
- Carry your own container for different liquids and some solids (grains)

Waste Bank for Dry Recyclable Waste (Indonesia)
- HH need to separate their waste
- Bring recyclable waste to certain site (volume monitored)
- Wastes are reprocessed into handcrafts
- Reusing the waste for souvenirs

MSc Environmental and Energy Management (MEEM15) University of Twente
Recommendations

1. Festival
   - Awareness Campaign
   - Barter Market
   - Waste Segregation (inside the festival)
   - Donation Program

2. Municipality
   - Waste Segregation
   - Communal Composting
   - Awareness Campaign
     - Vlieland (all island)
     - School

- Low Investment
- Easy implementation
- Festival & Municipality Synergy
- 2020 Campaign “Zero Waste”
Conclusions
Integral Solutions

Zero Food Waste: Vlieland

- Awareness Raising
- Waste Segregation & Reduction
- Barter Market & Smile Market
- Composting & Gardening

MSc Environmental and Energy Management (MEEM15) University of Twente
TEAM MEMBERS

Atebe Odafe J. (s1330888)
Ferry Setyo Haryono (s1509926)
Sonam Lhamo (s1509683)
Mohamad Iqbal Abdul Rauf (s1510398)
Nevridedi Endri (s1509896)

Juli Nurdiana (s1510436)
Rahmat Natawijaya (s1509845)
Dhika Suwardhika (s1509861)
Miguel Urrea (s1509446)
Xia Yanhong (s1509675)

MSc Environmental and Energy Management (MEEM15) University of Twente