

# ONE TWO WE – Life cycle management in canteens together with suppliers, customers and guests

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## ABSTRACT

The environmental impacts of all food purchases of the Swiss canteen operator SV Group were analysed within an LCA study. Improvement potentials were identified, which include measures in the canteen operation (e.g. reduction of food waste), measures in the supply chain (e.g. a reduction of vegetables grown in heated greenhouses) and dietary measures such as a reduction of the average amount of meat per meal. The results have been used to initiate the programme "ONE TWO WE" together with WWF Switzerland. It assists the customers (companies who commission the SV Group with the operation of canteens in their premises) to reach improved levels of environmental performance e.g. a 20% cut on GHG emissions in the supply chain.

Keywords: canteen, diet, gastronomy, life cycle management, supply chain, organisational environmental footprint

## 1. Introduction

Nutrition causes about 12% of total energy demand and 18% of greenhouse gas emissions due to Swiss consumption patterns (Figure 1). There are many other environmental impacts that should be accounted for in an LCA. Here we use the Swiss ecological scarcity method 2006 which weights different environmental indicators according to the political targets in Switzerland (Frischknecht et al. 2009). Environmental impacts are quantified as eco-points (UBP for Umweltbelastungspunkte). If all types of environmental impacts are included in the analysis with this method this share rises to about 30% (Jungbluth et al. 2011; Jungbluth et al. 2013). This is due to specific environmental impacts caused by agricultural practice such as pesticide use, heavy metal emissions from fertilizers, land and water use as well as problems caused by acidification and nitrification.

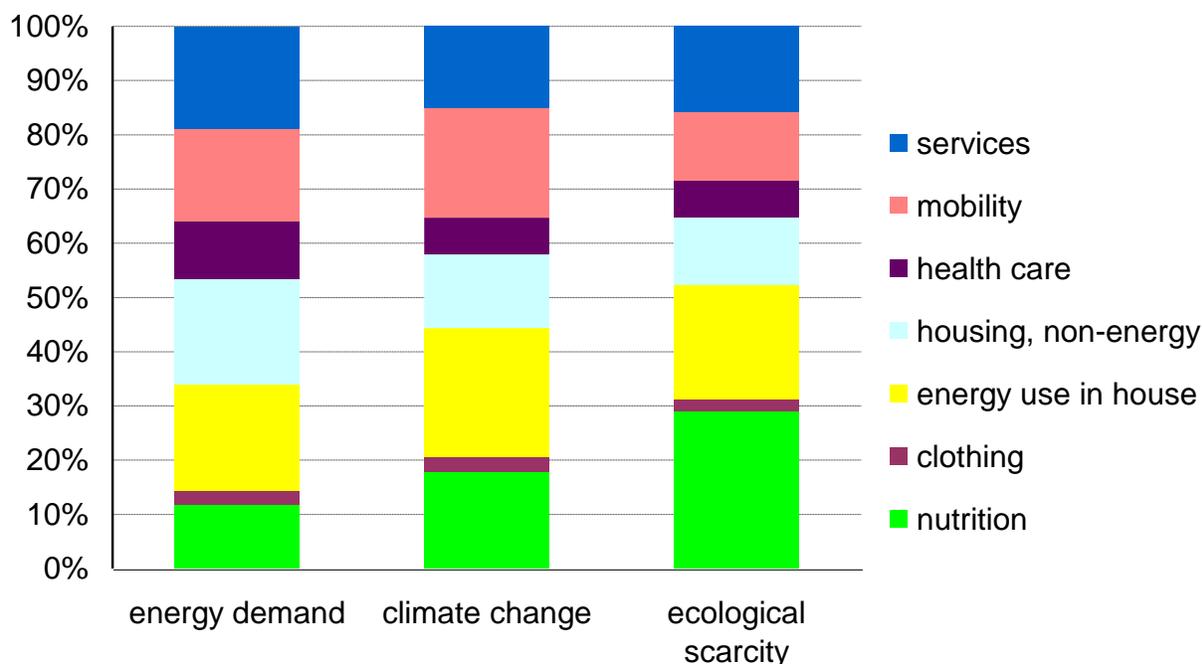


Figure 1. Importance of nutrition in total consumption (Jungbluth et al. 2011; Jungbluth et al. 2013)

The main part of the environmental impact arises from the agricultural production of meat and fish (Figure 2).

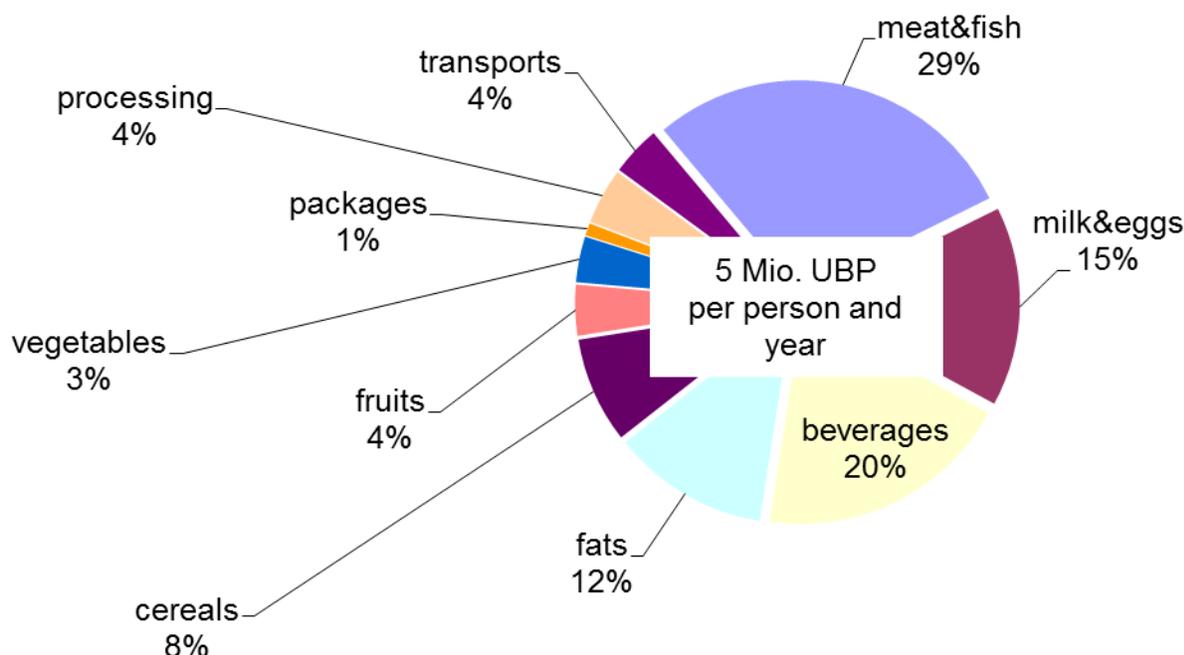


Figure 2. Importance of product groups in total impacts of nutrition. The total impact is 5 million eco-points (UBP – Umweltbelastungspunkte) per year

Environmental awareness is increasing in the gastronomy sector. The Swiss canteen operator SV Group commissioned ESU-services Ltd. to make an LCA of its full food and non-food purchases in order to identify improvement potentials. The LCA results are the basis of the program “ONE TWO WE”, which aims to assist the customers of SV Group with the reduction of their GHG emissions by 20 %. The customers are companies that commission the SV Group with the operation of their canteen in their premises. The program is elaborated in close collaboration with WWF Switzerland and ewz Zürich (public electricity supply in the Swiss city of Zurich).

## 2. Methods

The environmental impacts of all food purchases in 240 canteens of the SV Group were analysed within an LCA study for the operation in the year 2011. In this year 19.2 million meals were prepared and sold. About 820 grams of food items, 2.2 dl (deciliter) of beverages and 40 grams of other materials such as serviettes were used per meal (Table 1).

Table 1. Composition of the average meal in canteens of the SV Group

	Weight in average meal (grams per meal)
meat/poultry	108
fresh vegetables	21
bread	310
dairy products	108
eggs	135
fish	5
sweets	137
convenience	32
beverages	225
non-food	42

The SV group provided a detailed list of their food purchases including weight and costs of the purchased items. In the next step, LCI data for 160 different food items available within the ESU food database (Jungbluth et al. 2014) were linked to the purchased amounts. Therefore also rough assumptions on packaging and transportation have been made for the different food items. This followed the idea of a modular LCA as developed in a previous research work (Jungbluth 2000).

The objectives of this project were twofold. In a first step, the most important ingredients were identified and the impacts of the food supply were compared with the direct global warming impacts of the canteen operation. Impacts of canteen operation (e.g. electricity and water use) were evaluated in previous years within the environmental reporting of the company (SV (Schweiz) AG 2010, 2008). The total impacts have been divided by the number of meals sold as a functional unit. Food waste was already monitored as part of this environmental reporting. Impacts due to its disposal are included in the assessment. The production of the wasted food is included in the figures on total food supply.

In the second stage of the project, improvement potentials were identified in the supply chain and the operation of the canteen. The results in this study are analysed across a representative range of impact categories with the ecological scarcity method (Frischknecht et al. 2009) and with Global Warming Potential (GWP) (Solomon et al. 2007).

### 3. Results

#### 3.1. Global warming potential of average meal

The food purchases of the canteen operator were summarized for the categories of meat, fish, dairy products, eggs, vegetables, fruits, bread, sweets, beverages and convenience products. Within the group of convenience products a range of different types of food can be found. The contribution of each life cycle stage to the GWP of all food purchases is shown in Figure 3. The GWP is expressed per meal, which means that the GWP of all food purchases were divided by the total amount of meals delivered per year. The life cycle includes the production, the processing, the packaging, the transport of food items to the canteen and the operation (meal preparation at the canteen).

An average meal served in a canteen operated by the SV group has an average GWP of 4.1 kg CO<sub>2</sub>-eq. The agricultural production step is responsible for 60% of the emissions, the processing 8%, the packaging 2%, the transport 5% and the operation of the canteens (cooling, cooking, etc.) 25%. The overall GWP of the food supply is dominated by the meat and poultry products (35%), the dairy products (15%), the fresh vegetables (14%) and convenience products (14%).

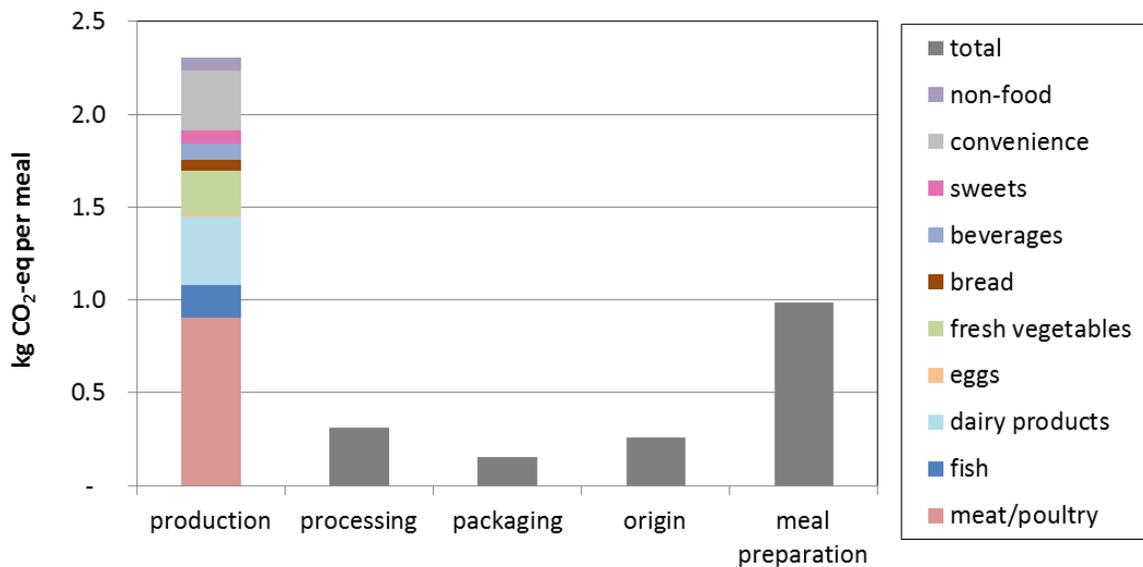


Figure 3. Global warming potential per meal of food purchases and canteen operation

### 3.2. Environmental impacts of average meal

The importance of the production of food products gets even more pronounced when total environmental impacts are evaluated according to the ecological scarcity method 2006 (Frischknecht et al. 2009). With this about 71% of total impacts are due to production of food products. The impacts per canteen meal are about 9'300 eco-points.

The environmental impacts of this meal can be compared with the average impacts due to nutrition in Switzerland. About 15'300 eco-points are caused due to the purchase of food products, but not including the consumption of food in canteens and restaurants nor including the delivery of food products to the home (Jungbluth et al. 2012). Thus, the canteen meal has quite some relevance which can also be partly explained by the higher share of meat (37%) than in the average daily consumption basket shown in Figure 4.

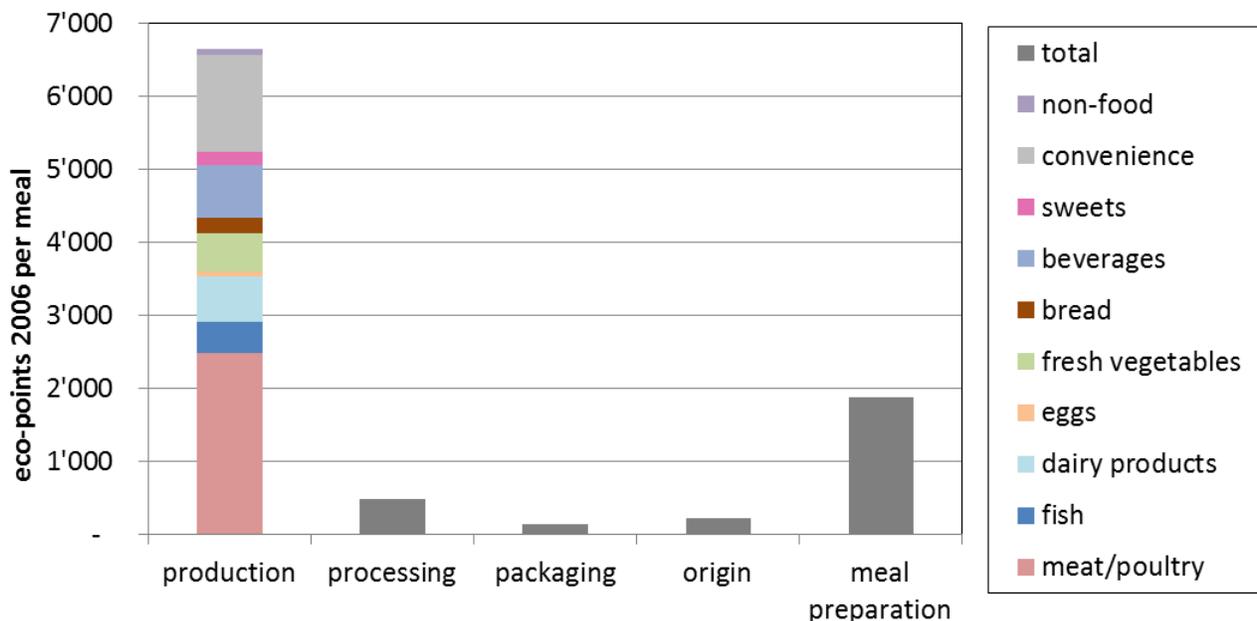


Figure 4. Eco-points according to ecological scarcity 2006 of food purchases per meal

The share of different types of environmental impacts for the different food categories is evaluated in Figure 5. The use of plant protection products, eutrophication, human health impacts due to ammonia emissions are important environmental aspects while evaluating the total food purchases of the canteen operator.

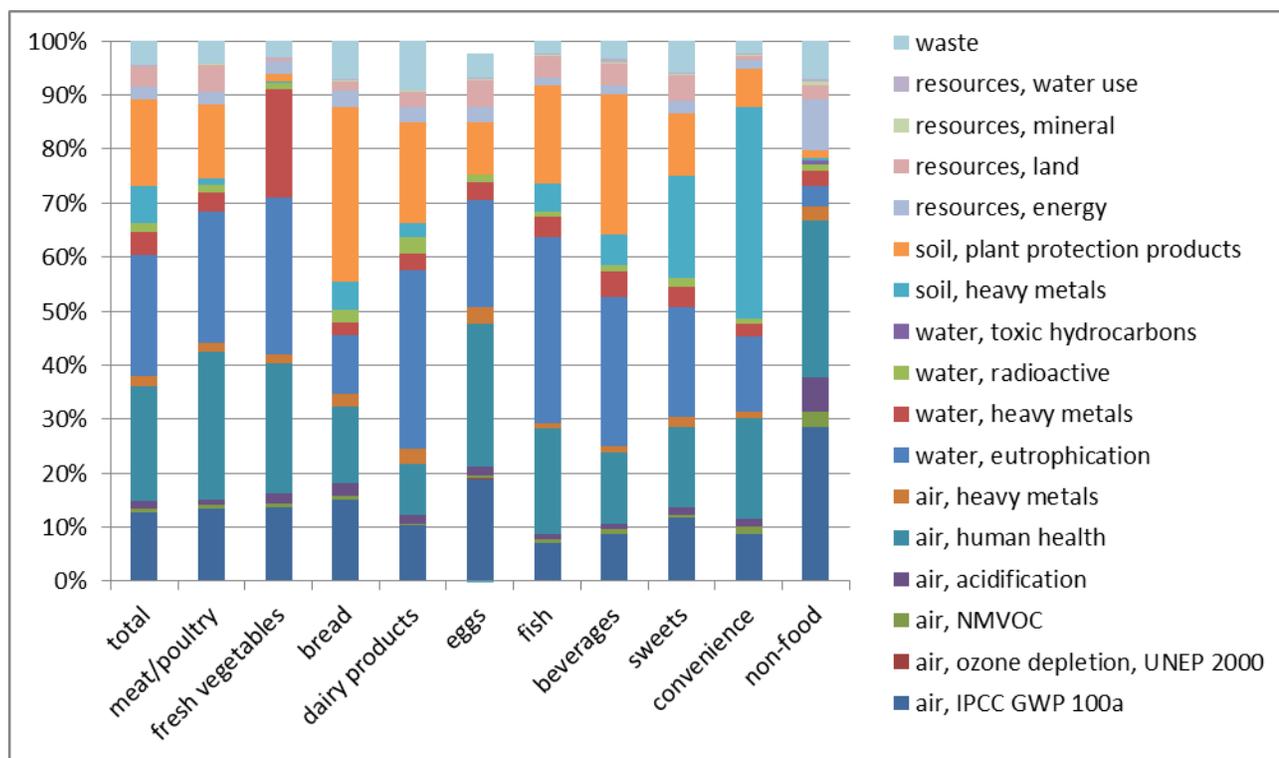


Figure 5. Share of category indicators according to ecological scarcity 2006 per meal of food purchases

### 3.3. Seasonal calendar to assist supply chain management

Based on the detailed assessment of the total environmental impacts, several improvement options for the supply chain have been discussed with the canteen operator. The detailed analysis of vegetable and fruit purchases has shown that an important part of impacts is due to the heating of greenhouse with fossil fuels when products are bought outside the Swiss season. Also transports by airplane can than play an important role. Therefore one option is the optimized purchase of fruits and vegetables.

The environmental impacts of vegetable and fruit purchases depend on the production period, the origin and the means of transport. For a given fruit or vegetable, all monthly supply routes were assessed in a seasonal calendar in order to provide better guidance for purchases. Two examples are illustrated in Figure 6.

For example, fresh broccoli is supplied from Switzerland, Spain and Italy. The fresh broccoli from Switzerland is only supplied from May to October and its GWP is 0.6 kg CO<sub>2</sub>-eq per kg. From January to May and from November to December, fresh broccoli is transported in truck from Spain and Italy. According to the supplier of the canteens, the fresh broccoli is produced in fossil heated greenhouses and its GWP is 7.2 kg CO<sub>2</sub>-eq per kg in January, February and December. The production of fresh broccoli that is deep-frozen in order to maintain a supply during the off-season generates a GWP of about 0.7 kg CO<sub>2</sub>-eq per kg. This increases with the time of storage after harvesting and is thus highest in April. Deep-frozen vegetables are an interesting alternative to fresh vegetables cultivated in heated greenhouses. The information concerning heating does not necessarily match with information found in literature about this type of vegetables (e.g. Milà i Canals et al. 2008).

Another relevant example is the supply of green asparagus. From July to February, green asparagus cultivated in Peru and transported by air cause a GWP of 12.8 kg CO<sub>2</sub>-eq per kg. Green asparagus cultivated in Switzerland or Spain and supplied from April to June have an average GWP of 1.6 kg CO<sub>2</sub>-eq per kg.

The cooperation with the wholesale dealer for vegetables shows that so far they often do not know in detail about the origin and way of production. A system to better monitor the important factors such as type and amount of heating for greenhouses for a given vegetable in a given months shall be build up in future.

kg CO2-eq per kg good		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Broccoli	CH-Lorry	n.a.	n.a.	n.a.	n.a.	0.6	0.6	0.6	0.6	0.6	0.6	0.6	n.a.
	ES-Lorry	7.2	7.2	0.9	0.9	0.9	n.a.	n.a.	n.a.	n.a.	n.a.	0.9	7.2
	IT-Lorry	7.1	7.1	0.7	0.7	0.7	n.a.	n.a.	n.a.	n.a.	n.a.	0.7	7.1
Broccoli deep frozen	CH-Lorry	0.70	0.72	0.74	0.77	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.68
Green asparagus	CH-Lorry	n.a.	n.a.	n.a.	1.5	1.5	1.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	ES-Lorry	n.a.	n.a.	n.a.	1.7	1.7	1.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	PE-Air	12.8	12.8	n.a.	n.a.	n.a.	n.a.	12.8	12.8	12.8	12.8	12.8	12.8
	US-Air	n.a.	9.7	9.7	9.7	9.7	9.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Figure 6. Example of broccoli and green asparagus for the creation of the Season table (country codes, CH-Switzerland, ES-Spain, IT-Italy, PE-Peru, US-United States)

#### 4. Discussion and follow up

The programme “ONE TWO WE” was elaborated based on the results of the LCA and further collaborations. It consists of a set of improvement options in five fields namely the logistic, the canteen operation, the food supply and the food range (see Figure 7). Therefore targets on certain key performance indicators have been set.

The environmental performance of the logistic shall be improved by reducing the share of air-freight. The optimisation at the canteen includes for example the amount of food waste and energy efficiency (cooling, lighting, cooking and ventilation). The mitigation of the environmental impacts of the food supply relies on the reduction of fruit and vegetables cultivated in heated greenhouses based on a seasonable table which calculated the carbon footprint per month of different products. Another important measure is the reduction of the average quantity of meat per meal by offering attractive vegetarian meals and meals with a lower amount of meat per serving. Therefore an education program has been initiated in order to teach the cooks attractive ideas for vegetarian meals that can be prepared for canteens.

A good communication with the guest and customers should explain the background of this programme while at the same time allowing the guest to choose from attractive recipes. The program “ONE TWO WE” aims for a reduction of 20% on greenhouse gas emissions in canteens which follow all suggestions for improvements. The achieved reductions are documented transparently. Therefore a simplified Excel tool has been elaborated which allows a simplified calculation of greenhouse gas emissions per meal passed on some key environmental performance indicators to be entered by the canteen operator.

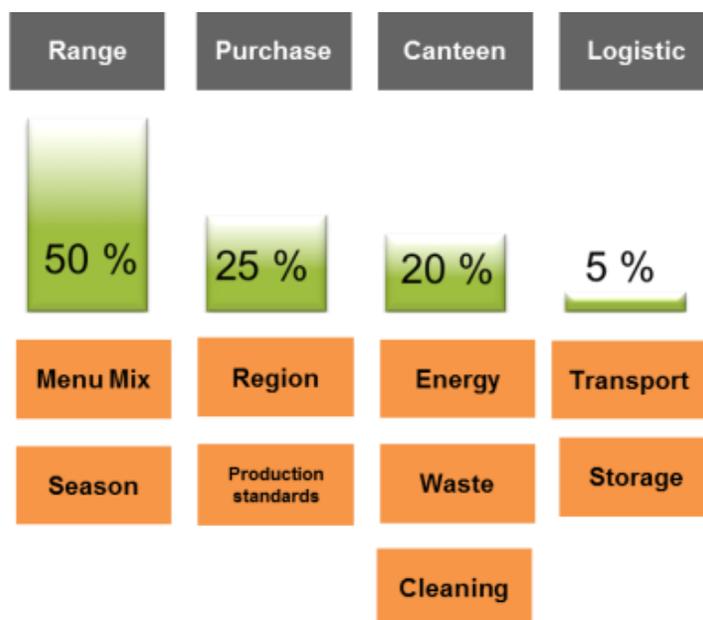


Figure 7: The program “ONE TWO WE” is structured in different steps

## 5. Conclusions

The programme “ONE TWO WE” started successfully with many customers positively convinced by the proposed changes in the provision of canteen meals. The program was launched in October 2012 in Zürich and is being implemented in 70 restaurants until the end of 2013. In 2013 the initiative " ONE TWO WE" has been awarded with the Zurich Climate Prize 2013. The future will show whether also the guest in the canteens support the changes.

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