



# The Healthy City

An investigation of tradeoffs between clean air and fresh food logistics in  
Amsterdam

YMS30812 – Metropolitan Challenges

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# Foreword

First and foremost, we wish to thank our supervisor, Bas van Vliet, for his patience and support throughout the past two months. We might have had an introduction day, but it is your course that made us feel truly a part of the MADE programme. We hope to carry the lessons that you taught us to our future courses and ultimately to our master's thesis.

Second, we must express our gratitude to everyone who agreed to be interviewed. Without your eagerness to help and contribute towards our research, it would have been impossible to finish this task. Your enthusiasm and novel insights have always pushed us to pursue new ways of looking at the subject of our research.

## Abstract

Last years have highlighted the importance of consistent and equitable access to nutrient-rich, plant-based foods. The city of Amsterdam is planning to prohibit the entrance of non-emission-free vehicles into the A10 ring road area of the city by 2025 with the Clean Air Action Plan. Its objective is to improve air quality and consequently the health of the inhabitants. The goals of this policy clash with the increasing desire of Amsterdam's residents to eat healthily by consuming more fruits and vegetables which require careful transport. The challenges that we identified make it clear that increased collaboration between various stakeholders in Amsterdam's food logistics is necessary to solve these issues. The municipality must seek to integrate their divergent and sometimes contradictory policies on food and give a more central role to logistics in policy-making. Still, a single stakeholder cannot solve the challenges to logistics in Amsterdam and the municipality must seek closer ties with its food distributors and the inhabitants of the city to effectively address these issues.

**Keywords:** Food logistics, electric vehicles, energy transition, air quality, Amsterdam, municipal policy

# Abbreviations

CAAP: Clean Air Action Plan

EU: European Union

EVs: Electric vehicles

FH: Food hub

FPI: Food Policy Integration

GHG: Greenhouse gasses

UA: Urban Agriculture

UDC: Urban distribution centre

UFS: Urban Food Systems

WHO: World Health Organization

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# 1. Introduction

## 1.1 The contradictory demands of healthy food and the energy transition

Never before has food logistics been a more critical point of discussion than in the aftermath of the Covid-19 pandemic. The past three years have exposed the shortfalls of the global food systems by highlighting the importance of consistent and equitable access to nutrient-rich foods as a determinant of public health (O'Hara & Toussaint, 2021). As found by Grimmelt, Moulton, Pandya, and Snezhkova (2022); the pandemic had tangible effects on the desire to eat healthily among North American and West European consumers. A significant portion of people of all ages in those regions, but especially the elderly, aim to integrate more plant-based and fresh products into their diets while reducing their consumption of meat. This growing demand for fresh plant produce may put additional pressure on the already strained food logistics system (Clinton, 2019). Additionally, the food logistics sector will not only be challenged in the coming years by the demands of consumers, but also by the ambitions of governmental bodies.

The European Union's (EU) aims to source 32% of its energy from renewable sources by 2030 is a notable example of these ambitions. This policy may result in additional pressures on the different sectors of society as they seek to meet these goals in the designated timeframe (Council of the EU, 2018). For this, new energy solutions should be considered to comply with this policy in the field of food transport, to ensure a similar, or even better mobility of perishables without jeopardizing their life span.

The measures of the energy transition are increasingly mandated by policy in some of the major cities within the EU's Northwestern member states. For example, Amsterdam was traditionally viewed as the region's frontrunner in terms of circular economy and climate mitigation (Obersteg et al., 2019). In this case, it is no different as the city recently unveiled the Clean Air Action Plan (CAAP) which will transform Amsterdam into the global leader of emission-free mobility by 2030 and contribute towards the mitigation of the effects of climate change. By promoting the adoption of electric vehicles (EVs) and the banning of non-emission-free modes of transport, including goods and delivery trucks, the municipality aims to reduce the emissions of CO<sub>2</sub> and other air pollutants within Amsterdam's boundaries (City of Amsterdam, 2019). But the promotion of zero-emission modes of transport for logistics is not without its caveats.

The CAAP's objective of promoting more sustainable modes of transport may carry unintended consequences for the municipality's goal of promoting "healthy, sustainable and plant-based food consumption by all inhabitants" in the city (City of Amsterdam, 2020, p. 26). For example, EVs introduce several new concerns into the general system of logistics as they require dedicated charge stations to refill the limited amount of electricity that can be stored in the vehicle's battery. Consequently, EVs have limited driving-range capabilities compared to combustion engine vehicles and they require significant additions to the current infrastructure (Juan, Mendez, Faulin, de Armas, & Grasman, 2016). Food logistics are an even more complex issue as many products such as fruits and vegetables require cooling during transport and improper transportation may lead to a loss of value (An & Han, 2015). Consequently, this transition may affect the affordability and availability of healthy, plant-based foods for the inhabitants of Amsterdam.

While CAAP highlights its beneficial effects on air quality and climate change mitigation, it does not outline the potential consequences for Amsterdam's food logistics. The logistics of perishables such as fruits and vegetables are especially crucial for the well-being of urban centers as access to healthy

foods is a key determinant of public health. Still, the effects of the transition to electric vehicles on the availability and affordability of this key industry are poorly researched. To provide more insights into them, the yet-unresearched influences of the CAAP on the integrity of vegetable and fruit logistics in Amsterdam will be identified and studied in detail.

## 1.2 Research objective & questions

The research objective is to provide insights into the potential effects of the energy transition on urban food logistics in the cities of Western Europe by identifying the influence of the Clean Air Action Plan 2030 on the fresh fruit and vegetable logistics in the city of Amsterdam.

To achieve this objective, the general research question was formulated as follows: *How will Amsterdam's CAAP potentially affect the availability and affordability of fresh fruit and vegetable logistics within the city?* The following three secondary research questions supplement the general question:

1. *How are fresh fruits and vegetables currently distributed in Amsterdam and how will CAAP change this?*
2. *How does CAAP potentially challenge Amsterdam's food logistics and how could it affect the availability and affordability of fresh fruit and vegetables in the city?*
3. *How can the potential challenges of CAAP be mitigated in order to maintain the availability and affordability of fresh fruit and vegetables in Amsterdam?*

## 1.3 Structure of the paper

The paper is structured as follows: Chapter 2 contains the literature review. Chapter 3 first presents the study area description. Second, it lists the data collection methods that were utilized during the research. Third, the chapter describes how the collected data was analyzed. Chapter 4 presents the results of data collection and analysis. Chapter 5 contains the interpretation of the results, their scientific and policy implications, and the limitations of the study. Chapter 6 concludes the paper by summarizing the results and answering the general research question.



## 2. Methodology

### 2.1 Research scope

This study looks at the City of Amsterdam's Clean Air Action Plan and its impact on the transportation of fresh fruits and vegetables. The CAAP aims to allow only emission-free vehicles within the A10 ring road by 2030. Therefore, the study area is the area of Amsterdam within the A10 (Figure 1).

There are many different types of food transportation, this research is limited to the transportation of fresh fruits and vegetables. We chose fruits and vegetables because they are a key element of healthy nutrition as was established in the introduction of this paper.

Additionally, fruit and vegetable logistics may be significantly impacted by the CAAP as they are both highly perishable. Fresh plant produce needs to be cooled and it benefits from a short supply chain, which poses additional challenges. Another theme, discussed in this paper, is energy. This is addressed because many vehicles must electrify in a short period through the measures of the action plan.

The impact of the action plan on various stakeholders will be examined in this paper. The transition to using only zero-emission vehicles for fresh vegetable and fruit transport will impact many stakeholders. To get a full picture of this impact, we talk to as many different stakeholders as possible. By considering research institutions, businesses, and the government, the transition is looked at from multiple points of view.

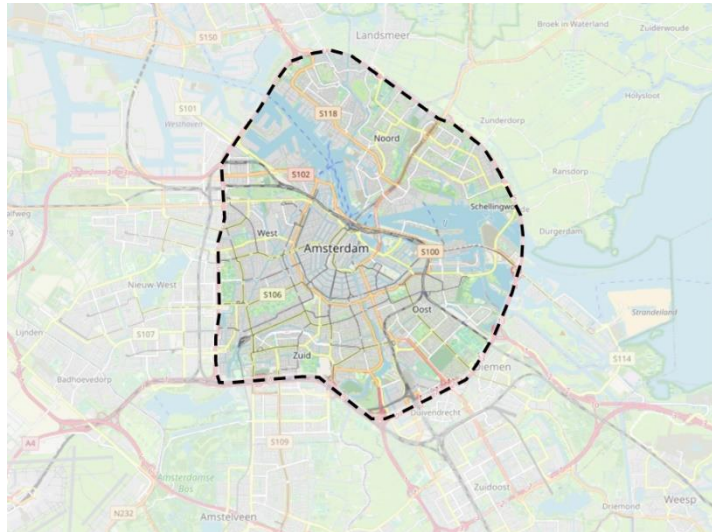


Figure 1 The study area within the A10 ring zone in Amsterdam.

### 2.2 Literature study and interviews

The study of scientific literature is the primary data collection method for this study. The following online sources are used: Google Scholar, Open Research Amsterdam, Research Gate, Science Direct, TU Delft Library, and WUR Library. These Boolean combinations are utilized as search terms: "Food" AND "Logistic" OR "Transport" OR "Chain" Or "Transit", "Urban" AND "food" OR "Logistics". Case studies of food logistics in cities are selected based on the similarity of their conditions to Amsterdam which is the focus of the study. In addition to scientific literature, grey literature is also studied and obtained from a wide variety of online sources belonging to either private or public organizations.

Interviews supplement the study of literature with unique types of data that cannot be found in other sources. The novelty of the CAAP handicaps any study based solely on literature as insights unique to this policy are still unpublished. Additionally, scientific literature cannot fully represent the subjective opinions of the authors which are still relevant when evaluating policy. By contacting experts from the government, industry, and academia; unique data is collected that contains both unique factual information and the opinions of persons that are highly involved in the topic of the study.

To identify suitable interviewees, the personal networks of the authors are leveraged, and online sources are consulted. Additionally, the “snowball” method is utilized to quickly expand the list of potential interviewees. Whenever an invited person agrees to be interviewed, they are asked about people in their network who carry a similar level of expertise in the field of logistics. Their colleagues are then contacted, and the process repeats until no new interviewees are identified. This is also done if the potential interviewee rejects the invitation due to scheduling conflicts, but still shows interest in the research.

The suitability of the interviewees is determined by these characteristics: (1) personal or professional involvement in (food) logistics, (2) a sufficient level of experience in the sector (3) and expected availability in the timeframe of the research. The interviewees are initially contacted by e-mail and subsequently by phone if no response is given. The default format of the email is found in Annex A. To ensure that a sufficient number of interviewees is found, an approximate amount of thirty e-mails is sent. The expected response rate is twenty percent which means that six interviews will be performed. Once an interviewee has agreed to a meeting, the default interview guide is adapted to match their professional background (Annex B). The interviews are recorded if consent is given by the interviewee. If permitted, they are also referenced by name or position in the results of this study. For the purposes of writing, a summary of the main points is created for each interview. The process of arranging and conducting interviews continues throughout the timeframe of the study or until information saturation is reached. This point is achieved when no novel insights into this topic are obtained in three consecutive interviews.

## 2.3 Data Analysis

After the conclusion of data collection, qualitative content analysis is performed. To facilitate this process, the collected literature, interview recordings, and notes are grouped according to their predominant themes. In the cases that the interview notes are incomplete, the interview recordings are utilized to fill in the gaps. Subsequently, the data is further examined and interpreted to identify the key themes for each of the secondary research questions. The results of this analysis are presented in Chapter 4.

### 3. Literature review

This literature review aims to explore the many topics connected to our research questions and to create a solid base for the interviews with the selected experts. It is especially crucial to gain a greater understanding of food and logistics policies in Amsterdam and their development. Therefore, the chapter is divided firstly into specific topics such as the *Clean Air Action Plan and Air Pollution*, *Food logistics requirements*, and *Energy transition in vehicles*. Finally, it explores the development of *Food Policies in Amsterdam* and consequent *Policy Integration* across sectors and the challenges that come with it.

#### 3.1 Clean Air Action Plan & Air pollution

As shortly introduced in the first chapter, the CAAP is a policy from the municipality of Amsterdam, released in 2019. To improve air quality and consequently the health and life quality within Amsterdam by 2030, this policy sets to tackle air pollution, the third largest health risk in the city. The municipality is set to comply with the European Air Standards and with the World Health Organization (WHO) standard values for the annual average concentration of particulate matter by 2030. This represents a reduction of particulate matter (PM<sub>2.5</sub>) emissions in the city below WHO's goal of 10,0 µg/m<sup>3</sup> by 2030, and a reduction of NO<sub>2</sub> concentration through new traffic strategies. CO<sub>2</sub> emissions will also be reduced, seeing as mobility is responsible by 9% of the city's CO<sub>2</sub>-emissions (City of Amsterdam, 2019).

The CAAP acts from the center outwards and goes from businesses to private. In summary, the strategy predicts:

1. By 2022, a city center that is only emission-free for buses and passenger coaches can enter.
2. By 2025, an emission-free A10 ring road perimeter for taxis, buses, coaches, vans, trucks, and municipal ferries; is a wider emission-free built-up area goal for mopeds and scooters as well.
3. By 2030, an emission-free Amsterdam built-up area for all modes of traffic.

To ensure these, the policy follows a combination of regulations and stimulation actions for each stage, where the municipality functions as a role model and facilitator to the transition for all parties involved. The goal is to make it easier to choose the clean option. Some of the main strategies include a good communication plan and several facilitation actions, from development and improvement of the charging stations networks, type of charging available within the grid, and subsidies to support the transition. At the same time, this policy works towards the harmonization of environmental zones for all vehicles required by the national government (City of Amsterdam, 2019).

Through the CAAP, the Municipality recognizes that traffic and transport are responsible for only 20% of all particulate matter in the city. It also draws on the reality that certain sources of air pollution cannot be directly tackled such as passenger water vessels, mobile machinery such as excavators and cranes, and households with pellet stoves, fireplaces, and fireworks. (City of Amsterdam, 2019). Furthermore, the policy states other indirect sources that cannot be tackled, such as industry, agriculture, and other countries' activities whose air pollution reaches Amsterdam through air currents. This said, while the aim of the municipality passes through reducing the number of trips and vehicles coming in and through the city, the CAAP strategy translates only in an emission-free area and on a transition to emission-free vehicles.

From a logistics point of view, the policy includes mentions of already achieved voluntary agreements within the logistics sector, as well as the consideration of logistics hubs, and their ability to charge logistic electric vehicles (City of Amsterdam, 2019). Nonetheless, no specification is made regarding food or fresh food logistics, which come with different specifications regarding distribution centers, type of vehicles for transportation, much shorter shelf life, and different delivery flow requirements.

Finally, it is also relevant to mention that although the policy predicts reductions of 52-96% of emissions from traffic by 2030, this strategy does not take into consideration nor makes any reference to non-exhaust particles, originating from brake systems and tires worn off, which currently pollute more than exhausting pipes (City of Amsterdam, 2019; Emission Analytics, 2020; Carrington, 2022).

### 3.2 Food logistics

City Food Logistics comprises all the necessary logistic movements to distribute and bring food products into a city, as well as the strategies utilized to promote its efficiency along the process. It includes two types of supply chains: long food supply chain, which deals with food that is produced and distributed at a national, international, or global level, and short food supply chain, which comprises the distribution of food at a regional and local level (Morganti & Gonzalez-Feliu, 2015; Collison, Collison, Myroniuk, Boyko, & Pellegrini, 2019).

In cities such as Amsterdam, the Food Logistics start at the distribution centers, where food is brought from Producers or shipments to be sorted, packed, bundled, and distributed towards retail, Horeca (Hotel, Restaurants, and Cafes) locations, terminal markets such as the Food Centre Amsterdam, and sometimes to local food markets too. Big players, such as wholesale companies are responsible for the distribution of high volumes of fresh produce, mostly using trucks with cooling engine systems. Yet many smaller distributors, often within the short food supply chain, cover part of the city food logistics, by connecting small producing businesses directly with local customers. The type of vehicles used by these varies, as they represent hundreds of small businesses (Morganti & Gonzalez-Feliu, 2015; Collison, Collison, Myroniuk, Boyko, & Pellegrini, 2019). To all these businesses the CAAP policy on Food City Logistics represents a requirement to quickly transition all their distribution fleet, as well as the possible development of new logistics models.

The Parma Food Hub is a relevant case study regarding how city food logistics can be optimized. Morganti & Gonzalez-Feliu (2015) showcases how perishable foods are transported in the city of Parma, Italy. The urban distribution center (UDC), traffic regulations, and delivery services work together to provide high-efficiency and emission-reduced urban food distribution. In this case study, the leadership of the public sector is highlighted, as well as the building of strong partnerships with other actors. In addition, the concept of a food hub (FH), as a partnership-based arrangement of food, is also introduced to the wholesale produce market.

### 3.3 Energy transition, transportation & vehicles

The transition towards emission-free vehicles in food logistics cannot happen overnight, as it requires financial, structural, technological, and behavioural investment. In a study by Galati et al. (2022), we can see that consumers are willing to pay for agri-food products under effects of their environmental concerns, perception on certification and consumption habits. However, as they express in their limitation, the sample of respondents is random, and social desirability bias is present. This means that consumers' willingness to pay may also be a challenge towards the sustainable food logistic. For example, social inequality can indirectly affect the development of food mobility with EVs. In other



words, people with lower income may not be able to pay for the price premium of the fresh product delivered by EVs at relatively high cost.

The current dichotomy and lack of consensus regarding the transition toward electric vehicles can be seen in the following examples. Dominković et al. (2018) wrote that electric vehicles are the most beneficial modes of transport in the transition towards a sustainable transport sector, according to the literature. It is argued that electrical modes of transport should be the main aim of the transport transition. This transformation has four advantages: lower CO<sub>2</sub> emissions, more energy efficiency, improved air quality, and integration of various energy sectors. According to calculations, the technology currently available could directly electrify 72,3% of the EU's transportation energy requirement. Yet, other case studies show that transition isn't so linear. In a case study of Hellmann Worldwide Logistics in Germany, Ehrler et al. (2021) pointed out that the implementation of last mile logistics with electric vehicles still has challenges on including financing, ancillary facility and infrastructure, policies. It is necessary to build a systemic approach to fit the required financial, advanced-technical, and political support.

Finally, a New York case study by Elangovan et al. (2021) compared the greenhouse-gas emissions (GHG) and electricity demand under food distribution by both electric and diesel trucks in Gowanus District in New York City. A framework was created to estimate routes and model schedules of food delivery at a district level, from the distribution center to retail stores. The result shows that energy consumption of electric trucks is three times less than that of diesel trucks. In addition, the GHG emitted is 40% less when using electric trucks instead of diesel trucks for food delivery in the district.

### 3.4 Food Policies development in Amsterdam

Although municipalities do not often tackle the topic of food in their policies, they usually work on urban challenges that have a direct impact on food systems. It is therefore essential to establish a Food Policy Integration (FPI) concept, where food challenges are observed and thought of across different sectors. This implementation allows for goals regarding to food policy to be signalled, incorporated, and prioritized in policy decisions to produce outcomes (Sibbing, Candel, & Termeer, 2019).

In Amsterdam, the interest towards food topics and food policies has been on the table for a while. Although food is often a topic on the national agenda, this trend has been evolving into a more urban concern as cities focus on health goals and the consequence of failing food systems as a direct impact in urban environments life quality (Kuhlmann, 2017).

The first Food Strategy in Amsterdam appears in 2005 inspired in London's Food Strategy, as a proposal by the urban planner Pim Vermeulen and supported at the time by the Groen Links party. In 2007, this strategy developed into several projects that were condensed in a plan, focused on healthy food for children and elderly, the relationships between the city and surrounding rural areas, and a sustainable regional food chain (Kuhlmann, 2017). This plan was known as *Proeftuin* Amsterdam and it lasted until 2010 when a new mayor was elected, and the plan did not sustain enough support to survive. By 2011 social pressure and some political support led to the *Voedselvisie* plan, which was accepted by the municipality, and published in 2014 as a complete food policy document, with a focus on nutrition and health while taking into consideration economic feasibility, social participation, and environmental aspect (City of Amsterdam, 2014; Kuhlmann, 2017).

By 2015, a new mayor and aldermen were installed after the elections and the new Mayor chose a new *Groene Agenda*, also focused on food and green neighbourhoods, focusing on reduction of food

ecological footprint through urban farms. The new strategy focused as well as on the reduction of barriers to Urban Agriculture within municipal legislation, as on the creation of the platform *Van Amsterdamse Bodem*. (Kuhlmann, 2017).

In 2013 a parallel policy, *Amsterdamse Aanpak Gezond Gewicht*, is also created with a focus on obesity in children in Amsterdam. Besides Municipal policies, the city of Amsterdam took part in other agreements, such as the *City Deal* which involved 12 cities, 4 ministries and 2 provinces in the Netherlands. The goal of the *City Deal* was to promote cooperation through a national knowledge exchange programme and the support of a food agenda while promoting the development of integrated food policy at a local level. In 2016, Amsterdam's mayor signs the Milan Food Policy Pact, which connects 138 cities and focuses on sustainability and social justice, aiming to address food security and sustainable development. (Kuhlmann, 2017; Milan Food Policy Pact, 2015). These cities are to connect all sectors related to food and to involve stakeholders, and consequently develop inclusive food policies. Amsterdam has seen, as well, the development of other initiatives based on civil societies such as *Edible Amsterdam Platform* and *Food Council MRA* (van der Valk, 2019).

Currently, research shows a trend in the Netherlands towards Food Policy Integration, but mainly on paper. It is yet unclear how this trend develops in practice, and more research is needed from local Food Policy Integration Outputs into Outcomes. Municipalities should apply a Food System approach to address Food related issues through wider policy domains, which extend towards Social and Environmental sectors (Sibbing, Candel, & Termeer, 2019). When applied to the CAAP, the concept of FPI denotes a direct impact on Food System Outcomes, specifically on Food Availability - Production, Distribution and Exchange, based on "The Food System Concept" by Ericksen 2008 as represented in Sibbing, Candel, & Termeer (2019). It is therefore essential for the Municipality of Amsterdam to understand how its CAAP policy affects the current food system in order to create a resilient food system for the city.

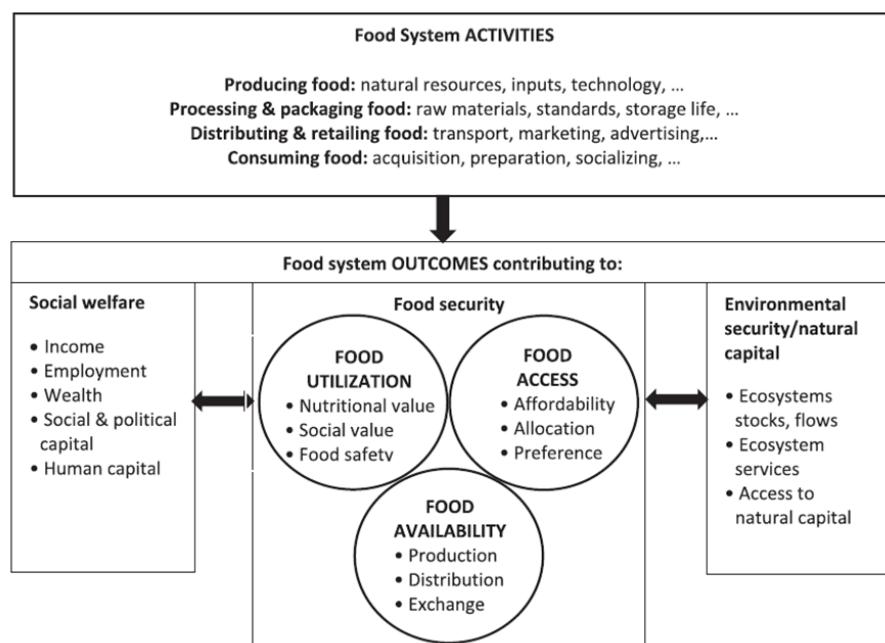


Figure 2. Food System Concept. Retrieved from: Sibbing, Candel, & Termeer (2019)

### 3.5 Policy integration

The CAAP is a policy that directly has an effect and is dependent on several sectors such as *energy* (grid resilience, renewables and energy supply), *transport* (electric and hydrogen vehicles transition, mobility, public transport networks, tourism oriented mobility, and city logistics), *food logistics* (accessibility, affordability, distribution centers re-location, innovation technologies and businesses accessibility), *health* (air quality, food accessibility, thermal comfort, environmental goals) and *industry* (machinery, housing developments, harbours, etc). Yet the policy does not reflect the required communication, reflection, and integration of all these sectors. Instead, it seems to prioritize easy to target solutions within too narrow time frames which leads to several blind spots in the policy, and consequent issues at a larger scale.

At the same time Amsterdam currently lacks an integrated, long term Food Policy. While efforts from civil societies, researchers and government have been put into place in some areas, the lack of a concrete policy, inhibits the Municipality to have a clear scope of action and to understand what the real challenges at hand are, and how they are dependent of many other sectors (Sibbing, Candel, & Termeer, 2019). A wide and more inclusive policy could include new opportunities for Food Logistics and promote new business models.

## 4. Results

In this chapter, the insights from interviews and the study of literature are combined to answer the three secondary research questions. An abridged list of interviews is given in Table 1 with a more complete table of findings in Annex C. First, the system of food logistics in Amsterdam is described in detail based on the findings from grey literature and the interviews 2, 3, 5, 6 and 7. Second, the challenges of the CAAP are shortly listed based on the findings from scientific and grey literature, and the interviews 2, 3, 4, 5, 6 and 7. The challenges which were most prominent in the interviews are explained in great detail. Third, the possible mitigation strategies for the challenges of the CAAP are presented based on scientific literature and interviews 1, 2 and 4.

Table 1. An abridged overview of performed interviews

Interviewee	Date interview	Background	Insights
1. J. A. Annema	26 October 2022	Professor	Policy evaluation
2. W. P. van Amstel	27 October 2022	Professor	Logistics and policy evaluation
3. G. de Bruijn	31 October 2022	Restaurant chain owner	Business perspective into policy
4. T. Erdenbold	1 November 2022	Master's student	Business response to policy
5. J. Jongeneel	3 November 2022	Municipal logistics adviser	Municipal perspective into policy
6. K.W.J.F. Rademakers	4 November 2022	Professor	Logistics and policy evaluation
7. T. Segers	4 November 2022	Business logistics manager	Logistics and business perspective into policy
8. J. Groot	7 November 2022	Professor	Vegetable logistics

## 4.1 Food logistics and the influences of the Clean Air Action Plan

To truly gain insight into the influences of the CAAP and its challenges, it is crucial to distinguish between the different players within the system of food logistics in Amsterdam. This system can be roughly subdivided according to its three main types of distributors: large retailers, small retailers, and food services (W.P. van Amstel, personal communication, October 27, 2022). First, large retailers include organizations, such as the fruit and vegetable retailer Rungis who distributes large volumes of produce from a variety of local and international suppliers. They deliver these products to restaurants, hotels and caterers in the Netherlands from their main location in Barendrecht. Within the A10 ring of Amsterdam, they utilize their own vans with the weight of up to 3500 kilograms that are equipped with a cooling system and larger trucks are utilized outside of Amsterdam's A10 ring. Neither type of vehicle is electric. (T. Segers, personal communication, November 3, 2022). This group of distributors is characterized by its high level of efficiency and financial capacity, high delivery volumes and the utilization of larger vehicles such as trucks and vans. Additionally, they are responsible for roughly 80% of food logistics in the city with the remaining 20% being done by the following group of distributors, the small retailers (K.W.J.F. Rademakers, personal communication, November 4, 2022).

Second, the group of small retailers refers to the smaller, specialized organisations that transport only a certain selection of produce. In the case of the company Ruyken BV., both local and imported products are delivered to various restaurants and hotels within Amsterdam from their main location in the Food Center. Vans are again utilized for transport within the A10 ring as the deliverer transports volumes and types of products that cannot be carried by bike (G. de Bruijn, personal communication, October 31, 2022). Compared to the large retailers, these companies are characterized by more frequent deliveries of a smaller volume and lesser degree of efficiency (J. Jongeneel, personal communication, November 3, 2022)

Third, food services include restaurants and caterers in addition to the growing sector of "dark kitchens". The latter group refers to the emerging restaurants without a storefront that deliver directly to their customers (Hakim, Dela Libera, Zanetta, Nascimento, & da Cunha, 2022). What connects these three groups is their ability to deliver products directly to their customers who are either individual citizens or organisations that provide food to their employees. This may include ready-made meals or a collection of groceries which contain raw fruits and vegetables. Unlike the previous two groups, food services utilize a wider variety of vehicles that range from bikes and scooters to cars and vans. Many of these are already electric although due to the sheer variety of vehicles, a significant portion of them still runs on fossil fuels. Compared to retailers, food services are characterised as the fastest growing and most dynamic group within Amsterdam's logistics that also has the highest frequency of deliveries with the smallest volume on average (W.P. van Amstel, personal communication, October 27, 2022).

As established in the literature review, the CAAP will disrupt Amsterdam's system of food logistics as each distributor faces regulations that permit only non-emitting vehicles such as electric vans and scooters within the A10 ring of the city by 2025 (City of Amsterdam, 2019). These groups of distributors are already aware of this policy, and its looming deadline has tangible effects on their business policy as many large retailers are carefully investigating their options to make this transition possible (T. Segers, personal communication, November 4, 2022). The municipality itself recognizes the sense of urgency among many logistics organizations in the city and it foresees some challenges to this transition towards zero-emissions transport (J. Jongeneel, personal communication, November 3, 2022).



## 4.2 Challenges of implementation

The challenges of the CAAP to Amsterdam's food logistics are plentiful and they are experienced differently by each involved party in the city. It naturally affects the food distributors, but its issues extend beyond these groups to also include the municipal government itself and the residents of Amsterdam who consume the transported fruits and vegetables. These challenges must be understood in detail as they can potentially inhibit the achievement of CAAP's objectives by their designated date. Additionally, they may affect the availability and affordability of fresh fruits and vegetables within the city with consequences for the habits of the residents. All the identified challenges of the CAAP are shortly listed in Table 3. To conserve space, only the most prominent challenges that were identified during the interviews will be explored in detail for each group.

*Table 2. An overview of challenges*

Potential challenges	Affected stakeholders
Lack of logistics integration in policy	Municipality
Difference in knowledge and organizational capacities between small and big distributors	Distributors
Insufficient infrastructure	Distributors
Damage to quay walls and historic bridges	Municipality
Financial challenges of the transition to EVs	Distributors
Lack of communication between municipality and private actors in policy design	Municipality, distributors
Lack of stakeholder engagement in policy implementation	Municipality
Lack of scientific basis for policy justification	Municipality
Limited supply of EVs	Distributors
Lack of motivation among smaller distributors	Municipality, distributors
Limited capacity for cooling in EVs	Distributors

There are two challenges faced by the distributors that featured prominently during the interviews. The primary challenge faced by these three groups was related to their varying financial, knowledge and organizational capacities to meet the CAAP's regulations by 2025. First, large retailers are less concerned with the costs of the transition to electric vehicles compared to the smaller retailers provided that enough suitable vehicles are available on the market. Instead, these large retailers are slow to meet the CAAP's goals due to the dynamic nature of the energy transition. Before they commit to an investment, this group would prefer to be risk-averse and wait for the competition to make the first step in the transition (T. Segers, personal communication, November 4, 2022). On the other hand, smaller retailers lack the necessary funds and knowledge to invest in the transition. They would rather focus on the immediate challenges of daily management rather than future municipal policy (K.W.J.F. Rademakers, personal communication, November 4, 2022). The food services group may be best equipped to follow the transition as many of them already utilize small electric vehicles (W.P. van Amstel, personal communication, October 27, 2022).

The secondary, but still universal challenge among the distributors was the issue of providing sufficient cooling in electric vehicles. As the CAAP pushes the distributors to use more electric vehicles, many of them are concerned with the high energy consumption of cooling systems in electric trucks that drains the battery and ultimately limits the possible length of delivery routes (T. Segers, personal communication, November 4, 2022). This could be a great challenge especially for the transport of fresh agricultural products like fruits and vegetables which are characterized by their short storage

period and propensity for spoilage. If they are improperly cooled during transport, their shelf life will be drastically reduced with potential health and safety concerns as a consequence (An & Han, 2015).

The main challenges faced by the municipality refer to the insufficient integration of logistics in their policies and the disputed scientific basis for their proposed solutions. First, logistics often fall outside of policymaking as they are politically unengaging (J. Jongeneel, personal communication, November 3, 2022). Additionally, logistics are often side-lined even in urban planning as the municipality does not successfully account for “people-friendly” logistics that integrate e-commerce or other types of deliveries. City logistics tend to be relegated to only an issue rather than a solution (K.W.J.F. Rademakers, personal communication, November 4, 2022). Second, the CAAP aims to improve the air quality in Amsterdam, but it focuses only on the emissions of vehicle engines instead of their tires (W.P. van Amstel, personal communication, October 27, 2022). As found by the RIVM (2018), 60% of fine particle emissions by cars are “non-tailpipe”. They are caused by the wear of the tires on the road surface which still occurs even with electric vehicles. The prohibition of vehicles with combustion engines by the CAAP is thus unlikely to improve the air quality and the greater average weight of electric vehicles may even contribute to higher non-tailpipe emissions of pollutants (K.W.J.F. Rademakers, personal communication, November 4, 2022).

The greatest challenge faced by the residents of Amsterdam is related to the potentially reduced availability and affordability of fresh fruits and vegetables. Since European populations are heading towards a healthier lifestyle and vegetarianism is rising as a trend, the challenges posed by CAAP to food logistics may limit the all-year-round availability of these products or result in price increases (W.P. van Amstel, personal communication, October 27, 2022). Consequently, the residents may face less favourable health outcomes as their ability to obtain healthy, plant-based products becomes limited (O’Hara & Toussaint, 2021).

### 4.3 Addressing the challenges

While the challenges of CAAP are diverse and often complicated, each of the stakeholder groups can contribute towards mitigating them in their own way or by combining their efforts. Therefore, the full list of mitigation measures is too large to describe exhaustively due to space constraints. As such, only a selection of measures is described in the following paragraphs. These selected mitigation measures were chosen based on their applicability to the challenges described in the previous subchapter.

For the distributors, the primary challenge to meeting CAAP’s objectives can be mitigated through stronger cooperation and action from the local government of Amsterdam (Sibbing, Candel, & Termeer, 2019). The municipality can address the needs of the transporters by making their policies clearer and more representative of the concerns and needs of businesses. First, they should adopt a more regulatory role regarding CAAP’s objectives while also facilitating the exchange of information between the stakeholders. This will contribute towards the greater clarity of the regulations that were introduced by the CAAP and ensure that each party has more confident expectations regarding future developments (W.P. van Amstel, personal communication, October 27, 2022). The additional transparency regarding regulations will also have a beneficial effect as all distributors may be motivated to exchange of information and collaborate on novel solutions. This exchange will be especially beneficial to the small retailers who often lack the necessary know-how on how to adapt to new policies (T. Erdenbold, personal communication, November 1, 2022).

To address the challenge of policy integration, the municipality must highlight the importance of logistics as a determinant of urban quality (J. Jongeneel, personal communication, November 3, 2022). In the case of food logistics specifically, the establishing of an FPI concept would facilitate the

integration of various policies around food into one comprehensive whole (Sibbing, Candel & Termeer, 2019). If food transport were to receive a central role in this, it could lead towards a greater focus on logistics as a solution rather than the problem in urban planning. (K.W.J.F. Rademakers, personal communication, November 4, 2022).

The primary challenge faced by the residents of Amsterdam can be mitigated by adopting more sustainable consumption habits. By depending more on seasonal and locally sourced food, the consumers could reduce the pressure put on logistics by the demand to always have all types of food available in every season of the year (J. A. Annema, personal communication, October 26, 2022). The municipality could facilitate this by further promoting the consumption of sustainably-transported fruits and vegetables.

As hinted in the first paragraph of this chapter, the challenges of the CAAP are diverse and incredibly complicated. To successfully address them, all stakeholders within Amsterdam's food logistics must combine their efforts to create integrated solutions. Contradictions in policy cannot be solved by a single party and only through cooperation is it possible to efficiently address these challenges. By seeking closer ties with the distributors and residents, the municipality can turn the challenges of the CAAP into an opportunity to establish a new of addressing issues within the city.

## 5. Discussion

### 5.1 Reflection

In this research we sought to identify the possible challenges that the clean air action plan of the City of Amsterdam may cause for the logistics of fresh fruits and vegetables. As described in the introduction, fresh perishables are important for the health of the inhabitants of Amsterdam and are in increasing demand. The CAAP requires all taxi's, buses, coaches, vans, trucks and municipal ferries within the A10 ring road to be zero-emission by 2025. This has implications for the logistics of fresh fruits and vegetables. These insights may serve as a base for policy recommendations that would help the city to maintain the affordability and availability of fresh fruits and vegetables in Amsterdam.

The results of the research show that the sector of food logistics has other factors that could accelerate or challenge the implementation of CAAP. But it is also noticeable that with the current business infrastructure, the goal of 2025 could be too ambitious. The distributors may need the proper framework and support to retain their current efficiency in the transport of fruits and vegetables. To be suitable for this task, the framework must contain certain characteristics: First, it must be an entrepreneurial framework that is written for businesses. Second, it must leave room for the integration of new technologies that are bound to emerge in the future. Third, it must remain open to new business models that will be created concurrently with the aforementioned new technologies. Finally, the framework must aid in proper communication between the parties that are involved in food distribution.

When it comes to policy making, we found a lack of integration of logistics in the CAAP policy. The consequences of this insufficient integration could hinder the transition towards sustainable modes of transport as promoted by the CAAP. This could be resolved through improved communication and increased collaboration between all parties. However, for governmental and non-governmental entities to communicate successfully, the private sector would need an incentive to cooperate, especially small businesses. This underlines the importance for policy makers to find better ways for small businesses to participate in a more inclusive and sustainable way than subsidies. This would lead

to the policies not only being effective, but also socially fair and inclusive of all business sizes. Moving to the plan itself, an important aspect would be that the CAAP focuses on the types of vehicles, making a distinction between emission and emission free vehicles, but not considering non-tailpipe emissions, not making this transition completely emissions free. The policy recognizes the fact as well that tackling transport will only tackle 20% of emissions. This does not imply that CAAP is harmful for society, but it lacks wider integration. We are already moving towards clean energy, and it might also be incentivizing the society to figure new challenges and solve them in a fraction of the time normally needed.

Finally, the challenges that would arise from the plan may also serve as great opportunities for improvement. The issues of the CAAP could motivate many stakeholders within Amsterdam's food logistics system to collaborate and create better solutions in the future. Additionally, logistics could take a more central role in policy making and lead to an increasingly integrated approach by the municipality towards future challenges. It also could make people more conscious of what they consume and thus grow beyond their role as only consumers. This plan would also help alternative solutions to logistics thrive and it could promote the consumption of healthy, locally sourced, and responsibly transported products.

## 5.2 Limitations

The research was limited by a few issues that, if avoided, could result in more precise findings. The main limitation of the research was time. If provided with more time, we might have been able to extend our knowledge by doing more interviews with different stakeholders. Speaking to more distributors and businesses would give more insights on the topic and the challenges specific to them. When it comes to interviews, another limitation is that we have not received an answer to all interview requests. An important player in Amsterdam's food logistics that will be greatly affected by the CAAP is the Food Center Amsterdam. This wholesaler sadly did not reply to our interview request. Their insights would have been greatly beneficial for the research. This research limits itself to a small part of food logistics: fresh fruits and vegetables. Fresh foods require cooling, which showed to be a challenge during zero-emission transportation. This, however, would be even more challenging for the transport of other foods, such as foods that require more conditions, such as freezing or gas control. A recommendation for further research is to study the requirements for different types of food and find their specific challenges when transported in zero-emission vehicles.

## 6. Conclusion

There are many aspects that can explain why the CAAP may be an obstacle to the availability and affordability of fruits and vegetables in Amsterdam. The vision of a city with only zero-emission vehicles is not yet fully realistic. Although considerable progress is expected in the next years in the technologies associated with this, existing technologies are not able to provide sufficient certainty for both large and small companies to make a radical change, both for technical and economic reasons. Most companies continue to use emissive vehicles for food transport. While in some cases alternative solutions such as the use of bicycles for deliveries have proven to be a viable option, in many others it has not. Also, physical factors, such as the weight of electric trucks, the complexity of cooling systems or the insufficient structural strength of quay walls, show the need for further development and investment in the logistics sector and in infrastructure. The CAAP goals may be postponed, indeed, given these circumstances. It may seem logical that in order to force the implementation of these goals, companies involved in fruits and vegetables logistics in the city should be forced to make the



change, but this would threaten the variety, quantity, quality and cost of fresh produce. The population would be directly affected, and this would be in contradiction with other policies that also aim to make Amsterdam a healthier city.

The lack of a new strategy for food logistics in the city means that this issue is often not considered or analyzed when creating new policies. For this reason, there are considerable contradictions between them, which make their development and implementation impossible or highly complex. Disconnection, differences of interest and lack or poor collaboration and communication between stakeholders are strong impediments that slow down change and reduce the chances of its success. Creating motivation, stimulating change, educating the different stakeholders involved in the processes is key to achieving a policy that is powerful, useful, fair, realistic and in harmony with other policies acting at the same time in the urban landscape.

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## Annex A – Email format

Dear Sir/Madam,

My name is [author's name] and I am a student of the master's Metropolitan Analysis, Design and Engineering at Wageningen UR and the AMS Institute. I wish to inquire whether you are available for an interview about urban food logistics before November 4th.

[Describe how the interviewee was found and what is interesting about their background]. Within our own research, we aim to identify the potential effects of Amsterdam's Clean Air Action Plan 2030 on the integrity of fruit and vegetable logistics within the city. This municipal policy aims to ban all non-zero-emissions vehicles, including food delivery trucks, from entering the built-up area of Amsterdam by 2030. Your extensive knowledge of [list interviewee's areas of expertise] would help us enormously in this study.

If you are interested in our topic and are available before November 4th, we would be extremely grateful if you could agree to either an in-person or online interview of thirty to forty-five minutes. The interview may be conducted in Dutch or English according to your preference. If you agree, we will gladly explain our research in greater detail and provide you with a list of questions that we wish to handle during the interview. If you must refuse, we would also be happy if you could direct us towards your colleagues with a similar type of expertise.

Thank you for your time and consideration. I CC'd the other members of my writing group, and we will eagerly await your response.

With kind regards,  
[Author's name]

## Annex B – Format interview guide

### *Consent*

- Do you consent to the interviewers making notes on paper during the interview?
- Do you consent to being referenced and quoted by name in the research paper?
- Do you consent to the audio and video of the interview being recorded? Please specify if you consent only to an audio recording.
- Do you consent to the distribution of video clips or excerpts from the interview recording in the form of a knowledge clip?

### *Open end questions*

- Could you please give us a brief introduction about yourself and what topics do you handle during your work/research?
- What do you think about the energy transition in logistics in your work/research?

### *Theme 1: Current situation*

- What do you know about fresh fruit and vegetable logistics in Amsterdam? (If not, what about food logistics in general?)
- How have these logistics developed over the last 5 years? Do you already see more electrical vehicles?
- How do you think that the CAAP will affect these logistics?
- What is your opinion about CAAP's objectives?

### *Theme 2: CAAP effects/challenges*

- Do you think that the CAAP has been successful in reaching its goals so far? Will this continue in the future?
- What are the challenges for the municipality, in your opinion, to reaching CAAP's goals in the future? Are these challenges inherent to the design of the policy or are they societal/financial/infrastructural? Is the electrical grid ready for more electrical trucks?
- How will CAAP challenge the food transporters in the city? Is there a difference in how small businesses and large industries will cope with this

### *Theme 3: mitigation*

- How do you think that these challenges can be mitigated by the municipality and the transporters?
- Do you think that the municipality should continue with its current strategy for this policy?

## Annex C – Interviews summary

Interviewee	Date interview	Food logistics	CAAP
Jan Anne Annema <i>Professor TU Delft</i>	26/10/2022		<ul style="list-style-type: none"> <li>It is good that the CAAP makers tried to incorporate different aspects such as behaviour, special planning, and technology</li> </ul>
Walther Ploos van Amstel <i>Professor HvA</i>	27/10/2022	<ul style="list-style-type: none"> <li>Different market channels:               <ul style="list-style-type: none"> <li>Big retail (efficient, uses few but big trucks)</li> <li>Small retail (supplies small stores)</li> <li>Catering (needs short chain because ready made food is very perishable)</li> <li>restaurants and bars (a lot of wholesalers and shipments)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Van Amstel doesn't think zero-emission zones will go through for a few reasons               <ul style="list-style-type: none"> <li>lack of proof of efficiency of the zones</li> <li>not every vehicle can be zero-emission</li> <li>The impact of the changes need to be paid for</li> </ul> </li> </ul>
Guido de Bruijn <i>Restaurant chain owner</i>	31/10/2022	<ul style="list-style-type: none"> <li>Perishables are ordered the night before delivery</li> <li>Company gets fruits and vegetables from a provider in Amsterdam and gets daily deliveries in the morning</li> <li>According to experience little requirements from vehicles was needed for perishable delivery</li> </ul>	<ul style="list-style-type: none"> <li>CAAP will force entrepreneurs to find different solutions and make changes.</li> </ul>
Tuul Erdenbold <i>Master's student MADE</i>	01/11/2022		
Joeri Jongeneel <i>Logistics Adviser City of Amsterdam</i>	03/11/2022	<ul style="list-style-type: none"> <li>Streams in Amsterdam's food logistics:               <ul style="list-style-type: none"> <li>Big retailers and horeca (large and efficient system)</li> <li>Small, specialized retailers (very frequent small deliveries)</li> <li>Consumer deliveries (quickly growing sector)</li> </ul> </li> <li>Food logistics are not equally efficient everywhere</li> </ul>	<ul style="list-style-type: none"> <li>The municipality has a regulating and facilitating role</li> <li>The objectives of the CAAP will be achieved according to Jongeneel</li> </ul>
Kees-Willem Rademakers <i>Professor HvA</i>	04/11/2022	<ul style="list-style-type: none"> <li>It will take 5-10 years to see reliable and affordable solutions</li> <li>Food logistics has the 2nd biggest traffic volume on the roads after construction logistics.</li> <li>Few big wholesalers deliver 80%, but thousands of small players for horeca distribution deliver 20%, by van and also trucks.</li> <li>Having consolidation centres for bike distributions also requires the consolidation of logistics and new regulations.</li> <li>The most sustainable way for distribution for horeca is actually the 7,5 tons trucks               <ul style="list-style-type: none"> <li>SFSC: Organic local farmers drive to the city to deliver small volumes of products, often with not efficient clean vehicles (So this is not the last mile logistic but the first one)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>The CO2 goals in Amsterdam don't make much of a difference. Current combustion engines are quite clean and emit very low CO2 levels.</li> <li>Amsterdam's zero emission city centre zone will not be achieved by 2025</li> <li>Big players have an easier time transitioning and can push the smaller ones out of the market</li> </ul>
Ton Segers <i>Logistics manager Rungis</i>	04/11/2022	<ul style="list-style-type: none"> <li>The most suitable types of vehicles for the inner city are smaller vans/trucks</li> <li>Fruits and vegetables require constant cooling during transport.</li> <li>All Rungis vehicles use cooling and are equipped with an automatic cooling motor that uses diesel.</li> <li>A route planning is made to ensure the highest efficiency and maximized density of recipients.</li> </ul>	<ul style="list-style-type: none"> <li>Rungis doesn't use EV's yet</li> <li>Rungis is hesitant about being the first in line to transition to zero-emission and would prefer to look at the actions of their competition first. "The competition can also find it out"</li> <li>Rungis is aware of how dynamic the transition is. What seems perfect now could be entirely unsuitable within 2 years or there</li> </ul>
Jim Groot <i>Professor WUR</i>	07/11/2022	<ul style="list-style-type: none"> <li>Food centre is in A10 ring, so everything would need to be transported towards Amsterdam zero-emission. Normal trucks should be able to reach the food centre according to Jim Groot.</li> <li>Fruits and vegetables need to be cooled, but energy can be saved here. If you know exactly what happens during the supply chain when it comes to temperature, the food doesn't need to be cooled as much during transport.</li> </ul>	<ul style="list-style-type: none"> <li>Jim Groot doesn't think the CAAP goals will be reached by 2025</li> </ul>

Challenges	Mitigation strategies	Other
<ul style="list-style-type: none"> <li>Policy makers let businesses figure it out</li> </ul>	<ul style="list-style-type: none"> <li>Light rail usage is doable but its less flexible because it will never reach the exact points you want them to</li> <li>Micro mobility could be a good solution for smaller businesses</li> <li>Hydrogen vehicles could be a good solution</li> <li>Subsidies could be implemented to help businesses</li> </ul>	<ul style="list-style-type: none"> <li>Going back to a seasonal supply-chain and depending more on locally produced foods would be more beneficial to the environment</li> </ul>
<ul style="list-style-type: none"> <li>CAAP is the safe approach, they let other companies fix the problem</li> <li>CAAP will hurt small businesses financially</li> <li>Cooling fruits and vegetables</li> </ul>	<ul style="list-style-type: none"> <li>Using small e-vehicles( it is important that there are micro hubs near the city for this)</li> <li>Making products that produce extra cold so it doesn't need to be cooled during transport (lineage does this)</li> <li>Government should have a more direct approach by stimulating and facilitating (government can push companies to work together)</li> <li>The government could zone places for logistic capacity</li> </ul>	<ul style="list-style-type: none"> <li>Since the implementation of low emission zones, there is no significant relation between traffic and air pollution anymore</li> <li>Next stages of CAAP according to van Amstel: <ul style="list-style-type: none"> <li>stop of total zero-emission zones</li> <li>stimulating (subsidies) for clean vehicles</li> <li>facilitating/ privileges for clean vehicles</li> <li>experimenting in the city</li> <li>coordination (traffic management in 'dirty' streets)</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>De Bruijn thinks policy makers have not been very realistic. Implementing new changes will be very expensive</li> <li>Maintenance places are scares and most of the time spare parts are only provided by the original companies</li> <li>Acquiring information is often a challenge for small businesses.</li> </ul>	<ul style="list-style-type: none"> <li>Small businesses need to receive some stimulus to make change more attractive and some solutions must be provided</li> <li>De Bruijn thinks that younger generations that are cautious about sustainability should raise awareness, not</li> <li>When small businesses are proved with transparent regulations, suitable advices and clear and readily available input numbers for estimates, they can move forward.</li> <li>GLEC is a good starting point for gathering information and insights into emissions. It really helps businesses to create an overview.</li> <li>Local production may help to reduce the logistics load</li> </ul>	<ul style="list-style-type: none"> <li>If suppliers change to electric vehicles, de Bruijn is willing to pay a little extra, but it must be in balance, share the cost, dividing responsibility.</li> </ul>
<ul style="list-style-type: none"> <li>Providing sufficient cooling in electric delivery trucks</li> <li>Weight of E-vehicles on old quay walls and bridges</li> <li>Expanding the capacity for food hubs</li> <li>Logistics often fall outside of policy</li> </ul>	<ul style="list-style-type: none"> <li>The municipality aims to increase availability of EVs and the capacity of the energy network</li> <li>Companies can select a "stadsvervoerder" to handle their logistics within city boundaries</li> <li>Transport over water</li> <li>The municipality needs to stay active with the CAAP to make cooperation with logistic players possible</li> <li>The municipality should make it clear just how crucial logistics are to gain political traction</li> </ul>	
<ul style="list-style-type: none"> <li>E-trucks are heavier, they cause higher levels of nitrogen fine particles.</li> <li>Cooling engines are very pollutant and noisy</li> <li>Smaller supplies / players don't trust or want to hear the government</li> <li>The subsidies from the Municipalities to help with the transition are too low in value</li> <li>Prohibition of combustion engine vehicles will affect the market distribution</li> <li>Jargon vocabulary used in the municipality- businesses communication</li> <li>Logistics is not connected with the people and how they want to live in the city.</li> <li>The current work model is not profitable in this first mile, that's why there isn't a solution yet.</li> </ul>	<ul style="list-style-type: none"> <li>Proper organization and cooperation among smaller distributors could reduce delivery costs and emissions</li> <li>Logistics should be taken more seriously at a personal and municipal level.</li> <li>City logistics can help make a functional city if it is thought about from the beginning.</li> <li>We need a system where all goods from local farmers are being collected in an efficient way, transferred to a location where they can be packed, treated and bundled in, ready for delivery.</li> </ul>	<ul style="list-style-type: none"> <li>New Municipality strategy from January 2022. It defines what new policies need to be done</li> <li>Next year is the start for the new regional master plan for city logistics. It says all big cities in Noord Holland &amp; Flevoland need to create new city logistics, and make sure they are all logistic plans in tune with each other between cities as well</li> </ul>
<ul style="list-style-type: none"> <li>Cooling especially on longer routes will be a challenge. It requires a lot of energy and unloading can lead to unwanted increases in temperature (if it's warm outside)</li> <li>Ton sees the charging infrastructure as the biggest challenge because transitioning would overwhelm the network.</li> <li>The customer may have to adapt their behaviour and reduce the frequency of requested deliveries</li> <li>The availability of EV's is also a challenge to reach the goals of CAAP</li> </ul>		
<ul style="list-style-type: none"> <li>Businesses use many different suppliers and get many deliveries</li> <li>Cooling is now done on the safe side by many big players such as Rungis, which requires a lot of energy</li> <li>Transitioning to EV's is very expensive, especially for small businesses</li> <li>EV's aren't very available</li> </ul>	<ul style="list-style-type: none"> <li>Logistics should be combined</li> <li>Keeping track of temperature and time is technically possible and can reduce energy use during transport, because food doesn't need to be as cold.</li> <li>Consumers can help by reducing the amount of food they eat and waste, this will reduce the amount of food</li> </ul>	<ul style="list-style-type: none"> <li>Food production is also important when it comes to the energy transition. The municipality should also look at this.</li> </ul>