AWAKEN SLEEPING ASSETS PROJECT

Floating pop-up recycling in Stockholm

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1. Introduction

Stockholm has a unique location surrounded by water. In comparison to other recycling solutions, waterborne transports have the potential to reach additional citizens and move transport from the streets and thereby reduce traffic, traffic noise, emissions and costs. Prior theoretical studies[1,2] showed that a floating recycling center has the potential to be beneficial from a climate perspective if it visits several quays under one and the same route. To test this under real conditions, a pilot study with a floating recycling center was conducted. The test took place in Stockholm from May 14 - 19 2022 as a collaboration between Stockholm Vatten och Avfall (SVOA) and Sweco within the EU Project Awaken Sleeping Assets Project (ASAP; http://www.smarturbanlogistics.eu/). Recycling containers were placed on a barge that docked and stayed two days at three different berths: Kvarnholmen/Skeppsbron (Berth S105), Norr Mälarstrand (Berth N466) as well as Hornsbergs strand (Berth H475). All docks are easily accessible by foot for the people living nearby.

The main objective of the study was to 1) offer the citizens the service to recycle close to where they are living and 2) reduce emissions of CO_2 equivalent since the need for private car trips to recycling stations is reduced.

During the pilot project the barge was towed by a towboat driven by Environmental Class 1 Diesel (MK1); the towboat and barge started and ended their journey at Kvarnholmen. During the project both electrical trucks and trucks using HVO were used for preparations and loading / unloading the barge.

This report is an evaluation of the ASAP pilot study. We try to address the costs and the environmental impacts (release of CO_2 equivalent) of the pilot study. We also discuss the value of the barge as a service for the citizens.

[1] Sjöström, T. et al. (2020). *Förstudie - Förutsättningar för en flytande återvinningscentral i Stockholm (projektrapport). Sweco, Stockholms stad, Stockholm Vatten och Avfall, The Civitas Initiative.*

[2] Sjöström, T. et al. (2020). *Förutsättningar för flytande återvinningscentral i Stockholm – del 2 (projektrapport). Sweco, Stockholms stad, Stockholm Vatten och Avfall, The Civitas Initiative.*

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2. Methods and results

2.1 Visitors and collected items

During the study, the number of visitors per day were counted and the weight of collected items were weighed daily for different categories. The number of visitors varied between 353 – 551 a day and the total weight of collected items varied between 0.399 – 1.283 ton a day (Table 1). More visitors did not necessarily result in a higher amount of collected items. Hence, no correlation can be seen between the number of visitors and the weight of collected items (not shown). In total 2871 citizens visited the barge where 2.06 tons of items were collected for reuse, 1.41 tons were bulky waste, 0.47 tons were electronics and 0.89 tons were categorized as hazardous waste. In total 4.83 tons were collected. In comparison, a stationary recycling centre receives around 1000 – 2000 visitors a day (including company visits which are not allowed at the pop-ups).

Table 1. Collected statistics from the ASAP pilot study.

		Skeppsbron		Norr Mälarstrand		Hornsbergs Strand		
	[Unit]	**May 14**	**May 15**	**May 16**	**May 17**	**May 18**	**May 19**	**SUM**
Number of visitors	Visitors	539	466	353	432	551	530	**2871**
Number of items given away (reuse)	Items	1042	709	364	343	582	559	**3599**
kg of items given away if every item weights 0,3 kg	kg	313	213	110	103	175	168	**1080**
Collected for reuse	ton	0.28	0.402	0.402	0.308	0.23	0.438	**2.06**
Collected bulky waste	ton	0.17	0.116	0.497	0.335	0.109	0.181	**1.41**
Collected electronic/electric waste	ton	0.23	0.06	0.07	0.028	0.022	0.063	**0.47**
Collected hazarous waste	ton	0.04	0.107	0.06	0.043	0.038	0.601	**0.89**
Collected waste/material in total	**ton**	**0.72**	**0.685**	**1.029**	**0.714**	**0.399**	**1.283**	**4.83**

2.2 Compilation of questionnaire

Visitors to the barge were asked to fill in a questionnaire that was available both digitally, as well as in paper format where personnel at the barge assisted the visitors in filling in the answers. The questionnaire had 9 questions, and eight of these had pre-defined answers to choose from. The last question gave the visitor the possibility to answer with free text. Altogether 270 answers were collected, 128 at Skeppsbron, 84 at Norr Mälarstrand and 58 at Hornsbergs strand. In this study we assume that the answers are representative for all the 2871 visitors (also for the visitors not filling in the questionnaire). The questions were:

1. Are you here to leave waste / leave items for re-use / visit the bargain corner?
2. How did you hear about the barge?
3. How often would you like the barge to visit?
4. How did you get here?
5. How far did you go to get here?
6. What would you have done with your item if you did not have the option of leaving it here at the barge?
7. How would you have transported yourself in that case?
8. Can you imagine visiting the recycling barge again?
9. What worked well and less well with the recycling barge?

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The answers from question 1 reveal that around the same share of people visited the barge to leave waste (28.5%), leave items for reuse (28.5%) and with the hope to find something in the bargain corner (31.1%). 11.5% of the visited had another purpose of the visit.

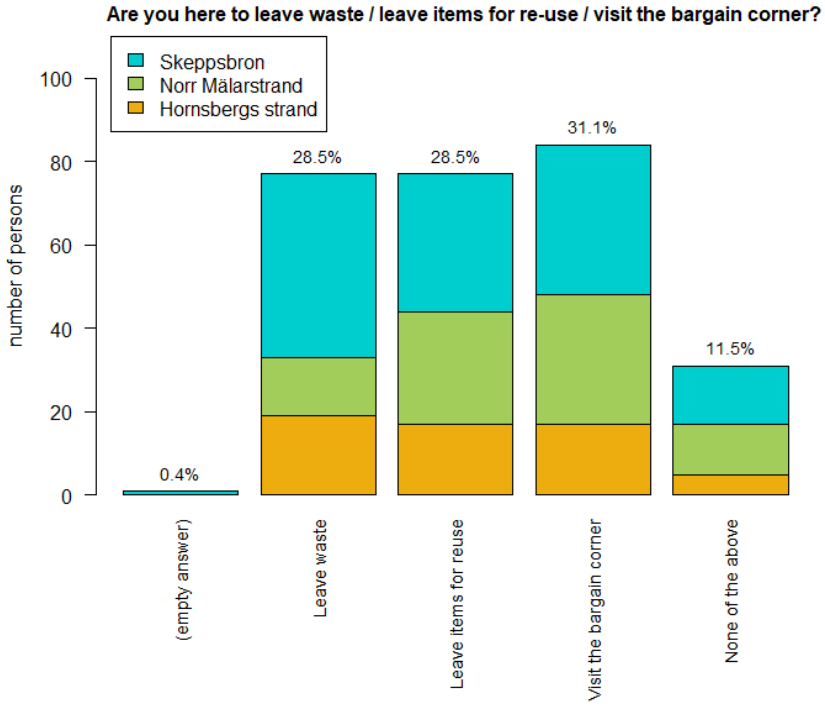

Figure 1. Purpose of the visit.

In question 2 it was asked how the visitors heard about the barge 38.5% got to know about it by passing by. A high share of visitors (22.2%) got to know about the barge by information sent to the postbox. Most of these visited Skeppsbron; the reason is that information about the barge was sent to every household in Gamla Stan, in which Skeppsbron is located. Also, social media (11.1%) and adverts in the local paper (9.3%) had informed the visitors about the floating recycling center.

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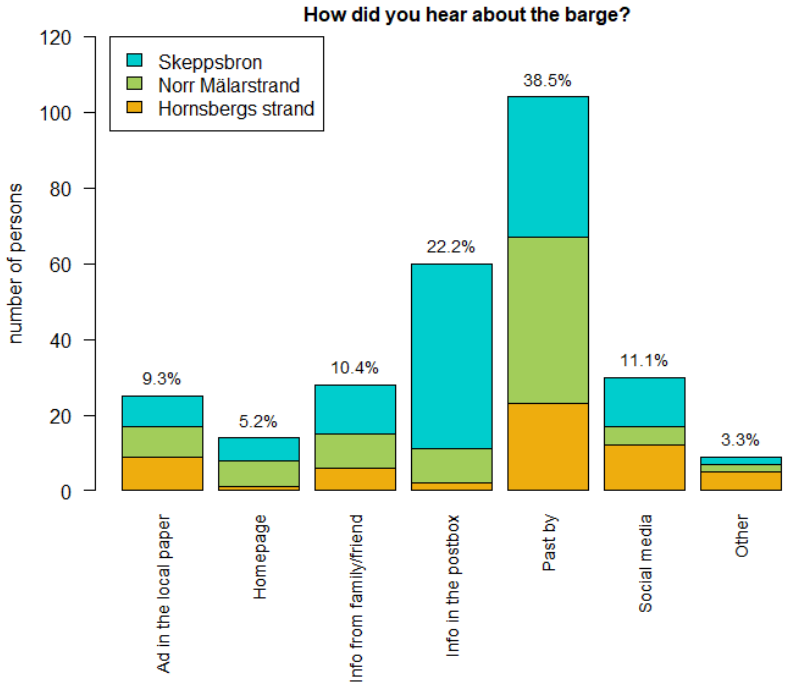

Figure 2. How the visitors heard about the barge.

Question 3 reveals that most of the visitors would like the barge to visit once a month (39.6%) or once every third month (31.9%). Once a week would be appreciated by 11.5% and two times a year was suggested by 13.3%.

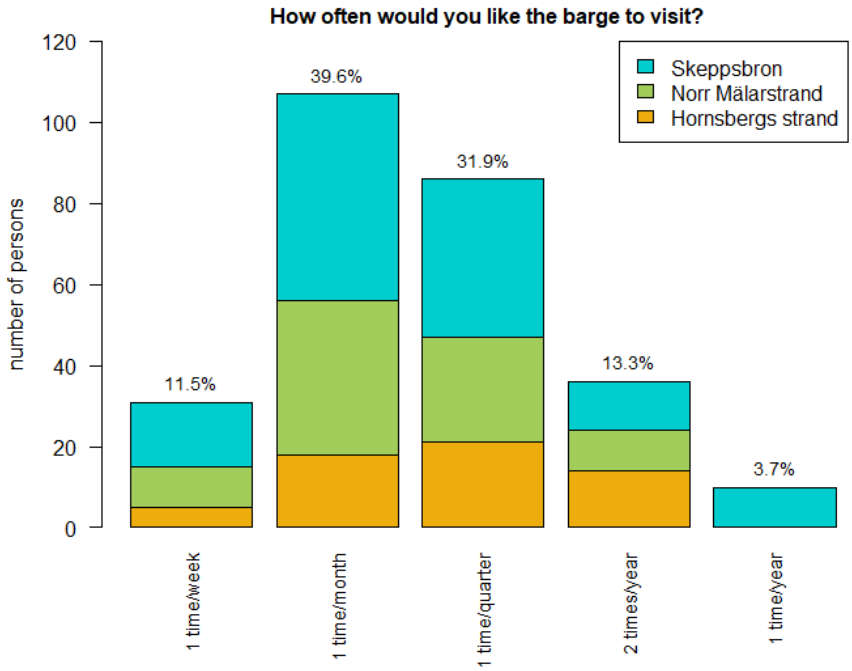

Figure 3. How often the visitors would like the barge to visit.

The results from question 4 show that a clear majority of the visitors visited the barge by foot (83.0%), 7.8% of the visitors came by bike and 6.3% by public transport. Only 3% arrived by car, corresponding to eight visitors of the ones filling out the questionnaire.

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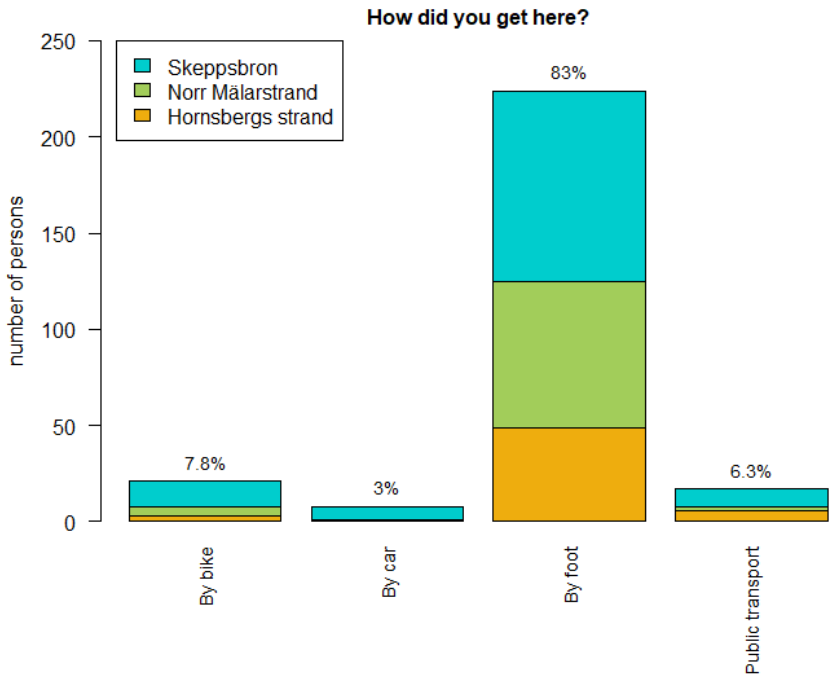

Figure 4. How people got to the barge.

In the pre-study it was assumed that most of the visitors would live in close approximation to the barge. The assumption was validated by the answers in question 5. 52.2% of the visitors answered that they live less than 500 meters from the barge. Still, 22.2% had a distance of 500 – 1000 meters to the barge, so the influence area is larger than 500 meters, for future studies it may be set to 1000 meters. 15.6% had an estimated distance of 1-2 km, 6.7% had 3-5 km and the share of visitors that had above 5 km was 3.3%. A difference in how far people went to get to the barge can also be seen between the docks; at Hornsberg strand almost all visitors lived less than 1 km from the barge. At Norr Mälarstrand people tended to go up to 2 km, and when the barge was docked at Skeppsbron, where there are less options for recycling, some visitors travelled more than 5 km to visit.

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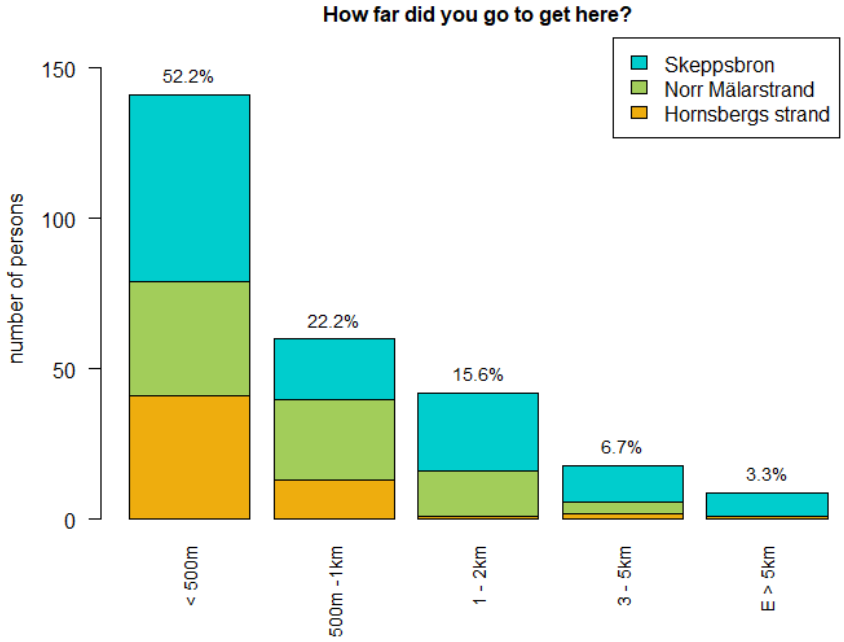

Figure 5. The distance the visitors went to get to the barge.

The visitors were in question 6 asked what they would have done with the item if they would not have handed it in at the barge. One out of four (25.6%) would have left it a recycling center whereas around the same amount (24.4%) would have left it at home. 20.7% would have left it to charity and 14.1% would have left it in a garbage room for bulky items they had access to.

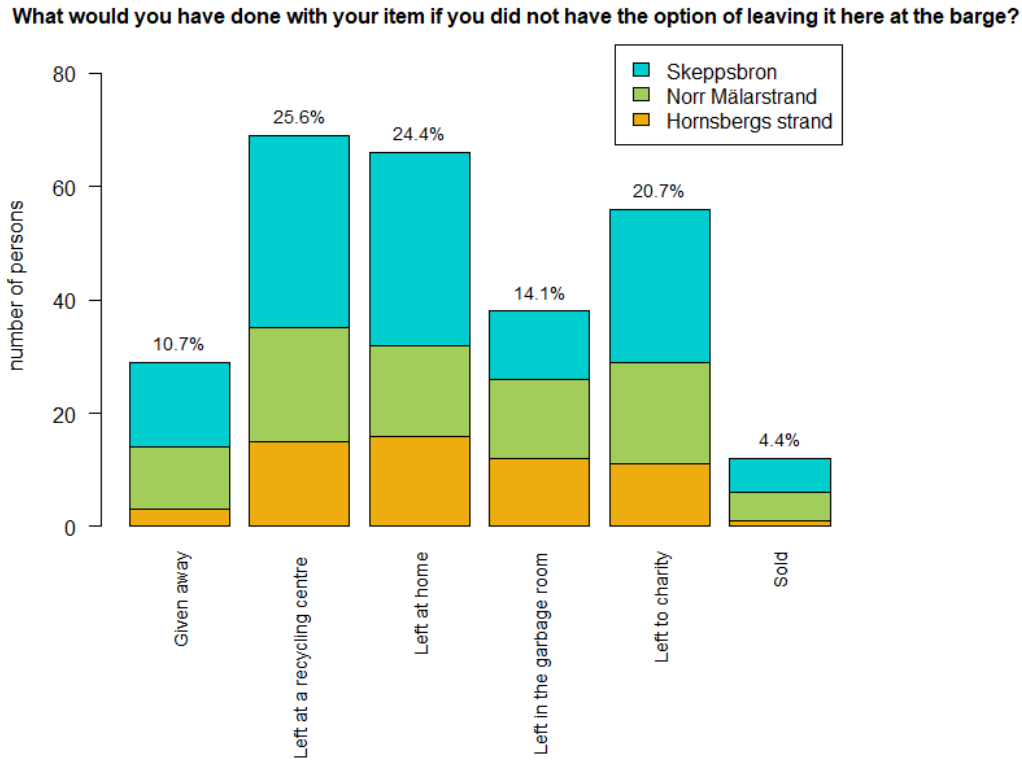

Figure 6. What the visitors else would have done with the item.

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One of the objectives with the floating recycling center is to facilitate recycling for citizens lacking access to a car. Question 7 is a follow-up question to the previous question. It shows that 41.9% of the visitors would not have needed transport in absence of the barge. This share of the respondents probably answered “given away”, “left at home” or “left in the garbage room” in the previous question. It can also be seen that 28.9% of the visitors would have used the car if the barge was not available.

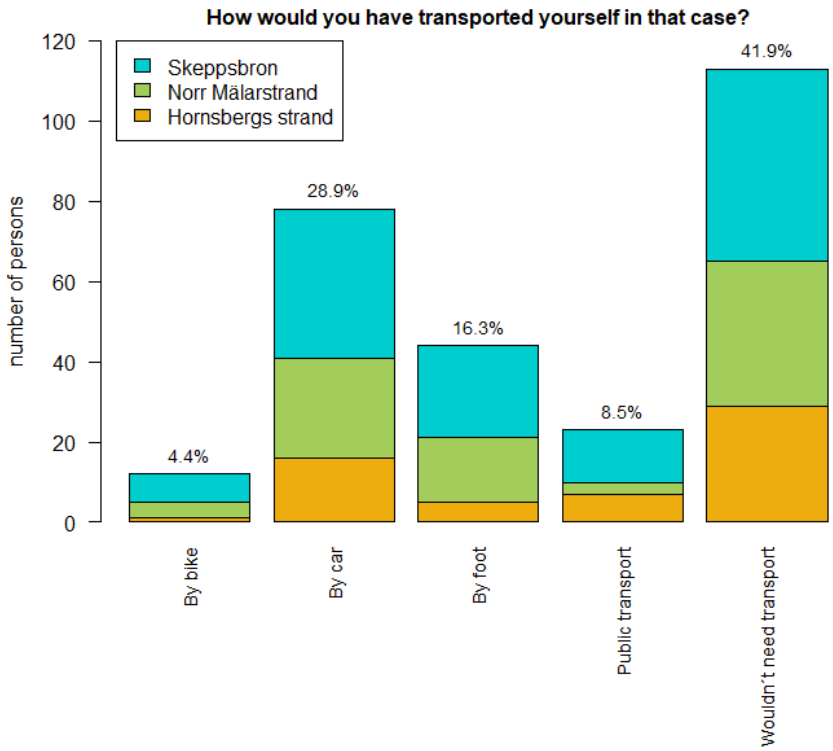

Figure 7. Which mean of transport otherwise would have been used.

Out of 270 visitors filling out of the questionnaire, 269 could imagine visiting the barge again according to the answers from question 8. Only one answered no.

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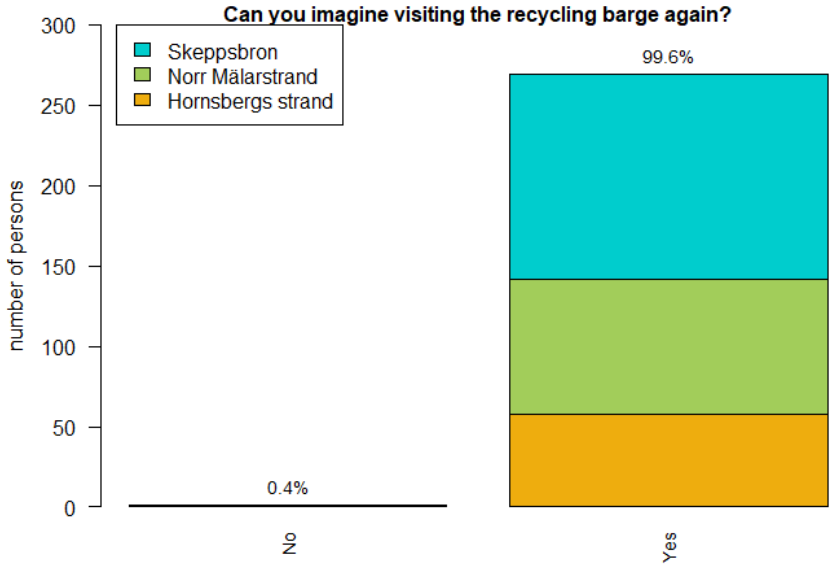

Figure 8. The visitors would return.

The final question 9 was phrased “What worked well and less well with the recycling barge?”. An attempt was made to categorize the free-texts answers in either Positive / Negative / Neutral and/or Suggestion. A clear majority of the answers were positive about the experience. Out of 270 answers 147 were categorized as Positive, 7 as Negative and 8 as Neutral. Furthermore, 25 answers were suggestions or included a suggestion. Many were positive in general, but specifically the personal were praised, as well as the possibility of recycling nearby the home without needing a car. The negative comments were about not having the possibility to leave all kinds of items (e.g. large ones) and about the perceived small supply in the bargain corner. A high share of the suggestions concerned the need to provide better information e.g. about opening hours. Another common suggestion was that the visitors wanted the barge to come regularly. Almost all answers were received in Swedish. These were automatically translated to English for the purpose of this report. See appendix for the answers in both Swedish and computer-translated English.

2.3 Cost

There are both monetary- and environmental costs that can be associated to the ASAP pilot study. In this section we try to address both costs:

2.3.1 Monetary cost expressed in SEK

The table below shows known costs related to the pilot project. The total is calculated to be 342 893 SEK.

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Table 2. Project costs.

Barge	Information	SEK
Renting costs	Including tugboat, personnel, renting costs and preparations needed.	97 200
Personnel and preparations	Costs for personnel (3 persons): 115 600 SEK. Setup of containers with crane: 15 600 SEK. Rental costs electric car, trailer and ramp: 8 900 SEK. Total: 143 100 SEK.	143 100
Fuel	Fuel consumption tugboat: 30 liters/hour Kvarnholmen – Skeppsbron: 3 hrs Skeppsbron – Norr Mälarstrand: 4,5hr Norr Mälarstrand – Hornsbergs strand: 2.5hr Hornsbergs strand – Kvarnholmen: 4hr Total: 14 hours x 30 liters/hour = 420 liter.	11 584
Truck		
Rental cost and personnel	(included in the costs Personnel as listed above)	-
Fuel (HVO)	85.5 km travelled. Truck´s fuel consumption: 99 l per 100 km gives 84.64 liters HVO.	2 410
Fuel (electricity)	99.4 km travelled. Charged kWh: 21 times x 6 kWh x 1,05 for losses = 132 kWh.	199
Other costs		
Staff Stockholm city	(not included in the calculations)	-
Information sent by post and adverts in local newspaper	Information sent by post to about 2000 households in Gamla Stan. Adverts in local newspaper and social media. Total cost ca. 83 000 SEK.	83 000
Berth fee	No cost for the pilot project. If repeated, a cost of 30 SEK per meter of berth needed would be charge for every 24 hours. The barge was 30 m long. Hence, the cost would be 30 x 30 = 900 SEK for every 24 hours. For total 6 days 6 x 900 = 5400 SEK.	5400
	Sum:	342 893

2.3.2 Environmental costs, carbon footprint

In this section we estimate the amount of carbon dioxide emitted during the pilot study.

Tugboat

The tugboat, operating with a velocity of 5 knots an hour, had a total operating time of 14 hours with an average fuel consumption of 30 liters an hour. Hence, the total fuel consumption for the tugboat was 14 x 30 = 420 liters of Diesel MK1 during the entire pilot study. As the sections travelled have different lengths, the fuel consumption varied between the stops. The 420 liters of fuel used by the barge results in 1144 kg of carbon dioxide equivalents (CO_2e) emitted (appendix 2).

Table 3. Operation time and fuel consumption for transport and docking.

Route	Time (hour)	Fuel consumption (liter)
Kvarnholmen - Skeppsbron	3	90
Skeppsbron - Norr Mälarstrand	4.5	135
Norr Mälarstrand - Hornsbergs strand	2.5	75
Hornsbergs strand - Kvarnholmen	4	120
Total:	**14**	**420**

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Trucks

During the pilot study both HVO and electrical trucks were used. The trucks traveled between Roslagstull recycling center and the barge placed at different locations. Altogether, the HVO truck traveled around 85.5 km and the electrical truck about 99.4 km. The carbon dioxide equivalent (CO2e) released by the HVO trucks is estimated to be 26 kg. The carbon dioxide equivalent (CO2e) associated with the electrical trucks is estimated to be 6 kg. Altogether this sums up to 32 kg of CO2e.

Emissions from visitor transport to the barge

Most of the visitors traveled by foot or bike, thereby releasing no CO2e. A lower percentage traveled by public transport (6.3%) or by car (3%). Considering that the barge had 2871 visitors the numbers are equal to 180 persons travelling by public transport. We assume that only public transportation by bus was used, this gives a total amount of carbon dioxide equivalent (CO2e) of 43 kg for the public transport to the barge.

It is estimated that 3%, i.e. 86 visitors travelled by car. By looking on individual questionnaires one can see that 25% of those lived within 500 meters from the barge, 12.5% within 500 – 1000 m, 25% within 1- 2 km, 12.5% within 3-5 km and finally; 25% of the people travelling by car had more than 5 km to the barge (not shown). To enable a calculation of the mean distance for the private car some assumptions[3] were made. To travel back and forth to the barge, it was calculated that altogether 430 km were traveled by private cars. Although the calculations are based on some assumptions and therefore are also related to a certain degree of uncertainties, the derived distance can still be seen as an estimated value of private transports. Assuming a mix of electrical vehicles, petrol and diesel the traveling of 430 km is calculated to release 55 kg of CO2e for the year 2022 and 26 kg for the year 2030. The decrease of emissions is due to the increased share of electric vehicles in the fleet by 2030. For the calculations an electric vehicle share of 60% for the year 2030 is used, compared to 18 % for 2022.

Sum of emissions

The table below shows the CO2e from barge, trucks, public transportation and cars within the pilot. The total amount of CO2e is 1274 kg. The barge stands for about 90 % of the total CO2e-emissions.

Table 4. Summary of the total CO2e emissions during the pilot.

Type of transportation	Information	Kg CO2e emitted	%
Barge (transported by tugboat)	14 hours operating time	1144	89.8
HVO truck	85.5 km traveled	26	2.0
Electric truck	99.4 km traveled	6	0.5
Public transport	180 persons travelled by public transport	43	3.4
Cars (2022)	430 km travelled	55	4.3
Total		**1274**	**100**

[3] We *assume that <500 meters equal 250 meters and >5 km equals 6 km. We then get a mean distance of 0.25 x 250 + 0.125 x 750 + 0.25 x 1500 + 0.125 x 4000 + 0.25 x 6000 = 2530. This gives the visitors traveling by car had a mean distance of about 2500 meters between their home and the barge*. Back and forth this corresponds to 5 km. We estimated that 86 visitors came by car; 86 visitors x 5 km = 430 km traveled by private cars.

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2.4 Benefits

The ASAP Pilot Project can be considered having several benefits. In this section we address and evaluate the benefits of the present setup of the ASAP project recycling barges pilot, which is not the same setup as in the pre-study. Both monetary and environmental benefits are addressed, as well as the benefit of providing this service to the citizens.

2.4.1 Monetary benefits expressed in SEK

The pilot study does not have any known direct monetary benefits for the city of Stockholm. The level of service is higher, but so are the costs.

2.4.2 Environmental benefits, less private car travels to recycling center

One of the main objectives of this pilot study was to provide the service to recycle without having to use a car. By offering a nearby recycling centre the citizens can recycle by foot. By examining the results from the questionnaire, it can be seen that a majority of the visitors came by foot or bike. Of the total number of 2871 visitors, 28.9% of the visitors would otherwise have used the car to transport the item(s) they now handed in at the barge. This is equivalent to (0.289 x 2871) 830 visitors that would have used the car if the barge was not there.

To address how many kilometers of driving this corresponds to some assumptions are made. We assumed that the mean distance car trip is the same distance as the distance between the barge and the recycling center. Although this is a simplification of the reality it still gives a rough estimation of the distances of car traveling “avoided” thanks to the pilot project. The mean distance of the (different locations of the) barge and the recycling center was 4.7 km. Hence, we estimate that each car trip that was avoided “saved” 2 x 4.7 km = 9.4 km return. The number of visitors that would have used the car if the barge was not there is 830, and 830 visitors x 9.4 km gives that 7802 km of private car traveling was potentially avoided by offering the citizens the possibility to recycle nearby at the barge. It must however be said that this number have some uncertainties related to it. E.g. if instead going to the recycling center, the visitors would probably have filled the cars with more items than they recycled by foot at the barge. Nevertheless, 7802 km of private car traveling corresponds to about 1002 kg of CO2e for a pilot year 2022 and 474 kg for year 2030. The decrease in CO2 for year 2030 is due to an increased share of electric cars in the fleet from 18% to 60%.

2.4.3 Citizen service

The visitors very much appreciated the floating pop-up recycling centre. This is clear when examining the answers from the questionnaires (See appendix 1). Especially the free text answers express positive reactions to the pilot project. A clear majority of the answers were positive and included comments from the visitors about being happy to see a revisit from the barge. The visitors furthermore appreciated the close distance from their home and the service that otherwise is lacking for many, not the least for the ones not having access to a car.

From the citizens’ point of view, there are no doubts that the pilot project was successful. Private persons don´t have to spend either money or time in order to transport items to e.g., a recycling center located further away. In addition to that, there are also benefits for the city of Stockholm that would like to offer each citizen equal possibilities to recycle independent of where they live within the municipality. Especially in Gamla Stan (Skeppsbron) other recycling solutions are limited due to lack of suitable places in the urban environment. At Skeppsbron in Gamla Stan the barge therefore solves some of the logistical problems related to limited space and required permits that the city otherwise faces. In addition to that, the barge acts as a promoter of recycling and environmental thinking in the urban inner city.

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2.5 Cost versus benefits

The following cost-benefit analysis is made from the City of Stockholm's point of view. The pilot study had a cost of altogether around 340 000 SEK and there are no obvious costs that are avoided when introducing a barge as a recycling station. Hence, to outweigh the cost, the environmental benefits have to be larger than the environmental cost and / or the citizen service has to be valued higher than the total monetary and environmental cost.

When addressing the environmental costs, the total release of CO2e associated with the pilot study is estimated to be 1274 kg CO2e. The environmental benefits of "avoided" car travels is estimated to be 1002 kg of CO2e during the same time period. Hence, a difference of 272 kg where the environmental cost is higher than the benefit.

As both the monetary- and environmental costs are higher than their respective benefits, these net costs can be put into relation of other known benefits. The remaining known benefit is the citizen service. As a result of the calculation above, the cost of the citizen service has an estimated cost of 340 000 SEK and 272 kg of emitted CO2e. This corresponds to 118 SEK per visitor, or 68 500 SEK per collected ton. This can be compared to SVOA´s land-based pop-ups during 2021 that costed 3 200 000 SEK, attracted 57,350 visitors over 107 days and costed 56 SEK per visitor, or 39 000 SEK per collected ton.

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3. Discussion

The questionnaire show that the public very much appreciated the floating recycle center. Furthermore, it was estimated that only about 3% of the visitors came by car, this indicates that the barge succeeded in reaching citizens without access to a car. Still, the pilot project cost around 340 000 SEK and the environmental cost was calculated to be higher than the environmental benefit. Nonetheless, there are rather simple measurements than can be taken to reach a break-even for the environmental cost and benefits, or even turn the service from climate negative to climate positive.

As most of the kg CO2e was emitted by the tugboat for the transportation of the barge, changes regarding the tugboat can have high impact on the emissions. There are adaptions that could reduce the environmental impact. Calculations were conducted where it was assumed that the tugboat would use HVO instead of Diesel MK1. HVO would cost 11 957 SEK, approx. only 3.2% more than Diesel MK1, the emissions however would have a strong decrease from 1144 kg CO2e to 127 kg CO2e emitted for the transportation of the barge. According to the calculation and assumptions of this study, this change of fuel would turn the service from climate negative to climate positive.

With the current setup the need to use a barge at all can be questioned. Trucks are still needed to empty the trays and transport items between the barge and the recycling center. The remaining purpose of the barge is to offer space for containers. At locations where it is possible, the containers should therefore probably be put on land instead, then both the monetary- and environmental cost associated with the barge can be totally excluded from the budget calculations. The barge potential is instead at locations were the space on land is limited, such as Skeppsholmen where the usage of a barge can be a solution to offer each citizen equal possibilities to recycle. At this densely build-up location the cost for a barge must be compared to other recycling solutions, since the alternatives are few, a higher cost may be accepted for the much improved service. To attract even more visitors the barge could possibly extend its opening hours or stay for an extended time (e.g. 2-4 weeks).

The calculation in this report is based on the current car fleet and its share of electrical vehicles. However, the share of electrical vehicles is expected to increase in the future. With an increase of electrical vehicles, the release emissions of kg CO2e decreases. For this study it means that the benefits of avoiding car travels will decrease under future conditions. See appendix 2 for detailed calculations.

There are different permissions for handling waste. If the barge would have been classed as a so-called C-facility the barge would have been allowed to store more weight, also overnight. It would not have changed the distance the barge would have to travel, but less transport between the recycling center and the barge would have been needed. For future pilot studies, it may be worth to seek permission for a C-facility.

Most people got to know about the barge by simply passing by. This indicates that longer opening hours or longer visits can be to prefer to reach out to more people. If the barge stayed longer at one place without moving the cost per visitors etc may possibly decrease.
In prior studies it was assumed that berths with a lot of residential houses within 500 meters would attract more visitors. The data collected from three berths within this study are not enough to confirm nor reject this assumption. As seen in table 1 there is a day-to-day variation of the number of visitors, but it may just as well be driven by other parameters like e.g. the weather and the day of the week. Furthermore, by examining table 1 and the number of visitors in relation to tons of collected waste/material, no linear relationship exists ($r^2 = 0.0745$). In other words, the number of visitors cannot be used to predict the tons of collected waste/materials.

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4. Summary and conclusions

The visitors at the barge were clearly positive and would visit again if the barge returned. Most of the visitors came by foot and many were happy they could recycling without needing a car. The barge also enabled SVOA to visit locations which otherwise are difficult to reach. Even though the barge is more expensive than land-based alternatives for recycling, it therefore offers an attractive solution for recycling at locations where the alternatives are few due to limited space on land.

The environmental cost of the pilot project is calculated to exceed the environmental benefits. There are, however, measures that can be taken to reduce the release of CO2e. If the tugboat would have used HVO, then the environmental benefits would have exceeded the environmental costs according to the calculations in this study. This would turn this project from climate negative to climate positive.

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Appendix 1 – Free-text answers from the questionnaire

SV: Vad fungerar bra och mindre bra med återbruksprämen?	Eng: What worked well and less well with the recycling barge?	Category
All funkar bra	Everything works well	Positive
Allt fungerade mycket bra!	Everything worked very well!	Positive
Allt fungerar bra	Everything works fine	Positive
Allt funkar bra.	Everything works fine.	Positive
Allt har fungerat bra	Everything has worked well	Positive
Allt har fungerat extra bra	Everything has worked exceptionally well	Positive
Allt som jag behövde var superbra och jättetrevlig personal! Återkommer och tipsar också vänner.	Everything I needed was superb and very nice staff! Will return and also recommend friends.	Positive
Allt va bra!	Everything is fine!	Positive
Allt var bra!	Everything was good!	Positive
Allt var bra, önskar dock att man kunde lämna in större grejer.	Everything was good, but wish you could hand in larger items.	Positive and suggestion
Allt var jätte bra 👍	Everything was very good ??	Positive
Allt var superbra! Inspirerande.	Everything was superb! Inspiring.	Positive
Allt var toppen	Everything was great	Positive
Allt verkar bra!	Everything seems fine!	Positive
Allt väl hittills.	All good so far.	Positive
Allt väldigt bra, trevlig personal, bra initiativ.	Everything very good, nice staff, good initiative.	Positive
Allt är bra, inga brister.	Everything is good, no flaws.	Positive
Allt är väldigt bra!	Everything is very good!	Positive
Allting fungerar toppen bra	Everything works great	Positive
Att den är placerad på en bra plats, mindre bra att den är två dagar bara vi hade velat ha den hela tiden	That it is placed in a good place, less good that it is two days only we had wanted it all along	Positive and suggestion
Bara bra!	Just great!	Positive
Bara positivt, smart grej	Only positive, smart stuff	Positive
Blir bara lite sjösjuk.	Just getting a little seasick.	Neutral
Bra att den är här	Good thing it's here	Positive
Bra att den är här, vore toppen om den kom regelbundet.	Good that it is here, would be great if it came regularly.	Positive
Bra att det finns! Mer reklam nära bostäderna!	Good thing there is! More advertising near the homes!	Positive
Bra att det är när. Speciell här i gamla stan.	Good thing it's when. Especially here in the old town.	Positive
Bra att det är så nära hem.	Good thing it's so close to home.	Positive
Bra att ni finns, mindre bra information (när, var etc.) Past by er av en slump. Fler ställen kanske?	Good that you are there, less good information (when, where, etc.) Past by you by chance. More places maybe?	Positive and suggestion
Bra attvi finns	Good that we exist	Positive
Bra för miljön och bra för folk som kanske inte har så mycket pengar.	Good for the environment and good for people who may not have much money.	Positive
Bra grej!	Good stuff!	Positive
Bra idé att ta vara på saker.	Good idea to take care of things.	Positive
Bra läge och man behöver inte köra bil	Good location and you don't have to drive	Positive
Bra läge. Bra öppettider	Good location. Good opening hours	Positive
Bra med återvinning!	Good on recycling!	Positive
Bra medåterbruk	Good co-recycling	Positive

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Bra mottagande	Good reception	Positive
Bra och smidig idé!	Good and flexible idea!	Positive
Bra plats, trevlig personal, lätt tillgängligt.	Good location, nice staff, easily accessible.	Positive
Bra service	Good service	Positive
Bra!	Good!	Positive
Bra: lättillgängligt. Dåligt: för sällan	Good: Easily accessible. Bad: too rarely	Positive
Cykla förbi här av men slump	Cycle past here by accident	Neutral
Den skulle gärna få komma oftare! Mycket uppskattat!	I would like it to come more often! Much appreciated!	Positive and suggestion
Den är så bra	It's so good	Positive
Den är toppen.	It is great.	Positive
Deponi avfallet kunde ej tas mot.	Landfill waste could not be accepted.	Negativeative
Det finns ett stort behov av att kunna kasta större saker.	There is a great need to be able to throw larger things.	Suggestion
Det finns ingen stamma att lämna återbruk, vi önskar att ni kommer tillbaka	There is no place to leave recycling, we want you to come back	Positive
Det fungerade bra det vi kom för.	It worked well what we came for.	Positive
Det fungerar bra	It works well	Positive
Det fungerar toppen! :-)	It works great! :-)	Positive
Det fungerar alldeles utmärkt	It works perfectly fine	Positive
Det går snabbt och smidigt	It goes quickly and smoothly	Positive
Det hade kunnat vart större.	It could have been bigger.	Suggestion
Det här konceptet var toppenbra.	This concept was great.	Positive
Det var smidigt!	It was smooth!	Positive
Det vore bra om nå kunde återkomma	It would be good if now could return	Positive and suggestion
Det är nära till hands när man inte har bil.	It's close at hand when you don't have a car.	Positive
Det är rätt bra att vi är på olika platser i stan.	It's quite good that we are in different places in town.	Positive
Dåligt utbud	Poor supply	Negativeative
Excellent location!	Excellent location!	Positive
Fantastisk idé!	Fantastic idea!	Positive
Fantastiskt bra initiativ!! Bra personal.	Fantastic initiative!! Good staff.	Positive
Fick sms notis om prämen	Received SMS notice about the barge	Neutral
Fungerar utmärkt	Works perfectly	Positive
Funkar jättebra, kul med båt	Works great, fun with a boat	Positive
Fyndade	Bargains	Positive
Gick snabbt att lämna in allt	Went quickly to submit everything	Positive
Gott om plats, snubbelrisk	Plenty of space, tripping hazard	Neutral
Gratis e bra	Free is good	Positive
Gungigt, vissa mår illa	Rocking, some feel sick	Negative
Helgen är bättre än vardagar	The weekend is better than weekdays	Suggestion
Hitta bra prylar	Find great stuff	Positive
Här för sällan	Here too rarely	Suggestion
Härligt att ni finns	Great that you are there	Positive
Information att vi står här	Information that we are here	Neutral
Informationen innan (1-2veckor innan) för att hinna förbereda	The information before (1-2 weeks before) to have time to prepare	Suggestion
Informationen om det här	The information about it here	Suggestion
Ingen bil behövs nära och bra	No car needed close and good	Positive

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Inte helt klart vad man får och inte får lämna in. Annars ett superbra initiativ!	Not entirely clear what you can and cannot submit. Otherwise, a superb initiative!	Positive and suggestion
Inte här så ofta	Not here very often	Suggestion
Jag lämnade farligt avfall. De är rätt bra att det tas hand om på rätt sätt	I left hazardous waste. They are quite good if taken care of properly	Positive
Jag saknar erfarenhet av prämen.	I lack experience with the barge.	Neutral
Jag tycker det är bra att ni finns i Gamla Stan så att många personer kan hitta er.	I think it is good that you are in Gamla Stan so that many people can find you.	Positive
Jag tycker det är super!	I think it's great!	Positive
Jätte bra att den finns	Very good that it exists	Positive
Jätte bra verksamheten , gillar återbruk	Very good business, like recycling	Positive
Jätte nöjd	Very happy	Positive
Jätte trevlig personal, som var hjälpsamma	Very nice staff, who were helpful	Positive
Jättebra, vänligt bemötande av personalen	Great, friendly treatment by the staff	Positive
Kan inte lämna allt. VI som inte har bil har svårt att slänga stora saker såsom möbler.	Can't leave everything. WE who don't have a car have a hard time throwing away large things such as furniture.	Negative
Kan inte myrorna mfl också vara på prämen och sälja saker?	Can't the ants and others also be on the barge and sell things?	Suggestion
Kanon att det finns	Great that it exists	Positive
Keep up the good work!	Keep up the good work!	Positive
Kom tillbaka	Came back	Positive
Kul idé attanvända dig av hamnen	Nice idea to use the port	Positive
Kunnig personal som svarar på frågor , bra med återbruk	Knowledgeable staff who answer questions, good with recycling	Positive
Lite lite utbud	Little selection	Negative
Lite svår info kring tider, trevlig miljö med inredning och personal	Some difficult information about times, nice environment with decor and staff	Positive
Långt att gå, fungerar väldigt bra	Long way to go, works very well	Positive
Läget är väldigt bra.	The location is very good.	Positive
Magiskt	Magically	Positive
Man slänger ej grejerna och köper ej onödiga grejer - bra!	You don't throw things away and you don't buy unnecessary stuff - good!	Positive
Mer reklam	More advertising	Suggestion
Mycket bra initiativ!	Very good initiative!	Positive
Mycket trevlig personal.	Very nice staff.	Positive
Nya produkter i fynd hörnan , lämnar ut direkt	New products in the bargain corner, handing out immediately	Positive
Nära Gamla Stan!	Close to Old Town!	Positive
Nära hemma😀	Close to home😀	Positive
Nära hemmet bil behövs inte	Close to home, a car is not needed	Positive
Nära och bra	Close and good	Positive
Nära och bra	Close and good	Positive
Nära promenad avstånd	Close walking distance	Positive
Närheten	Around	Positive
Närheten och att vi fanns på plats	The proximity and that we were there	Positive
Närheten viktigt med återbruk!! Konceptet	Proximity important with recycling!! The concept	Positive
OK!!	ok!!	Positive
Om jag hinner lämnar jag saker ikväll, annars nästa gång. Superbra idé!	If I have time I will leave things tonight, otherwise next time. Super idea!	Positive
Once a month	Once a month	Neutral
Osäker vad som tas emot mer tydlighet	Not sure what is received more clarity	Suggestion
Perfekt	Perfect	Positive

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Perfekt för oss som inte har tillgång till bil eller grovsophantering.	Perfect for those of us who don't have access to a car or solid waste disposal.	Positive
På informationslappen saknades öppettiderna	The opening hours were missing from the information sheet	Suggestion
Saker återbrukas	Things are recycled	Positive
Saknas öppettider	No opening hours	Suggestion
Servicen av personalen	The service of the staff	Positive
Smidigheten	The flexibility	Positive
Smidigt med närheten	Convenient with the proximity	Positive
Större utbud av produkter	Greater range of products	Negative
Super bra	Super good	Positive
Super bra initiativ	Super good initiative	Positive
superbra och trevliga personer!	great and nice people!	Positive
Superbra!	Super good!	Positive
Superkul initiativ, toppen om ni hade skylt med schema, öppettider så man enkelt kan se nästa tillfälle.	Super fun initiative, great if you had a sign with schedule, opening hours so you can easily see the next opportunity.	Positive and suggestion
Suveränt närmande saknar bil	Superb approach lacks a car	Positive
Tack!	Thanks!	Positive
Tiderna stod inte på utskick.	The times were not posted.	Suggestion
Tillgång! Det finns annars ingen!	Access! Otherwise there is none!	Positive
Tillgängligheten	The availability	Positive
Toppen!	The top!	Positive
Toppenbra!	Excellent!	Positive
Toppenidé!	Great idea!	Positive
Trevlig personal	Friendly staff	Positive
Trevlig personal	Friendly staff	Positive
Trevlig personal + hittade bra saker i fynd hörnan	Nice staff + found good things in bargain corner	Positive
Trevlig personal och lösningsorenterade , konceptet med pop up	Pleasant staff and solution-oriented, the concept of pop up	Positive
Trevlig personal!	Friendly staff!	Positive
Trevligheten mottagandet , det känns bra när man får lämna ifrån sig prylarna	The pleasantness of the reception, it feels good when you can leave your belongings	Positive
Trevligt bemötande	Friendly reception	Positive
Trevligt bemötande , tog mot allt jag hade	Nice treatment, took everything I had	Positive
Trevligt bemötande!	Friendly reception!	Positive
Trevligt med närheten	Nice to be close	Positive
Tydligare info om när nä kommer hit.	Clearer info about when nä will get here.	Suggestion
Tydlighet vart vi står någonstans när man cyklar	Clarity of where we stand when cycling	Suggestion
Utmärkt , flyttbar	Excellent, removable	Positive
Utmärkt att vi står här	Excellent that we are standing here	Positive
Utmärkt idé!	Excellent idea!	Positive
Utmärkt och nära	Excellent and close	Positive
Utskick med längre tidsmarginal, lättillgänglig info, samt öppettiderna	Dispatch with a longer time margin, easily accessible information, as well as the opening hours	Suggestion
Var här för att jag var nyfiken. Trevligt bemötande, tack.	Was here because I was curious. Nice treatment, thank you.	Positive
Varmt välkomnande av personalen!	Warm welcome from the staff!	Positive
Verkar OK (år 1) :)	Seems OK (year 1) :)	Positive

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Vet inte men lite kul att det finns ändå	I don't know, but it's kind of fun that it still exists	Positive
Vi har inget soprum för grovsopor + att inte kunna ha bilen fram till dörren är ett problem som pråmen löser.	We don't have a garbage room for bulky garbage + not being able to have the car right up to the door is a problem that the barge solves.	Positive
Vi har inget annat sätt att lämna saker som inte går in i återvinningen, utan att köra bil! Vi vill ha mer av er! Perfekt läge!	We have no other way to leave things that do not go into the recycling, but to drive! We want more of you! Perfect location!	Positive
Vi tar mot farligt avfall	We accept hazardous waste	Positive
Vid stortorget skulle det vara bra. Tungt att bära, gammal, handikappad.	At the main square it would be good. Heavy to carry, old, disabled.	Suggestion
Visste inte att den fanns.	Didn't know it existed.	Neutral
Väl ordnat	Well arranged	Positive
Väldigt bra	Very good	Positive
Väldigt lite grejer att kolla på i fyndhörnan, inga kläder.	Very little stuff to look at in the bargain corner, no clothes.	Negative
Väldigt nära	Very close	Positive
Väldigt smidigt för oss som bor i city!	Very convenient for us who live in the city!	Positive
Vänlig och proffsig service, bra att saker återanvänds.	Friendly and professional service, good that things are reused.	Positive
Vänlig personal som bemöter en bra	Friendly staff who treat you well	Positive
Vänligt bemötande, viktigt med fina mänskliga möten, tack!	Friendly treatment, important with nice human encounters, thank you!	Positive
Återbruk är super bra	Recycling is super good	Positive
Öppettiderna saknades	The opening hours were missing	Suggestion

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Appendix 2 – Calculation of emissions

Summary of the total CO2e emissions during the pilot.

Type of transportation	kg CO2e	%
HVO truck	26	2,0%
Electric truck	6	0,5%
Public transport	43	3,4%
Barge	1144	89,8%
Private cars (2022)	55	4,3%
Private cars (2030), higher share of electrical vehicles.	26	
Total emissions 2022	**1274**	
Total emissions 2030	**1245**	

Estimated decrease of emissions due to less private car travels during the pilot.

Type of transportation and year	kg CO2e
Private cars 2022	1002
Private cars 2030	474

Estimated net CO2e during the pilot. The calculation is based on the total emissions minus the estimated decrease of emissions due to less car travels.

Year	kg C02e	Comment
2022	1274 - 1002 = 272	Positive value means increased emissions.
2030	1245 – 474 = 771	Positive value means increased emissions.

Emission from trucks and barge

Fuel	Emisson (gr C02e/kWh)	Energi content (kWh/liter)	Source
HVO100	32	9,44	Förstudie- (Energimyndigheten, Drivmedel 2018)
Electricity	47		Svensk elmix- Miljöfordon.se
Diesel MK1	278	9,8	Förstudie- (Energimyndigheten, Drivmedel 2018)

Amount of electricity used by electrical trucks		Source
Days of usage	7	Pilot
Charges per days	3	Pilot
Energy battery (kWh)	6	Pilot
Total Energy consumption (kWh)	126	Calculated
Total Energy consumption (kWh) incl. 5 % losses when charging	**132,3**	Calculated

Emisson from truck		Source
Total distance truck HVO100 (km)	85,5	Pilot
Energy consumption truck HVO (l/km)	0,99	Pilot
Total emission electrical truck (kg CO2e)	6,2	Calculated
Totala Utsläpp lastbil HVO100 (kg CO2e)	25,6	Calculated

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Emisson barge		Source
Fuel consumption MK1 (litre)	420	Pilot
Emissoon (kg CO2e)	1144	Calculated

Emission public transport

Bus		Source
Gram CO2/person-km	94	trafikforvaltningens-miljoredovisning-2018.pdf
% of persons travveling bu bus	6	Pilot
Tot number of visitors	2871	Pilot
Amount travlleing by bus	181	Uträkning
Estimated distance travvled per person (km)	3	Estimated to be the same distance as for cars
Totala emissions (kg CO2)	**43**	

Emissions private cars

CO2e per type of fuel [kg CO2e/liter]	Source
Petrol MK1 2,78	Miljöfordon.se
Diesel MK1 2,58	
E85 1,14	
Vehicle gas 0,49	

Type of fuel	Ca consumption	Source
Petrol (l/km)	0,057	Energimyndigheten
Diesel (l/km)	0,052	Energimyndigheten
E85 (l/km)	0,0741	Stockholm Miljöförvaltning
Vehicle gas (kg/km)	0,04	Svensk Biogas
Electrical hybrid (l/km)	0,043	Motormännen
Electricity (kWh/km)	0,2	Vattenfall

Privare car	km	Source
Estimated decrease of private car travels during the pilot.	7802	Pilot
Total distance to the barge.	430	Pilot

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Private cars	Petrol	Diesel	Electricity	Electrical hybrid	Plug-in hybrids	Etanol	Gas	Source
Share in Stockholm city 2021	42%	32%	5%	5%	13%	3%	1%	www.trafa.se
Share (forecast) in Stockholm city 2030	20%	9%	55%	1%	5%	7%	3%	Powercircle/Antaganden Sweco
Distribution of ”avoided” private car travels 2021 (km)	3245	2507	369	369	1007	224	81	Pilot
Distribution of ”avoided” private car travels 2030 (km)	1560	702	4291	78	390	546	234	Pilot
Travelled distance to barge 2021 (km)	179	138	20	20	55	12	4	Pilot
Travelled distance to barge 2030 (km)	86	39	237	4	22	30	13	Pilot
Fuel consumption (liter, kg, kWh / km)	0,057	0,052	0,2	0,043	0,03	0,074	0,04	Energimyndigheten mfl.
Emissions (gram CO2e/unit)	2780	2580	47	2780	2780	1140	490	Uträkning
Saved / ”avoided”emissions 2021 (kg CO2e)	514,1	336,4	3,5	44,1	83,9	18,9	1,6	
Saved / ”avoided”emissions 2030 (kg CO2e)	247,3	94,2	40,3	9,3	32,5	46,1	4,6	
Utsläpp 2021 (kg CO2e)	28,3	18,5	0,2	2,4	4,6	1,0	0,1	
Utsläpp 2030 (kg CO2e)	13,6	5,2	2,2	0,5	1,8	2,5	0,3	
Tot "avioded" emissons 2021 (kg CO2e)	**1002,5**							
Tot "avioded" emissons 2030 (kg CO2e)	**474,3**							
Tot Emissons 2021 (kg CO2e)	**55,3**							
Tot Emissons 2030 (kg CO2e)	**26,1**							

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