

WP6. DELIVERABLE 6.5.1. HYTEC PRE-TRIAL SURVEYS

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Introduction

- This presentation reports the outcomes of two surveys:
 - i. A survey of 19 users and three fleet managers from the Municipality of Copenhagen on 5th July 2013. The survey was conducted during the user induction day prior to the rollout of HyTEC-funded Hyundai FCEVs with the Municipality fleet.
 - ii. A survey of ten fleet decision makers based in the UK. The fleet decision makers were based in a mixture of private and public sector fleets. The survey sample size is not intended to be representative.
- The survey and analysis are a deliverable of HyTEC WP6, Task 6.5 Societal impact assessment and reporting.

COPENHAGEN PRE-TRIAL SURVEY

Cenex – Naytan Fijiwala, Peter Speers



Introduction

- This presentation reports the outcomes of a survey of 19 users and three fleet managers from the Municipality of Copenhagen on 5th July 2013. The survey was conducted during the user induction day prior to the rollout of HyTEC-funded Hyundai FCEVs with the Municipality fleet.
- The survey and analysis are part of HyTEC WP6, Task 6.5 Societal impact assessment and reporting.
- The survey was based on a first iteration drafted by Cenex and Element Energy in 2012 which was trialled on the London HyTEC taxi drivers.
- Following feedback that the first survey was too long and repetitive, the four-page user and five page fleet manager surveys employed here were drafted by Cenex in 2013. Both surveys were subsequently translated into Danish.
- The aims of the pre-trial driver survey were to understand users':
 - Current driving attitudes
 - Attitudes to and awareness of hydrogen vehicles and hydrogen vehicle refuelling
 - Understanding of the costs of hydrogen vehicles
 - Thoughts on whether hydrogen vehicles would be able to satisfy their future needs
- The fleet managers' survey aimed additionally to capture fleet managers':
 - Current and future fleet needs
 - Perceptions of issues of integrating hydrogen vehicles into their fleets
- The survey also allowed *ad hoc* comments at the end of each section.
- We would like to express our gratitude to Birte Busch Thomsen, Project Manager, Environmental Engineer of the City of Copenhagen for her invaluable assistance with carrying out the surveys and liaising with the users and fleet managers in Copenhagen.



Fleet context

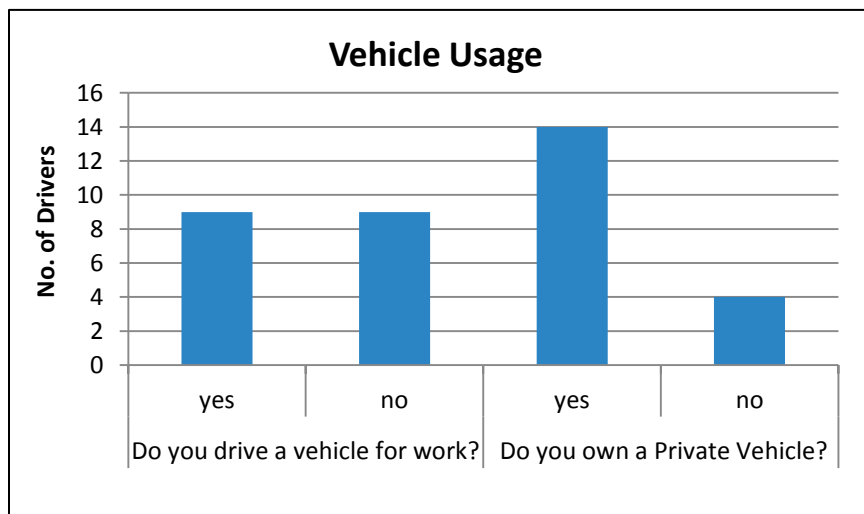
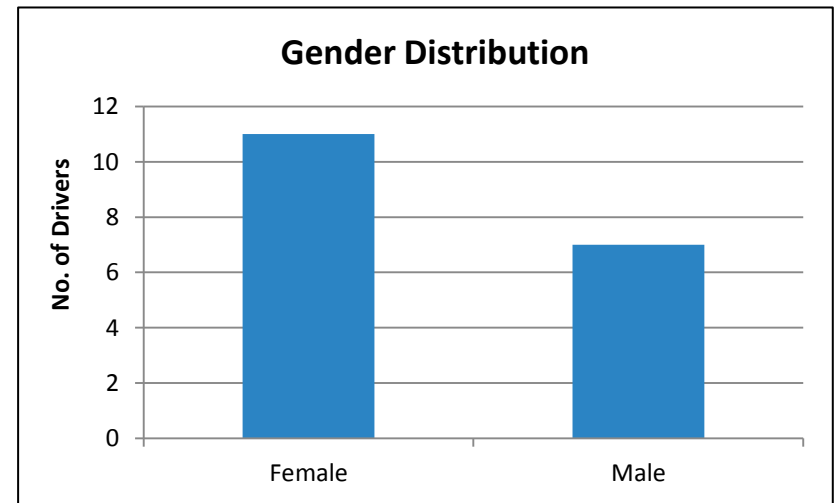
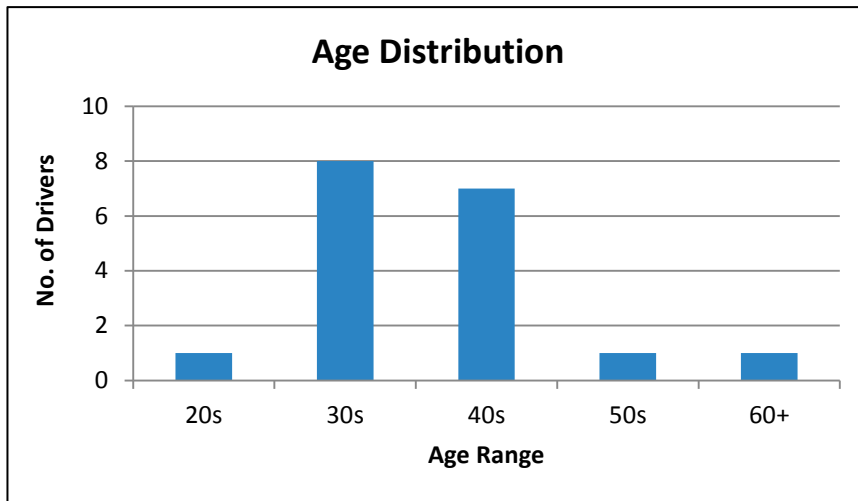
- The Municipality of Copenhagen operates 1,153 vehicles of all types.
- The fleet includes:
 - 217 passenger cars
 - 237 lorries (> 3.5t)
 - Around 100 minibuses (< 3.5t)
 - OTMs (utility and service vehicles) *
- The vehicles use petrol, diesel, electricity and hydrogen fuel.
- The fleet includes 70 passenger EVs, 15 FCEVs, and 94 electrified utility vehicles. A tender for a further 42 EVs has just been issued.
- Previously, the fleet has employed 6 Think! fuel cell retrofits.
- The passenger vehicles perform general transport tasks for the Municipality. They operate mainly on weekdays, but there is some use at weekends by care workers.
- The vehicles primarily operate within Copenhagen, and occasionally on major surrounding roads. Motorway use is rare.
- The fleet typically refuels at public refuelling stations.
- Vehicles typically travel 40km per day. Some of the FCEVs will be part of the Municipal carpooling system, and may therefore travel further.
- From 2013, the Municipality is only allowed to buy electric drive passenger vehicles.

PRE-TRIAL USERS' PERCEPTION



Users - context

- 19 users took the survey.* *Note that some drivers did not complete all the questions.*



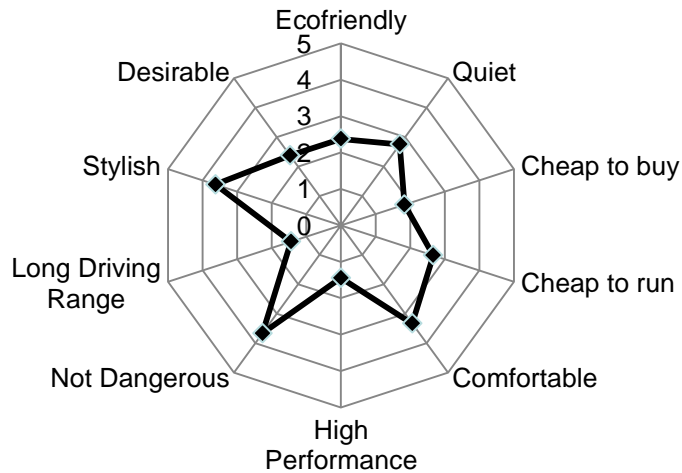
- **The majority of the users were in their 30s or 40s, were female and owned a private vehicle. 50% of the users drove a vehicle for work.**

* The sample size is not meant to convey statistical significance, but represents the users present on 5/7/13

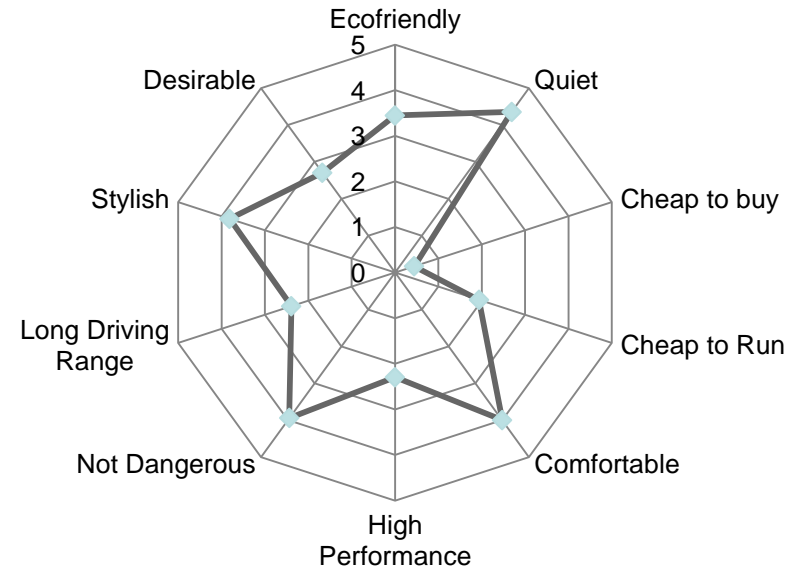
Perception of hydrogen and current vehicles

- A high proportion of users (67%) had heard of hydrogen vehicles, but did not know much about them, and 33% of users had already driven or been a passenger in a hydrogen vehicle.

Perception of Current Vehicle



Perception of Hydrogen Vehicles

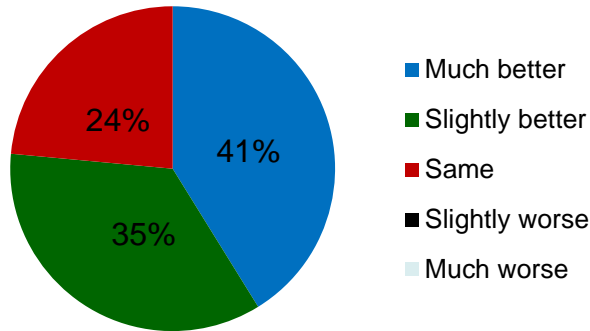


Key	
5	Very Strong
4	Strong
3	Neutral
2	Weak
1	Very Weak

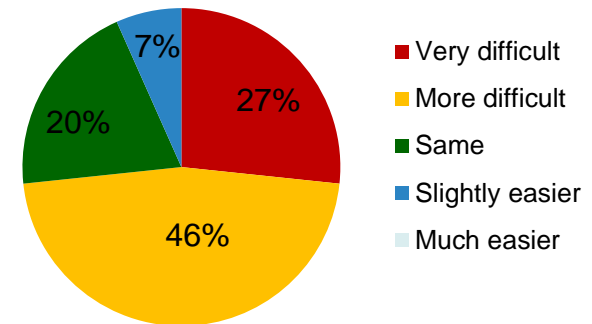
- Users thought that the hydrogen vehicle would be quieter, more comfortable, more eco-friendly, more desirable, and have a longer driving range than their current vehicles.
- However, they also thought that hydrogen vehicles would be more expensive to purchase and run than their current vehicles.
- Users broadly agreed that hydrogen vehicles were relatively safe; and had a similar view that there was a lack of danger in their current vehicles and hydrogen vehicles.
- The perceptions were very similar when only considering users that had already driven or been passengers in hydrogen vehicles (not shown).

Expectations of hydrogen versus current vehicles

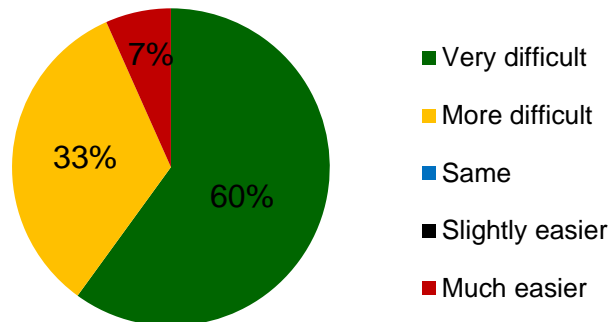
Do you expect the driving experience in hydrogen vehicles will be better or worse relative to your current work vehicle?



Do you think it will be easier or more difficult to deal with mechanical problems (e.g. breakdown) of hydrogen vehicles relative to your current work vehicle?



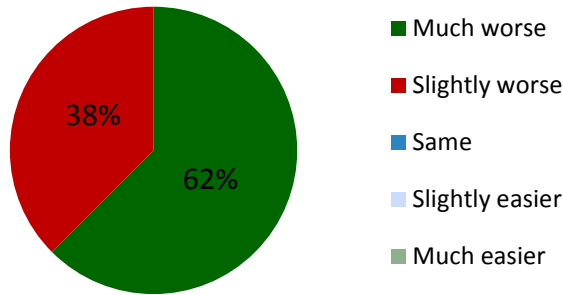
Do you think it will be easier or more difficult to find a mechanic or garage to fix a hydrogen vehicle relative to your current work vehicle?



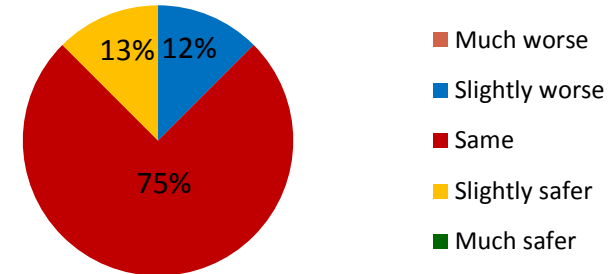
- No drivers believed that the driving experience will be worse in a hydrogen vehicle than in their current vehicle. 41% of drivers thought that the driving experience would be 'Much better' in a hydrogen vehicle.
- However, the majority (73%) of drivers thought that it will be 'more difficult' or 'very difficult' to deal with mechanical problems in the hydrogen vehicle compared to their current vehicle.
- Also, the majority (60%) of the drivers consider that it will be 'very difficult' to find a mechanic or garage to fix a hydrogen vehicle.

Refuelling aspects of hydrogen vehicles

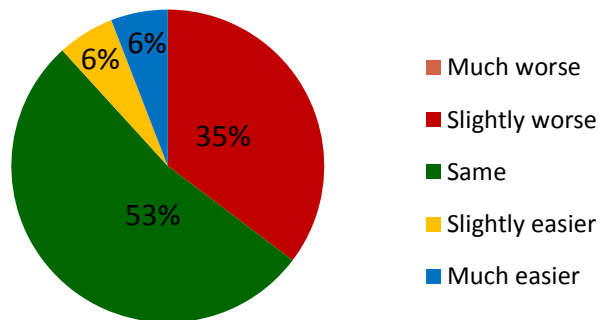
Do you expect finding refuelling points for hydrogen vehicles to be easier or more complicated than your current work vehicle?



Do you expect hydrogen fuelling to be safer or more dangerous than refuelling your current work vehicle?



Do you expect hydrogen vehicles to be easier or more complicated to refuel than your current work vehicle?



- All the drivers thought that it will be more complicated to find refuelling points for hydrogen vehicles.
- 75% of the drivers thought that the safety of the hydrogen fuelling process will be the 'same' as fuelling their current vehicle, with 53% of drivers considering that the process of refuelling will be similar to refuelling their current vehicle.
- All the drivers also believed that the refuelling time would be less than five minutes (similar to a petrol/diesel vehicle).
- The majority of drivers generally re-fuel their vehicle and intended to re-fuel hydrogen vehicles when the tank is between empty and a quarter full.

"There are plans for service stations to have hydrogen refuelling points"

*"Service stations are too far away for most people.
Hydrogen vehicles are only relevant for some people who live close to these stations"*

Cost and usage perception of hydrogen vehicles

- 82%** - Thought that hydrogen vehicles will cost 'a lot more (at least 25% more)' than petrol or diesel vehicles.
- 67%** - Believed that the running cost of a hydrogen vehicle will be 'a bit less (<10%)' or 'about the same' compared to a petrol and diesel vehicle.
- 88%** - Considered that hydrogen vehicles would cover their work related needs.
- 50%** - Thought that hydrogen vehicles would cover their personal needs.

"Too expensive for my private needs"

PRE-TRIAL FLEET MANAGERS' PERCEPTION



Fleet managers - context

Three fleet managers took the survey.*

Note that some fleet managers did not complete all the questions within the survey.

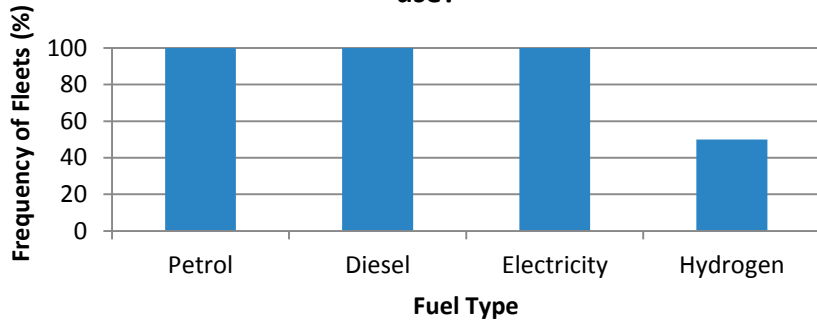
- **The fleet managers were in their 40s; two were male and one was a female.**
- **Managers were in charge of 50-200 vehicles in their fleet.**
- **Each vehicle in a fleet covered approximately between 100-150 km per week.**

* The sample size is not meant to convey statistical significance, but represents the fleet managers present on 5/7/13

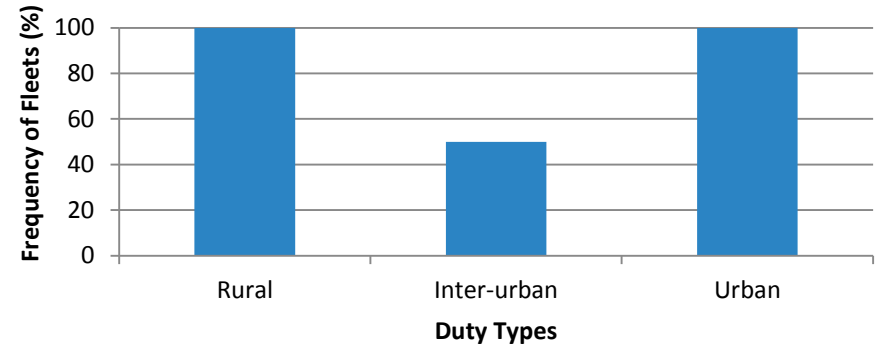


Fuel, vehicle and duty types

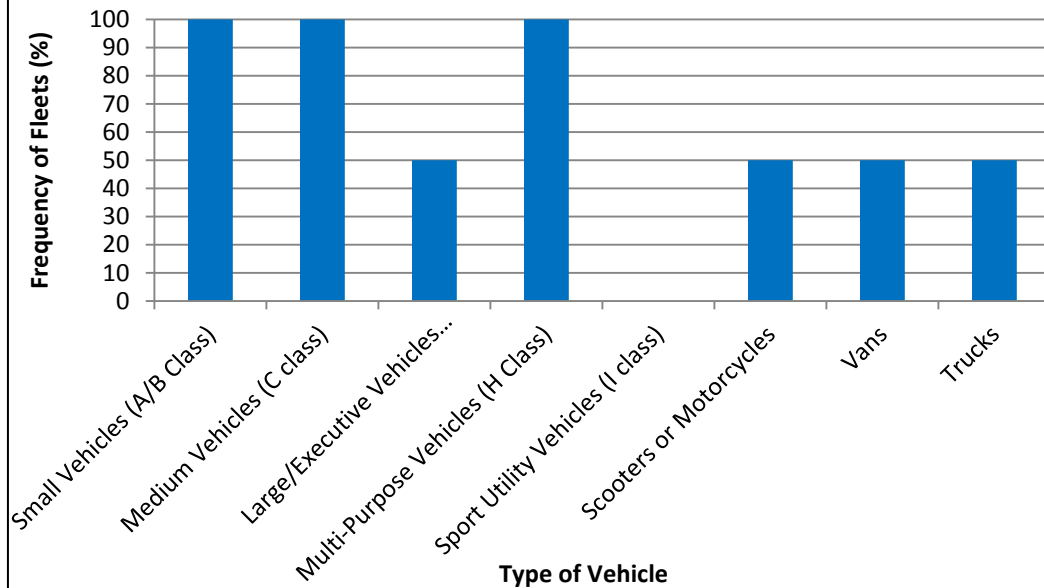
Which types of fuel do your current fleet vehicles use?



Where do your fleet's vehicles operate?



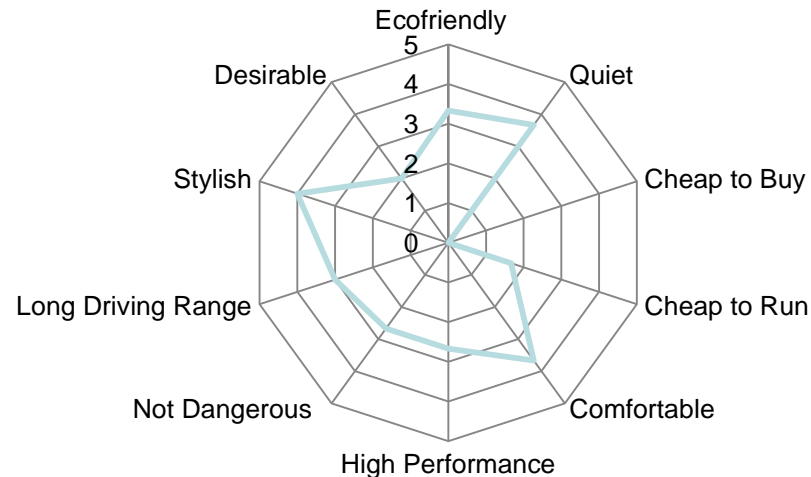
Which types of vehicles are in your fleet?



- All the fleets consist of petrol, diesel and electric drive vehicles.
- Most vehicles operate in rural and urban areas.
- Small, medium and multi-purpose vehicles are predominant within the fleets.
- Two of the fleet managers had already driven or been passengers in a hydrogen vehicle, the other had heard of them but did not know much about them.

Perception of hydrogen vehicles

Perception of Hydrogen Vehicles



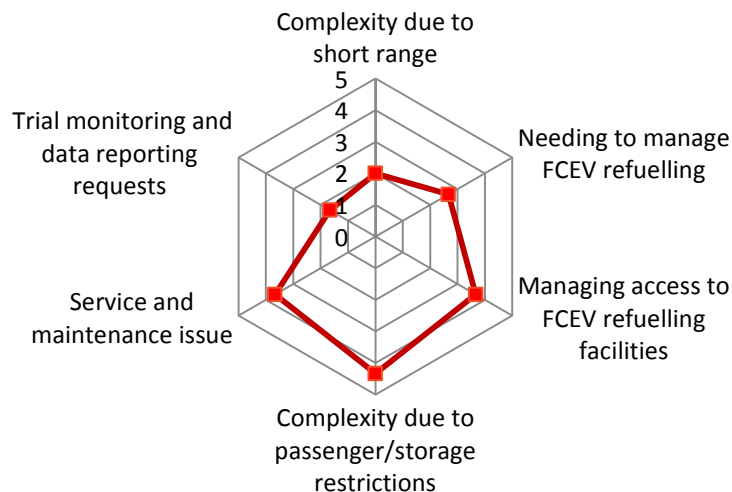
Key	
5	Very Strong
4	Strong
3	Neutral
2	Weak
1	Very Weak

- Managers generally believed that hydrogen vehicles will be eco-friendly, quiet with high performance and have a long driving range compared to their current fleet.
- However, they also thought that they would be expensive to buy and run.
- They indicated they were relatively neutral on the dangers of hydrogen vehicles compared to their current fleet.

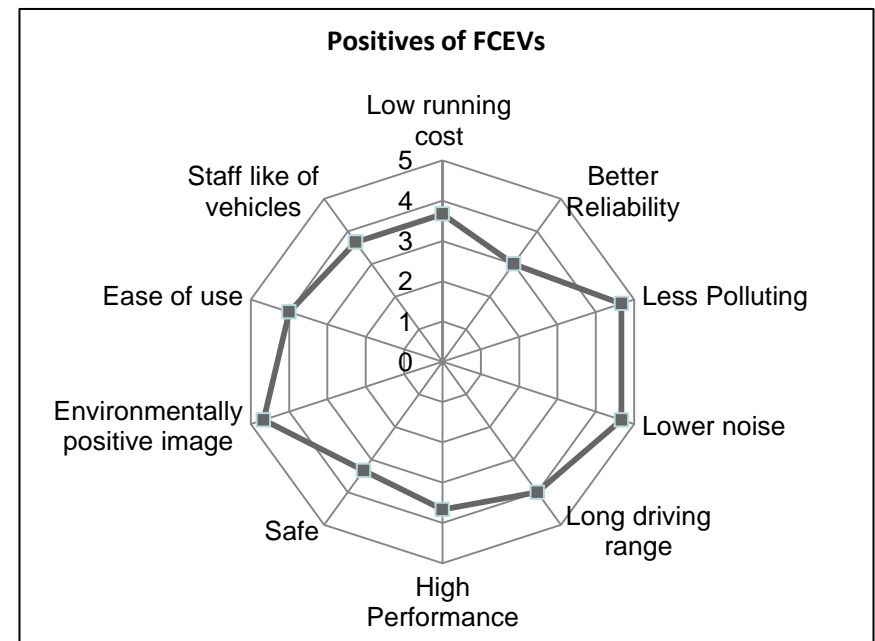
Perception of FCEVs and conventional vehicles

Key				
Very Strong	Strong	Neutral	Weak	Very Weak
5	4	3	2	1

Negatives of FCEVs

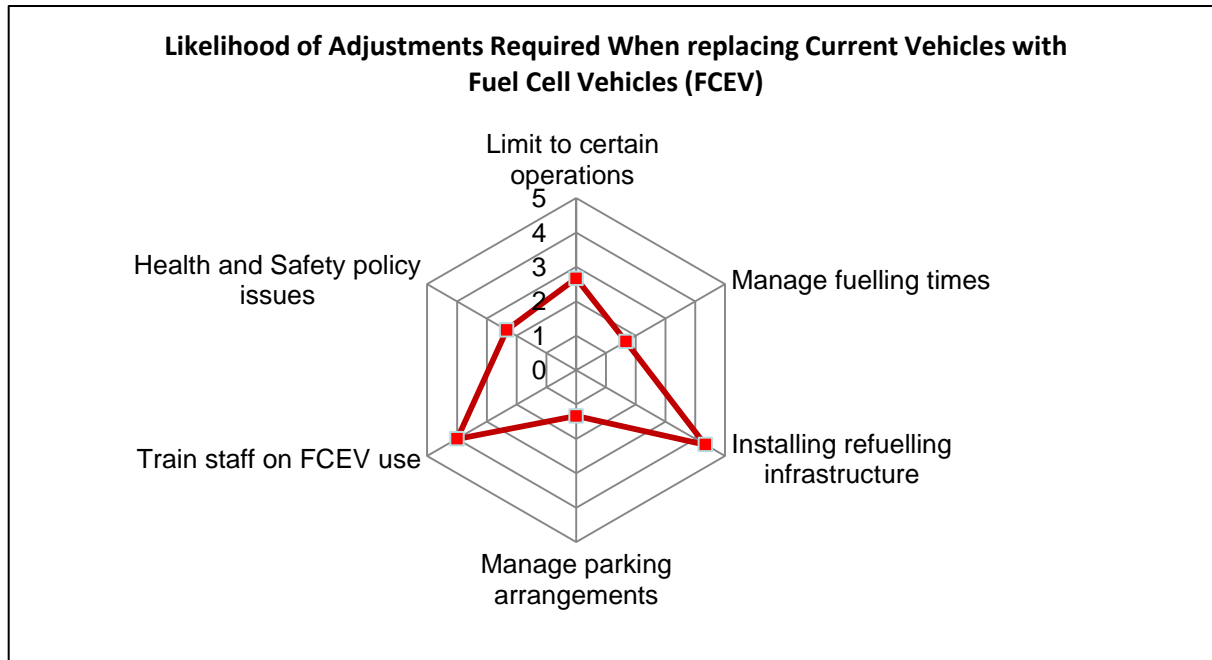


Positives of FCEVs



- Managers believed that the FCEV's major negatives would be 'servicing and maintenance issues' and 'Managing access to FCEV refuelling facilities'. They also expressed concern about the need to fulfil trial data reporting requests.
- Managers were generally positive about the benefits of FCEVs. They strongly believed that FCEVs will provide an 'environmentally positive image,' emit 'less pollution' and provide 'lower noise' levels.
- They also believe that their drivers will like using the vehicles and find them easy to use with a long driving range.
- The managers also believe that that FCEVs will be reasonably safe to operate.

Adjustments needed to integrate hydrogen vehicles

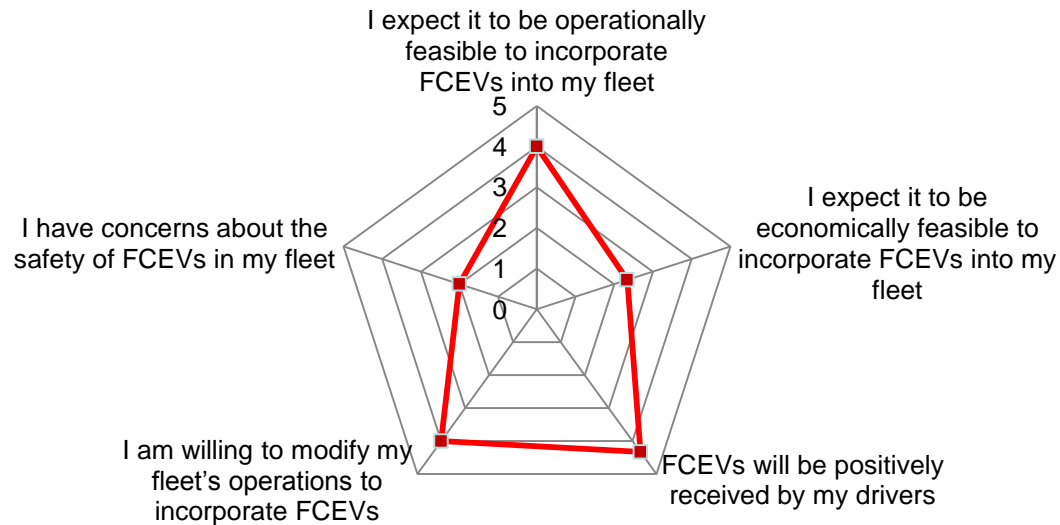


Key	
5	Very Likely
4	Likely
3	Neutral
2	Unlikely
1	Very Unlikely

- When comparing FCEVs to their fleets' current vehicles, managers thought that 'installing refuelling infrastructure' and 'training staff on FCEV use' would be the two major adjustments they would have to make if they replace their current vehicles with fuel cell vehicles.

Perception of FCEVs and conventional vehicles

Managers' Expectations of FCEVs



Key	
5	Very Strong
4	Strong
3	Neutral
2	Weak
1	Very Weak

- Managers expected FCEVs to be operationally feasible, positively perceived by their drivers and were willing to modify their fleet's operations to incorporate FCEVs.
- Managers expressed concern over the economics and safety aspects of integrating FCEVs into fleets.

Conclusions

- The HyTEC pre-trial survey covered 19 users of hydrogen vehicles in the Municipality of Copenhagen.
- The majority of the users were in their 30s or 40s, were female and owned a private vehicle. 50% drove a vehicle for work.
- Most users (67%) had heard of hydrogen vehicles, but did not know much about them. 33% of users had already driven or been a passenger in a hydrogen vehicle.
- Users generally thought that the hydrogen vehicle will be quiet, comfortable, eco-friendly, desirable, and have a long driving range. However, they also thought that hydrogen vehicles would be expensive to purchase.
- 41% of users thought that the driving experience will be 'Much better' in a hydrogen vehicle.
- 73% of believed that it will be 'more difficult' or 'very difficult' to deal with mechanical problems in the hydrogen vehicle compared to their current vehicle.
- All the users also believed that the refuelling time would be less than five minutes (similar to a petrol/diesel vehicle). Moreover, 53% of users thought that the complexity of fuelling a hydrogen vehicle would be very similar to that involved with a conventional vehicle.
- 82% of users thought that hydrogen vehicles will cost 'a lot more (at least 25% more)' than petrol or diesel vehicles. 88% believed that hydrogen vehicles would cover their work related needs.
- Three Copenhagen Municipality fleet managers were also surveyed. Their fleets comprise petrol, diesel and electric drive vehicles, the majority of fleets operate in rural and urban areas. Small, medium and multi-purpose vehicles are predominant within the fleets.
- Managers were generally positive about the benefits of FCEVs. They agreed strongly that FCEVs will provide an 'environmentally positive image,' emit 'less pollution' and provide 'lower noise' levels. On average, managers' believed that the FCEVs' major negatives would be 'servicing and maintenance issues' and 'Managing access to FCEV refuelling facilities'.
- Managers generally expected FCEVs to be operationally feasible, positively perceived by their users and were willing to modify their fleet's operations to incorporate FCEVs. They expressed some concern over the safety implications of fleet integration.

WP6: FLEET DECISION MAKERS SURVEYS

Cenex – Naytan Fijiwala, Peter Speers

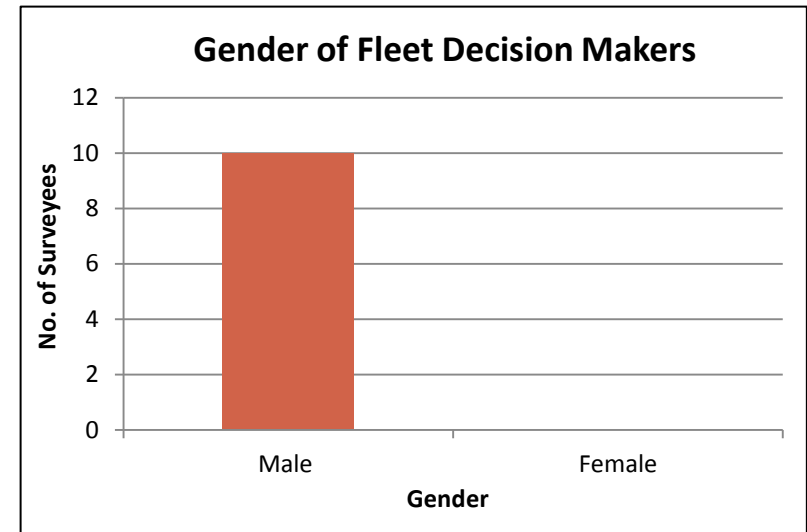
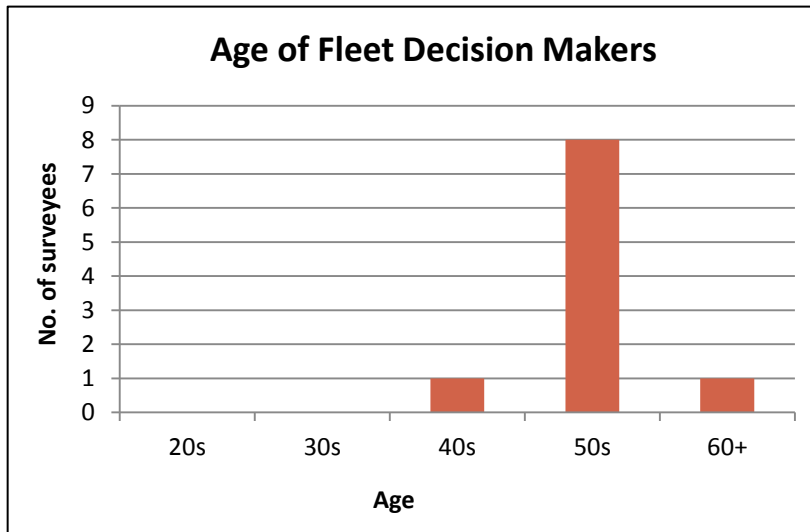


Introduction

- This presentation reports the outcomes of a survey of 10 fleet decision makers based in the UK. The fleet decision makers were based in a mixture of private and public sector fleets. The survey sample size is not intended to be representative.
- The survey and analysis are part of HyTEC WP6, Task 6.5 Societal impact assessment and reporting.
- The survey was designed and carried out by Cenex.
- The aims of the survey were to understand the fleet decision makers:
 - Current fleets' structure and operation.
 - Attitudes to and awareness of hydrogen vehicles and hydrogen vehicle refuelling
 - Thoughts on whether hydrogen vehicles could be integrated into their fleets
 - Understanding of the costs of hydrogen vehicles
- The survey also allowed *ad hoc* comments at the end of each section.

Fleet Decision Makers' Demographics

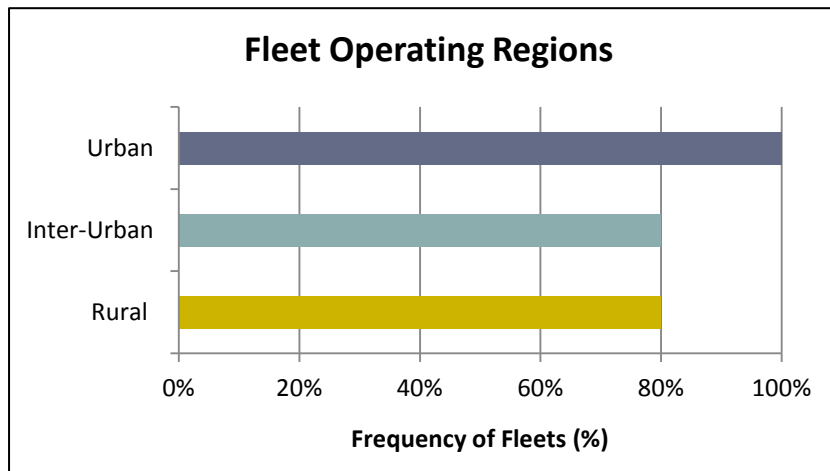
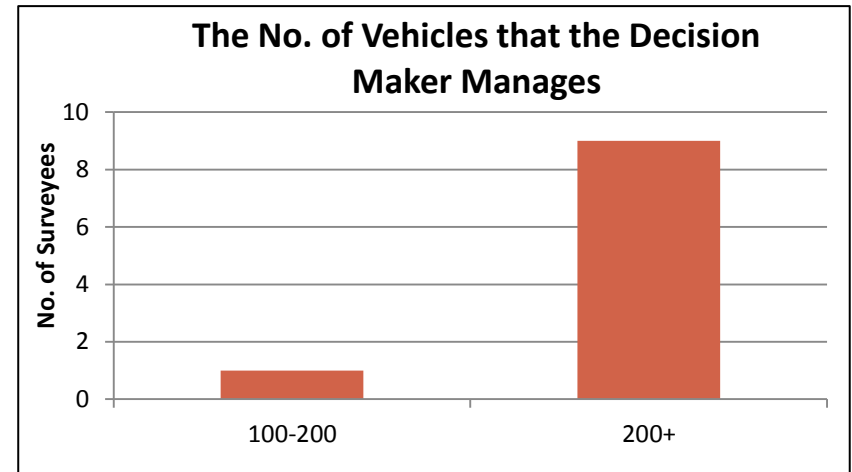
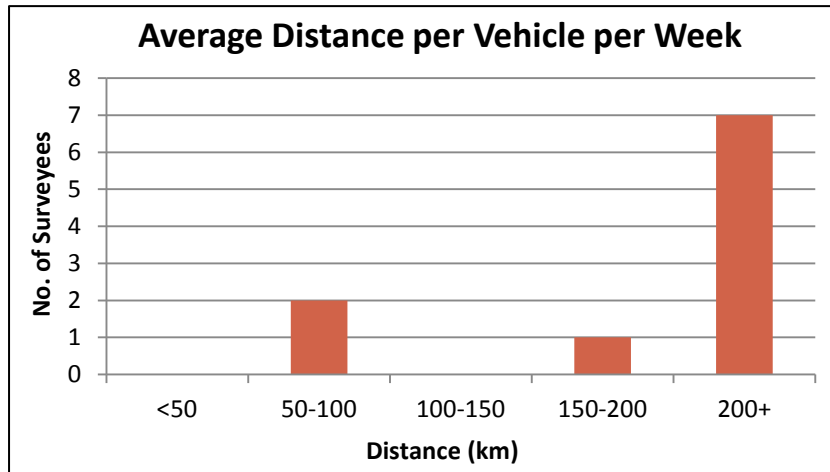
- The survey was carried out by 10 Fleet decision makers; 6 from private sector fleets and four from public sector fleets. All the surveyees were responsible for recommending, specifying and/or purchasing vehicles for their fleet.



- From the charts above, it is apparent that the majority (80%) of the fleet decision makers were in their 50s and all of them were male.

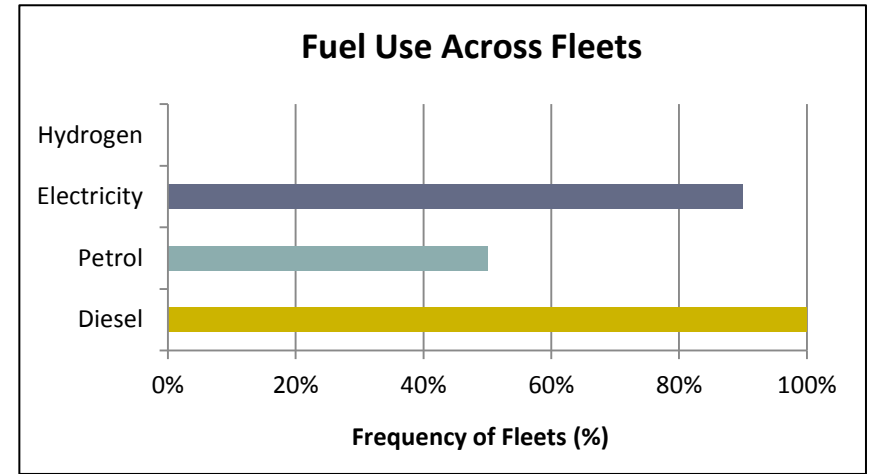
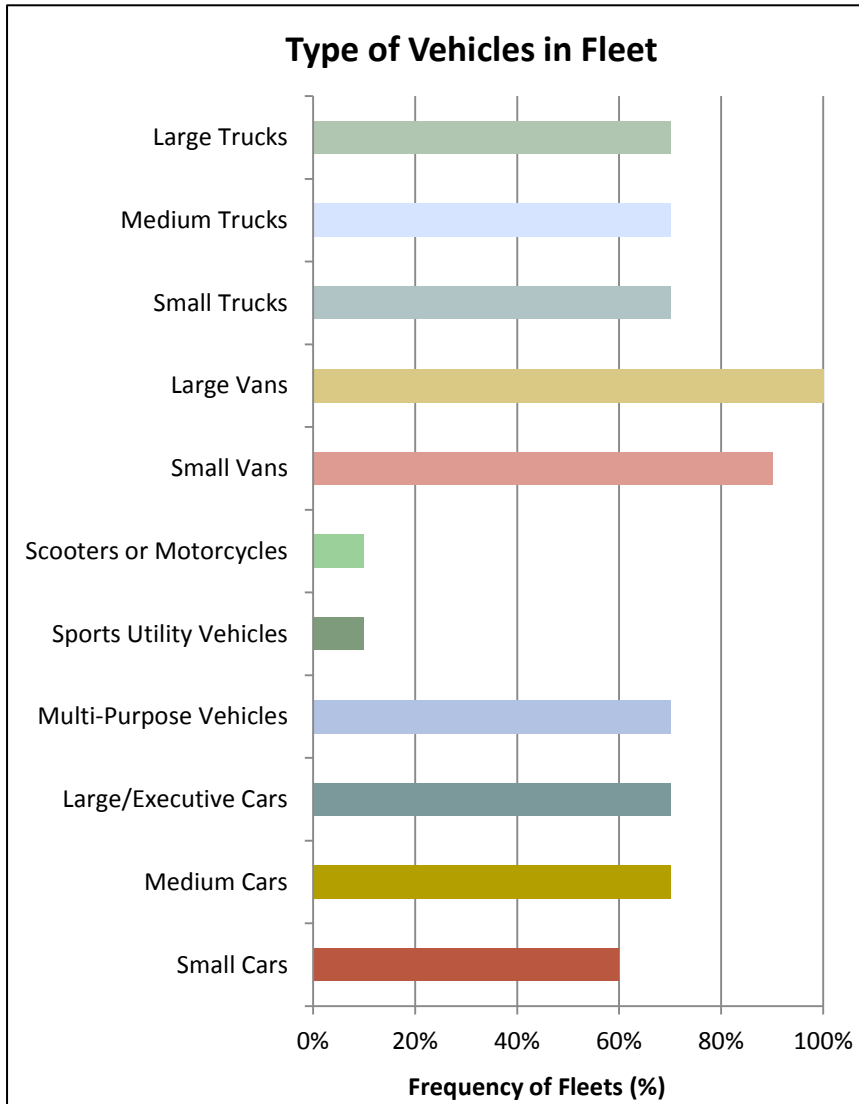
Current Fleet Vehicles

- To gain a better understanding about the operations and structure of the fleet decision maker's current fleet, questions were asked regarding this subject.



- 90% of the fleet decision makers manage more than 200 vehicles and 70% of them said that each vehicle in their fleet carries out more than 200km per week.
- All fleets operate in urban regions and 80% also operate in inter-urban and rural regions.

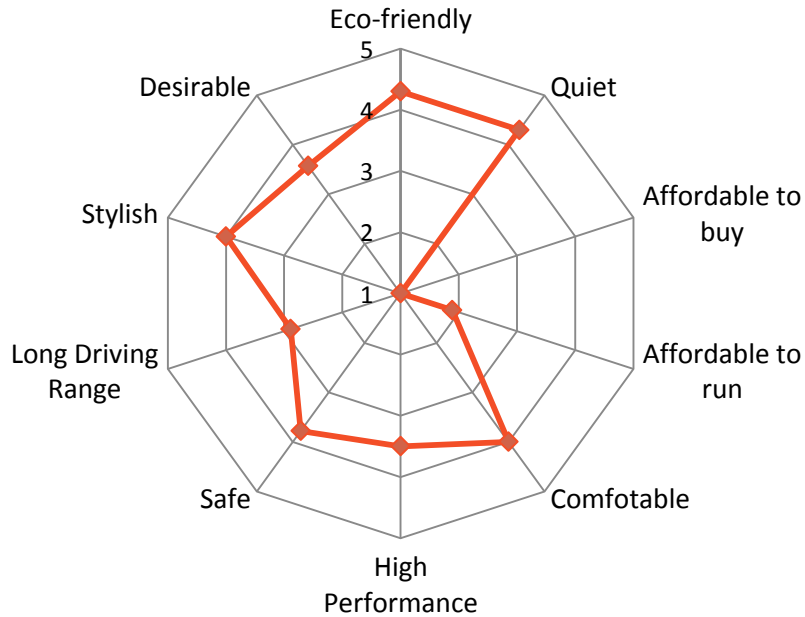
Current Fleet Vehicles



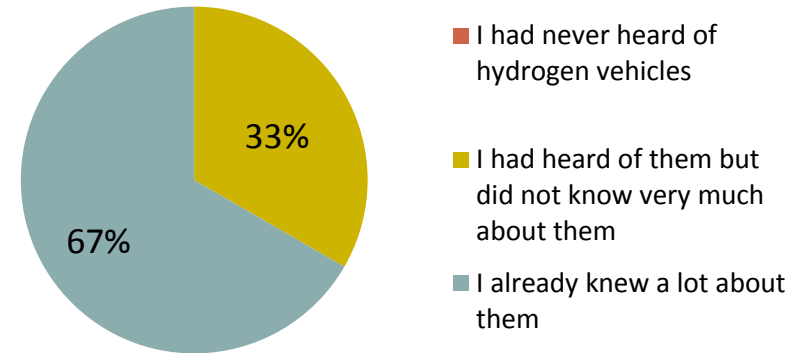
- The most popular type of vehicle is a large van (e.g. Ford Transit) with 100% of the fleets containing this type of vehicle. Furthermore, 90% of the fleets also include small vans (e.g. Citroen Berlingo).
- The most common types of fuels used across the 10 fleets were diesel and electricity with 100% and 90% of the fleets using these fuels respectively.
- No fleets contained hydrogen vehicles. However, 70% of the decision makers believed that they would incorporate hydrogen vehicles within 10 years.

Views and Awareness of Hydrogen Vehicles

Perception of Hydrogen Vehicles



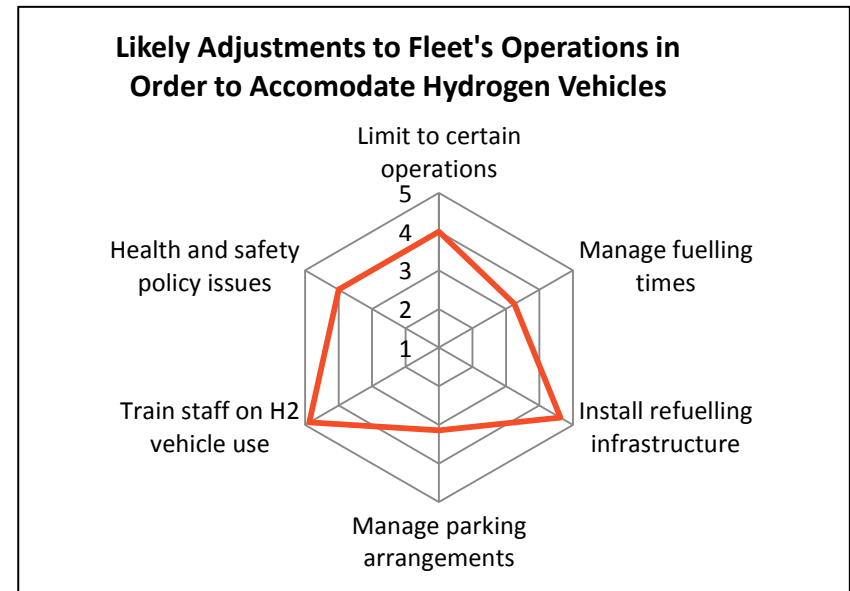
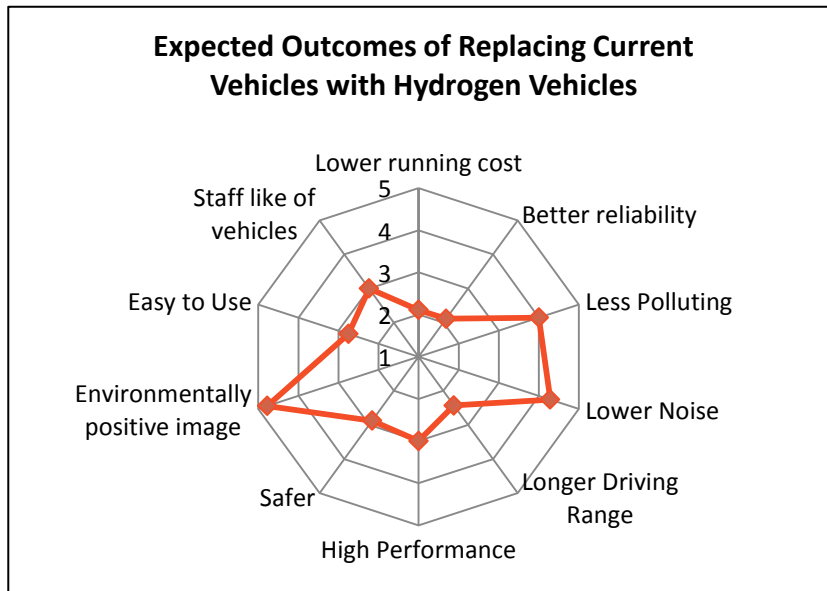
Knowledge of Hydrogen Vehicles



- Fleet decision makers were asked to rate (5 to 1, 5 being the strongest and 1 being weakest) many different aspects of hydrogen vehicles.
- From the radar chart above, it is apparent that fleet decision makers agreed on hydrogen vehicles being *eco-friendly, quiet, stylish and comfortable*; however, they also said that they are not *affordable to buy or affordable to run*.

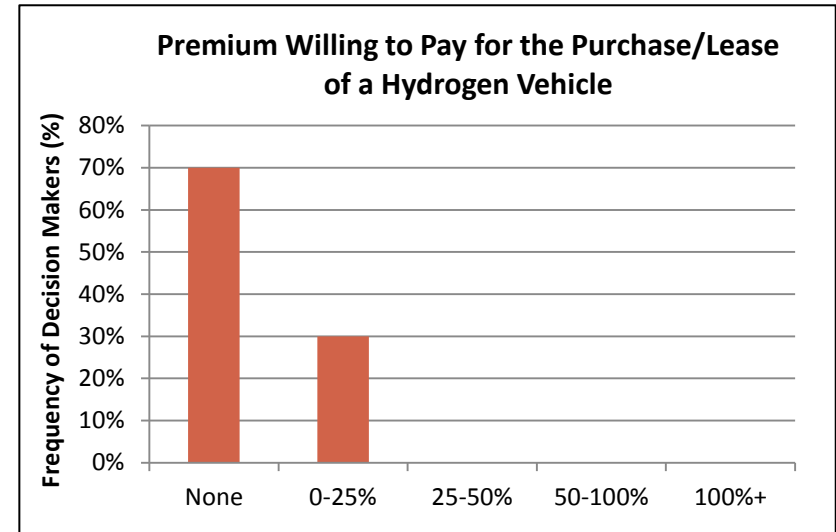
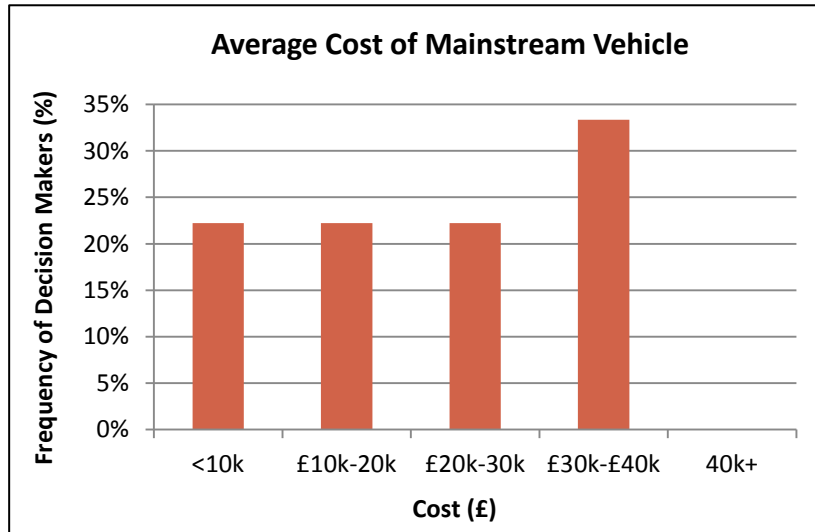
Hydrogen Vehicles – Fleet Integration

- Fleet decision makers were asked to rate *the changes they expected to their fleet's operation if they were to replace all of their current vehicles with hydrogen vehicles.*
- They were also asked to rate the likelihood of *adjustments they would need to make in order to accommodate hydrogen vehicles.*



- Decision makers strongly believed that replacing their current vehicles with hydrogen vehicles will give an *environmentally positive image* and be *quieter* than their current fleet vehicles. However, they also thought that the *reliability* would be *worse* and the *running costs* would be *higher*.
- All of the decision makers thought that they would have to *train staff on hydrogen vehicles* and *install refuelling infrastructure* in order to accommodate hydrogen vehicles. A high proportion also thought that they would be *limited to certain operations* and that there would be *health and safety policy issues*.

Costing - Current Vehicles vs Hydrogen Vehicles



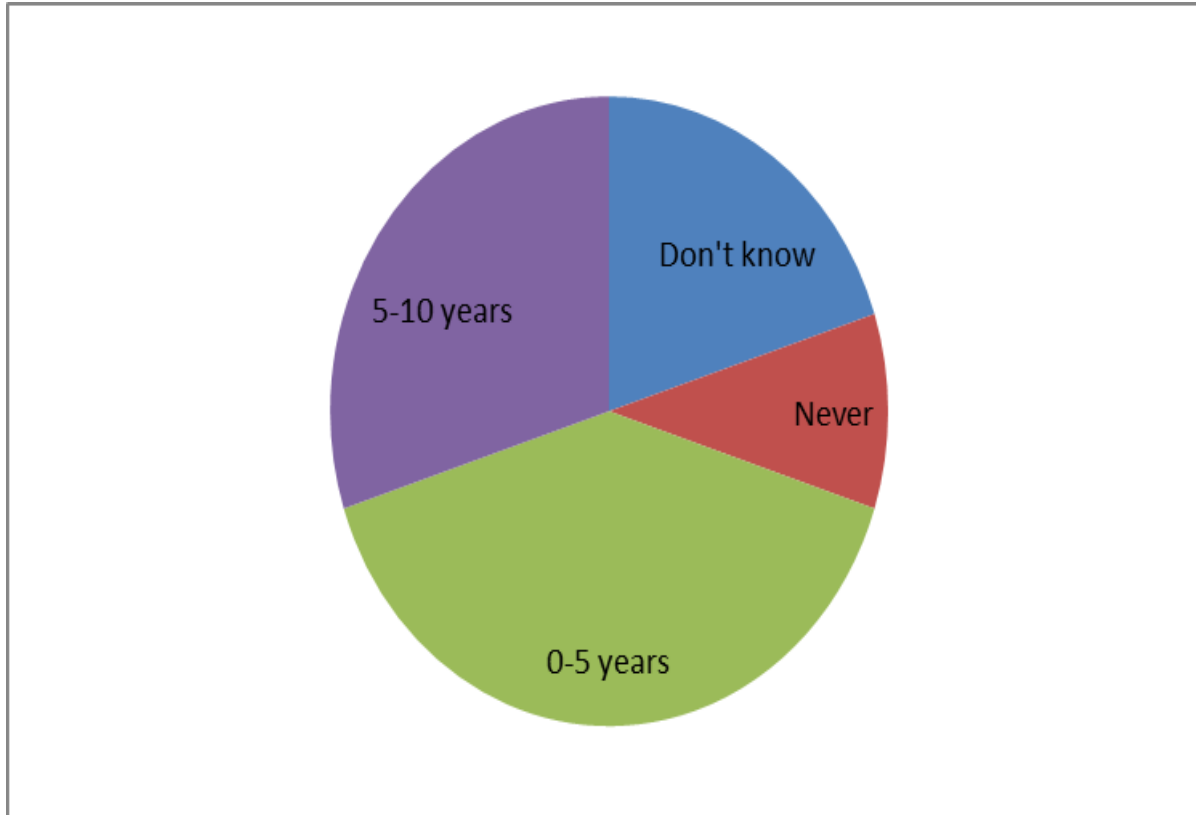
- The largest proportion (33%) of decision makers believed that the average mainstream vehicle in their fleet cost between £30k and £40k. There are discrepancies between decision makers as the cost of the vehicle is largely dependent on the type of vehicle (i.e. truck, van, car etc...).
- No fleet decision maker was willing to pay more than 25% premium for the purchase/lease of a hydrogen vehicle; moreover, 70% of them were not willing to pay any premium.

50% of decision makers thought that the fuel (hydrogen) would cost a *lot more* (>25%) compared to their current vehicles.

80% of decision makers thought that it would cost *at least 10% more* to maintain hydrogen vehicles compared to their current vehicles.

Purchasing intentions

- **When would you consider incorporating hydrogen vehicles into your fleet?**



“We will await the availability of affordable and well supported vehicles”

Conclusions

- Ten fleet decision makers from public and private sector fleets in the UK were surveyed. The main aims of the survey were to understand the structure of their current fleet and ascertain their views & knowledge regarding hydrogen vehicles.
- 80% of the decision makers were in their 50s and all of them were male.
- 90% of the decision makers manage more than 200 vehicles and 70% of them felt that each vehicle in their fleet carries out more than 200km a week.
- All of the fleets operate in urban areas and 80% of them also operate in inter-urban and rural regions.
- A large proportion (67%) of fleet decision makers already knew a lot about hydrogen vehicles and 30% of them had already driven or been a passenger in them.
- The most popular type of vehicles in the fleets were vans (large and small).
- Electricity and diesel were the most popular types of fuels consumed across all fleets. No fleets are currently using hydrogen vehicles.
- It was apparent that fleet decision makers agreed that hydrogen vehicles are *eco-friendly, quiet, stylish and comfortable*; however, they also said that they are not *affordable to buy or affordable to run*.
- Decision makers believed that replacing their current vehicles with hydrogen vehicles would give an *environmentally positive image* and *reduced noise levels*. However, they also thought the vehicles would be *less reliable* and have *higher running costs*.
- All of the decision makers thought that they would have to *train staff on hydrogen vehicles* and *install refuelling infrastructure* in order to accommodate hydrogen vehicles.
- No fleet decision maker was willing to pay more than 25% premium for the purchase/lease of a hydrogen vehicle; moreover, 70% of them were not willing to pay any premium.
- When comparing the fuel and maintenance cost of a hydrogen vehicle to their current vehicle; half of the fleet decision makers thought that the fuel (hydrogen) cost would be 25% or greater than their current fuel cost and 80% of them thought that the fuel and maintenance cost would be at least 10% higher.
- Seven of the ten respondents are considering introducing hydrogen vehicles into their fleets within the next ten years. Only one respondent said they would never consider hydrogen vehicles.