

Centre for Transport Studies

IMPERIAL COLLEGE

UNIVERSITY COLLEGE

Intercollegiate MSc Course in Transport

**The Prospects for the Electric
Bike in the UK**

J.B. Eagle

September 2008

A Special Study submitted as part of the requirements for
the degree of Master of Science of Imperial College
and the University of London

Abstract

This report examines the prospects for the electric bike in the UK. It starts with providing some background information on electric bikes and then goes on to review current literature on the topic of cycling and electric bike use. The study uses qualitative research methods in the form of semi structured interviews with electric bike industry experts. From the data gathered in the interviews a focus group guide was developed. Two focus groups were conducted in the conventional way and one was run on an online electric bike forum.

It was found that many members of the public saw the advantages to e-bikes but most felt that a conventional bike met their current needs. For widespread electric bike use it was felt that cycle infrastructure would have to improve and so would the marketing of electric bikes a relatively few people were aware of them.

Acknowledgments

I would like to thank everybody who has been involved in my project. I am grateful for all the help and support I have received from my tutor, M.G.H Bell. I would also like to thank all my interviewees for giving up their time and providing me with very helpful insights. Moreover my project would not have been able to have been carried without the help and time of the focus group attendees both in person and online.

Contents

Chapter	Title	Page
	Abstract	2
	Acknowledgements	2
	List of Boxes, Tables and Figurers	5
Chapter 1 Introduction		6
1.1	Setting the scene what is an electric bike?	6
1.2	Aims	9
Chapter 2 Literature Review		11
2.1	History of the electric bike	11
2.2	Context of the electric bike in the UK: What role could they fill?	12
2.3	Cycling (Conventional Bikes)	14
2.4	Cycling government and other organizations views	18
2.5	Electric bikes	21
2.6	Electric bikes around the world	23
2.7	Marketing	26
2.8	Reasons why people do not cycle	27
2.9	Electric bikes in the UK	28
Chapter 3 Methodology		31
3.1	Interviews	31
3.1.1	Analyzing and coding the interviews	32
3.2	Focus groups	33
3.2.1	Recruiting the focus group participants	34
3.2.2	Location of focus groups	34
3.2.3	Design of focus group guide	35
3.2.4	Moderating the focus groups	36
3.2.5	Recording the focus groups	37
3.2.6	Analyzing the focus groups	37
3.2.7	Limitations of focus groups	37
Chapter 4 Results		39
4.1	Interviews with industry experts	39
4.1.1	Reasons given for purchase of e-bike	39
4.1.2	What type of people purchase e-bikes	40
4.1.3	Once an e-bike is purchased what is it used for?	40
4.1.4	Barriers to expansion of e-bike use	41
4.1.5	Marketing	42
4.1.6	Other comments made	43

4.2	Focus group results	43
4.2.1	Online focus group	43
4.2.2	What are the main reasons why you cycle?	44
4.2.3	How did you find out about e-bikes?	44
4.2.4	What were the major factors that persuaded you to get an e-bike?	45
4.2.5	What were the main worries/queries you had before purchasing your e-bike?	46
4.2.6	Advantages and disadvantages of e-bikes over conventional bikes	47
4.2.7	Safety advantages or disadvantages over conventional bikes	47
4.2.8	Do you think that e-bikes have a role to play in sustainable transport in the UK?	48
4.2.9	Other comments made	49
4.3	Focus groups	50
4.3.1	Focus group held in London	50
4.3.2	Reasons for and against cycling	50
4.3.3	Awareness of e-bikes	51
4.3.4	How did you find out about e-bikes?	51
4.3.5	Technical aspects	51
4.3.6	Attraction of e-bikes	52
4.3.7	Does an e-bike seem more attractive than a conventional bike?	52
4.3.8	Do you think that e-bikes have a role to play in sustainable transport in the UK?	53
4.3.9	Concluding remarks	53
4.4	Focus group held in Bourne	54
4.4.1	Reasons for and against cycling	54
4.4.2	E-bike awareness	55
4.4.3	Advantages of e-bikes	55
4.4.4	Safety	55
4.4.5	Do you think you would cycle more if you had an e-bike?	57
Chapter 5 Conclusion		58
Chapter 6 Evaluation		62
Bibliography		63
Appendix 1 Semi structured interview guide		67

List of Boxes, Tables and Figures

Number	Title	Page
Boxes		
1	E-bike regulations in the UK	8
2	Reasons for not cycling	27
3	Reasons for not cycling more that are more applicable to e-bikes	27
4	Advantages and disadvantages of e-bikes generally	29
5	Advantages and disadvantages of e-bikes over other forms of transport	29
6	Profiles of Interviewees	32
7	How people found out about e-bikes	45
8	What were the major factors that persuaded you to get an e-bike?	45
9	Worries queries before purchasing an e-bike	46
10	Advantages and disadvantages of e-bike over conventional bikes	47
11	Advantages and disadvantages of e-bikes	48
12	Reasons why e-bikes could have a role in sustainable transport	49
13	Profiles of focus group attendees London	50
14	Reasons for cycling	50
15	Reasons against cycling	51
16	Profiles of focus group attendees Bourne	54
17	Reasons for and against cycling	54
18	Possible further research	62
Figures		
1	Light electric vehicles	7
2	An early electric bike	11
3	Process of awareness	26
Tables		
1	Worldwide electric bike sales (estimates)	23
2	Questions used on the forum	34
3	Focus group discussion guide summary	35

Chapter 1 Introduction

1.1 Setting the scene: What is an e-bike?

An e-bike is an electrically powered bicycle or tricycle, most often this will look very similar to a conventional bike and be powered by a battery either built into the frame of the bike or detachable.

An e-bike can be controlled in different ways, some are controlled with a throttle on the handle bars, similar to that of a motor bike, the bike may or may not have gears, these will be operated as they would be on a conventional bike and are independent of the electric motor. Another way an e-bike can be operated is by a pedal assist function; this is a motor that assists the rider when there is a hill or a head wind. This type of motor control is sometimes known as a pedelec,

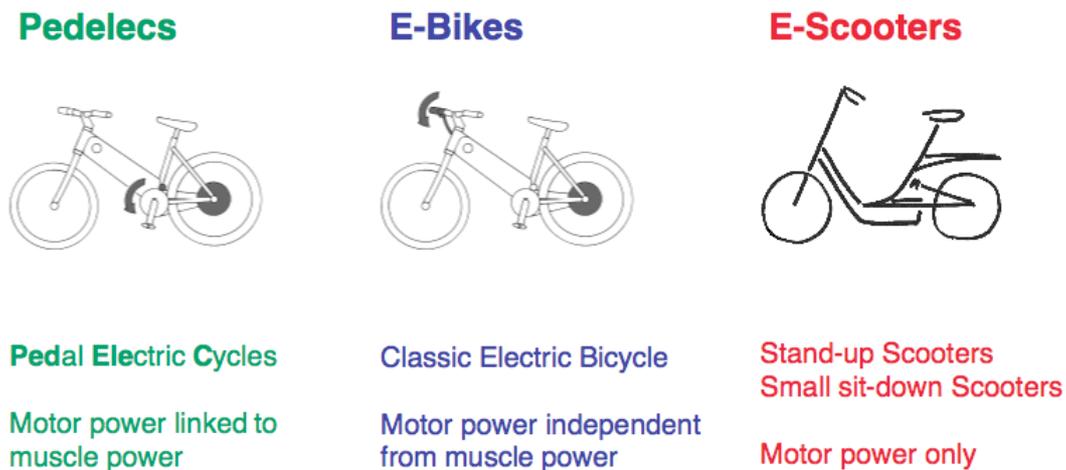
“Some electric bikes use the pedal sensor to decide how much power the motor provides - they don’t have a throttle, instead a microprocessor automatically controls the motor depending on how much effort you are putting in” (Kinetics 2008).

In some countries it is the law that the pedals must be turning in order for the electric motor to work, but this is not the case in the UK.

Some e-bikes have a combination of both the pedelec/pedal assist and the throttle, so extra power can be drawn using the throttle when required. The vast majority of e-bikes can be operated without the electric power but they are much heavier than conventional bikes and therefore pedalling them can be hard work.

Below is a slide taken from a presentation titled “Market overview and Pedelec Product Niches” By Susanne Bruschi, the slide shows neatly what has been explained above.

Figure 1 Light Electric Vehicles



Source (Brusch 2001)

In this report when e-bike is mentioned it refers to both pedelecs and non pedelec e-bikes or a combination of the two as featured in the figure above.

Brusch's presentation goes on to show how there are many different designs of pedelec bike and there is one suited for almost every need. Human power is more dominant in pedelec bikes, less so in e-bikes and absent in e-scooters.

The UK law concerning electric bikes is outlined below. The legal position of the e-bike in the UK is clearly stated in Electrically Assisted Pedal Cycles in Great Britain: Fact Sheet: Electronically assisted pedal cycles (EAPCs) in Great Britain (Department for Transport 2005). This documents states the following requirements for e-bikes:

Box 1 E-bike regulations in the UK

The Regulations apply to any bicycle, tandem bicycle or tricycle fitted with pedals by means of which it is capable of being propelled. If the vehicle is to be regarded as an EAPC the motor assistance must be provided by an electric motor and not by an internal combustion engine. The electric motor must not be able to propel the machine when it is travelling at more than 15 mph.

Maximum kerbside weight (not including rider) shall not exceed:

- bicycle: 40kg
- tandem bicycle: 60kg
- tricycle: 60kg

Maximum continuous rated power output of the motor shall not exceed

- bicycle: 200W
- tandem bicycle: 250W
- tricycle: 250W

There is some confusion, as under EU law a bicycle motor power can be up to 250w. The above regulations are posted on many websites and allow potential e-bike users to see legal status of e-bikes. Moreover there is more confusion about whether the bike has to be a pedelec, where power will only be provided if the pedals are being turned by the rider, or if it is legal for the bike to be self propelled like the e-bike in figure 1 above.

I spoke with the Department for Transport and the following clarification was given:

A new factsheet had been produced in January 2008. Twist and go bikes, (e-bikes in figure 1) are allowed with a maximum speed of 15 mph, but they are also governed by the European Community Whole Vehicle Type Approval. Also EAPCs also have to meet the construction regulation for pedal cycles. The 2008 Factsheet, (Department for Transport 2008b), highlights the same regulations as the 2005 Factsheet above but provides the following information,

“An EAPC which complies with the above is not considered to be a motor vehicle within the meaning of The Road Traffic Act 1988. As a result, it is not required to be registered, pay vehicle excise duty (road tax) or be insured as a motor vehicle. No EAPC may be ridden by anyone under the age of 14 years”.

It also provides some clarity on the twist and go regulations:

“A vehicle is not exempt from having either a European Certificate of Conformity or an individual pre-registration assessment if it is fitted with pedals and a motor that can provide power assistance at any time without the rider pedaling, or if the motor is not cut off automatically when the vehicle reaches 25km/h. However, if it is within the scope of the EAPC Regulations, it still does not require, licensing or insurance”.

The Electric Bike World Report (EBWR) 2007 states the following on the regulation of e-bikes in the UK, it remains consistent with the above but the speed quoted is 16 MPH not 15 MPH and also it states that a throttle control e-bike is not classified as a conventional bike.

“An EAPC which complies with the technical requirements in SI 1983/1168 (an EAPC) is not considered to be a motor vehicle within the meaning of The Road Traffic Act 1988. An EAPC is not required to be registered, have a vehicle license or a nil license, pay vehicle excise duty vehicle (road tax) or be insured as a motor vehicle. In the UK, riders of electric cycles must be at least 14 years of age. Electric cycles are classed as pedal cycles provided they conform to the pedelec definition (motor power output inversely related to speed, and power cut whenever the rider stops pedaling and have a powered-assisted maximum speed no greater than 25 KPH (16 MPH but you can pedal faster unassisted)” (Jamerson & Benjamin 2007, p.137).

1.2 Aims

The aims of my project are to examine the prospects for the e-bike in the UK. The project will provide some background to the e-bike and cycling in general this will be done by the means of a literature review. It will then consider the prospects for the e-bike in the UK. As relatively little research has been conducted into the e-bike in the UK a qualitative approach will be taken in my study. First interviews will be conducted with e-bike industry experts, (dealers, manufactures, importers and retailers). Secondly focus groups will be conducted with members of the public from different backgrounds. The interviews will be carried out first to help generate a topic guide for the focus group. Using two distinct groups of people the

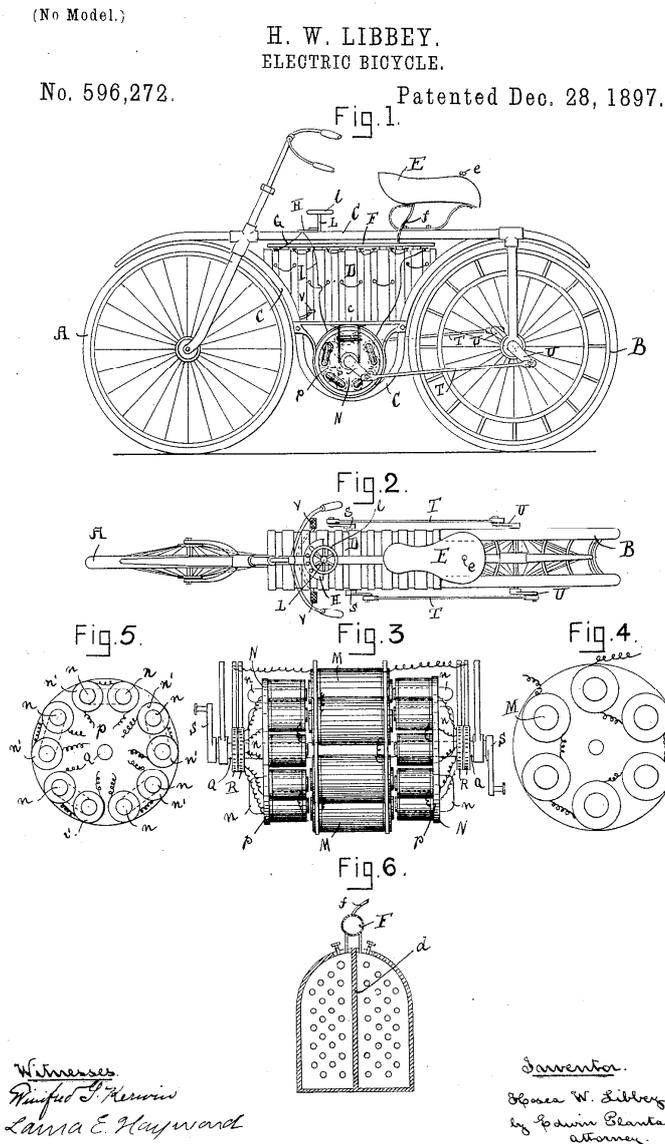
experts and general public it will be possible to see if there are any major disparities between the two groups.

Chapter 2 Literature Review

2.1 History of the e-bike

Electric bikes have been documented for many years. There were various US patents with details of electric bikes in the 1890s. Obviously there has been major technological developments since those early days.

Figure 2, An Early Electric Bike



Source: (Libbey n.d.).

The bike shown above is the basis for some of the modern e-bikes on the market today. As e-bikes have been developed torque sensors and power controls have been added. 1998 saw e-bikes becoming widely available with around 49 different bikes on the market worldwide (Wikipedia 2008b).

Lido Anthony “Lee” Iacocca, developed an e-bike. He was famous for his revival of the Chrysler Corporation in the 1980s.

“In 1999 Iacocca was the head of EV Global Motors Co. a company formed to develop and market electric bikes with a top speed of 15 MPH. and a range of 20 miles between recharging at wall outlets” (Wikipedia 2008a).

“With sale projections of 50,000 electric bikes for the first year through bike shops, auto dealers and the internet, Iacocca was confidently predicting that he would eventually sell one million bikes a year, even though no one else had so far been able to sell more than a few thousand electric bikes in the United States in any given year” (Frost 2002).

Frost relates how the price of \$995 for the e-bike was too expensive for many potential customers, in 2001 EV Global only sold 12,000 e-bikes. There were rumors that Iacocca had been trying to sell EV Global to DaimlerChrysler (Frost 2002). It could be said that EV Global failed to create a market for the e-bike, but it is in some ways remarkable that Iacocca who had a history in the car industry went on to invest in the development of e-bikes.

2.2 Context of the e-bike in the UK: what role could they fill?

There is a feeling amongst e-bike industry experts and other transport professionals that e-bikes could become part of a sustainable transport solution. Journeys are generally divided into two main categories. Those that are journeys to work (commuter trips), normally involving home to work in the morning and work to home in the afternoon, forming the morning and afternoon peak respectively. Commuting can also include journeys to school, college and university and other education based trips. Sometimes more complicated trip chains are formed for example dropping children off at school then going on to work, or on the way home from work

stopping at a supermarket. The other type of journey is generally carried out for pleasure and could be regarded as less essential than work based journeys. It is also possible that that these are easier to relocate in time and maybe even in space if the same activity can be carried out in a different location. This might be the case for shopping trips but is unlikely to be the case for a journey that involves visiting a fixed location such as a friend's house.

Generally the commute to work/place of education, has been the focus of most transport related inquiries for multiple reasons: it is the most predictable with fixed origins and destinations and it is regular, occurring on most weekdays. A particular leisure trip might only occur once or twice a year and therefore is much harder to predict.

“The journey to work is one of the most commonly experienced forms of every-day travel, encompassing almost all transport modes, and making a substantial contribution to urban traffic congestion... Britain commuting accounts for just under one-fifth of all journeys undertaken by all transport modes” (Pooley & Turnbull 2000, p.11).

“The promotion of more sustainable urban transport in the late twentieth century is largely dependent on the extent to which people can be persuaded to change transport modes, either through the promotion of attractive sustainable alternatives or through penalties imposed on energy-extensive forms of transport (or both)” (Pooley & Turnbull 2000, p.11).

There are push and pull factors which can attract people to more sustainable modes of transport or dissuade them from using less sustainable modes of transport. Generally pull factors are seen to be the most effective in making people change travel behavior. It should be noted that push and pull factors have different success rates amongst different socio-demographic groups.

“It is plain that they prefer the former (pull factors) to the latter (push factors) judging pull measures substantially more likely than push measure to be effective in reducing their own car usage” (Stradling, Meadows & Beatty 2000).

An e-bike could be seen as a pull factor for reducing car use and increasing sustainable transport. E-bikes use a lot less energy than a car and also give the rider some health benefits. E-bikes also have the positive benefit of being a private form of transport, for example journeys can be made when the rider wants and the trip route can be changed at anytime unlike a public transport journey that generally runs to a fixed time and route. Stradling et al (2000, 208) cited the (Transport 2000 Trust, 1997) report that shows how much planning has to go into a journey using public transport compared with a car journey, using an e-bike would also require a lot less planning than public transport.

“In contrast to a car journey, a trip by public transport needs virtually all the relevant information beforehand: routes, times, luggage-capacity, refreshments, carriage of small children and of animals, perhaps fares and smoking restrictions. In a car, some mistakes at least (like a wrong turning) may quickly be put right, but equivalent mistakes on public transport are hard- if not impossible- to put right once the trip has begun. Indeed, because they are out of the passenger’s control, they may be sufficient to put him or her off traveling by public transport again” (Stradling, Meadows & Beatty 2000, p.208).

“Not only is our personal transportation convenient and an enabler for better jobs, better homes, or a better business - most people see their transport much the same way they regard their clothes... as a statement about themselves, their style and their income or status”. (Jamerson & Benjamin 2008, p.5).

2.3 Cycling (conventional bikes)

Considerable research has been conducted into the reasons why people do or do not cycle. There has also been some work conducted into predicting demand for cycling and how various factors affect this demand. A brief review of literature on cycling in general will be examined here.

Most of the research on cycling begins by highlighting the positive benefits of the mode of transport.

“The bicycle is an individual non-motorized mode with low access costs and high efficiency in the use of road space; it is also associated with benefits in terms of health, the environment and the quality of life” (Ortuzar, Iacobelli & Valeze 2000, p.353)

Ortuzar et al go on to mention how park and ride schemes were developed in the 1970s and '80s in North America and Europe, most of these were seen to be fairly unsuccessful in getting people out of their cars. Their report goes on to say that bikes were not really examined as an alternative form of transport. They state “a fair amount of knowledge about bicycle use and cycle-way design has been amassed in the last decades” (Ortuzar, Iacobelli & Valeze 2000, p.355)

Pooley and Turnbull look at the journey to work in Britain and show that the bike was used a great deal in the past for the trip to work

“Use of the bicycle to travel to work between about 1920 and 1950 was particularly notable in smaller settlements, with commuting by bicycle the single most important means of travelling to work in such towns in the 1940s” (Pooley & Turnbull 2000, p.14).

They go on to give reasons why people cycle and they show that these reasons have remained constant from the 1930s to the present day, the only change being that in more recent times environmental concerns are voiced as reasons for cycling,

“The main perceived advantages of cycling, in all time periods, were low cost, relative speed (especially the ability to undertake complex cross-town journeys quickly, to cut through standing traffic and avoid waiting for public transport), flexibility and the enjoyment of exercise” (Pooley & Turnbull 2000, p.18).

Pooley and Turnbull go on to state that the reasons for cycling are the same for both men and women, but reasons for not cycling were different.

“Men were more concerned about the lack of a secure place to leave their cycle, cited laziness, the weather and the need to look smart for work; whereas women most often said they did not cycle because they were afraid of cycling in urban traffic..., that they never considered cycling to work, or that they could not afford to purchase a bike... women were much more likely than men to avoid cycling because they had to undertake other tasks after work (such as shopping or collecting children) which would be difficult to accomplish on a bicycle” (Pooley & Turnbull 2000, p.19).

Other studies have found similar results. In general men seem to cycle more than women.

In January 2007 the Department for Transport (DfT) and the Office of National Statistics (ONS) produced a cycling fact-sheet for Great Britain. The fact-sheet contains a lot of statistics about bike use and bike trips. It is interesting to note that on the fact sheet it states, *“cycling figures are relatively volatile due to the small number of trips made”*. There are no numbers given for electric bikes, this could be because there are so few of them that the statistics are insignificant. The report shows that cycle trips are both declining in length and number of trips, it also states that *“over two thirds (69%) of people say they cycle less than once a year”*. It also highlights a gender difference in cycling *“across all age groups males make more cycle trips than females”*. The fact-sheet also confirms what Pooley and Turnbull state above, *“many adults are concerned about the safety of cycling. Almost half (47%) strongly agree that ‘the idea of cycling on busy roads frightens me’, with a further 27% tending to agree with this. Women are more likely to express concerns about safety (85%) than men (61%) (Omnibus 2002)”*.

The document also looks at the potential for increasing cycling; cycling tracks were seen as important to encourage cycling. Higher car parking and congestion charges would motivate round a quarter of people to cycling more. *“Over two thirds (68%) of all trips and over half (58%) of car trips are under 5 miles, approximately a half an hour cycle ride”* these short trips are ideal to be taken by bike. All the quotes in the above paragraph were taken from, (Department for Transport & Office of National Statistics 2007).

In conclusion to their work on travel plans and cycling Dickinson et al, raise some issues that need solutions before larger numbers of people will start cycling,

“Ultimately then there is untapped potential for commuting by cycle. However, it needs to be recognized that the issues are different for women and men and the environment affects them in different ways. Attempts to increase cycle commuting in the UK need to address four factors: practicalities of the journey; the extraneous activities incorporated into commuting; the image of the cyclist; and the cultural context. Conditions on short journeys need to be improved so that cyclists are safe from traffic without incurring risk to their personal security” (Dickinson et al. 2003, p.66).

Wardman et al 2000, examine how different factors affect rates of cycling and do some modeling that uses stated preference techniques about mode and route choice, information was also taken from the National Travel Survey (NTS). The model that was developed to take into account many different factors, such as type of cycle way, facilities available for parking bikes at the end of the journey, socio-economic variables which can influence the probability of cycling where also included. The study also looks at the willingness to pay for additional facilities.

“The results indicate that males are more likely to walk and cycle but that there will be, as expected, a lesser propensity to cycle or walk as age increases. Increases in income will increase the numbers traveling to work by train, and there may also be a positive income effect on cycle use” (M Wardman et al. 2000, p.20).

They go on to develop a mode choice model for the journey to work, using revealed preferences from the NTS and stated preference from a specially commissioned survey.

“Of the en-route cycle facilities, a completely segregated cycleway was forecast to have the greatest impact, but even the unfeasible scenario of universal provision of such facilities would only result in a 55% increase in cycling and a slight reduction in car commuting. Payments for cycling to work were found to be highly effective with a £2 daily payment almost doubling the level of cycling” (Mark Wardman, Miles Tight & Matthew Page 2007, p.339).

There have been several studies that have looked into making cycling more attractive to a greater number of people to using bikes as a mode of transport rather than just for recreation,

“Bicycling in much of the industrialized world is a marginal mode of transport, occasionally used for recreational purposes but rarely used for practical, everyday travel needs. Moreover, the social distribution of cycling tends to be very uneven, with young men doing most of the cycling, while women cycle far less, and the elderly hardly cycle at all” (Puncher & Buehler 2008, pp.495-6).

Puncher and Buehler go onto show how countries like the UK, USA and Australia can learn lessons from the Netherlands, Denmark and Germany,

“The provision of separate cycling facilities is undoubtedly the cornerstone of Dutch, Danish and German policies to make cycling safe and attractive. They are designed to feel safe, comfortable and convenient for both young and old, for women as well as men, and for all levels of cycling ability. Separate facilities are not sufficient but they are certainly necessary to ensure that cycling is possible for a broad spectrum of the population (Garrard et al., 2008)” (Puncher & Buehler 2008, p.513).

In summary, it can be seen that males are more likely to cycle than females, as age increases cycling decreases and cycling facilities are important both on route and at the end of the journey to attract more people to cycling. Moreover it can be seen that a range of measures/improvements are needed to increase levels of cycling.

“When a package of measures is considered, including modest financial incentives, cycle facilities for around half the journey to work and good parking and shower facilities at work, cycle emerges as a much more significant mode and has an appreciable impact on car share” (Mark Wardman, Miles Tight & Matthew Page 2007, p.349).

2.4 Cycling: Government and other organizations views

The government and local authorities are keen to promote cycling as a mode of transport. *“Cycling has a major role to play in any sustainable transport strategy. It helps tackle congestion and local air pollution, as*

well as the emissions that cause climate change” (Department for Transport 2008a, p.3).

“The government has set a target to quadruple the number of cycling trips by 2012 (from the 1996 level) (Department of the Environment, Transport and Regions (DETR) 1998). This has been endorsed in the Government’s 10 year plan (DETR, 2000) that sets the target to triple the number of cycling trips by 2010 from a 2000 base. Cycling to work has been targeted as an area for action” (Dickinson et al. 2003, pp.54-55).

Cycling England was developed by the DfT in 2005 to work with local authorities and cycling groups to get more people cycling. Cycling England is involved with many different projects and the areas it is working within include: Journey’s to school and work, cycle demonstration towns, bikeability cycle training and improving cycle infrastructure. Cycling England commissioned a study on the benefits of cycling,

“The value accrues from the unique combination of the benefits that cycling offers. No other single activity can simultaneously: improve general health and fitness, reduce pollution and the emissions of CO₂ and help tackle congestion” (SQW Consulting 2007, p.1).

In order to make cycling more attractive it is important that a variety of policies are used in conjunction to ensure the investment has the greatest value for money.

“The key to the success of cycling policies in the Netherlands, Denmark and Germany is the coordinated implementation of the multi-faceted, mutually reinforcing set of policies...Not only do these countries implement far more of the pro-bike measures, but they greatly reinforce their overall impact with highly restrictive policies that make car use less convenient as well as more expensive. It is precisely that double-barrelled combination of ‘carrot’ and ‘stick’ policies that make cycling so irresistible” (Puncher & Buehler 2008, pp.523-4).

The importance of a combination of measures to make cycling attractive is highlighted by,

“Cycle routes...As well as making cycling safer, they have been designed to attract more people to cycle in preference to driving, hence achieving the benefits of reduced car use...It appears that cycle routes can achieve travel time benefits for cyclists, but will not attract more people to cycle in the absence of other measures”(The Institution of Highways and Transportation 1996, p.81).

Transport for London have created a cycle action plan that aims for *“a 200% increase in cycling in London...and by 2010 I expect to see an 80% increase in cycling” (Transport for London & Mayor of London 2004, p.2).* The report looks into reasons for cycling and then looks at how to increase cycling within the city. The report also examines barriers to cycling,

“Seven barriers to cycling have been identified through various surveys: danger, effort, weather, poor cycling environment, cycle theft, lack of information and skills and culture, attitudes and credibility. This has been reinforced by a recent survey of the near market of cycling in London, where danger, effort and poor cycling environment were stated as the main reasons for not cycling in London” (Transport for London & Mayor of London 2004, p.16).

Some groups feel that the prospects are poor for e-bikes. I applied for some funding from the Cycle Touring Club and their response was interesting in the terms of the prospects for e-bikes, *“We also felt the scope for electric bicycles in the UK was small and the potential user market might well be those with experience of, or considering, other motorised two wheelers, as opposed to cyclist derived” (Meudell 2008).* This also highlights how an e-bike might not be attractive to conventional cyclists.

I spoke with Cycling England on the 8 July 2008 and they stated that they do not really have a position on e-bikes, and feel that because much of their funding comes from the Department of Health that, e-bikes might not really fit in with their remit. Cycling England tends to look at the bigger issues rather than the types of bikes people use. Cycling England’s aim is to get more people cycling more often, and to use cycling as a tool to help with other problems such as obesity, school run, traffic congestion and air pollution.

In an email from the DfT when asked what the department's position on e-bikes was, it was stated, *"It's not really my area but I'm certain that we are not actively encouraging or discouraging EAPC's. EAPC's are classed as pedal cycles so you could say that any position we take on pedal cycles applies to EAPCs"* (Burrows 2008).

2.5 E-Bikes

Currently there is very little literature on electric bike use in the UK or in other developed countries. A detailed search has been carried out using various databases such as, Web of Knowledge, Science Direct, EBSCO Business Source Complete and Ei Engineering Village 2. The major reason for this lack of information may be due to the very low use of electric bikes in developed countries. The majority of articles seem to focus on the high-end engineering of the bikes.

There is a growing but still relatively small amount of data on electric bike use in China. This is surprising due to the massive increase in e-bike use *"e-bike sales in China grew from 40,000 in 1998 to 10 million in 2005."* (Weinert, Ma & Cherry 2007, p.301)

Research undertaken in China has tended to look at mode choice, reasons for the extensive use and speed of growth.

Cherry and Cervero examine the use characteristics and mode choice of e-bike users in China. They find that in general, *"Electric bike users are found to travel considerably more than bicycle users. Also, most electric bike users would travel by bus if electric bikes were unavailable"*. (Cherry & Cervero 2007, p.247)

Weinert, Ma and Cherry show how the *"extraordinary growth in the late 90s to the present is due to a combination of economic, technical and political factors"*. (Weinert, Ma & Cherry 2007, p.315). It is interesting to note the role of these three factors and how they are all interrelated.

“If China can find a way to make relatively efficient electric bikes a significant part of its transportation system, it could have major repercussion elsewhere in the developing - and developed-world” (Fairley 2005, p.59).

This shows that Fairley believes much can be learnt from China and that e-bikes could have a massive role to play in transportation in the 21st century.

(Weinert et al. 2008) Look into the future of electric two wheelers (E2Ws) in China. *“The key forces supporting the growth of the E2W market are: cost and performance improvements, motorcycle bans, local policy support for E2Ws and poor bus public transit service” (Weinert et al. 2008, p.2547).*

Research that has been conducted into e-bikes is reviewed below. The Electric Bike Worldwide Report (EBWR) which has been published in 2004 and 2007 with a 2008 update contains a large amount of information on e-bikes, e-scooters and electric vehicles. Although the report is worldwide it tends to quote figures and data for Europe rather than the UK, this may well be because figures and data for the UK are hard to come by (Jamerson & Benjamin 2007).

The EBWR is optimistic about e-bike growth and stated the following reasons:

*“1. Increasing market economy growth of the wealth of people all over the world, but particularly in China and India
2. High gasoline prices with high prices dominated by Middle East turmoil
3. Concerns about global warming and the movement to alternative energy
4. High quality products with better technology like lighter lithium batteries that provide longer range and better performance.
5. Rapid urbanization of the human race leading to high density cities with no room for parking of cars, and limited surface road that will require two-wheelers for much of personal transport.
Factors 2/3/4/5 are impacting Europe and the USA now and the sense is that electric bike and electric scooter will be gaining more users in those locales” (Jamerson & Benjamin 2007, p.5).*

2.6 E-Bikes around the world

A brief review of e-bikes around the world follows. The quotation shows the extent to which conventional bikes are commoner than cars worldwide.

“Worldwide conventional bicycle ownership is estimated to be close to 2.1 billion units with China owning the largest number for a single country at around 900 million units. United States ownership is around 200 million with Europe around 275 million units. In 2006, global production of bicycles hit 105 million or one-and-a-half times the 67 million cars produced and sold that year” (Jamerson & Benjamin 2007).

The EBWR states how motorbikes and scooters are seen as a step up from a bicycle and the e-bike is now starting to take the place of petrol powered bikes.

E-bikes are most prolific in China, “The dominant electric bike producer and user is China as yearly sales continue to climb and soon will be over 20 million units” (Jamerson & Benjamin 2007, p.9). The report states that one in five new bikes in China is electric.

The table below shows estimates of E-bike sales worldwide from 2005-2009:

Table 1 Worldwide Electric Bike Sales (Estimates)

Country	2005	2006	2007	2008	2009
China	12,000,000	14,000,000	17,000,000	21,000,000	24,000,000
India	20,000	50,000	100,000	200,000	500,000
Japan	197,000	200,000	200,000	200,000	200,000
Europe	180,000	190,000	220,000	400,000	750,000
Taiwan	9,000	10,000	10,000	10,000	10,000
SE Asia	25,000	30,000	35,000	40,000	45,000
United States*	100,000	120,000	150,000	180,000	200,000
Total	12,531,000	14,600,000	17,715,000	22,030,000	25,705,000

*based on estimates of products shipped to the US from Asian Sources

Source: Table 2.1 from (Jamerson & Benjamin 2007, p.11)

It can be seen in table 1 that e-bike sales are predicted to increase in Europe and by 2009 e-bike sales are predicted to be second only to China.

ExtraEnergy has slightly different prediction to the ones in table 1.

“According to the latest estimates of ExtraEnergy, 250,000 electric bikes were sold in Europe in 2007. An estimated 60% were pedelecs sold through Independent bike dealers (IBDs) at price between 1,200 and 2,000 Euros or more. About 40% of the sale were achieved with 300-1200 Euro products... About 100,000 Pedelecs were sold in the Netherlands in 2007” (ExtraEnergy.org 2008).

The e-bike industry is still developing and in the past and currently there have been some poor quality products on the market, it is promising that *“There is a lot of electric bike activity worldwide and the 2007 Light Electric Vehicle (LEV) conference suggests that companies are now starting to talk like the auto industry about standards and communization for the good of the industry” (Jamerson & Benjamin 2007, p.29).* The Energy Bus standard was introduced to the market at the LEV conference which aims to improve electric vehicles and improve standards and compatibility issues.

“EnergyBus is a new standard to improve compatibility of electric components in Light Electric Vehicles (LEV). It consists of a standardized hardware interface (set of plugs) and a software interface (communication protocol and energy management). This way energy and service data can be safely transferred through one plug. The communication protocol is based on CAN bus and further specializes to meet the specific needs of the LEV industry” (Bruesch n.d.).

These standards are clearly very important for industry.

“The industry more and more regards these standards as an important condition for further market growth. Battery safety and compatibility of electrical components are specially important for public rental systems and fleet operation” (ExtraEnergy.org 2008).

The EBWR goes on to show the profiles of people who ride e-bikes in different countries, (Jamerson & Benjamin 2007, p.31). In China an e-bike user is typically a commuter who uses their e-bike to open up choices in terms of housing and employment, if they have used a conventional bike an e-bike will also make their commute a little easier.

In Japan e-bikes tend to be used instead of a second car, quality of the product is much more important here than it is in China. E-bikes are useful as there is often a lack of space for parking. E-bikes are commonly used for commutes to train stations where parking maybe limited.

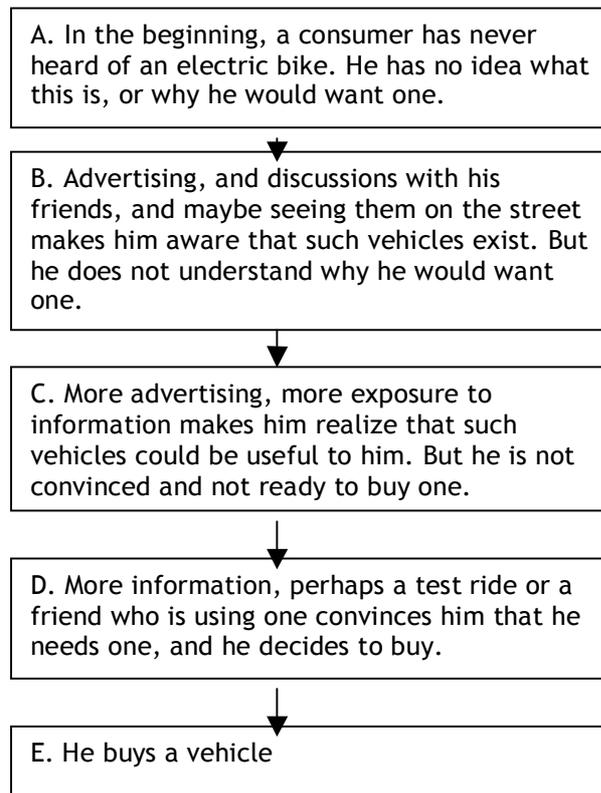
In the EU e-bike growth has mainly been seen in the Netherlands, Germany and Switzerland. *“EU users are often older people who have ridden bicycles their entire life for transport and recreation and appreciate electric power assistance today” (Jamerson & Benjamin 2007, p.31).*

Types of e-bike users will be explored further in the interviews conducted. The fact that in the EU e-bike riders are mainly former conventional cyclists could mean that different marketing techniques will be needed to encourage non-cyclists to ride e-bikes than those that are currently being employed. The EBWR also states that cheaper Chinese e-bikes have been selling well in the UK but this is not true across the EU.

2.7 Marketing

As e-bikes are a fairly new product in the UK, marketing has a massive role to play in making more people aware of this relatively new mode of transport. Marketing is a topic that will be explored further in the interviews undertaken, but an overview of the topic is given below.

Figure 3: Process of awareness



Source: (CycleElectric n.d., p.11)

With respect to figure 2 it is thought that most people in the UK are near the top of the diagram in boxes A or B. Normally people will move down the chain e.g. from A to E but it is possible with bad press or unfavorable verbal reports for somebody to move up the chain from D to B for example. The report goes on to state how it is much easier to employ engineers and people to produce the bikes than to employ people to sell them.

“Most of the businesses and individuals involved in light electric vehicles are focused on technical and production issues. To get a vehicle made is not as big a problem as selling it. To get financing for a factory or for inventory is easier than to get financing for an advertising campaign. Hiring engineers feels more comfortable than hiring salesmen. And a good salesman or sales manager is very expensive. (A bad one is even more expensive.) As a result of these factors, the light electric vehicle industry has yet to create an effective marketing campaign for any of the products. And as a result of this lack of marketing, the consumers of the major markets have very little information on light electric vehicles” (CycleElectric n.d., p. 10).

2.8 Reasons why people do not cycle

There are many reasons why people choose not to cycle, and the major reasons are going to be examined here. It is felt that there is some crossover of factors as to why people do not ride conventional bikes as well as electric bikes.

Box 2 Reasons for not cycling

- Safety and fear of other road users, mainly motor vehicles
- Cycling is too much effort, (this would be reduced with an e-bike but a small amount of effort is still required)
- The weather is too bad, (the effects of head winds are reduced when using an e-bike)
- There is no convenient and secure place to store bikes
- There is limited changing and showering facilities at my destination, (this again is less of a problem with an e-bike as less effort is required as it is possible to arrive at places without getting sweaty)
- Unable to carry all the things I need on a bike (there are carrying solutions for conventional and e-bikes but they are more commonly fitted as standard on e-bikes)
- The distances I need to travel are too far
- Cycling might be seen as an inferior method of transport compared to a motorized form such as a car

Box 3 Reasons given for not cycling that are more applicable to e-bikes

- The cost of purchasing a bike is also a factor, if one is not already owned. Moreover e-bikes tend to cost more than a conventional bike
- The financial consequences of having an e-bike stolen maybe greater than having a conventional bike stolen, but there are some e-bikes which have security features such as ignition keys, removal batteries/control panels which means that the bike can only be operated as a conventional bike without these parts
- An e-bike might be thought of as in some way cheating

2.9 E-bike in the UK

As mentioned before there is very little research into e-bikes in Europe and North America but there are two reports, one based in the UK and one in Canada that research e-bikes. It is useful to give a brief review of these projects here.

The project in Canada was run by the Centre for Electric Vehicle Experimentation in Quebec (CEVEQ), (Lamy 2001). The aims of the project were to determine the safety of e-bikes. E-bikes were made available to volunteers for testing. Then the e-bike users were given questionnaires to answer. In general most people felt safe on the e-bikes.

“83% of the respondents felt as safe on an e-bike as on a conventional bike. 95% of those who rode electrically propelled bicycles (EPBs) (e-bike throttle controlled) and 96% of those who rode electrically assisted bicycles (EABs) (pedelec) felt they had full control of their bicycles when the motor was running. Reducing the weight of the e-bike and improving the braking system on certain models were the main elements that would contribute to an increased feeling of safety” (Lamy 2001, p.x).

People gave differing reasons as to why they might use an e-bike. 79% said that exercise would encourage them to use an e-bike to commute to work. 51% to reduce pollution and 41% as it was a low cost form of transport. Many people are attracted to the new e-bike technology and 64% said they would use an e-bike to travel to work and 65% of those who usually travelled to work by car said they would use an e-bike (Lamy 2001, p.xi).

As to the advantages, 59% stated it made it easier to climb hills 58% said riding into the wind was easier and travel in the open air was cited by 51% as a bonus. As in many other surveys about cycling, 79% of the e-bike users say they were very influenced by the weather, fear of rain being a major draw back for 71% (Lamy 2001, p.38).

Guthrie 2001, researched new forms of private transport in Britain, which included the smart car, e-bikes, small motorcycles and BMW C1 covered motorcycle. He found that *“the perceived risk of accidents was considered*

to be biggest deterrent to the increased use of these vehicles” (Guthrie 2001, p.ii).

Guthrie went on to carry out a survey of e-bike users. He did this by using the customer database of Powabyke (an e-bike manufacture). He found that the bikes were being used well and were replacing a lot of car trips. The advantages and disadvantages to e-bikes are very similar to those found in Canada:

Box 4 Advantages and disadvantages of e-bikes generally

Advantages <ul style="list-style-type: none">• 35% said their e-bike was easier for hills• 25% said their e-bike was generally less effort and hard work• 9% said it was faster/quicker• 6% said that it was easier in headwinds and more enjoyable/comfortable.
Disadvantages <ul style="list-style-type: none">• 66% of people commented on the weight of their bike• 7% about having to recharge it and it having a limited range• 5% about a higher risk of theft

Source: (Guthrie 2001, p.43).

Box 5 Advantages and disadvantages of e-bikes over other forms of transport

Advantages <ul style="list-style-type: none">• 26% of respondents stated saving money• 13% cited freedom/independence from public transport or lifts from other people• 7% less pollution/better for the environment• 6% freedom from tax insurance• 6% and ability to use cycle priority facilities
Disadvantages <ul style="list-style-type: none">• 52% saw the major disadvantage to be exposure to the weather• 9% cited slow speed• 9% of respondents stated that limited carrying capacity was a problem• 7% limited range• 7% road danger

Source: (Guthrie 2001, p.43).

Guthrie went on to ask e-bike users what changes to government policy would encourage greater use of e-bikes. Most of the respondents could not

think of anything but of the 28% which could the majority 64% mentioned publicity campaigns on the television, radio and in newspapers. 29% mentioned financial incentives (Guthrie 2001, p.43).

The demographics of the e-bike users questioned by Guthrie are interesting,

“The majority of respondents were aged over 60 although nearly half 47% were under 60, most 80% of the under 60’s were over 41... Only 4% were under 25. Over 80% of e-bike owners were aged over 40”. “The gender split amongst respondents was 33% female and 67% male” (Guthrie 2001, p.44).

As part of the project Guthrie carried out a survey of people at various car parks in Leeds. Around 50% of respondents were aware of e-bikes but only 20% said that they had seen one. This may have been due to the fact that they look very similar to conventional bikes. 66% of respondents felt that the government should encourage the use of e-bikes. 4% said that they would buy an e-bike and 10% said they would possibly buy one. 51% of respondents gave reasons for not buying an e-bike, 31% of this group had safety concerns, 27% had issues with the luggage and people carrying limitations, lack of weather protection was cited by 16% of respondents. (Guthrie 2001, pp.47-53).

The above has reviewed current information concerning e-bikes and conventional bikes.

Chapter 3 Methodology

The methodology that was used to research my project is outlined below. The primary research was divided into two main areas, the interviews with e-bike industry experts and focus groups with members of the public.

3.1 Interviews

As this is a recent area of research it was felt it would be best to conduct qualitative research to obtain peoples' views and feelings. Moreover it was thought that qualitative research is often lacking in transport research and it could provide a useful insight into a developing area.

It was decided that interviews would be a good way to gather information about the prospects for the e-bike in the UK. The first stage was to make contact with industry experts. This was done using the A to B magazines Manufacturers or distributors list (A to B Magazine n.d.), from this and google web-searches an excel database was created, from which contact was made with potential interviewees. Interviews were arranged at a convenient time and location for the interviewee, this was normally at their place of work.

It was intended that interviews would be recorded, "*The tape recorded interview is a liberating influence on the interviewer, because it permits him to devote full attention to the respondent*" (Bucher, Charles Fritz-E & Quarantelli 1956, p.360), but the vast majority of interviewees wished for the interview to remain confidential and preferred not to have them recorded. This meant that detailed notes were made whilst conducting the interview and these were typed up soon after the interview had taken place.

As the interviews revealed some sensitive information such as marketing and sales information all the interviews were kept confidential. In this way no company could gain any advantage over another and interviewees would feel safe to say what they wanted to without fear of disclosure.

Interviews were conducted using a semi-structured guide see appendix 1. A semi-structured approach was chosen because it allowed interviewees to voice their own opinions and issues that were not raised in the interview guide, *“Open-ended questions mean that the interviewee’s responses are not constrained to categories provided by the interviewer; respondents can give whatever answer they wish”* (Kitchin & Tate 2000, p.213). This has advantages over using a survey in that unknown responses can be generated. One of the disadvantages is that it requires much more time and resource to contact the same number of people and it is very hard to run statistical tests from data generated from interviews whereas this is much easier with survey data.

3.1.1 Analyzing and coding the interviews

As only notes had been taken it was felt that it was best to analyze the interviews under subject headings (see interview guide appendix 1). In this way common themes and views could be drawn out from the data collected in the interviews as well as any differences in opinion. In total 6 interviews were carried out.

Box 6 Profiles of Interviewees

- Sales person in a conventional bike shop
- Manager of an electric transport shops selling a wide range of e-bikes and other electric vehicles
- Managing Director of an electric transport shop specialising in the development of e-bikes
- Managing Director of an e-bike manufacture
- Sales Manager of e-bike manufacture
- Managing of an e-bike shop

All the interviewee were male.

3.2 Focus Groups

As the interviews draw on the views of experts it was felt that it would be important to get the view of the “general public”. From research it was found that there was a low general awareness of e-bikes so it was felt that a focus group would be a good way to gather people’s opinions. It was decided that two focus groups would be run. One in London at Imperial College and

one in Bourne, South Lincolnshire.

3.2.1 Recruiting the focus group participants

The focus group in Bourne had 7 attendees and the one in London 6.

“There is really no hard and fast rule, however, about the optimal size of the focus group... the ideal range seems to be between 8 to 12 people”

(Stewart & Shamdasani 1990, p.81). This number of people allowed everyone to talk comfortably and there was enough time for everybody to speak. I feel that if the groups had been larger not everybody would have been able to say what they wanted to in the time available.

The focus groups were mainly recruited online using emails for contacts. Other focus group recruits were recruited from an electric bike forum, www.pedelects.co.uk, where I made a posting on the forum inviting people to the focus group. It was suggested that I should create an online focus group. This was done, and several different threads were created that were taken from the focus group guide, these are shown in the table below. As the online focus group was being carried out, there was little need for moderation as everybody could say what they wished, and they could do so in their own time and from the comfort of their own computer, which obviously had great advantages and meant that more people could be involved in the focus group. The disadvantages of using a forum as a focus group are; there is a lot less interaction between people involved in the group, you cannot look at people’s body language and it is harder to probe information and opinions from people. Moreover the majority of people on the forum were electric bike users which had it’s limitations but also gained some interesting information. Posters were also displayed in prominent locations around Imperial College and Bourne. An email was also sent out to the Imperial Bike Users Group. It is important to note, *“It is almost inevitable that a self-selected sample will be biased towards those with more education and in higher status occupations”*(Pooley & Turnbull 2000, p.13).

Table 2 Questions used on the forum

Aims
What are the main reasons for why you cycle?
What are the major factors that persuaded you to get an electric bike?
Safety advantages or disadvantages of e-bikes over conventional bikes?
How did you find out about electric bikes?
Do you think that e-bikes have a role to play in sustainable transport in the UK?
What were the main worries queries you had before purchasing your e-bike?
Advantages and disadvantages of e-bikes over conventional bikes?

The data from the forum focus group will be analyzed in the same way as data from the focus group. This can be seen in the results/analysis section.

3.2.2 Location of focus group

“A proper physical environment must be provided. The location should be neutral and easy to find, a place where participants feel comfortable and relaxed. The group should be arranged so that each participant can see others in the group, often around a table” (Krueger 1993, p.68). The focus group at Imperial College was run in a conference room and this was situated around a table. The group in Bourne was run from a friend’s home around a large table. Although the location was not completely neutral it was easy to find and relaxed. It was seen to be the best location available.

3.2.3 Designing the focus group guide

“Questions play an important role not only in getting at answers to research problems but also in setting the tone or climate for interaction” (Stewart & Shamdasani 1990, p.74).

When compiling the focus group guide I kept the questions as open as possible in order to facilitate the free flow of conversation within the group. *“By keeping the questions open-ended, the moderator can stimulate useful trains of thought in the participants that were not anticipated”.* (Knodel 1993, p.36)

It was important that the focus group was kept on topic *“The general*

concepts to be explored need to be formulated as a set of discussion guidelines that can be used by the moderator during the focus group sessions". (Knodel 1993, p.36) So the guide was also to be used for this purpose.

A summary of discussion guide follows in the table below.

Table 3 Focus group discussion guide summary

Aims
Introductions
Brief description of an e-bike
Explanation of how the focus group will work
Reasons for cycling or not?
Awareness of e-bikes how were they first found out about?
What would be the major factors that might persuade you to buy an e-bike?
What barriers do you think the e-bike might face in the UK?
Does an e-bike seem more attractive than a conventional bike?
What does everybody think the major advantages or disadvantages e-bikes have over conventional bikes?
Do you think that electric bikes have a role to play in sustainable transport in the UK?
Thank you very much for your time.

It was important to promote discussion amongst group members *"A good design also allows for synergy to occur, which produces greater insights due to the fact that participants work together during the session"* (Grudens-Schuck, Lundy Allen & Larson 2004, p.3).

3.2.4 Moderating the focus group

Both the focus groups were moderated by myself. It was important for consistency that the same person moderated both groups. Moreover as I was carrying out the research this allowed me to keep the group focused and I could pursue relevant points that arose when needed.

Keeping to time is important *"One of the most important skills of the moderator is time management. The moderator must gauge the extent to which a topic has been exhausted and further discussion will yield little new information"* (Stewart & Shamdasani 1990, p.94). In both of the focus

groups a number of participants were interested in the technical detail of e-bikes and it was important to move away from this topic once a general understanding of an e-bike was gained by everyone.

Possible probes that could be used for gaining extra information included the following,

- Reflecting back what the person said for example: What I heard you say was ... is that correct?
- Can you tell me more about that please?
- I don't quite understand, can you explain what you mean?

Taken from (Stewart & Shamdasani 1990, pp.95-96).

The bullet points above could be used to get participants to expand further what they had said. Below are some probes that could be used to generate more information from the group generally.

The group can be probed in general using the following prompts:

- Does anyone have an example of that?
- Is this anyone else's experience?
- Does anyone have a similar or different perspective?

Taken from (Stewart & Shamdasani 1990, pp.95-96)

Prompts were rarely needed as both groups were generally focused and fairly chatty. Occasionally they were used to bring people back on to the topic.

3.2.5 Recording the focus group

Both focus groups were recorded using a microphone and mini disc recorder. Due to restrictions of time and budgets the focus group recordings were not transcribed but the recordings could be used for reviewing what had been said.

3.2.6 Analyzing focus group data

“Given the qualitative nature of the data gathered by focus group methodology, a considerable amount of subjective judgment is necessarily involved in their interpretation and analysis” (Knodel 1993, p.43). After the focus groups had been carried out I listened to the recordings again and made detailed notes pausing the recording when needed.

It was decided that the topics should be grouped together using the discussion guide making sure that additional points were taken into account. The discussion guide provided a useful framework for analyzing what was said in the group. *“The topics for analysis are generally dictated by those included in the focus group guidelines. Sometimes other topics not explicitly incorporated in the guidelines will arise regularly enough that sufficient information was generated to include them in the analysis” (Knodel 1993, p.44)*

As only two groups were conducted it was felt that no formal coding system was needed. *“It is necessary to appreciate that content analysis need not employ a formal coding scheme, nor need it be a precursor to any kind of quantification” (Wilkinson 2004, p.184).* Computer software such as ATLAS.ti (www.atlasti.com) could have been used to analyze the data collected but this would have required the focus groups to be transcribed and it was felt that this would not have been time or cost affective.

3.2.7 Limitations of Focus Groups

With any research technique it is important to recognize its possible limitations. The main limitations with focus groups are that only a small number of people are involved so it is hard to make generalizations. The data collected from a focus group can also be hard to analyse. It is also possible for dominant members to add bias to the session (Bar-Bin Kimel 2004) and (Fidgeon n.d.).

Focus groups have not been frequently used in transport studies research,

but an examples is the work of (Ramos et al. 2008) which, examined young people's perceptions of accidents in Spain using interviews and focus groups. The methodology has been used within market research and the social sciences, and therefore there is plenty of a literature about focus group methodology. Focus groups were chosen as a methodology in this research for many reasons: it is a good method for generating views about a new mode of transport, participants can build on each others responses and there is more freedom than would be had with a survey. They are a good way of gathering background information and they can be used to explore topics that need a 'depth of understanding'.

Chapter 4 Results

4.1 Interviews with industry experts

In this section the results of the data gained in the interviews is analyzed. All the six interviews conducted will be reviewed at the same time and any differences and similarities will be pointed out.

4.1.1 Reasons given for the purchase of e-bikes?

Many different reasons were given as to why people chose to purchase an e-bike. Generally there was much agreement between interviewees. Four stated that e-bikes were purchased to make cycling easier, comments were made such as *“To take the hills out of cycling”*, *“It is possible to wear work clothes and not get sweaty”* and *“People sometimes purchase e-bikes to help them keep up with someone who cycles further or faster than they would do normally.”*

Only one interviewee mentioned anything about environmental issues, on stated that *“it was led by the green lobby.”* Two mentioned that e-bikes were used for commuting and the school run. Three interviewees felt that cost saving was a reason for the purchase of e-bikes. One said that companies that use e-bikes as vehicles save a lot of money, and another stated that *“also to do with cost, there are great cost reductions when using an e-bike, no insurance, road tax, parking fees and in London the congestion charge is a major factor, petrol costs are also a factor”*. Three interviewees suggested that e-bikes were sometimes used as a replacement for or supplement to a car.

Health reasons were cited by two as factors influencing the purchase of an e-bike, *“Post knee operation or due to other health reasons such as weakness due to MS or ME”*. Another respondent mentioned that cyclists with knee injuries often look to e-bikes. Three respondents mentioned enjoyment, health and wellbeing as reasons why people might purchase an e-bike.

Finally corporate image was cited by one respondent as to why companies might use e-bikes as part of the transport plan and vehicles for staff going short distances.

4.1.2 What type of people purchase e-bikes?

The general consensus amongst interviewees was that a real mixture of people purchased e-bikes. One said that, *“It’s a fairly new thing and some people just like trying out new things”*, another person said that, *“e-bike purchasers tended to be people who do not purchase conventional bikes”*.

Three interviewees mentioned that people might use an e-bike for health reasons for example to improve fitness and also people with illness who wanted to cycle. People who want to make cycling easier was also mentioned here, *“people who want to take the struggle out of cycling”*.

Two people stated that commuters purchased e-bikes, one said that commuters in London may be a new market. Interviewees went on to say that it tended to be older people who purchased e-bikes and very few people under 30 years old purchased them. Other types of people who purchase e-bikes are people who need to carry large amounts of luggage e.g. people camping and people making deliveries. One respondent said that folding bikes were most popular with people living in flats.

4.1.3 Once an e-bike is purchased what is it used for?

Commuting to work was the major use of e-bikes, with five respondents mentioning this use, with comments like, *“Commuting to and from work is a big use of e-bikes”* and *“commuting and the school run”*.

Work related trips were mentioned by two respondents, their comments were, *“For making deliveries”* and *“Business have started to use them for short business trips, with great cost savings when compared with car use”*.

Two respondents mentioned that e-bikes were used for leisure trips.

Other statements were made about e-bikes and their uses by two respondents: *“Distances become much bigger once people start using an e-bike, so the mental map of the area that can be reached by an e-bike is greater than that of a conventional bike”* and *“E-bikes are used for daily chores that involve traveling short distances”*.

4.1.4 Barriers to expansion of e-bike use

Awareness/unawareness of e-bikes was cited as a major barrier for e-bike expansion in the UK. Four interviewees made comments about awareness these two highlight the general view, *“Awareness is a major problem, getting people to try them out is hard, but once they have tried one they really like them”* and *“Lack of e-bike advertising is a problem as so few people know about the bikes”*.

Another barrier was that people were worried about a new thing, this was mentioned by two people, *“various worries such as how long will they work for?, what is the service back up like? and other such things”*, *“People are frightened about a new thing”*.

Two people mentioned that another problem was seen to be that conventional bike shops were not greatly in favour of e-bikes, and barriers were seen to be, *“Getting shops to be confident enough in the product so they will promote it. A lot of e-bikes are trying to be sold through bike shops and this does not work that well as people who purchase e-bikes tend not to go to bike shops”*. *“It’s hard to get the bike to the end user as bike shops are not interested in selling them and also there is not much point trying to sell them in bike shops as it is fairly unlikely that potential buyers will be there”*.

Weather was seen to be a factor that would work against the wider use of e-bikes. *“Weather is seen as a factor that affects people and stops people purchasing e-bikes, new developments are needed to get around this”*,

“Weather is an important issue but an e-bike makes cycling more attractive even in bad weather”.

Several interviewees mentioned other barriers for the e-bike, these included, *“People don’t fully see the advantages of e-bikes there is a lot of misunderstanding, and also in the past a lot of bad Chinese models have been sold in the UK and this has led to some bad press and people having bad experience with e-bikes”.*

It is interesting that only one interviewee mentioned road safety although this is commonly cited as a reason for not cycling, *“Safety on the roads is an issue for a lot of people and this needs to improve”.*

4.1.5 Marketing

A fairly unstructured approach to marketing was taken by most of the respondents, and a variety of different marketing methods were used. Three interviewees went to green festivals or other shows, *“We go to agricultural shows where members of the public can see and test the bikes, we tend not to go to bike shows as regular bike users are not all that interested in them”.*

Two interviewees mentioned that they ran competitions in magazines may be by giving a bike to a journalist to review and then let the publication give away the bike in a competition. Two respondents mentioned running demonstrations at companies for employees to test e-bikes was part of their marketing activity.

It seemed that getting people to test the e-bikes was a major marketing tool, so it is not surprising that a respondent said that an e-bike hire scheme was great publicity and another thought that a new e-bike hire scheme would be great for raising e-bike awareness.

Generally people took a 'scatter gun' approach to marketing, *"As it is such a new thing we have to take a scatter gun approach to marketing as it is too early to focus down."* But one respondent did state, *"We do market research into different geographical areas and see which are most likely to use e-bikes."* Moreover it was felt that a *"full scale advertising campaign in a national newspaper would be good but would be too expensive for most e-bike manufacturers."*

4.1.6 Other comments made

Several other comments were made which did not fit in to any of the sections above and only related to one interviewee. It was felt that e-bike sales would increase as the cost of oil and living in general increased. One interviewee felt that e-bikes should not be seen as a conventional bike and it should be seen as a useful cheap vehicle, *"People view them as expensive but it is important to realize they are much more than a normal bike and when the price is compared with that of a car it becomes much more reasonable"*. Another comment that was made was that, *"Some companies need more knowledge before they start developing e-bikes, some companies are very good at making bikes and some are very good at making motors but very few are good at adding motors to bikes"*.

4.2 Focus Group Results

In this section the results from the focus groups are analyzed. First the online focus group is going to be examined followed by the two conventional focus groups.

4.2.1 Online focus group

It is hard to ascertain how many respondents took part in the online forum as different numbers of people responded to different questions. It is thought approximately 25 people took part. The majority of people on the forum owned or were thinking about purchasing e-bikes.

4.2.2 What are the main reasons why you cycle?

The reasons that were mentioned by the greatest numbers of respondents were for fitness and health reasons and for enjoyment. These two reasons were given by nine participants respectively. Cost was the next reason given by five people. Journey time and environmental reasons were given by three and poor public transport provision and not being able to drive was given by two. The following quotes summarise well the main reasons for cycling given by the group:

“At the end of a cycling trip of any sort, there’s a feeling of satisfaction that no other vehicle can give, one that still holds good for e-bikes.”
“Ability to travel where a car or motorcycle cannot, e.g. cycle lanes. I live on a large campus and travel about 7 miles per day on it, needed to get around quickly and efficiently. The e-bike is ideal for that job.”
“A chance to say ‘good morning’, maintaining full mobility in the old joints. Enjoying a constantly changing scenery of the urban and rural cycle routes. It’s peaceful, non-aggressive, stress free and I get to say ‘good morning’ to so many smiling people.”

4.2.3 How did you find out about e-bikes?

It was generally felt that very few members of the public would be aware of e-bikes. *“Those seeing and expressing an interest in one of my bikes usually say they weren’t aware of them, and from that I’d guess that possibly as many as 90% of the population don’t know that they exist. Exposure on TV should have helped reduced that, The Gadget Show twice and Working Lunch.”* There are many different ways in which people find out about e-bikes.

Box 7 How people found out about e-bikes

- Been involved in the industry
- Seen them on the street
- A major manufacture/dealer situated nearby
- Found them when looking for electric motorcycles
- Saw an e-bike hire place
- Research online

"I think electric bikes need much more promotion from the government... most of my family and friends had no idea they existed and they all thought it was a good idea. The number of cars doing shortish runs with only one person in them is making so much pollution and congestion in our towns. If only they could invest some money in promoting electric bike use, who all but the most severely disabled should be able to use! Most people seem to find out about them by either chance or 'fuzzy searches...surely that tells us something?"

4.2.4 What were the major factors that persuaded you to get an e-bike?

Many factors were given in answer to this questions, the ones that were mentioned most frequently follow:

Box 8 What were the major factors that persuaded you to get an e-bike?

- Needed to be able to travel a distance further than could be travelled on a conventional bike
- Carrying extra loads and using a trailer
- Health reasons would not allow use of a conventional bike
- To improve fitness
- Not wanting to use a car
- Not being able to drive
- Traffic congestion
- Travel time saving
- Exploring and seeing more than would be seen from other modes of transport
- Petrol prices
- To replace a car
- To stop arriving at your destination in a sweaty condition
- Environmental/green reasons
- Public transport does not fulfill my needs

Below are some quotes from the forum which summaries reasons for using an e-bike,

“Being different. Supporting ‘green modes of transport. Ideal for my circumstances (needing to get from A to B quickly and in places where a car is difficult or impossible). Finding a quality product. Knowing that a normal bike would not encourage me out of the car or off the motorcycle”.

“So I summarized that:-

I needed to reduce my pollution and waste

I needed to do something to improve my lifestyle and health

I needed to get to and from work economically.

I didn’t know how to do this, but quickly realized that if I could cycle to work, I would improve my general health, improve my lifestyle, and vastly reduce my pollution and waste (and expenses). The problem was that after cycling 11 miles to work I wouldn’t be fit for anything except a nap. So I did a lot of googling over a number of weeks whilst contemplating my dilemma and discovered electric bicycles, and the fact is that they tick all of the boxes”

4.2.5 What were the main worries/queries you had before purchasing you’re e-bike?

There were several key worries and a lot of the discussion on the forum focused on the legal status of e-bikes in the UK. There were also concerns about service back-up, quotes are followed by a list of major worries.

“I had serious concerns about many of the distributors who appeared to be here today gone tomorrow outfits which I suppose always is the case when relatively new products come to market- all jump in the hope of making a quick buck and stuff the consumer when the things go wrong. As the market matures and there are more dedicated cycling retailers providing a full service to the customer then these worries will no doubt recede.”

“Would it do the required job, measure up to what was wanted while still being pleasant to ride. In this respect there’s no substitute for test rides of course, for which there’s often no availability without travelling long distances.”

Box 9 Worriers queries before purchasing an e-bike

- Lack of dealers for test rides
- Legal situation
- Range/battery life
- Ability to repair and sourcing of parts (service back up)
- Picking the correct bike
- Would the bike fit its desired use

4.2.6 Advantages and disadvantages of e-bikes over conventional bikes

The following quote clearly highlights what most respondents felt were the major advantages of e-bikes over conventional bikes, *“For most of us the e-bike can take you further more quickly and with less effort. Commuting is easier as there maybe no need for a shower at each end and a change of clothes.”*

Box 10 Advantages and disadvantages of e-bikes over conventional bikes

Advantages of e-bikes

- Takes away the hills and headwinds
- Ability to carry greater loads
- No need to arrive sweaty at end of journey so no need for shower and change of clothes
- Possible to ride with greater awareness as less effort is required to power the bike

Disadvantages of e-bikes

- Initial cost is high
- Weight is greater than a conventional bike
- Greater complexity so harder to repair and repairs may cost more
- Views of conventional cyclists
- Great potential of theft

4.2.7 Safety advantages or disadvantages of e-bikes over conventional bikes?

The feeling on the forum was that generally people are safer on an e-bike than on a conventional bike and this was due to a combination of reasons. The main safety factors are summarized in the quotes below:

“for me the ability to accelerate away at junctions and traffic lights to get out of the way of other traffic...and the up hill assistance which stops you weaving up the road in agony!!”

“That lower speed differential between e-bikes and other traffic brings other safety benefits, the bike causing less hold up frustration to motor vehicles drivers, and less likelihood of them taking risks to pass under dangerous circumstances.

Where the unassisted cyclist is often head down and under stress battling up a hill or against a headwind, the e-biker with the assistance is more likely to be relaxed and able to pay greater attention to road conditions, signs and other road users.

On longer journeys, the e-biker suffers less from the tiredness that can bring inattention.”

Box 11 Advantages and disadvantages of e-bikes

Safety advantages

- Advantage of greater speed and acceleration, pulling away at junctions and overtaking vehicles
- Greater safety on hill climbs
- Greater alertness of rider due to less effort being required to power the bike

Safety disadvantages

- Greater weight of bike
- Road conditions were highlighted as a concern
- Visibility and need for rear view mirror as bikes are frequently overtaken

It was also suggested that the skill of the rider played an important part in safety.

4.2.8 Do you think that e-bikes have a role to play in sustainable transport in the UK?

On the forum there was a very definite yes in answer to this question for a variety of reasons listed below. It was interesting that none of the respondents stated that e-bikes could not have a role to play in sustainable transport, but some did mention that action would be needed to be taken to make e-bikes more sustainable.

Box 12 Reasons why e-bikes could have a role in sustainable transport

- Yes if cycle infrastructure improves
- Green electricity will help e-bikes become a lot more sustainable
- Recycling of batteries is important
- Petrol prices will help push people to more sustainable forms of transport
- People need to be aware of the money that can be saved by using an e-bike
- Congestion will mean that more people will use e-bikes
- If more congestion charging zones are brought in and cycling infrastructure is improved there should be an increase in cycling

4.2.9 Other comments made

There were very few other comments made but the one below highlights some of the barriers to the greater use of e-bikes.

“Also perhaps perception, talk to most folks about electric bikes and they are under the impression that they’re for senior citizens and the disabled yet when I am out on mine, I get stopped everyday and asked the usual, how fast is it, how far does it go, what did it cost etc... people are generally amazed when you spell out the actual running cost, and these enquires are all ages, plus you don’t see many e-bikes, not on the roads, nor in the shops, so at the moment folks don’t know what is available or what it costs, and many people don’t want to look out of place or be the first to try something new. This may all change with the cost of petrol and increasing ‘eco’ climate, and will put more cyclists on the road generally, some of these will be eclectic”

4.3 Focus groups

It was felt it would be best to show the results for the two focus groups separately, to highlight the difference and similarities of views between the two areas.

4.3.1 Focus group held in London

Box 13 Profiles of focus group attendees London

- Trainee Chartered Accountant - female - 25 year old - leisure cyclist
- Facilities Manager- male - 25 years old - regular cyclist
- Teacher - female- 25 years old - occasional leisure cyclist
- Temporary Worker - female - 25 years old - regular cyclist
- Local Council Worker - male - 25 years old - regular e-bike user
- Occupational Therapist - female - 25 years old - occasional leisure cyclist

Please note ages are approximate

An introduction to the aims of the project and e-bikes in general was given. Participants had some queries about e-bikes and how they worked and these were answered at this point. Members of the group introduced themselves. There were six people present at the group and three cycled regularly, of which one was an e-bike owner. The other three members of the group cycled for pleasure, some more regularly than others. The group loosely followed the structure as outlined in the methodology section.

4.3.2 Reasons for and against cycling

The group generally enjoyed cycling for a combination of reasons, but there were reasons why some members of the group did not cycle or did not cycle as often as they might have wanted to. There was a slight gender divide in the group, two females said that they were scared of cycling and this did not hold true for the males, but regular cyclists did admit that they were sometimes scared of traffic.

Box 14 Reasons for cycling

- Good method for commuting
- Quicker than other forms of transport
- It is a good feeling passing stationary traffic
- Cheap, a good way to save money
- Environmentally friendly form of transport
- Cycling is pleasurable
- Exercise and fitness

Box 15 Reasons against cycling

- Have nowhere to store a bike at my current house
- Distance needed to travel is too great
- Poor condition of bike
- Pollution
- Weather
- Lack of anyone to go cycling for pleasure with
- Scared of cycling due to traffic- right turns a major fear
- Arriving at work sweaty and not at the standard required, “I wouldn’t cycle to work as much if there wasn’t a shower there. I generally shower at work and this saves me more money as well.
- Fear of bendy buses
- Bad condition of cycle paths

4.3.3 Awareness of e-bikes

Everybody in the group had some awareness of e-bikes but most had a fairly rudimentary knowledge of them and how they worked. As already mentioned one was an e-bike user.

4.3.4 How did you find out about e-bikes?

People were fairly unsure of how they first found out about e-bikes. One participant said:

“I was looking online with a friend who was keen to get one, I think he’s a bit lazy really! He was looking for a way to make cycling easier. He is still keen on e-bikes but price is a major factor and he is now looking on e-bay to buy parts to make one.”

4.3.5 Technical aspects

Participants asked the e-bike user a number of technical questions about battery life, charging, range and costs. When range was being discussed it was stated that “It is important that you can cycle the whole distance on it and know that the battery isn’t going to run out.”

The e-bike user was also asked:

“did you think about getting a scooter instead of an e-bike?”

“Not really no because first of all you have to tax and insure a scooter and you can’t go around lights and through parks, on an e-bike it is a lot freer.”

4.3.6 Attraction of e-bikes

One participant stated: *“One of the attractions of an e-bike for me is the possibility to load it up to be able to carry more stuff and to use it to possibly tow a trailer.”* Participants were surprised by the 15 MPH. speed limit and felt that they would be able to go faster on a conventional bike, but it was stated that there were ways to make an e-bike go faster e.g. changing the gearing and de-restricting the bike. Moreover it was felt by the group that it would be unlikely for a police officer to pick on this speed limit and it would only become an issue if somebody got injured and there was a court case.

The group went on to talk about servicing e-bikes, the e-bike user said:

“Regular bike shops tend not to touch e-bikes- even though they were fairly similar to conventional bikes.”

Group members went on to discuss how Halfords were now selling e-bike and it was thought that they serviced them too.

4.3.7 Does an e-bike seem more attractive than a conventional bike?

Most of the people present at the group felt they would prefer a conventional bike but the e-bike user said that if they tried an e-bike they would change their minds. Charging was seen as an issue for participants:

“I couldn’t be bothered to charge it every day I am bad enough charging my mobile, I am not that environmentally friendly but I would think that if I was going to cycle I would do it at my own speed and get the most exercise I could.”

“It sounds too expensive for me. If I had £800 I would buy a very good conventional bike as to me it would seem that I could do a lot more with it.”

A non e-bike user could see the benefit of e-bikes for older people or people with injuries: *“I think it is a great way to help some people to maintain independence if they have always cycled and want to carry on into older age.”*

It was also said by a non e-bike user that: *“I like cycling long distances and I feel that I would get a sense that I was cheating and I had not accomplished as much if I wasn’t doing under my own steam.”*

When the group discussed e-bikes as an alternative to a car it became much more attractive to members of the group. There was an interesting discussion between two members of the group:

“When I look at people who cycle and look at my mum there is no way she would bike to the shops, but she’s a middle age women and she went electric bikes oh yeah that’s a good idea”
“But if she’s not going to cycle why would she use an e-bike?”
“because you don’t really cycle and it’s fresh air and it’s leisurely my mum would like it, she could park close to the shops.”

4.3.8 Do you think that e-bikes have a role to play in sustainable transport in the UK?

It was felt that e-bikes could have some impact on sustainable transport if it replaced cars but it would not have any impact if people converted from conventional bikes to e-bikes. This may even make things environmentally worse. It was also felt that segregated cycle paths would have a major impact on getting more people cycling.

4.3.9 Concluding remarks

Overall most members of the group felt that an e-bike was not for them at the moment but felt that they could have some impact on sustainable

transport and they might be attractive to people at different stages of their lives.

“I think that the real future for the e-bike is as a replacement to the car, being a really keen cyclist I wouldn’t choose an e-bike over a conventional bike but I would perhaps choose a very good e-bike over a car, if petrol prices carrying on rising and recharging the bike is cheap.”

4.4 Focus group held in Bourne

Again an introduction to e-bikes was given and members of the group introduced themselves, none of them owned an e-bike. There were seven people at the group, two of the group were regular cyclists and the other members tended to cycle for pleasure to a greater or lesser extent.

Box 16 Profiles of the focus group attendees Bourne

- Civil Servant - female - 25 years old - leisure cyclist
- Runs own business installing audio visual equipment - male - 25 years old - occasional leisure cyclist
- Landscape architect - female - 25 years old - regular cyclist
- Dentist - female - 25 years old - occasional leisure cyclist
- Retried teacher - male - 55 years old - leisure cyclist
- Retried teacher - female - 55 years old - leisure cyclist
- Retried teacher - female - 55 years old - regular cyclist

Please note all ages are approximate

4.4.1 Reasons for and against cycling

Box 17 Reasons for and against cycling

Reasons for cycling

- Only form of transport
- To keep fit (exercise)
- To save money
- For enjoyment
- Environmental reasons
- Speed (sometimes it is quicker to cycle than use public transport or drive)

Reasons against cycling

- Not possible to carry everything I need on a bike
- The area where I used to live was too hilly
- Distances I need to travel are too far to go by bike

4.4.2 E-bike awareness

All of the participants in the group were aware of e-bikes. One said their friend had one as they did not drive and did not feel fit enough to ride a conventional bike.

Participants were interested in the range of e-bikes and felt that 20-40 miles was a good range. It was felt that the speed limit of 15 mph. was too slow, *“you can go faster than that on a normal bike”*.

4.4.3 Advantages of e-bikes

It was felt that an e-bike could:

“Make cycling more accessible to people who wouldn’t normally cycle on the grounds of fitness or injury or confidence and it would be good for them to know they could make it.”

“I think that it is a useful link for people who used to be quite active, who then might see the next big step is seen to be an electric scooter, but it could be a niche for people starting to slow down and still wanting some independence and some exercise and want to be environmentally friendly, also it doesn’t look out of the ordinary.”

It was felt that another market for e-bikes could be commuting to work:

“An e-bike would be particularly good if you don’t have facilities at work you arrive feeling cool and in work clothes.” Moreover it was felt “All the effort that goes into cycling could be reduced, it can be stressful if the roads are busy. An e-bike would be easier as you would only have to pedal a bit and you might be likely to cycle more often if you had an e-bike.”

The cost of an e-bike was seen as a major disincentive and there was a fear of theft. Participants also felt that the batteries were not all that environmentally friendly and it might be problematic to recycle them.

4.4.4 Safety

The group went on to discuss safety issues it was felt that road conditions would have to become much safer before e-bike use became wide spread.

“If there is already a network for cycling more people might use e-bikes but if there are places, where there are not any cycle paths there is no provision, people would still have the same fear. There is a confidence thing because you’re not protected an e-bike if you’re on the road.”

“Given the right environment- appropriate provision I think these would be seen as a very attractive alternative but whilst there is a danger it will put a lot of people off.”

It can be seen from the above that it was felt by the group that cycle infrastructure was very important and this was discussed later on by the group who felt that it was important that the e-bike became more convenient than the car, it was also felt that workplaces had to improve their cycle infrastructure also.

It was agreed that a lot of people were put off cycling because of the effort required but it was also said *“A lot of people cycle to put the effort in as I would never join a gym, people cycle for very different purposes.”*

The group went on to say that an e-bike could be seen as a bit “geeky” but styling could be used to improve this and most e-bikes now look like regular bikes.

It was felt by the group that e-bikes would need a massive promotional campaign for their use to become more widespread, as relatively few people are aware of them. Moreover it was thought that current cyclists were not the people to target when trying to promote e-bike use. *“In a sense an e-bike is not for cyclists it is for people who don’t want to cycle much but will if there is an incentive to do so. It’s a way of overcoming an objection.”*

The group discussed how an e-bike could be a good alternative to a car or maybe as a replacement for a second car: *“Cyclists would see it as expensive but if you target motorists you have a lot of strong arguments.”*

Another useful aspect of e-bikes and electric vehicles in general was seen to be their overnight storage capacity for energy that was generated at night and not used, for example electric vehicles could be used to store energy generated from wind turbines.

4.4.5 Do you think you would cycle more if you had an e-bike?

“I think I would probably consider it for commuting to work as showering at work is a hassle but if you have an e-bike you can go longer distances than normal. Also you might be put off by a 15 mile cycle ride and use a car but if you had an e-bike you might use that or longer distances.”

Two participants felt that an e-bike would not increase their likelihood of cycling.

“I tend to cycle just for pleasure and very few of my journeys could be covered by bike, they are either too short so I walk or too long. I see the attraction for the commuter and using it as a transport method rather than for pleasure. I like putting in effort and feeling like you have done something- feels a bit like cheating.”

“I don’t think in my current circumstances as I enjoy cycling but in the future I could see it as being attractive to stop my life being limited and it could help people retain independence.”

Chapter 5 Conclusion

From the research carried out it can be seen that there are varied prospects for the e-bike in the UK and it is impossible to predict the success or failure of the e-bike in the UK, as there are multiple reasons for both possibilities. There were no major disparities between the findings of any of the different groups that were questioned in the research.

From the interviews with e-bike industry experts it can be seen that they feel that the prospects for e-bikes in the UK is promising. This is not surprising as many have invested money and time into e-bikes. It should be realised though that some of the experts felt that other developments were needed before e-bike use becomes widespread. Such as better road safety, solutions for coping with the UK weather conditions, technological improvements and greater public awareness of e-bikes.

In the past 10 years there has been massive technological improvements in e-bikes, an increase in their range and battery life have been the key aspects of this as well as a general increase in e-bike quality. These factors are seen as being key to the more widespread e-bike use. Most of the industry experts contacted felt that technology of the e-bike was not a major barrier to growth in the UK but some felt that continuing technological improvement was important.

Unawareness of e-bikes was seen as an aspect that weakened the prospects for e-bikes. This was mentioned in all aspects of the research undertaken. When asked about marketing it was interesting to note that none of the e-bike dealer/manufactures were carrying out any major marketing campaigns because of financial constraints. In the focus groups it was mentioned that a major advertising campaign would be needed to increase the awareness of the general public and to highlight the benefits of e-bike use.

On both the online focus group and the two groups conducted conventionally generally participants were unsure of how they first found

out about e-bikes, but felt that it was either through internet searches or word of mouth, nobody stated that an advertisement was how they found out about e-bikes.

Members of the public felt that e-bikes did have a prospect in the UK but some changes were needed first, the major ones being:

- Greater awareness of e-bikes by general public
- Improved road safety or better still development of separate cycle ways
- Cycle parking facilities would need to be improved
- Work place cycle facilities would need to be improved

There were many reasons given as to the advantages and benefits of e-bikes by all people involved in the research the main ones were seen to be:

- Fitness and health benefits
- Makes cycling more accessible to a greater number of people
- Allows people to do more than can be done on a conventional bike
- Is much more environmentally friendly than a car
- Can decrease travel times and reduce congestion

Most of the people at the focus group felt that e-bikes were not an attractive option at their current stage of life, (but one did say that the thought of arriving at work on a bike and not needing a shower was attractive). Some felt that they would be useful when they were older and they could no longer use a conventional bike.

When comparing an e-bike with a car it was seen as an attractive alternative. This could show that it needs to be marketed in a different way so as to appeal to people who would be looking to replace a car and not those looking for a conventional bike.

The conclusion from the Canadian e-bike study provides some parallels to this report:

“E-bikes admittedly have little appeal for competitive cyclists or mountain bike enthusiasts. However, they are feasible mode of transport for commuting to work or traveling short distances.

During these tests, many people were attracted to the e-bikes, which rekindled their interest to travel by different means than a car. Some of them had given up on conventional bicycles because it was difficult to climb the steep hills on their route. Others were hesitant about riding bicycles because of weather conditions.

...

Seniors and people with respiratory conditions, cardiovascular problems or muscular disabilities can rediscover the pleasures of cycling without having to expend a lot of physical effort.

It appears that a new market niche will open up for e-bikes without compromising the traditional bicycle market. As with conventional bicycles, the more varied the choice of e-bikes, the greater the number of consumers who will find a product that meets their needs.”
(Lamy 2001, p.44)

Most of the points made in the above quote hold true for the research conducted for this report. It was clear that there was a large amount of interest in e-bikes but there were also some concerns about the environmentally friendliness of the bikes, these concerns stemmed from attracting conventional cyclists to e-bikes which would cause more environmental harm than good. It was also felt that battery disposal could be a problem and they might be hard to recycle them. The feeling was that an e-bike could only be sustainable if green electricity was used to charge it and it was replacing trips that were previously made by vehicles burning fossil fuels.

Overall I feel that the major barrier to greater e-bike use in the UK is general awareness of the product. It is hard to say how many more people would use them if they were aware, but from my experience I believe that they could be used in a niche market maybe for older people and former cyclists.

Greater e-bike use in the UK by the general public is dependant on many factors which are again hard to predict but they include high charges for

using cars in city centres (parking and congestion charging), increasing the amount of useful segregated cycle ways which would attract many more cyclists, be they conventional or e-bikers. It has been found in studies some reviewed in chapter 2 that improving cycle facilities at work places are also known to increase cycle usage and therefore would increase e-bike use. It can therefore be seen that certain aspects of cycling have to improve before there will be any major growth in e-bike or conventional cycle use in the UK.

Chapter 6 Evaluation

The research carried out provided some useful findings. However as the research methodology was qualitative it would be incorrect to extrapolate the data any further and it should be remembered that the data collected is only relative to this study and is no-way statistically significant i.e. the views are just those of the people questioned.

The research could be extended in many different ways, some of which are shown below:

Box 18 Possible further research

- Continue the research in the same way as has been done in this report, i.e. carrying out more interviews and running more focus groups. The focus groups could be run with different demographic groups maybe focusing on older people and people with health problems as it was felt that these groups has a higher propensity to use e-bikes
- Carry out a study similar to the Canadian one (Lamy 2001) where e-bikes are lent to the public for long term use and a survey is carried out afterwards
- Travel diaries could be used to find out what e-bike users use their bikes for and how much they use them
- A statically significant survey of members of the public could be carried out to gain peoples views on e-bikes, thus finding out about their prospects

It can be seen that it would be possible to extend this research in many ways to add value to it.

No major problems were encountered when conducting the research, and all the aims outlined were met. As with most research projects if there was more time and/or money available the research could have been extended or more focus groups and interviews carried out.

Biography

- A to B Magazine, Manufactures or Distributors List . Available at:
http://www.atob.org.uk/Electric_price_tag.html [Accessed February 4, 2008].
- Bar-Bin Kimel, M., 2004. Focus Group Methodology. Available at:
www.fda.gov/ohrms/dockets/ac/03/slides/4007S1_05_Kimel.ppt
[Accessed May 21, 2005].
- Bruesch, S., EnergyBus. *EnergyBus*. Available at:
<http://www.energybus.info/> [Accessed July 7, 2008].
- Brusch, S., 2001. Market Overview and Pedelec Product Niches . In Taipei.
Available at: www.pedelec.com/taipei/lectures/pdf/Product-Niches.pdf [Accessed June 30, 2008].
- Bucher, R., Charles Fritz-E & Quarantelli, E., 1956. Tape Recorded Interviews in Social Research . *American Sociological Review*, 21(3), 359-364.
- Burrows, A., 2008. 080218-Factsheet-Consumer information on EAPCs-SS.doc.
- Cherry, C. & Cervero, R., 2007. Use characteristics and mode choice behavior of electric bike users in China. *Transport Policy*, 14, 247-257.
- CycleElectric, *CycleElectric's Industry Primer*, Available at:
www.cycleelectric.com/rsc/cycleelectricFAQ.pdf [Accessed July 7, 2008].
- Department for Transport, 2008a. A Sustainable Future for Cycling.
Available at:
www.dft.gov.uk/pgr/sustainable/cycling/cyclingfuture.pdf [Accessed June 1, 2008].
- Department for Transport, 2008b. Consumer Advice- Electrically Assisted Pedal Cycles (EAPCs) in Great Britain.
- Department for Transport, 2005. Electrically Assisted Pedal Cycles in Great Britain: Fact Sheet: Electronically assisted pedal cycles (EAPCs) in Great Britain . Available at:
<http://www.dft.gov.uk/pgr/roadsafety/drs/cyclingandmotorcycling/electricassistedpedalcycles> [Accessed February 6, 2008].
- Department for Transport & Office of National Statistics, 2007. Cycling Personal Travel Factsheet. Available at:

- <http://www.dft.gov.uk/pgr/statistics/datatablespublications/personal/factsheets/> [Accessed May 31, 2008].
- Dickinson, J.E. et al., 2003. Employer travel plans, cycling and gender: will travel plan measures improve the outlook for cycling to work in the UK? . *Transportation Research Part D*, 8, 53-67.
- ExtraEnergy.org, 2008. LEV Conference 2008: Standards and Rental Systems to push the Market . Available at:
<http://www.extraenergy.org/main.php?language=en&category=event&subcateg=&id=1838> [Accessed July 10, 2008].
- Fairley, P., 2005. China's Cyclists take Charge. *IEEE Spectrum*, 54-59.
- Fidgeon, T., Focus Groups-how to run them. Available at:
www.webcredible.co.uk/user-friendly-resource/web-usability/focus-groups.shtml [Accessed May 21, 2008].
- Frost, R., 2002. EV Global Motors- Stalled. *Brand Channel.com*. Available at:
http://www.brandchannel.com/print_page.asp?ar_ir=89§ion=profile [Accessed May 27, 2008].
- Grudens-Schuck, N., Lundy Allen, B. & Larson, K., 2004. *Focus Group Fundamentals* , Iowa State University. Available at:
www.extension.iastate.edu/publications/pm1969b.pdf.
- Guthrie, N., 2001. *The New Generation of Private Vehicles in the UK: Should Their Use be Encouraged and Can They Attract Drivers Out of Conventional Cars* , Leeds: Institute of Transport Studies Leeds.
- Jamerson, F.E. & Benjamin, E., 2008. Electric Bike Worldwide Report 2008 Update to the 2007 Report.
- Jamerson, F.E. & Benjamin, E., 2007. *Electric Bikes Worldwide Report Eighth Edition.*, Naples, Florida/ Petostey, Michigan: Electric Battery Bicycle Company. Available at: www.ebwr.com.
- Kinetics, 2008. Pedelec or E-Bike? Available at: http://www.kinetics-online.co.uk/html/pedelec_or_e-bike.shtml [Accessed June 8, 2009].
- Kitchin, R. & Tate, N., 2000. *Conducting Research in Human Geography: Theory, Methodology and Practice*, London: Prentice Hall.
- Knodel, J., 1993. The Design and Analysis of Focus Group Studies: A Practical Approach. . In *Successful Focus Groups: Advancing the State of the Art*. London: Sage, pp. 35-50.
- Krueger, R.A., 1993. Quality Control in Focus Group Research. In *Successful Focus Groups: Advancing the State of the Art*. London: Sage, pp. 65-85.

- Lamy, V., 2001. *Electric Bike 2000 Project*, Quebec: Centre for Electric Vehicle Experimentation in Quebec.
- Libbey, H.W., Electric Bike Patent. Available at:
<http://patimg2.uspto.gov/.piw?Docid=00596272&homeurl=http%3A%2F%2Fpatft.uspto.gov%2Fnetacgi%2Fnph-Parser%3FSect1%3DPTO1%2526Sect2%3DHITOFF%2526d%3DPALL%2526p%3D1%2526u%3D%25252Fnethtml%25252FPTO%25252Fsrchnum.htm%2526r%3D1%2526f%3DG%2526l%3D50%2526s1%3D0596272.PN.%2526OS%3DPN%2F0596272%2526RS%3DPN%2F0596272&PageNum=&Rtype=&SectionNum=&idkey=NONE&Input=View+first+page>.
- Meudell, J., 2008. CTC Research and Development Postgraduate Bursaries 2008.
- Ortuzar, J.D.D., Iacobelli, A. & Valeze, C., 2000. Estimating demand for a cycle-way network. *Transport Research Part A* , 34, 353-373.
- Pooley, C.G. & Turnbull, J., 2000. Modal choice and modal change: the journey to work in Britain since 1890. *Journal of Transport Geography*, 8, 11-24.
- Puncher, J. & Buehler, R., 2008. Making Cycling Irresistible: Lessons from the Netherlands, Denmark and Germany . *Transport Reviews*, 28(4), 495-528.
- Ramos, P. et al., 2008. Young people's perceptions of traffic injury risk, prevention and enforcement measures: A qualitative study. *Accident Analysis and Prevention*, doi 10.1016/j.aap in press.
- SQW Consulting, 2007. *Valuing the Benefits of Cycling* , Available at:
<http://www.cyclingengland.co.uk/cedocs/Final%20Executive%20Summary%201-6-07.pdf> [Accessed July 29, 2008].
- Stewart, D.W. & Shamdasani, P.N., 1990. *Focus Group: Theory and Practice*, London: Sage.
- Stradling, S., Meadows, M. & Beatty, S., 2000. Helping drivers out of their cars integrating transport policy and social psychology for sustainable change. *Transport Policy*, 7, 207-215.
- The Institution of Highways and Transportation, 1996. *Guidelines for Developing Urban Transport Strategies*, London: The Institution of Highways and Transportation.
- Transport 2000 Trust, 1997. *Blueprint for quality public transport*, London: Transport 2000.

- Transport for London & Mayor of London, 2004. Creating a chain reaction: The London Cycle Action Plan . *TfL*. Available at: www.tfl.gov.uk/assets/downloads/businessandpartners/cycling-action-plan.pdf [Accessed February 6, 2008].
- Wardman, M. et al., 2000. Cycling and Urban Commuting: Results of Behavioural Mode and Route Choice Models. *Institute of Transport Studies, University of Leeds, working Paper 548*.
- Wardman, M., Tight, M. & Page, M., 2007. Factors influencing the propensity to cycle to work. , 339-350.
- Weinert, J., Ma, C. & Cherry, C., 2007. The transition to electric bikes in China: history and key reasons for rapid growth. *Transportation*, 301-318.
- Weinert, J. et al., 2008. The future of electric two wheelers and electric vehicles in China. *Energy Policy*, 36, 2544-2555.
- Wikipedia, 2008a. Lee Iacocca. Available at: http://en.wikipedia.org/wiki/Lee_Iacocca [Accessed May 27, 2008].
- Wikipedia, 2008b. Motorized Bicycle. Available at: http://en.wikipedia.org/wiki/Electric_bike [Accessed May 31, 2008].
- Wilkinson, S., 2004. Focus Group Research . In *Qualitative Research Theory, Method and Practice*. London: Sage, pp. 177-199.

Appendix 1

Semi Structured Interview Guide

- **Introduction**
 - What I am doing? Researching the prospect of the e-bike in the UK
 - What I aim to achieve

- **Reasons why people purchase e-bikes?**
 - A conventional bike is too much work
 - E-bike is easier to use
 - Can travel further distances quicker on an e-bike
 - Better for commuting to work as do not get so sweaty
 - More prestige than a conventional bike
 - Seen as a sustainable form of transport

- **What types of people purchase e-bikes?**
 - Age of people
 - Socio-demographic group
 - Employment group
 - Area in which they live

- **Once an e-bike is purchased what is it used for?**
 - Commuting
 - Leisure
 - Used to travel in urban areas as is quicker to get through congested areas
 - Used for social trips

- **Barriers for the e-bike**
 - People are worried about the legal status of the e-bike
 - People are unaware that they exist
 - People see them as 'cheating'

- People feel they are too expensive
- Battery life is not long enough
- The 15 MPH. speed limit is too slow

- **Marketing**
 - What types of marketing does your company conduct
 - Who does it try and target and why
 - Has any market research been conducted

- **Thank you for your time**
 - Do you know of anyone else who would be useful to speak to
 - Do you mind me contacting you in the future