



Northern Ireland
Assembly

Research and Information Service Research Paper

November 2014

Des McKibbin

Why do people cycle & what benefits does cycling bring? Lessons from the Netherlands, Denmark and Germany

NIAR 228-14

This literature review explores current understanding of what makes cycling so attractive in the world's top three cycling nations: The Netherlands, Denmark and Germany. Additionally, a series of case studies, from municipalities within each country, are used to demonstrate the economic benefits derived from high cycling levels.

Paper 23/15

November 2014

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Executive Summary

Nowhere in the world do more people cycle regularly than in the Netherlands and Denmark; in the Netherlands 27% of all journeys are made by bicycle while in Denmark this figure is 19%. Only Germany comes close to these with 10% of all journeys made by bicycle whilst in Northern Ireland less than 1% of all journeys are made by bicycle.¹

Transport authorities in these top cycling nations have developed and delivered long term cycling strategies and have, through a process of trial and error, developed a number of interventions, whether it be segregated infrastructure, extensive bicycle parking, cycling education and/or pro-bicycle traffic laws, that have effectively normalised cycling as a mode of transport. The work done in these countries over time provides transport authorities, seeking to improve conditions for cyclists and promote cycling as a mode of transport, with an invaluable resource.

The Netherlands

Dutch municipalities are responsible for the development of local cycle plans and the provision of cycling infrastructure. As a result of this the bicycles modal share varies between 10% and 38%, with a national average above 25%. The Netherlands Ministry of Transport suggest the reason so many people cycle is that they simply enjoy it. However, in all likelihood the reason they enjoy it so much is because of the approach taken by their local government to make them feel welcome, comfortable and safe, they also have access to some of the finest infrastructure on the planet.

A Dutch evaluation tool, known as the Bicycle Balance Score, confirms the link between high modal share and infrastructure provision: in municipalities with the highest score (based on an assessment of local cycle conditions, including local policies, bicycle use is on average 14% higher than in municipalities with lower scores.

Dutch cycling infrastructure is designed according to five principles: safety, directness, comfort, attractiveness and cohesion. These principles have been adopted across the globe by authorities seeking to improve cycling conditions and attract more people onto bikes.

The municipalities of the Netherlands enjoy significant benefits from their pro-bicycle policies which are considered more economic than environmental in their design. Dutch people benefit from low transport costs, higher disposable incomes, improved health and have cleaner, safer cities in which to live. The authorities have lower costs in terms of health care and infrastructure costs to contend with as cyclists are healthier and bicycles use less road space and the construction and maintenance of bicycle facilities costs much less than that needed for cars.

¹ Pucher, J. and Buehler, R. (2008) Making Cycling Irresistible: Lessons from the Netherlands, Denmark, and Germany. Transport Reviews, Vol. 28, No. 4 [online] available at: <http://nia1.me/24p>

A common theme within cities with high cycling levels is the role cyclists play within the local retail economy. Case studies examined in the preparation of this paper from all three countries have shown that cyclists shop more often and spend more money. Indeed this type of buy-what-you need retail culture keeps town centres thriving and would be most welcome in a place like Northern Ireland which has suffered so much with the rise of online retail and out-of-town shopping centres.

Denmark

The case of Denmark is interesting from the perspective that, nationally, cycling has been declining over the last decade whereas the City of Copenhagen has continued to improve and is widely regarded as one of the top cycling cities in the world.

The Danish Government has launched a new national cycling strategy which is seeking to reverse the downward trend in cycling levels. The focus of this strategy is to make cycling as easy and as safe as possible. It is for this reason that the Danish are looking to the Netherlands, particularly the guiding principles of safety, directness, comfort, attractiveness and cohesion. Measures will include green waves, safer junctions and cycle superhighways – interventions that have already begun to be introduced in Copenhagen.

Copenhagen is typical of all the best cycling cities in that it is relentless in its pursuit of perfection. The city's latest strategy "*Good, Better, Best*" leaves no uncertainty about their overall aim – to be the best cycling city in the world. Cyclists are important to the City of Copenhagen, saving the city £60m per year in costs that would be associated with car use, spending €2 billion in the city's shops and displacing a possible 90,000 tons of CO₂ emissions that would otherwise be emitted by drivers.

The city shows its appreciation by continually involving citizens in its evaluation and development. The Biannually published Bicycle Account includes a large scale survey of Copenhageners' seeks their views of issues like safety, attractiveness and condition of routes and what improvements could be made. This enables the city to target interventions at specific problems, these include bridges and super highways to reduce journey times, multi modal traffic lights and islands at intersections for safety and facilities like pumps, footrests, bins and cycle counters to improve comfort and convenience.

Germany

It is fair to say that Germany has learned much from the likes of Copenhagen, Groningen and Amsterdam and key elements of the infrastructure from these cities is evident across Germany. Unlike the Netherlands and Denmark however, Germans are very keen on driving and the car is ingrained within German culture.

It is perhaps for this reason that the German Government, as much as they promote good infrastructure, emphasise the importance of communication and public relations. The German national cycling plan calls on policy makers at all levels of government to

put these three elements (infrastructure, communication and public relations) on equal standing.

Conclusion

This paper concludes by discussing issues around transferability of the lessons learned from studying cycling in the Netherlands, Denmark and Germany. The basic design of infrastructure – standards around lane width, signalling and intersection design can and should be applied to cycling design standards here, already Transport for London has rewritten its standards and applied many of these lessons. However, there is a major issue in terms of the level of investment that would be required to make any significant changes in travel behaviour within the Northern Ireland context and the level of priority currently afforded to cycling schemes.

The countries discussed in this paper know from experience that any money they spend on cycling infrastructure will produce positive returns and cyclists form a critical part of their respective economies. This is why, for example, £322m (€410 million) was spent on cycling related projects in the Netherlands during 2012 (£20 per person).² Similarly the city of Copenhagen has consistently spent over £20 per person on cycling over a number of years.³

What a similar level of spending would achieve within Northern Ireland, where currently less than £1m is spent per year⁴ (approx. 55 pence per person⁵) is unclear. Looking at it on a per capita basis, this would require DRD to spend:

- £18m if it was to base its budget on a spend of £10 per person;
- £27m if it was to base its budget on a spend of £15 per person; or
- £36m if it was to base its budget on a spend of £20 per person;

An important lesson can be taken from learned from the Germans in this instance. While infrastructure is critical, the German's are investing heavily in promotion and public relations to increase cycling levels, which they view as equally important to infrastructure. This approach has brought results, arguably creating a culture where one did not previously exist.

² Fietdberaad (see: <http://nia1.me/24h>) Taken from: ECF (2013) ECF, Cyclist.ie Memorandum [online] available from: <http://nia1.me/24i>

³ GLA (2012) Gearing Up: An Investigation Into Safer Cycling in London. London: Greater London Authority [online] available from : <http://nia1.me/1zs>

⁴ AQW 8315/09

⁵ Based on the current NI Population of 1.84 million. See NISRA [online] available at: <http://nia1.me/es>

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1 Introduction

Nowhere in the world do more people cycle regularly than in the Netherlands and Denmark; in the Netherlands 27% of all journeys are made by bicycle while in Denmark this figure is 19%. Only Germany comes close to these with 10% of all journeys made by bicycle whilst in Northern Ireland less than 1% of all journeys are made by bicycle.⁶

There are a number of cultural and environmental conditions that influence the extent to which people cycle, for example, the historic cities and towns in the Netherlands and Denmark lend themselves to cycling as they are largely flat and compact, while their citizens have a long tradition of cycling advocacy.⁷ It is a recognised fact that cycling has been to the fore of transport policy for decades that Denmark and the Netherlands, a factor that has contributed to such high levels of bicycle use.

Transport authorities in these top cycling nations have developed and delivered long terms cycling strategies and have, through a process of trial and error, developed a number of interventions, whether it be segregated infrastructure, extensive bicycle parking, cycling education and/or pro-bicycle traffic laws, that have effectively normalised cycling as a mode of transport.

The work done in the Netherlands, Denmark and Germany over time provides transport authorities in other regions with an invaluable resource. As urban design company Copenhagenize suggest:

“Surely the simplest way~~s~~ to transform a city into a bicycle-friendly place is to merely adopt the Best Practice from cities who have figured it out [...] cities that rock the urban cycling world have spent years perfecting the design - making mistakes and fixing them.”⁸

This paper examines what makes cycling so attractive in the top cycling nations and looks at how best practice, developed in these jurisdictions, has been applied elsewhere and what the result of this has been.

⁶ Pucher, J. and Buehler, R. (2008) Making Cycling Irresistible: Lessons from the Netherlands, Denmark, and Germany. Transport Reviews, Vol. 28, No. 4 [online] available at: <http://nia1.me/24p>

⁷ Copenhagenize Blog [online] Cycle Paths & City Traffic 1945-1995 in UK, Denmark and Germany, Published 9th January 2013. Available at: <http://nia1.me/25c>

⁸ Copenhagenize Blog [online] Copy-Paste Copenhagenization in Ljubljana, Published 19th August 2012. Available at: <http://nia1.me/25d>

2 The Netherlands

Over the last number of decades, the bicycle has maintained a modal share above 25% in the Netherlands, although this varies from city to city. For example, the top ranking city is Groningen where bicycle holds a 38% modal share, whilst cities with the lowest bicycle use still have a relatively high modal share ranging between 10% and 20% (see table one below).⁹ Given that the delivery of cycling infrastructure is predominantly a local authority function across the Europe, similar variations occur elsewhere (table two).

Table 1: Percentage of bicycle use in a number of Dutch cities with more than 50,000 inhabitants¹⁰

Municipality	Cycle Share
Groningen	38%
Zwolle	37%
Leiden	33%
Ede	32%
Veenendaal	32%
Lelystad	19%
Capelle aan den IJssel	18%
Sittard-Geleen	17%
Rotterdam	16%
Heerlen	10%

Table 2: Variations in cycling levels in Europe¹¹

Country	Bicycle share of trips	Variations in cycling levels
The Netherlands	27%	The top municipalities score between 35-40%, cities with the lowest bicycle use rate between 15-20%
Denmark	19%	Copenhagen stands out with 36% modal share. However in general the bicycle accounts for 20% of all trips
Germany	10%	The western federal states have a higher average bicycle use, especially Nordrhein-Westfalen, several cities with bicycle shares between 20-30%
Austria	9%	Top: Graz (14%) and Salzburg (19%)
Switzerland	9%	Several cities at a higher level: Bern (15%); Basel (17%); Winterthur (20%)
Belgium	8%	Cycle usage in Flanders approaches 15%, in some cities higher levels are reached, top: Bruges (20%)
Sweden	7%	Cities; 10%, extremes: Lund and Malmö (20%), Västerås (33%)
Italy	5%	Some high levels in cities: Parma (15%); Ferrara (30%); Florence (20%)
France	5%	Top: Strasbourg (12%) and Avignon (10%)
Ireland	3%	Dublin 4%
Czech Republic	3%	A few cities between 5 and 10%; Prostějov (20%)
Great Britain	2%	Some cities with higher use: York and Hull (11%) and Cambridge (20%)

Source: The Netherlands Ministry of Transport, Public Works and Water Management

⁹ The Netherlands Ministry of Transport, Public Works and Water Management (2009) Cycling in the Netherlands [online] available from: <http://nia1.me/23h>

¹⁰ Ibid.

¹¹ Ibid.

Dutch municipalities are responsible for the majority of the facilities used by cyclists, including road infrastructure cycling paths and bicycle parking. They are also responsible for education and the promotion of cycling while broader policies such as spatial planning have also had an impact on cycling levels. Cycling infrastructure outside of the municipalities may be the responsibility of Provincial Government who are responsible for provincial roads and adjacent bicycle infrastructure, or the Water Boards, who are responsible for bicycle infrastructure adjacent to water ways.¹²

2.1 Bicycle Balance Score

The 'Bicycle Balance Score' is a score allocated to a municipality based on an assessment of local cycling conditions. The primary objective of this project is to encourage local authorities to improve their cycling policy by providing evidence of good policy elsewhere in the Netherlands.¹³ The Bicycle Balance Score assesses ten different dimensions (and 24 sub-dimensions) of the local conditions for cyclists (see Table four). These dimensions provide a good mixture of policy results, policy effects and policy process.

Table 3: The ten dimensions of assessment in the Cycle Balance

1. Directness	2. Bicycle use
3. Comfort (obstructions)	4. Road safety of cyclists
5. Comfort (road surface)	6. Urban density
7. Attractiveness	8. Cyclists satisfaction
9. Competitiveness compared to car	10. Cycling policy on paper

Cycling conditions across the Netherland have been examined in a benchmarking study conducted by the Dutch Cyclists' Union (Fietzersbond). This study confirms that bicycle use in a municipality and the quality of the cycling infrastructure are inextricably linked:¹⁴ In Dutch municipalities with a high bicycle Balance Score, bicycle use is on average 14% higher than in municipalities with a low bicycle Balance Score.¹⁵

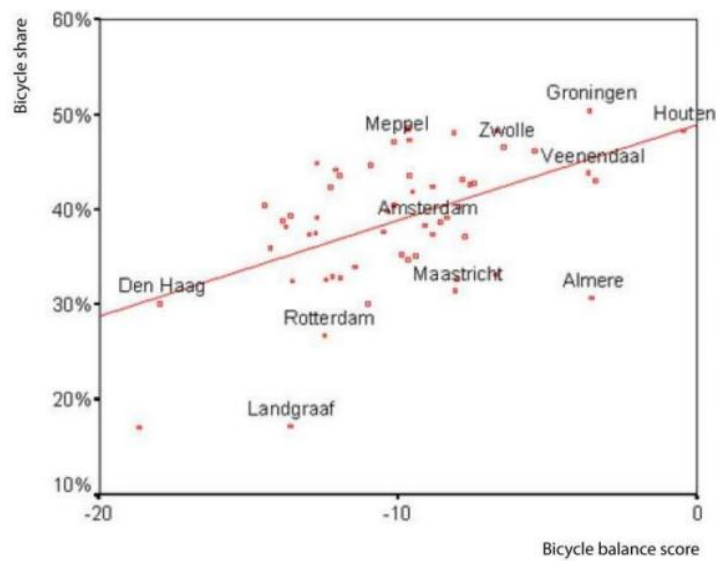
¹² The Netherlands Ministry of Transport, Public Works and Water Management (2009) Cycling in the Netherlands [online] available from: <http://nia1.me/23h>

¹³ Ibid.

¹⁴ Borgman, F. (2003) The Cycle Balance: benchmarking local cycling conditions. In: Tolley, R. (ed.) (2003), Sustaining sustainable transport: planning for walking and cycling in urban environments, Cambridge (UK), Woodhead Publishing Limited [online] available from: <http://nia1.me/23s>

¹⁵ The Netherlands Ministry of Transport, Public Works and Water Management (2009) Cycling in the Netherlands [online] available from: <http://nia1.me/23h>

Figure 1: Relationship between bicycle use and quality of bicycle infrastructure



2.2 Why is cycling so popular in the Netherlands?

According to the Netherlands Ministry of Transport the reason so many Dutch people cycle is very simple, they enjoy it. However, there are clearly a number of factors that contribute to this enjoyment, not least the level of safety afforded by specialised bicycle infrastructure. **Safety** is only one of five key components of 'good bicycle infrastructure', with Dutch national guidelines also demanding it must be:

- **Direct:** short and rapid routes from origin to destination;
- **Comfortable:** good surface, generous space and little hindrance from other traffic participants;
- **Attractive:** an attractive and socially safe environment, without smell or noise inconvenience; and
- **Cohesive:** logical and cohesive routes.¹⁶

These five principles of 'good cycling infrastructure' were developed in the Netherlands, but are now internationally recognised as best practice guidelines.¹⁷ They are promoted in EU policy guidance¹⁸ and have been adopted into cycling strategies and design guidelines in countries including the UK (London¹⁹), USA²⁰ and Australia.²¹

It is important to recognise that Dutch Transport Policy, within urban areas in particular, is intentionally focused on cycling, walking and public transport (the balance varies between municipalities), very much at the expense of cars. Urban centres have been designed to make car use, particularly for short journeys, difficult. Therefore by

¹⁶ Fietsberaad (2009) Cycling in the Netherlands [online] available from: <http://nia1.me/23h>

¹⁷ Dufour, D. (2010) PRESTO Cycling Policy Guide: Cycling Infrastructure [online] available from: <http://nia1.me/26u>

¹⁸ Ibid

¹⁹ TfL (2014) London Cycling Design Standards (Draft) [online] available from: <http://nia1.me/294>

²⁰ City of Portland Bureau of Transportation (2010) Portland bicycle plan for 2030 [online] available from: <http://nia1.me/2ac>

²¹ Queensland Government (2014) Guideline: Separated Cycleways [online] available from: <http://nia1.me/2ab>

applying these key principles it is simply easier for people to get around Dutch towns and cities by bicycle than it is by car.

2.2.1 Comprehensive networks

This provision of bicycle friendly infrastructure has been at the core of Dutch cycling policy for decades and this is not limited to cycle paths, they have also pioneered the development of specialist junctions, roundabouts, bridges, tunnels and traffic signals. Essentially though it has been the design and implementation of a comprehensive and complete network of cycling infrastructure, combining all those elements across entire cities, rather than 'incidental' stretches of road, that sets Dutch cycling policy apart.

2.2.2 Bicycle tracks and lanes

Bicycle tracks (as opposed to on-road cycle lanes) are a key element of the comprehensive Dutch cycling networks. These are separated from traffic lanes and pedestrians by a barrier, which could be a paved or unpaved verge, a raised kerb or some other barrier. Standard widths are generally 2.5 metres for one-way tracks and 4m for two-way ones.²² The higher the speed of the traffic, the greater the separation required between the tracks and the main carriageway.

Figure 1: Two way bicycle Track in The Hague, NL



Source: [Wiki](#)

There are on-road bike lanes in the Netherlands and these are marked by either a dashed line or a solid line: lanes marked by a dashed line may be used by motorists provided that they do not impede cyclists, while those marked with a solid line may not be used by motorists.

²² Cycling Embassy of Great Britain [online] Dutch Cycle Infrastructure. Available from: <http://nia1.me/26p>



Figure 2.1: This shows a shared use bike lane and road. The broken line indicates cars are allowed to use this road space, and they do so as this picture shows – travelling in both directions. However the red colouring indicates that bicycles have priority. The speed limit on this road is 30km/h in recognition of the shared use.

Source: [Peter Furth Wiki](#)



Figure 2.2: This example shows a regular two-way carriage way with bike lane on both sides. Cars are not allowed to drive in these, except for crossing them to access a parking

Source: Wikimedia Commons

Car parking is never allowed in either type of lane, however there is parking provided inside of the lane. As figure 2.2 above shows, this layout is similar to bicycle lanes seen in Belfast and as is the case here, there is a real potential for accidents caused by car doors opening and ‘dooring’ cyclists. There are however, a few reasons why this happens less often than would be expected:

- **Strict Liability:** Some observers claim that Article 185 of the Road Law which seeks to protect vulnerable road users/cyclists from motor vehicles reduces accidents by placing liability on drivers, is the main reason cycling is so popular in the Netherlands. However, while it is likely that this law does make motorists more aware and cautious of cyclists,²³ there is a lack of empirical evidence to support the view that this has a substantive role in preventing accidents;
- **Sustainable Safety:** (“Duurzaam veilig” in Dutch) is a lesser known policy which seeks to prevent severe crashes and severe injuries when crashes do occur by proactively addressing potential issues within the traffic system; it is based on five principles:
 - Functionality (of roads);
 - Homogeneity (of mass, speed and direction of road users);
 - Predictability (of road course and road user behaviour by a recognizable road design);
 - Forgivingness (of both the road/street environment and the road users); and
 - State awareness (by the road user).²⁴

²³ NL Cycling [online] Strict liability in the Netherlands. Available from: <http://nia1.me/26t>

²⁴ NL Cycling [online] Sustainable Safety. Available from: <http://nia1.me/26s>

- **Safety in numbers:** There is strong evidence, going back decades, to support the idea that cycling gets safer as more people do it.^{25 26} The Netherlands has witnessed a 45% increase in cycling from 1980-2005 and a 58% decrease in cyclist fatalities.²⁷ The reasons for this are that drivers grow more aware of cyclists and become better at anticipating their behaviour whilst they are also more likely to be cyclists themselves, giving them a better understanding of how their driving may affect other road users. More people cycling also leads to greater political will to improve conditions for cyclists.²⁸
- **Low traffic volumes:** Cycle lanes are only used on roads with low traffic volumes.

The Dutch national guidance (CROW, Design manual for bicycle traffic in The Netherlands, 2006) states that cycle-lane widths should be between 2 and 2.5m wide, with a minimum of 1.8m. However, bicycle lanes are only considered adequate on roads with speeds at or below 50 km/h (30 mph). Segregated cycle tracks are recommended for roads with speeds limits greater than 50 km/h.²⁹ **Segregated bicycle tracks are clearly the favoured treatment wherever it is possible to install them.** In total the Netherlands now has around 37000 km of bicycle track compared to just 5500 km of bicycle-lanes – a ratio of almost 7:1.³⁰

2.2.3 Bicycle Streets

Clear segregation is not required where vehicles speeds are kept to a minimum. Almost all residential areas in the Netherlands have a speed limit of 30km/h. However, this is particularly the case on Fietsstraat, which translated means 'Bicycle Street'. In addition to signage which indicates the bicycles priority over cars, rules dictate that cars are not allowed to overtake bicycles. Fietsstraat are easily identified as they have the same red tarmac as bicycle paths. Fietsstraat are only designated where there is a particularly low level of car traffic (<500vpd).

Figure 3: A typical Fietsstraat in the Netherlands, This shows both the signage used and colouring of the road surface.



²⁵ ECF (Factsheet) Safety in numbers [online] available from: <http://nia1.me/26w>

²⁶ Science Daily [online] A Virtuous Cycle: Safety In Numbers For Bicycle Rider. Available from: <http://nia1.me/26y>

²⁷ CTC [online] Safety in Numbers. Available from: <http://nia1.me/26x>

²⁸ Ibid.

²⁹ Fietsberaad [online] No more narrow cycle lanes. Available from: <http://nia1.me/26q>

³⁰ A view from the cycle path [online] On-road cycle-lanes. The Good, The Bad and the Ugly (mostly bad and ugly). Available from: <http://nia1.me/26r>

2.2.4 Junction Design Solutions

Collisions between cyclists and vehicles tend to be concentrated around junctions. Therefore completely removing the potential conflicts between these two road users is the best way to avoid collisions.³¹ Transport authorities in the Netherlands employ a range of measures including roundabouts, overpasses, underpasses and multimodal traffic signals to ensure junctions are as safe as possible, while the quality of the cycle route is not compromised. Basically road designers will choose what is best for a particular situation based on a number of factors such as viability, cost etc.

2.2.5 Bicycle friendly Roundabouts

Figure four (below) shows a typical Dutch-style roundabout. These generally have a tighter geometry which reduces vehicles speeds and improves visibility. The roundabout pictured in figure four has an orbital cycle lane which allows cyclists to travel around separately to other traffic.³² In general the rule is that in built up urban areas, cars should give way to cyclists on the track (this is implemented in about 60% of urban roundabouts); whereas in rural areas, bikes generally give way to cars coming on and off the roundabout.³³ The Transport Research Laboratory are currently trialling Dutch-style roundabouts at its facility in Berkshire (see photo below), with a view to rolling out the design in key locations in London in 2015.³⁴

Figure 4: A typical Dutch roundabout built by the Transport Research Laboratory at its facility in Berkshire (see photo above) with a view to rolling out the design in key locations in London in 2015



Source: TFL

CROW suggest that roundabouts are only appropriate for cyclists on junctions with traffic volumes of 500-1500 v/phr. Where there is a higher volume of traffic it recommends alternatives such as traffic lights.³⁵

³¹ TfL (2014) London Cycling Design Standards (Draft) [online] available from: <http://nia1.me/294>

³² TRL [online] Dutch Style Roundabouts. Available from: <http://nia1.me/26h>

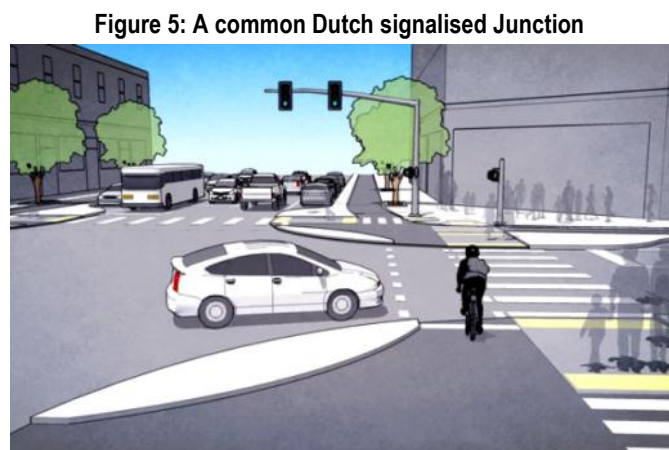
³³ SWOV (2012) Roundabout fact sheet [online] available from: <http://nia1.me/26i>

³⁴ London Cycling Campaign (2014) Major victory as Transport for London says Dutch-style roundabouts could be in London in 2014 [online] available from: <http://nia1.me/2ef>

³⁵ A view from the cycle path [online] The best roundabout design for cyclists. Available from: <http://nia1.me/2eq>

2.2.6 Signalised junctions

In the larger cities such as The Hague, Rotterdam and Amsterdam cycle tracks follow main arterial routes and commonly have signalised intersections, as opposed to roundabouts as installation of roundabouts would be impractical.³⁶ Figure five opposite shows a design for a common junction; the cyclist is protected by an island while there is space for a car to wait out of the way of traffic while people cycling and walking cross.



Source: NL Cycling

Figure six shows a concept sketch for a junction redesign involving island protection in a UK context (i.e. traffic on the left hand side of the road). Generally, this type of island separation eliminates potential conflicts with left-turning vehicles.³⁷ This could be a significant intervention when consideration is given to the dangers of left turning vehicles, particularly HGVs; between 2008 and 2012 more than half of cycling fatalities in London involved Heavy Goods Vehicles (HGVs) colliding with cyclists when turning left at traffic lights or other junctions.³⁸

Figure 6: Concept sketch for a junction redesign involving island protection



³⁶ NL Cycling [online] Junction Design In the Netherlands. Published: February 2014. Available from: <http://nia1.me/26z>

³⁷ TfL (2014) London Cycling Design Standards (Draft) [online] available from: <http://nia1.me/294>

³⁸ TfL [online] Driving near cyclists. Available from: <http://nia1.me/297>

2.3 Case Study: Groningen

Groningen is the main municipality as well as the capital city of the eponymous province in the Netherlands. With a population of 198,108, it is the largest city in the north of the Netherlands. Almost 40% of all trips within the city of Groningen are made by bicycle and the city has held the top ranking bike balance score since 2002.

As an historic and quite compact city, Groningen lends itself to cycling:

- The wider Groningen area is 87km² but the city centre is only 1km²;
- 80% of inhabitants live within 3km of the centre and 90% of the jobs are located within 3km;
- Most distances covered (trips) are less than 5km;
- The city has 190,000 inhabitants;
- 50% of which are students;
- There are 75,000 cars and 300,000 bikes; and
- The goal is to have 60 to 65 percent of trips made by bike by 2020.

Figure 6: Cycling in the centre of Groningen



Credit: Clarence Eckerson, Jr

2.3.1 Integrated planning

Groningen's spatial planning policies have been focused on maintaining a compact city, so that most activities are easily reachable by bicycle – **car movement within the city centre is heavily restricted**. The city's 1977 traffic circulation plan was the first time spatial and transport planning was integrated within one policy. This policy involved dividing the inner city into four sections with only limited access to cars – a ring road was built around the perimeter of the city for cars. This resulted in a city

where it is more convenient to travel between sectors by walking, bicycle or public transport; cycling is the most popular mode due to the huge cycle network, which consists of:

- A combination of primary and secondary routes:
 - Secondary routes connect residential areas to primary routes;
 - Primary routes ensure that cyclists cross as little vehicle traffic as possible;
- more than 200 kilometres of bicycle paths (fully segregated) or lanes (painted line) – in total there are 605km of roads and streets;
- In residential areas there is no specific cycling infrastructure but the speed limit is 30km/h (19mph);
- The city's guidelines require (at least) bicycle lanes on all roads with a limit of 50km/h (31mph) or over.

The result is that some routes see 14,500 cyclists per day while collectively the 46 main routes see approximately 216,000 users each day.

2.3.2 Economic benefits

Mobility is vital for the economic vitality of cities and regions, and contributes to the social life therein. In a city like Belfast car use dominates other modes, such as public transport, cycling and walking and many believe that for the city to prosper, accessibility by car is essential.

Studying a city such as Groningen provides a different perspective on urban mobility. This city has a strong cycling culture today but this was not purely organic, it has been shaped by a long term consistent approach to encouraging people to cycle by providing them with the facilities to do so; what is key though is making car use more difficult. As a result the city has prospered; Gerrit van Werven, a senior city planner states:

“This [cycling prioritisation policy] is not an environmental programme, it is an economic programme. We are boosting jobs and business. It has been proved that planning for the bicycle is cheaper than planning for the car.’ Proving the point, requests now regularly arrive from shopkeepers in streets where ‘cyclisation’ is not yet in force to ban car traffic on their roads.”³⁹

Research shows that cities with reduced car-dependence have many benefits, including:⁴⁰

- More stable transportation costs, even when fuel prices increase;

³⁹ True, K (1997) Groningen Gears Up: Bicycle-friendly urban planning is good for business [online] available from: <http://nia1.me/24f>

⁴⁰ Centre for Transit-Oriented Development (CTOD) (2011) Transit-Oriented Development Strategic Plan / Metro TOD Program [online] available from: <http://nia1.me/24g>

- Higher household disposable incomes, more likely to be circulated within the local economy;
- reduced infrastructure costs with less need to make more room for cars: whereas bicycles use less road space and the construction and maintenance of cycle paths and bicycle facilities costs much less than roads and parking facilities for cars;
- Healthier residents as a result of more physical activity, which leads to less sick days, benefiting employers as well as reduced public health expenditure;
- Cities with reduced car dependence and high cycling levels are often ranked the best places to live; and
- More cyclists offer a steady stream of shoppers more likely to visit town centre retail outlets.

The general experience from the Netherlands is that while cyclists spend less per visit, they do come more often. For example, research from Utrecht and Breda suggests cyclists spend on average one and a half times as much as a motorist.⁴¹ Table four compares the share of visitors (to Groningen) by transport mode against the share in turnover by mode. In total, considering all visitors and the complete turnover, cyclists contribute most:

Table 4: Results from 2004 survey amongst visitors in Groningen city centre; shares* of the main modes of transport in the number of visitors and realised turnovers (in %)

	Share in visitors (%)				Share in turnover (%)			
	walking	Bicycle	Public Transport	Car	Walking	Bicycle	Public transport	Car
Local visitors	32	46	13	9	19	56	14	25
Regional	1	22	41	36	0	21	32	40
Superregional	5	7	48	39	4	5	39	37
Total	20	31	27	21	11	34	25	35

Source: The Netherlands Ministry of Transport, Public Works and Water Management

*respondents may have used more than one mode of transport during visit

- 46% of Groningen citizens (local visitors) cycle to the city centre and account for 56% of sales;
- Car users spend more, but then it is likely they are using the car because they are buying more;
- Car use is significantly higher among those not from the city. However, public transport is the preferred mode.⁴²

This phenomenon is not exclusive to the Netherlands, a report published by the UK charity *‘living streets’* suggests improved facilities for walking and cycling in city/town centres can increase retail sales by 30%.⁴³

⁴¹ Fietsberaad (2009) Cycling in the Netherlands [online] available from: <http://nia1.me/23h>

⁴² Fietsberaad (2009) Cycling in the Netherlands [online] available from: <http://nia1.me/23h>

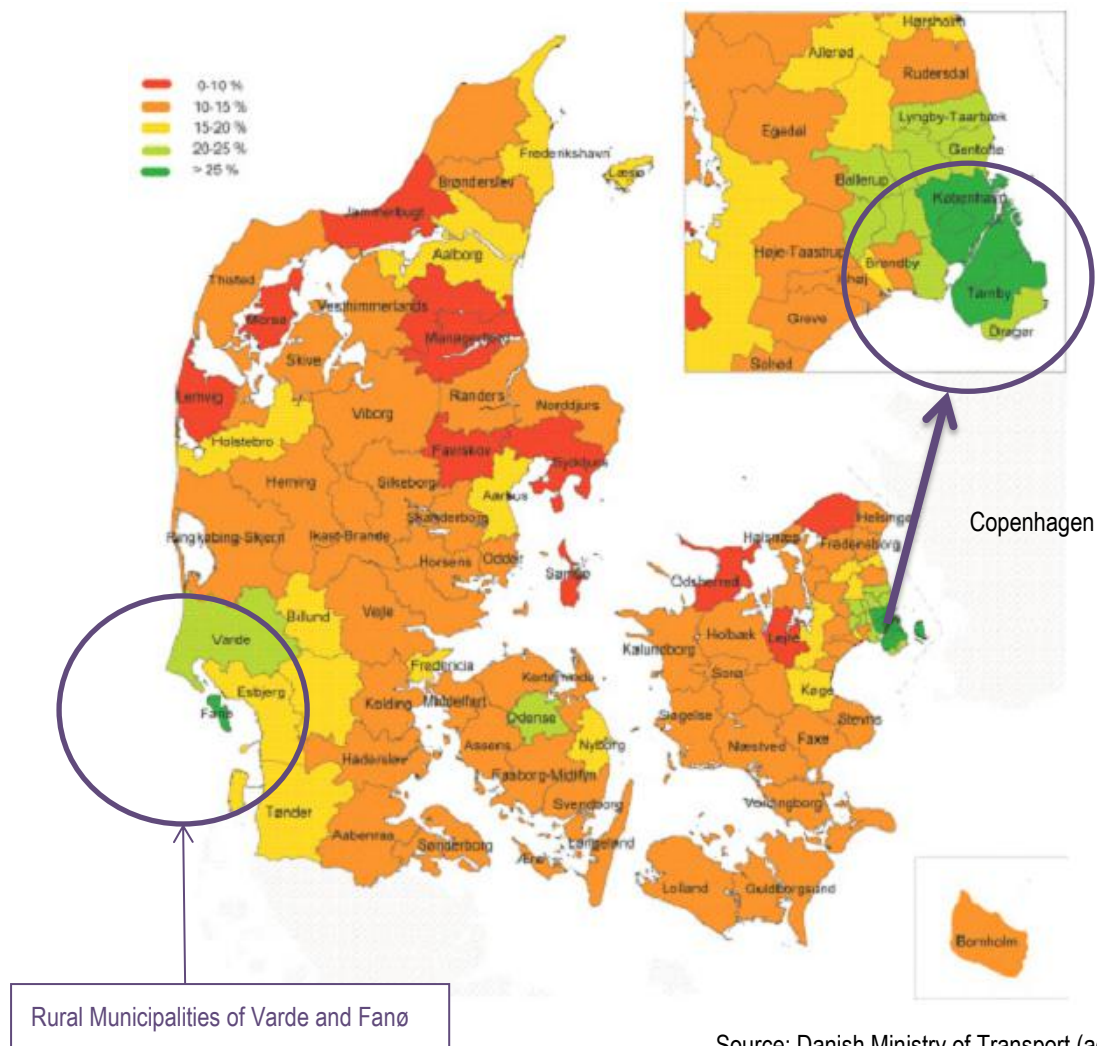
⁴³ Just Economics (2014) The Pedestrian Pound: The business case for better streets and places. Living Streets: London

3 Denmark

Denmark has a long tradition of cycling and while it has the second highest national cycling level in the EU (19% modal share), there has been a decline of more than 10% in bicycle trips between 1990 and 2013.⁴⁴

The map below shows the variation in cycling levels in the Danish regions. The area around Copenhagen, to the East of Denmark, stands out in dark green (this indicates a minimum of 25% modal share); Copenhagen is widely regarded as one of the top cycling cities in the world with the bicycle’s modal share remaining around 36% for the last few years.⁴⁵ But as this map shows there is a generally high level of cycling across the country (>10%) with modal share > 20% in Odense and some of the Western municipalities including Fanø and Varde; this is interesting as both towns are predominantly rural and high cycling levels are normally associated with larger urban centres.⁴⁶

Figure 8: Bicycle modal share across Denmark’s municipalities



Source: Danish Ministry of Transport (adapted)

⁴⁴ Fietsberaad [online] Denmark launches national cycling strategy (translated). Available from: <http://nia1.me/270>

⁴⁵ City of Copenhagen (2012) Bicycle Account 2012 [online] available from: <http://nia1.me/29b>

⁴⁶ Danish Ministry of Transport (2014) Denmark - The national bicycle strategy [online] available from: <http://nia1.me/29b>

3.1 The Danish national cycling strategy

In 2014 the Ministry of Transport published a new cycling strategy which seeks to reverse the recent national decline in cycling; in the foreword the Minister commented:

*“Unfortunately we use our bikes less than we used to. Instead, it is quite common for Danes to get behind the wheel of a car – even on short trips. It is comfortable and easy. The bike must become the easy choice. We can achieve this by making **better cycle lanes, fewer stops** for cyclists and **better facilities for parking bicycles**”.*⁴⁷

The strategy focuses on three areas:

- Every day Cycling;
- Active holiday and leisure cycling; and
- New and safe cyclists.

According to Klaus Bondam, Director of the Danish Cyclists’ Federation, Denmark is behind the Netherlands in a number of key parameters, particularly safety at junctions and secondary infrastructure like secure parking. He does, however, believe that this can change if the strategy can be delivered and sufficient funding is allocated:

*“The Danes would like to cycle more, but **only if it is easy and attractive**. Therefore, we are happy that the strategy brings focus to ‘everyday cycling’ as well as specific focus on ‘better and secure bicycle parking at stations and junctions’ for example. This is just one of the areas where Denmark is currently behind the Netherlands.”*⁴⁸

- The focus on everyday cycling will focus on making cycling feel easier and safer through various measure, including:
 - Creating better links with public transport and increasing parking and other facilities at stations;
 - Creating cycling highways to encourage bicycle commuting;
 - Improving safety at junctions; and
 - Developing cycling cities right across the country
- The focus on recreation and tourism will lead to the development of new routes and better signage and directions on existing routes;
- The focus on getting new cyclists will target school children, through various measures including:



⁴⁷ Danish Ministry of Transport (2014) Denmark - The national bicycle strategy [online] available from: <http://nia1.me/29b>

⁴⁸ Cycling Embassy of Denmark [online] New national strategy for cycling in Denmark. Available from: <http://nia1.me/271>

- More bicycle paths at schools and leisure facilities;
- Coherent road safety solutions in urban areas;
- The development of tools for schools and teachers.

3.2 What has made cycling popular in Denmark?

While the Danish Government are lamenting the fact that cycling declined, the fact is it is still an incredibly popular form of transport with bicycle modal share at levels most countries can only aspire to. So why is it so popular?

3.3 Case Study: Copenhagen

It is difficult to answer this question for each individual municipality as there is a lack of information available in English. However, the City of Copenhagen provides extensive literature on its cycling policy and the resulting outcomes of this.

3.3.1 A cycling tradition

Copenhagen has always had a tradition of cycling but like most parts of the western world, growth in car use towards the end of the 1960s and into the 1970s threatened to displace the bicycle. It was the oil crisis at the end of the 1970s that encouraged people to cycle again and when 1980s transport policy began to favour the car and policy makers sought to remove cyclists from the busiest roads as safety problems grew, people became uneasy.⁴⁹⁵⁰

The Danish Cycling Federation (DCF) encouraged Copenhageners to stage (cyclist) demonstrations⁵¹ calling for improved conditions for cyclists; these proved very successful. According to the Copenhagen Museum:

“The 1970's were a turning point for everyday cycling in Denmark in general and Copenhagen in particular. The oil crisis helped spawn a real grassroots movement that returned the bicycle to the urban landscape after a decade or so of intense decline.

These demonstrations featured thousands and thousands of citizens on bicycles. They were peaceful but noisy. It was regular citizens demonstrating, not sub-cultures, so the effect was enormous and far-reaching. Just look at our streets today. Critical Mass can learn a lot from the Copenhagen experience in the 1970's.”⁵²

⁴⁹ Jensen, N (1998) Copenhagen: Encouraging the use of bicycles [online] available from: <http://nia1.me/23n>

⁵⁰ Gössling, S. (2013) Urban transport transitions: Copenhagen, City of Cyclists. Journal of Transport Geography vol. 33 pp.196–206

⁵¹ Denmark [online] Copenhagen: Bike City for more than a century. Available from: <http://nia1.me/23c>

⁵² Copenhagenize [online] Copenhagen Bicycle History Exhibition at City Museum [online] available from: <http://nia1.me/2ea>

Figure 10: Photograph from one of the great bicycle demonstrations in the 1970s.⁵³

Credit: Danish Cycling Federation

Source: ECF

Jensen (1998) points out that politicians were not overly keen on building cycling infrastructure in the 1980s, particularly along main roads, and they explored alternative solutions such as limiting cycling lanes to quiet back streets.⁵⁴ However, the demonstrations and growing public pressure eventually succeeded and gradually, the construction of cycle tracks on main roads was taken up again in the 1980s. Since then there has been a sustained commitment to cycling in municipal transport planning.

3.3.2 Cycling in numbers

Copenhagen aims to be the most bicycle friendly city in the world. This goal was unanimously approved by the City Council as an integral part of the vision to make Copenhagen an eco-metropolis. This means that there are stated political objectives aimed at continually increasing bicycle modal share in the city. This aim was most recently affirmed in the *“Copenhagen Bicycle strategy 2011-2025”*.

As things stand currently, Copenhagen already has among the highest level of cycling:

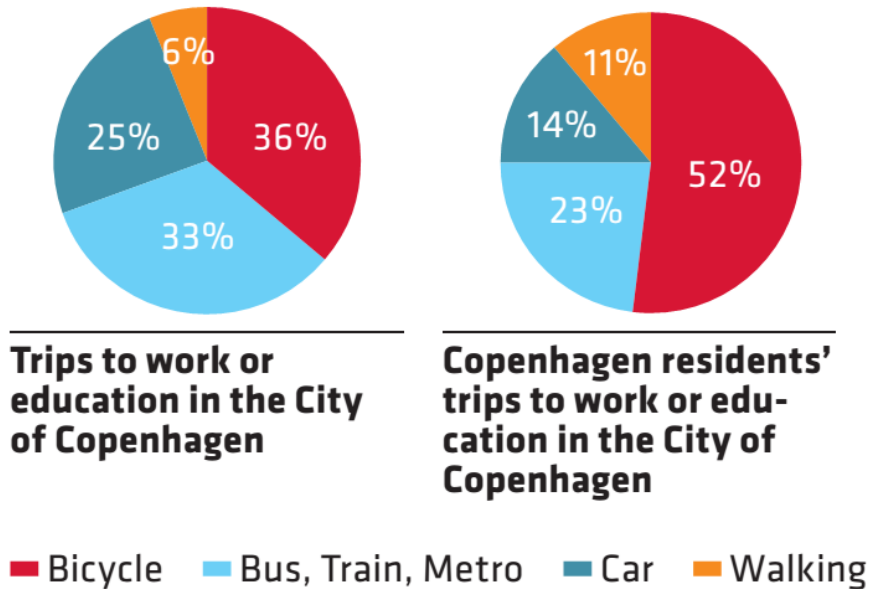
- More people use a bike to travel to work in Copenhagen than any other mode of transport;

⁵³ ECF [online] Meet Denmark, the International Bicycle Darling. Available from: <http://nia1.me/23i>

⁵⁴ Jensen, N (1998) Copenhagen: Encouraging the use of bicycles [online] available from: <http://nia1.me/23n>

- In 2012 just over one third (36%) of everyone working or studying in Copenhagen took a bike to work (including commuters);
- If you include only those who live within the city boundary, this figure rises to 52%;
- Together Copenhageners cycle a total of 1.27 million km every working day.⁵⁵

Figure 11: Modal Split in Copenhagen – Travel to place of work or study



- Even during the winter, when temperatures average zero degrees (January and February) 70% of bicycle commuters continue to cycle;
- The main reasons why commuters choose to cycle in Copenhagen are because it is faster (56%); more convenient (37%); cheap (29%) and healthy (26%);
- There are 650,000 bicycles in Copenhagen and approximately 550,000 inhabitants. Compared to 125,000 cars; this corresponds to 5.2 bicycles for each car.⁵⁶

Figure 12: Bike commuters in Copenhagen



Photograph by: Kasper Thyge

Source: Visit Copenhagen

⁵⁵ City of Copenhagen (2013) Copenhagen City of Cyclist: Cycling Accounts 2012.

⁵⁶ Ibid.

3.3.3 The impacts of infrastructure investment

The Danish Government and the Danish Cycling Embassy have acknowledged that the Dutch infrastructure, particularly at junctions, is ahead of theirs. That said, in the City of Copenhagen, planners have worked continuously on perfecting the designs of cycle paths and parking facilities and this correlates with significant increases in cycling levels. Table five (below) shows that as the infrastructure provision has improved (in terms of the provision of cycle lanes, tracks, green routes, cycling highways and bicycle parking) the number of cyclists has gone up, while accidents have gone down and perceptions of safety have improved; this figure has risen from 51% in 2008 to 76% in 2012.

Table 5: Cycle behaviour and Infrastructure Developments in Copenhagen 1996-2025

	1996	1998	2000	2002	2004	2006	2008	2010	2012	2015	2020	2025
Cycle Behaviour												
Cycle to work/education (%)	30	30	34	32	36	36	37	35	36	50	50	50
Seriously injured cyclists (# per year)	252	173	146	152	125	97	121	92	102	56	45	34
Cyclists that feel safe (%)	60	58	57	56	58	53	51	67	76	80	85	90
Cycled km (million per weekday)	0.93	0.92	1.05	1.11	1.13	1.15	1.17	1.21	1.27			
km between serious casualties (million km)	1.2	1.8	2.4	2.4	3	4	3.2	4.4	4.2			
Cycling Speed (km/h)					15.3	16	16.2	15.8	15.5			
Infrastructure Provision												
Cycle Tracks (km)	294	302	307	323	329	332	338	346	359			
Cycle Lanes (km)		6	10	12	14	17	18	23	24			
Green cycle routes	29	30	31	32	37	39	41	42	43			
Cycle Super Highways (km)									17.5			
Cycle Parking Spaces (000s)						42	47	48	49			

The ever expanding cycling network in Copenhagen now consists of:

- 359 km of cycle track (segregated);
- 24 km of cycle lanes;
- 43 km of green cycle routes;
- 32.5 km of cycle super highways (June 2013); and
- There are a total of 43 km of green cycle routes and new sections under construction.⁵⁷

According to the City of Copenhagen every time it builds a new cycle track, it results in 20% more cyclists (and 10% less cars) using that particular stretch of road.⁵⁸ Indeed a

⁵⁷ City of Copenhagen [online] Bicycle Statistics. Available from: <http://nia1.me/2dr>

number of studies from around the world support the thesis that a greater supply of bike paths and lanes will result in increased cycling levels.⁵⁹

Figure 13 Bicycle promenade around Havnegade.



Figure 14: The green 'Nørrebro route' from Rantzausgade to Jagtvej.



Figure 15: Two-way bicycle track along Hans Knudsens Plads



⁵⁸ Ibid.

⁵⁹ See Buehler, R. and Picher, J. (2011) Cycling to work in 90 large American cities: new evidence on the role of bike paths and lanes. *Transportation* vol. 39, pp. 409–432 [online] available from: <http://nia1.me/2ds>

3.3.4 Good, Better, Best – The City of Copenhagen’s Cycling Strategy

The City of Copenhagen is renowned for its cycle lanes, but their success has meant that many routes suffer congestion during rush hour. Therefore, in order to retain what makes cycling attractive in Copenhagen: speed and convenience, the City recognises the need to prioritise and innovate in its development of cycling infrastructure. As the documents title suggests, current provision is good but they are continually seeking to make it better and their overarching aim is to become the best.

According to city’s cycling strategy, by 2025 the city aims to:

- Increase the percentage of commuters who cycle to work or education to 50%;
- Increase number of cycle tracks in the Copenhagen PLUS-net with 80%;
- Reduce cyclists’ average travel time by 15%;
- Grow the number of cyclists who feel safe in traffic to 90%;
- Decrease the number of seriously injured cyclists by 70%;
- Increase the share of cyclists who find cycle tracks well maintained to 80%; and
- Increase the share of citizens who think that bicycle culture affects the city’s atmosphere positively to 80%.

The city’s cycling strategy has outlined what is called a PLUSnet system in order to deliver these aims. PLUSnet will target congested routes installing two bike lanes on either side of the street—that is a total of four lanes on streets that are bi-directional—allowing cyclists to ride at their pace; a space for those commuting and a space for those riding leisurely. To foster a feeling of safety, particularly among inexperienced cyclists, the PLUSnet system will include high quality intersections where cyclists will have priority over other transport modes and there will be a number of bridges and tunnels which will reduce journey times.

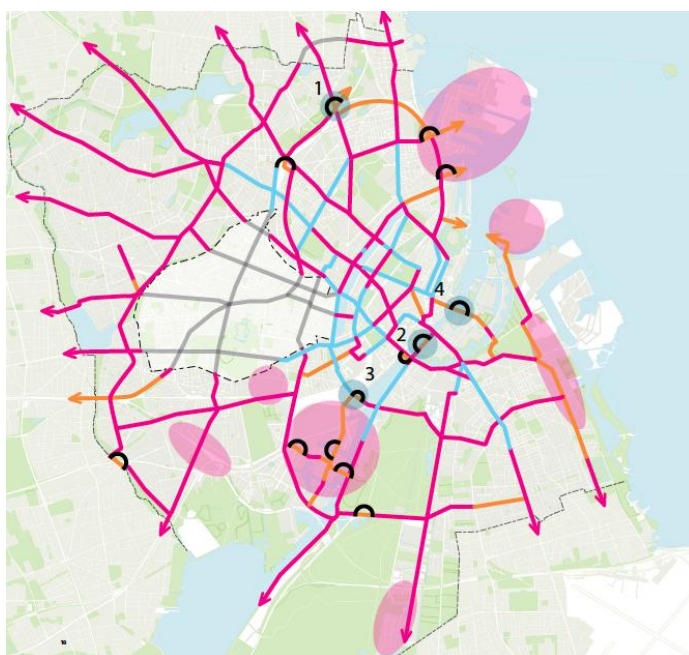


Figure 16: The proposed PLUSnet system

- The pink lines signal that only minor adjustments need to be made to that route;
- the blue signifies that more space for bikes is needed;
- orange denotes large-scale improvements need to be made;
- the black semi-circles will be new bridges/tunnels for cyclists and pedestrians; and
- the pink circles are new urban development areas.

3.3.5 Cycle super highways

Cycle Super Highways are a collaborative regional project between the City of Copenhagen and the neighbouring municipalities. Their focus is on long distance commuting. The PLUSnet and the Green Cycle Routes (routes of 3.5m wide tracks along greenways, minor roads, bridges, etc.) will be integrated into the Cycle Super Highway network.⁶⁰

The first of 28 (planned) Cycle Super Highway (CSH) was completed in 2012. It is a 17 km route which passes through the municipalities of Albertslund, Glostrup, Rødovre, Frederiksberg and Copenhagen.⁶¹ The CSH are specifically targeted at commuters who have between 5 and 20 km to travel to work or school. To make the journey as fast and as comfortable as possible, routes are relatively straight, flat, smooth and direct, connecting residential areas, educational facilities and commercial areas. They also offer extra services like ‘green waves’ in which traffic signals are synchronised to provide a green light for cyclists travelling at 20km/h; speed signs and LED running lights help keep cyclists at the correct speed. For those who have to stop at intersections there are countdown signals, bicycle pumps, and footrests.⁶²



Figure 17 (Top left): “Your speed” counter helps cyclists maintain travel speed in the green wave.

Figure 18 (Bottom left): Modular LED running lights help cyclists maintain proper travel speed so that they maintain effort required for green wave and they don't have to stop at the red light.

Figure 19 (Below): Foot rests at signalised intersections provide added comfort when cyclists do have to stop.



⁶⁰ City of Copenhagen (2014) Focus on Cycling: Copenhagen Guidelines for the Design of Road Projects[online] available from: <http://nia1.me/2e9>

⁶¹ City of Copenhagen (2012) Bicycle Account 2012 [online] available from: <http://nia1.me/2dn>

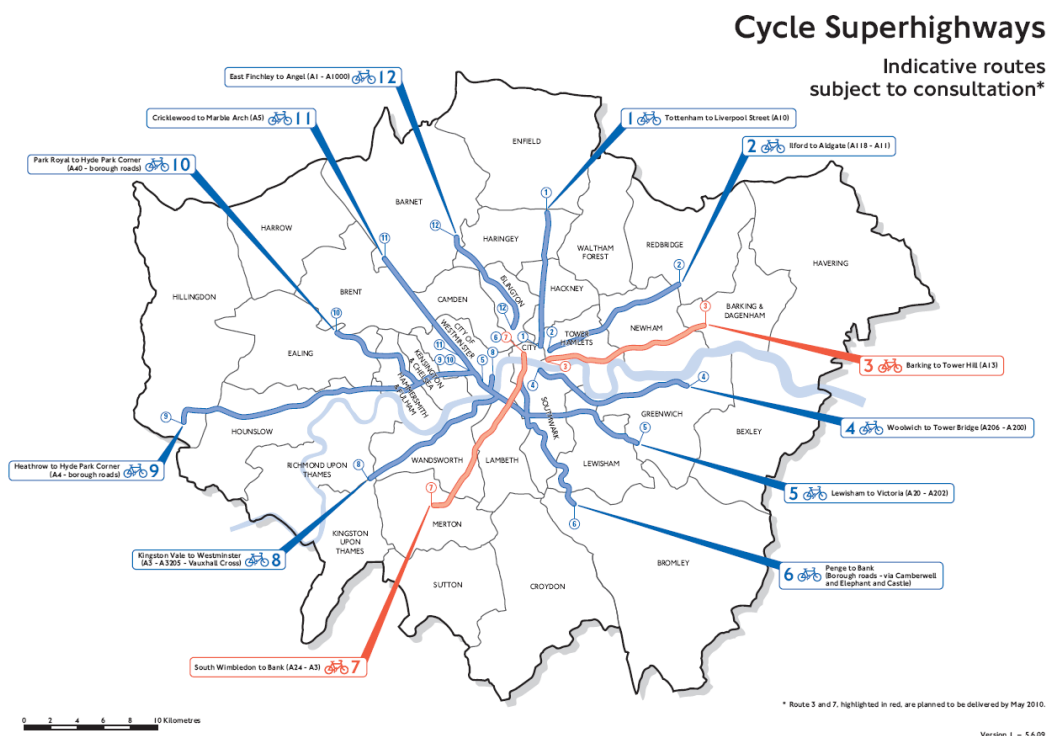
⁶² Ibid,

The 28 routes together will make up 500 km of Cycle Super Highways and cost between an estimated £44m (base solution) to £93m (for the ideal solution).⁶³ This equates to approximately £148,000 to £308,000 per km depending on the level of finish. It is estimated that 15,000 additional people will commute by bicycle as a direct result of the CSH and as a result the City of Copenhagen expect to save approximately £38 million per year.

An analysis of the socio-economic impact of the overall network of 28 Cycle Super Highways shows that over a 50-year period, with an investment of just under DKK 1 billion (approximately £107 million), there is an expected economic gain to society of approximately £750 million (DKK 7.3 billion).⁶⁴ This is equivalent to an internal rate of return on investment of 19%. The ministry of finance's minimum requirement is 5% for infrastructure projects so compared with other infrastructure investments; this is a very high return.

A similar approach is being taken in London where there are four active Cycle Superhighways, and eight more are planned as part of the Mayor's cycling revolution. These routes provide a safe, fast and direct route from outer London into and across central London. When all twelve are up and running they are expected to generate up to 120,000 additional cyclists and will come at a cost of approximately £800,000 per km.⁶⁵

Figure 20: Cycle Superhighways in London



⁶³ Supercykelstier [online] Concept: Cycle Super Highways in Greater Copenhagen area [online] available from: <http://nia1.me/2dp>

⁶⁴ City of Copenhagen (2012) Bicycle Account 2012 [online] available from: <http://nia1.me/2dn>

⁶⁵ London Assembly Transport Committee (2010) Pedal power: the cycle hire scheme and cycle superhighways [online] available from: <http://nia1.me/2e8>

3.3.6 Focus on Cycling – The City of Copenhagen’s cycling design standard

Focus on Cycling is the name of the City of Copenhagen’s guidelines for the design of road projects”.⁶⁶ The goal of the guidelines is to ensure that consideration of bicycle traffic is factored into all the city’s road projects regardless of whether the actual project is a cycling project or a more general traffic project. Furthermore, the guidelines are intended to ensure consistent design. These standards for cycling go above and beyond those prescribed in Danish Road Standards for city areas, and are designed specifically to ensure the city’s cycling policy aims are realised.⁶⁷ The minimum standards for various cycle infrastructures are as follows:

- Standard PLUSnet cycle track width is 3.0 m;
- Standard Cycle Super Highway width is 2.5-3.5 m depending on bicycle traffic volume;
- Standard width of other cycle tracks in Copenhagen is 2.5m;
- Minimum PLUSnet cycle track width is 2.8 m;
- Minimum width of a Copenhagen cycle track is 2.2 m (in exceptional cases 1.7 m); and
- Minimum width of a cycle lane (without a parking lane on the outside) is 1.5 m.⁶⁸

The city has acknowledged that it falls short of the Netherlands in terms of intersection design, and indeed the majority of all Copenhagen traffic accidents occur at intersections, although this is phenomenon is not unique to Copenhagen.⁶⁹

Intersection design is a critical area of bicycle infrastructure. There is little evidence that the introduction of cycling lanes will lead to a significant reduction in the number of cycling accidents, however there is evidence that reducing car-bicycle conflicts at intersections will reduce accidents. The Netherlands lead the way in intersection design as acknowledged by Copenhagen and more recently the Transport for London, which has adapted the Netherland’s design standards for application in London.⁷⁰

3.3.7 Benefits of cycling in Copenhagen

There are a number of environmental, economic and social benefits of cycling; these include: lower air pollution, less accidents, less congestion, less noise, and less wear and tear on the roads.⁷¹ Taking account of each of these benefits and giving them a monetary value, the City of Copenhagen estimates that:

⁶⁶ City of Copenhagen (2014) Focus on Cycling: Copenhagen Guidelines for the Design of Road Projects[online] available from: <http://nia1.me/2e9>

⁶⁷ Ibid.

⁶⁸ City of Copenhagen (2014) Focus on Cycling: Copenhagen Guidelines for the Design of Road Projects[online] available from: <http://nia1.me/2e9>

⁶⁹ Phillips, R.O. (2011) Reduction in car–bicycle conflict at a road–cycle path intersection: Evidence of road user adaptation? Transportation Research Part F: Traffic Psychology and Behaviour. Volume 14 (2), pp. 87–95

⁷⁰ TfL (2014) London Cycling Design Standards (Draft) [online] available from: <http://nia1.me/294>

⁷¹ Growth Green Leaders (2012) Copenhagen – Beyond Green [online] available from: <http://nia1.me/2dm>

- For every kilometre travelled by bike instead of a car, the City of Copenhagen saves 1.22 DKK (£0.13) – this is based on a number of factors including wear and tear;⁷²
- When you consider that 1,270,000 km are cycled every day⁷³ – this represents a saving of £165,100 per day or £60 million per annum;
- By comparison there is a negative cost to the city for every kilometre travelled by car (-1.13 DKK⁷⁴ or £0.12).

In terms of personal benefits:

- Cycling costs the owner (purchase price and maintenance) £0.04 per km cycled; while,
- Car driving costs the owner £0.12 per km driven.⁷⁵

From an Environmental perspective:

- Every year Copenhagen cyclists save the city 90,000 tons of CO₂ – this is what they would produce if all of the equivalent miles were travelled in a (average European) car.⁷⁶

In terms of health:

- less sick days used and lower medical expenses, save the people of Copenhagen more than £250 million.

These savings have meant that between 2006 and 2010 the City of Copenhagen was able to justify investing approximately £200 million on bicycle projects including new cycle paths, cycle parking, redesign of intersections and promotional campaigns.⁷⁷

3.3.8 Cyclists are good shoppers

A 2012 study by the city of Copenhagen sought to explore the links between shopping and transport mode; respondents (n=3,000) were asked about their overall shopping behaviour as well as detailed information on their latest shopping trip for each transport mode used. The findings were as follow:

- 35 billion shopping trips per year are made by walking and cycling;
- half of all shopping trips by car are done by persons living outside of Copenhagen coming into town for shopping purposes;
- On average, Copenhagen residents only use the car for every seventh shopping trip, that is, 15% of all shopping trips;
- When looking at shops and supermarkets at street level, 58% of all shopping trips in Copenhagen are done by cycling or walking;

⁷² City of Copenhagen (2012) Bicycle Account 2012 [online] available from: <http://nia1.me/2dn>

⁷³ Ibid.

⁷⁴ Ibid.

⁷⁵ Jensen, N (2009) Cycling's high return on investment in Copenhagen [online] available from: <http://nia1.me/2do>

⁷⁶ City of Copenhagen (2010) Copenhagen City of Cyclists: Bicycle Account 2010 [online] available from:

⁷⁷ Willumsen, A. and Røhl, A. (2010) Economic assessment of cycle projects methodology and cases. Association for European Transport and contributors 2010 [online] available from: <http://nia1.me/2dl>

- Cycling is the most frequent means of transport for shopping, with 35% of all shopping trips done by bike and only 20% by car;
- In terms of revenue, cycling customers spend a total of £1.61 billion per year whereas car driving customers spend slightly less, that is £1.60 billion per year;
- In total, walking and cycling customers count for 55% of the total revenue of street-level shops and supermarkets in Copenhagen;
- Cyclists do spend less per visit than car drivers. The average spending for cyclists is €30 per visit and €50 per trip, whereas car drivers spend 60€ per visit and 90€ per trip;
- The reason cycling customers still generate more revenue than car driving customers is due to the fact that cyclists in general shop more often than car drivers, which in turn compensates for the tendency to spend less per visit.⁷⁸

Clearly cyclists in Copenhagen are good shoppers and the type of shopping they are doing i.e. small and frequent would be particularly welcome in the Northern Ireland context where increasingly small town centre retailers are suffering while larger multiples prosper at their expense.

3.3.9 Community Involvement – Copenhagen’s Bicycle Account

The City of Copenhagen produces a Bicycle Account, every two years – the latest edition was published in June 2012. The Bicycle Account is a continuous assessment of cycling developments in the city whereby local residents are surveyed in order to gauge their views of cycling in the city. Already in this paper the data produced in the Bicycle Accounts has been drawn on heavily as it provides a detailed account of the development of cycling in Copenhagen over a number of years. Critically, the bicycle account provides the city’s transport authority with an insight into its citizens views of the city’s cycling infrastructure and this has enabled them to target innovative interventions at specific problems identified by users, such as the perception of safety (junction redesign), the desire for comfort (footrests at intersections) and the desire to travel as quickly as possible (the green wave and cycle super highways).

The Bicycle Accounts also provide data on travel behaviour, particularly bicycle traffic and modal share, while it also provides analysis of the role of cyclists in the local economy, including the finding that 58 per cent of shopping trips are made by bike, generating 55 per cent of retailers’ revenue.

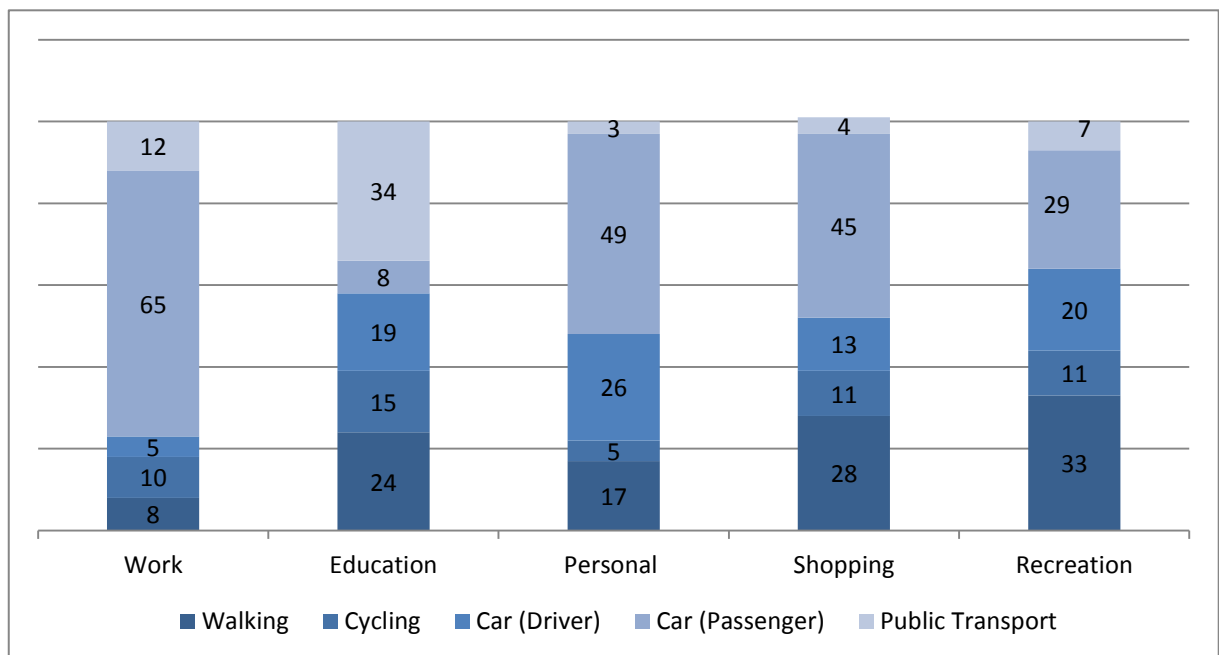
The adoption of this type of approach could provide an invaluable resource for the DRD’s cycling unit as the users of cycling infrastructure are the best placed to evaluate its strengths and weaknesses. In addition to users, it is critical to understand the perceptions of non-cyclists if we are to increase numbers.

⁷⁸ Kåstrup, M. (2012) Are cyclists good customers? Cycling Embassy of Denmark [online] available from: <http://nia1.me/2eb>

4 Germany

Examination of the cycling policies in the Netherlands and Denmark is a prerequisite for any inquiry seeking to establish what policies and interventions encourage people to cycle. However, doubts about the transferability of these policies may arise, due largely, to the fact that cycling is ingrained within the culture of these nations. It is therefore interesting to examine cycling policies in a country like Germany, which is synonymous with cars and the autobahn but which has some of the highest levels of cycling anywhere in Europe (10%).

Figure 21: Modal split for different purposes of journey in Germany (%)



4.1 German National Cycling policy

The German Government is keen to promote cycling for most of the same reasons as other governments: environmental protection; climate change mitigation, public health promotion and economic development. It is also cognisant of the role cycling and walking has in improving the liveability of towns and cities and in improving the quality of life for its citizens.⁷⁹

Planning procedures in Germany are regulated at four different government levels: federal, state, regional and municipal.

- The Federal government sets traffic law and the German equivalent of the highway code while they also provide some funding for cycling infrastructure;
- More specific standards for cycling are set at the State level;

⁷⁹ Federal Ministry of Transport, Building and Urban Development (2013) National Cycling Plan 2020 [online] available from: <http://nia1.me/2ec>

- Local Transport Planning and design/implementation of cycling strategies is carried out at the local (regional/municipal) level.

Accordingly the prominence of cycling policy and the level of support varies among states and municipalities.

4.1.1 National Cycling Plan

Germany's first National Cycling Plan (NCP) was published in 2002 with a clear focus on providing a framework for State and Local Government to promote cycling.⁸⁰ The plan has been deemed a success:

- A "*Mobility in Germany*" study showed that, over the period from 2002 to 2008, the number of journeys made by bicycle increased by 17 %. This is the highest rate of growth of all modes of transport;
- Cycling's share of all journeys made rose from 9 to 10 % (national average) in the same period; and
- Both the number of trips and the length of journey made by bicycle increased, especially in urban areas – both at weekends, when people cycle mainly as a leisure activity, and on workdays, when people cycle mainly to go about their day-to-day business.
 - In Munich, the proportion of journeys made by bicycle rose from 6% in 1996 to 17% in 2011;
 - In Frankfurt, the proportion rose from 6% in 1998 to 14% in 2008;
 - In Rostock, it rose from 9% to 20% in the ten years up to 2008; and
 - Cycling is particularly popular in town and cities such as Bocholt (35 %), Münster (38 %), Oldenburg (43 %) and Greifswald (44 %).

The current NCP (NCP 2020) covers the period from 2013 to 2020 and seeks to follow on seamlessly from the first NCP (NCP 2002-2012). However, rather than continuing to simply promote cycling, the primary aim of this strategy is to establish cycling as a key element of an integrated transport and 'Eco-mobility' policy that focuses on public transport, walking and cycling.

This document sets out SMART objectives for what can be achieved within the strategy's lifetime. Extensive work was conducted to identifying what was possible in terms of increasing modal share. A group of experts was convened by the Federal Ministry of Transport, Building and Urban Development to develop estimates on how cycling might develop in Germany over the period to 2020. These estimates were based on findings and forecasts from large-scale nationwide surveys on mobility patterns – "*Mobility in Germany, Mobility in Towns and Cities*" and "*German Mobility Panel*". In addition, there were scenarios and variation calculations from the project

⁸⁰ Federal Ministry of Transport, Building and Urban Development (2013) National Cycling Plan 2020 [online] available from: <http://nia1.me/2ec>

entitled “*The potential inherent in cycling for tackling climate change*”, which was commissioned by the Federal Environment Agency and findings from the project entitled “*The potential inherent in cycling for savings in road transport*”, which was commissioned by the Federal Highway Research Institute.

The outcome is a target for cycling to have a 15% share of all journeys made by 2020. This means that for rural areas, there must be an increase in the average value from 8% at present to 13 % of all journeys made in 2020. For urban municipalities, the growth will be from 11% to 16%.⁸¹

4.1.2 Communication

Germany’s NCP is based on the vision of “cycling as a system”. In their view increasing cycling levels is much more than a case of simply providing more cycle-friendly infrastructure. The Government also emphasises the importance of intensive communications and public relations and calls on policymakers at all levels – Federal Government, federal state and local authority to attach equal importance to each element.

An example of effective communication and promotion can be found in Frankfurt am Main. Frankfurt a. M. has a population of just over 660,000 and cycling has a 13% modal share. The city has a total annual budget of around £4m for cycling or a round £6 per person.⁸²

In 2009 the municipality set up a Cycling Office to promote cycling in the city and act as a point of contact for all cycling related matters. The office also has an online presence which deals with many issues relating to cycling in the area including routes, parking locations and general visitor information. The overall aim of the body is to create a better environment for cyclists, including better facilities and services and to build a climate where all road users respect each other.⁸³

The office has four cycling co-ordinators with various areas of expertise around urban planning and infrastructure development. They are responsible for managing the system, developing new ideas for infrastructure and co-ordinating education campaigns. The coordinators are also actively involved in developing basic standards for bicycle infrastructure in cooperation with the relevant municipal authorities.

In its first year the cycling office dealt with an average of 10 requests per day and found the continuous dialogue with cyclists an important resource in their continued development of the city’s cycling provision. The office has also been involved in the

⁸¹ Federal Ministry of Transport, Building and Urban Development (2013) National Cycling Plan 2020 [online] available from: <http://nia1.me/2ec>

⁸² Federal Ministry of Transport, Building and Urban Development (2013) Planning for Cycling in Germany: Case Study of Cycling in Frankfurt [online] available from: <http://nia1.me/2ed>

⁸³ Ibid.

delivery of new cycling paths and associated infrastructure, such as bicycle storage facilities.

5 Summary and Conclusions

This paper has examined a body of literature in order to identify what makes cycling so popular in the three of the world's top cycling nations: the Netherlands, Denmark and Germany. Of course there are many similarities between each country in terms of infrastructure – precisely because transport authorities within each of these countries are not afraid to compare themselves against the best, learn what works and implement it in their own cities'. Some of the common approaches they take are:

- Reduced speeds in (20mph zones) in all residential areas;
 - Bicycle traffic is prioritised in low traffic streets known as 'bicycle streets'
- Bicycle friendly junctions;
- Multimodal traffic signals;
- Segregated cycle paths on all roads with speeds greater than 30mph;
- Cycle paths wide enough (minimum 2.5m) for cyclists to ride two abreast;
- Separate routes/lanes for faster moving cyclists (mainly commuters);
- Complimentary infrastructure such as bins, pumps, footrests.
- Extensive parking at places of work, education and in residential and shopping areas;
- Integration with public transport;
- Bicycle share schemes; and
- Segregation of motor vehicles and bicycles on all roads with speeds greater than 30mph;

5.1 The Netherlands

Dutch municipalities are responsible for the development of local cycle plans and the provision of cycling infrastructure. As a result of this the bicycles modal share varies between 10% and 38%, with a national average above 25%. The Netherlands Ministry of Transport suggest the reason so many people cycle is that they simply enjoy it. However, in all likelihood the reason they enjoy it so much is because of the approach taken by their local government to make them feel welcome, comfortable and safe, they also have access to some of the finest infrastructure on the planet.

A Dutch evaluation tool, known as the Bicycle Balance Score, confirms the link between high modal share and infrastructure provision: in municipalities with the highest score (based on an assessment of local cycle conditions, including local policies, bicycle use is on average 14% higher than in municipalities with lower scores.

Dutch cycling infrastructure is designed according to five principles: safety, directness, comfort, attractiveness and cohesion. These principles have been adopted across the globe by authorities seeking to improve cycling conditions and attract more people onto bikes.

The municipalities of the Netherlands enjoy significant benefits from their pro-bicycle policies and the Case study of Groningen indicates the economic benefits accrued from cycling are considerable. Dutch people benefit from low transport costs, higher disposable incomes, improved health and have cleaner safer cities in which to live. The authorities have lower infrastructure costs to contend with as bicycles use less road space and the construction and maintenance of bicycle facilities costs much less than that needed for cars.

A common theme within cities with high cycling levels is the role cyclists play within the local retail economy. Case studies examined in the preparation of this paper from all three countries have shown that cyclists shop more often and spend more money. Indeed this type of buy-what-you need retail culture keeps town centres thriving and would be most welcome in a place like Northern Ireland which has suffered so much with the rise of online retail and out-of-town shopping centres.

5.2 Denmark

The case of Denmark is interesting from the perspective that, nationally, cycling has been declining over the last decade whereas the City of Copenhagen has continued to improve and is widely regarded as one of the top cycling cities in the world.

The Danish Government has launched a new national cycling strategy which is seeking to reverse the downward trend in national cycling levels. The focus of this strategy is to make cycling as easy and as safe as possible. It is for this reason that the Danish are looking to the Netherlands, particularly the guiding principles of safety, directness, comfort, attractiveness and cohesion. Measures will include green waves, safer junctions and cycle superhighways – interventions that have already begun to be introduced in Copenhagen.

Copenhagen is typical of all the best cycling cities in that it is relentless in its pursuit of perfection. The city's latest strategy "*Good, Better, Best*" leaves no uncertainty about their overall aim – to be the best cycling city in the world. Cyclists are important to the City of Copenhagen, saving the city £60m per year in costs that would be associated with car use, spending €2 billion in the city's shops and displacing a possible 90,000 tons of CO₂ emissions that would otherwise be emitted by drivers.

The city shows its appreciation by continually involving citizens in its evaluation and development of its cycling facilities. The Biannually published Bicycle Account includes a large scale survey of Copenhageners, seeking their views on issues like safety, attractiveness and condition of routes; this also offers a forum for locals to make suggestions on what improvements could be made. This enables the city to target

interventions at specific problems, these include bridges and super highways to reduce journey times, multi modal traffic lights and islands at intersections for safety and facilities like pumps, footrests, bins and cycle counters to improve comfort and convenience.

5.3 Germany

It is fair to say that Germany has learned much from the likes of Copenhagen, Groningen and Amsterdam and key elements of the infrastructure from these cities is evident across Germany. Unlike the Netherlands and Denmark however, Germans are very keen on driving and the car is ingrained within German culture.

It is perhaps for this reason that the German Government, as much as they promote and invest in good infrastructure, they also emphasise the importance of communication and public relations. The German national cycling plan calls on policy makers at all levels of government to put these three elements (infrastructure, communication and public relations) on equal standing.

5.4 Conclusion

This paper has examined what makes cycling attractive in the Netherlands, Denmark and Germany with a view to identifying transferable lessons that could be applied in the local context.

Clearly the basic design of infrastructure – standards around lane width, signalling and intersection design can and should be applied to cycling design standards here, already Transport for London has rewritten its standards and applied many of these lessons within them. However, there is a major issue in terms of the level of investment that would be required to make any significant changes to our roads, to the extent that it would dramatically alter travel behaviour within the Northern Ireland. Certainly the current level of priority afforded to cycling schemes and indeed the consideration given to cycling within wider road and public realm schemes is insufficient.

The countries discussed in this paper know from experience that any money they spend on cycling infrastructure will produce positive returns and cyclists form a critical part of their respective economies. This is why, for example, £322m (€410 million) was spent on cycling related projects in the Netherlands during 2012 (£20 per person).⁸⁴ Similarly the city of Copenhagen has consistently spent over £20 per person on cycling over a number of years.⁸⁵

⁸⁴ Fietdberaad (see: <http://nia1.me/24h>) Taken from: ECF (2013) ECF, Cyclist.ie Memorandum [online] available from: <http://nia1.me/24i>

⁸⁵ GLA (2012) Gearing Up: An Investigation Into Safer Cycling in London. London: Greater London Authority [online] available from : <http://nia1.me/1zs>

What a similar level of spending would achieve within Northern Ireland, where currently less than £1m is spent per year⁸⁶ (approx. 55 pence per person⁸⁷) is unclear. Looking at it on a per capita basis, this would require DRD to spend

- £18m if it was to base its budget on a spend of £10 per person;
- £27m if it was to base its budget on a spend of £15 per person; or
- £36m if it was to base its budget on a spend of £20 per person;

An important lesson can be taken from Germany in this instance. While they accept infrastructure is critical, the German's are investing heavily in promotion and public relations to increase cycling levels, which they view as equally important to infrastructure – particularly as they, unlike the Netherlands and Denmark, would not previously of had a mainstream cycling culture. This approach has brought results, arguably creating a culture where one did not previously exist.

⁸⁶ AQW 8315/09

⁸⁷ Based on the current NI Population of 1.84 million. See NISRA [online] available at: <http://nia1.me/es>