

UNLOCKING NEW OPPORTUNITIES: JOBS IN GREEN AND HEALTHY TRANSPORT

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Abstract

The promotion of public transport, cycling and walking is increasingly being recognised as important in improving the environmental performance of transport, particularly in urban areas. More recently, attention is starting to be paid to the economic benefits of such policies, particularly in terms of their potential to generate jobs in green and healthy transport. THE PEP's *Partnership on jobs in green and healthy transport* is exploring this issue further. This paper is an important part of this process.

On the basis of a review of relevant literature, there is sufficient evidence to suggest that the green and healthy transport sector has the potential to be a significant employer and contributor to the green economy. However, evidence on the number of existing jobs in green and healthy transport, and the potential number of additional jobs that might result from further investment, is not consistent or comprehensive. The figures for cycling are the most comprehensive, consistent and transparent, so an indicative figure for the potential number of additional cycling jobs has been estimated.

It is concluded that there is the potential to create around 76,600 jobs if selected cities from the pan-European Region achieved the same modal share of cycling as the Danish capital Copenhagen. In 21 cities, there is the potential to create more than 1,000 additional cycling jobs. While the methodology that was used was simple, and required a number of assumptions, these figures are likely to underestimate the potential for a number of reasons: they do not estimate all of the potential additional cycling jobs; they only cover one city per country; and they do not include the potential for other types of jobs in green and healthy transport.

Jobs in green and healthy transport have the added benefits that they are local, and so will further benefit the local economy, and require a wide range of skills. Investing in public transport, cycling and walking also creates more jobs than investing similar amounts of money in roads. The potential is greatest in urban areas, where a large proportion of existing car journeys cover distances that could relatively easily be replaced by public transport, cycling and even walking. While more research is needed to identify the full potential for the creation of jobs in green and healthy transport, there is enough evidence of benefits for relevant investments to be made now.

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[TO BE ADDED:]

- **Keywords**
- **Foreword**

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The benefits and challenges of transport in the pan-European Region¹: Redressing the issue

An efficient transport system is vital for the functioning of modern economies. It allows people to travel to work and for education, and to access a range of services, including leisure and health care. It is also central to and intertwined with the development of the urban environment. The transport system also plays an important economic role, as it enables trade and is an important economic sector in its own right. In the EU, it has a turnover equivalent to 10.5% of GDP and employs 10.5 million people, which is nearly 5% of the total workforce^{i,2}.

However, transport has a downside due to its various adverse environmental and health impacts, particularly in urban areasⁱⁱ. In many European cities, transport is a major contributor to air pollution, which in turn has important adverse effects on health. For example, across Europe on average people lose approximately 9 months of life expectancy as a result of exposure to particulate matter aloneⁱⁱⁱ. Road accidents account for a further 120,000 premature deaths each year^{iv,3}. Other adverse health impacts result from exposure to excessive levels of noise from road transport, which affects almost 70 million people^{v,4}. All of these adverse health impacts burden society with costs, particularly in relation to health care. For example, the costs associated with the burden of fatal and non-fatal road traffic injuries can be up to 3% of a country's gross domestic product^{vi}.

It is not just the direct impacts on health that are of concern. People living in urban areas suffer from high levels of congestion, while others experience social exclusion that can be increased by busy roads^{vii}. When it discourages or impedes cycling and walking, transport also reduces opportunities for physical activity, which in the WHO European Region is estimated to be related to nearly one million deaths per year^{viii,5}. Last but not least, transport contributes to around 24% of total greenhouse gas emissions in Europe and North America⁶, which is likely to contribute to a range of negative health impacts^{ix}. The adverse effects of transport activities on health and the environment represent contribute to the external costs of transport, i.e. costs that are not often considered in the

¹ In the context of this paper, the 'pan-European Region' includes all of the member countries of the UNECE, including the Central Asian states that were previously part of the Soviet Union, as well as Canada and the United States of America; see www.unece.org/oes/member_countries/member_countries.html

² The figures are for 2010 and include Croatia. Some of the underlying data for 2010 were obtained from earlier editions of the same publication.

³ Figure relates to the 49 countries of the WHO European Region that provided data for the report referenced. The WHO European Region largely corresponds to the definition of 'Europe' in footnote **Error! Bookmark not defined.**, with the exception of Liechtenstein.

⁴ The figures are from 2007 and relate to the EU-27, plus Norway and Switzerland.

⁵ See footnote 3 for the definition of the WHO European Region.

⁶ Figures derived from UNFCCC data at (accessed 12 November 2013): http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php; the vast majority of transport's GHG emissions are carbon dioxide; the figure relates to 2010 and is based on the GHG emissions of the 39 UNECE members who are Annex I countries under the Kyoto Protocol. Total GHG emissions used for the calculation include those relating to land use and land use change and forestry.

economic calculations that support policy development; these have been estimated to be around 4% of the gross domestic product^{x,7}.

In contrast with this challenging picture, it is important to highlight that there is growing evidence of the benefits that certain transport policies, such as those that support public transport, cycling and walking, can have for health and the environment. Studies have shown that, when the health effects of different transport policies are factored into valuations of different measures to address climate change, the inclusion of these “co-benefits” favours support for public transport, cycling and walking as the most effective combination of policies^{xi,xii}.

An even more recent, and largely unexplored area of growing interest, is the possible economic significance, particularly in terms of job creation, of these policies. This would suggest that policies that support public transport, cycling and walking have a potentially important contribution to make to the green economy, as a result of their environmental, social and economic benefits. This contribution would potentially be of even greater importance in urban areas, where such modes have the largest potential. Already, jobs in green and healthy transport make up a significant proportion of the total number of jobs in the transport sector, e.g. in Spain these jobs make up around 60% of the transport jobs in the country (see Box 4)^{xiii}. As a result of their apparent benefits, there is a need to explore further the potential for job creation in green and healthy transport in the pan-European Region.

Exploring uncharted land: The contribution of the Transport, Health and Environment Pan-European Programme (THE PEP)

One of the underlying reasons behind the creation of THE PEP in 2002 was the importance of integrating environmental and health considerations into transport policy. In this way THE PEP contributes to the development of a green economy by highlighting the links between transport, health and the environment, and the need to better take account of these in policy-making. However, there is currently a lack of information on the economic dimension of this relationship, particularly in relation to the number of jobs that might be generated by an increased focus on green and healthy transport. In order to strengthen the evidence base, THE PEP has launched a *Partnership on jobs in green and healthy transport (PJGHT)*; see Box 1).

Box 1: THE PEP’s Partnership on jobs in green and healthy transport

The purpose of the *Partnership on jobs in green and healthy transport (PJGHT)* is to bring together interested member states, experts and policy-makers from the transport, environment and health sectors to develop a set of actions and joint projects in order to achieve the following goals:

- 1) “Stimulating a debate and a shared understanding on what a green and healthy job in transport is by bringing environmental and health considerations into the existing discussion on ‘green jobs’ creation.
- 2) Documenting the breadth of existing experiences in Europe and other parts of

⁷ The figure relates to the external costs as a proportion of total GDP of countries covered in the study, which was the EU-27, plus Norway and Switzerland.

the world with new policies and approaches for creating green and healthy jobs in transport.

- 3) Analysing the potential of greening 'old jobs' and creating 'new green jobs' in transport and mobility and assessing the qualitative and quantitative impact of such approaches have on the environment, health, transport and the economy.
- 4) Sharing good practice and disseminating the experiences, policies and approaches.
- 5) Developing strategies and actions for stakeholders to implement Goal 1 of the Amsterdam Declaration in order to promote green jobs in transport."

At the first meeting of the PJGHT in September 2011 in Astana, Kazakhstan, THE PEP launched an introduction to the Programme and a small collection of case studies to highlight the breadth of jobs in green and healthy transport in the pan-European Region^{xiv}.

This paper contributes to the Partnership's objectives by:

1. Presenting an overview of available studies that investigated the potential for the creation of jobs in green and healthy transport;
2. Analysing the potential for jobs in green and healthy transport by developing a scenario that aims to provide policy makers with a 'ball park' figure on the magnitude of this potential; and
3. Identifying areas for further international collaboration and research.

This paper is based on a background report that reviewed the relevant literature, which was prepared at the University of Oxford^{xv}. The background report was discussed at a consultation meeting in October 2013, which was attended by representatives of UNECE, UNEP, OECD, ILO, EEA and WHO. However, it is important to note that this work is only the beginning of a longer process. This paper, and the background report on which it is based, focuses only on a narrow range of jobs that might be considered to be associated with green and healthy transport. In particular, it focuses on public transport and the active modes, as these are the areas that have been most neglected in the debate about green jobs, and yet appear to have a sizable potential to contribute to job creation in the pan-European Region.

What is a job in green and healthy transport?

A number of different types of activity might be considered to be a job in green and healthy transport (see Box 2). This demonstrates the potential range of such jobs, which are not limited to jobs associated with public transport, cycling and walking. Also included are jobs that aim to manage or reduce car use; jobs in the design, production and development of vehicles, including cars with lower emissions; and the jobs associated with new transport services, such as car and bicycle sharing schemes. The background report on which this paper is based went a step further by proposing a definition of a job in green and healthy transport (see Box 3).

Box 2: Where are the jobs in green and healthy transport?^{xvi}

Supporting Active Travel

Improving Public Transport

Technological Measures to

<p>Bicycle retail and maintenance, (high-quality) bicycle production, construction and maintenance of high quality infrastructure and environments for walking and cycling, provision of clothing, accessories, facilities for walkers and cyclists</p>	<p>and increasing its attractiveness Construction and maintenance of public transport vehicles and infrastructure, operating public transport systems, bike hire schemes, pedicabs, car-sharing schemes, development and maintenance of integrated travel networks, development of “bike and ride” systems</p>	<p>Reduce Emissions per Mode Design, production and development of technologies for electric and other lower-carbon vehicles, production of renewable energy</p>
<p>Encouraging Behavioural Change Installation of lighting, neighbourhood patrols and street maintenance, mobility advisors and behaviour change practitioners, cycle training, public transport route planning, training in more energy efficient driving techniques, and environmental skills training</p>	<p>Mobility Management Establishing mobility centres, promoting customer friendly intermodal mobility systems, promoting innovations in mobility services and transport technologies, innovations in the transport chain, awareness raising, training and education</p>	<p>Freight Production, maintenance and operation of cargo bikes and electrically assisted cycles, logistics and planning to take more account of environmental considerations</p>
<p>Reducing Car Use Implementing pedestrianisation, parking enforcement, the operation of road pricing and congestion charging schemes, mobility management</p>	<p>Reducing Travel Demand Information and Communications Technologies industries, local and decentralized businesses.</p>	<p>Tourism Provision, maintenance of bicycle hire schemes, route planning for walking, cycling and public transport, local small retailers, local providers of accommodation, community regeneration and heritage development and maintenance schemes, development of locally produced food</p>

Box 3: Definition of a job in green and healthy transport

A two-part definition of a “job in green and healthy transport” has been adopted. First,

jobs in green and healthy transport are those that form part of a wider solution to climate change by helping to facilitate the necessary reduction in emissions and improvements in energy-efficiency (hence 'green'). Second, these jobs should simultaneously contribute to the promotion and use of safer, cleaner and more active modes of transport that can contribute directly to reductions in health risks (hence 'healthy'). For a job to be included in this definition, it has to fulfil both criteria. In addition, jobs in green and healthy transport should contribute to one or more of the following objectives:

- a) Reduce air and noise pollution and greenhouse gas emissions;
- b) Reduce energy consumption;
- c) Increase safe walking and cycling; and
- d) Improve transport efficiency.

A job in green and healthy transport can be either a direct, indirect or an induced job. A **direct job** is one that is involved with the construction and maintenance of infrastructure (e.g. pavements, bicycle lanes and bus stops), the manufacture of vehicles (e.g. public buses, rail rolling stock and bicycles) or the operation of the associated services. An **indirect job** is one in the supply chain of the relevant construction, manufacturing and maintenance industries (e.g. the production of spare bicycle parts or materials for bicycle lane construction), as well as those in professional and administrative services that manage the operation of green and healthy transport systems. **Induced jobs** are those created when the overall level of spending in the economy rises as a result of increased direct and indirect employment. Additionally, increases in cycle tourism will benefit the wider tourist industry, as jobs servicing the needs of cyclists will be generated, including in hotels and restaurants^{xvii}.

However, as with any policy, the jobs that might be created by measures to support public transport and the active modes have the potential to have a negative impact on jobs in other sectors. For example, if a modal shift to public transport and active travel were to lead to a lower level of demand for cars, jobs in car manufacturing and servicing could be lost. However, jobs in car manufacturing face a range of other pressures, including overcapacity in Europe and mechanisation. These issues will need to be addressed by the industry anyway and are likely to be much more significant than the impact of any modal shift.

Similarly, if modal shift were to lead to less car use, tax revenues from fuel duties would decline, leading to a lower overall tax take and therefore a reduced ability of governments to invest in other parts of the economy. At the same time, however, the reduced damage to health and the environment would reduce the need for some government expenditure, particularly in relation to health costs, thereby offsetting, at least partially, the reduced income through taxation. Furthermore, as a result of improved vehicle efficiency, and in the medium-term higher levels of electric car use, national finance ministries will face a decline in the tax take from fuel duties on petrol and diesel irrespective of any modal shift away from car use. Hence, government finances will continue to face a range of issues that are likely to have a more significant impact than modal shift.

Indeed, a couple of studies have concluded that investment in transport policies that benefit the environment, particularly in relation to climate change, will deliver net employment benefits. This is because public transport and the active modes are more labour-intensive, so the increase in jobs in green and healthy transport will more than make up for any job losses in industries associated with the car industry^{xviii,xix}.

It is also important to underline that investment in green and healthy transport will bring benefits that are often not quantified, and which indeed can be difficult to quantify. These include improvements to the quality and attractiveness of the urban environment, as well as the health benefits associated with the higher take up of active transport. Further health benefits will come from reduced exposure to air pollution and noise, and a reduction in road accident injuries, which in turn reduces the costs to health services and employers (resulting from days of absence from work).

Furthermore, there is a significant potential for more jobs in green and healthy transport, as the modal share of the respective modes is often relatively low. For example, Copenhagen where 26% of all trips are undertaken by bicycle^{xx} is an exception, as in many other cities cycling makes up a significantly lower proportion of trips, e.g. 1% in Madrid, Sofia and Budapest, 2% in Athens and Ottawa and 3% in Paris^{xxi}.

There are many opportunities for job creation in public transport, cycling and walking

Jobs in public transport

There is evidence from the literature review that the public transport sector is a significant employer. In the UK, a rail project is expected to employ up to 14,000 people in the course of its construction and to create a further 1,000 jobs associated with the operation and maintenance of the line once it has been completed^{xxii}. When announcing an order for 600 new diesel hybrid buses, Transport for London (TfL) underlined that it would safeguard 220 jobs, including creating 50 new ones. More generally, TfL stated that investment in London's transport network supports over 50,000 jobs within the UK supply chain^{xxiii}.

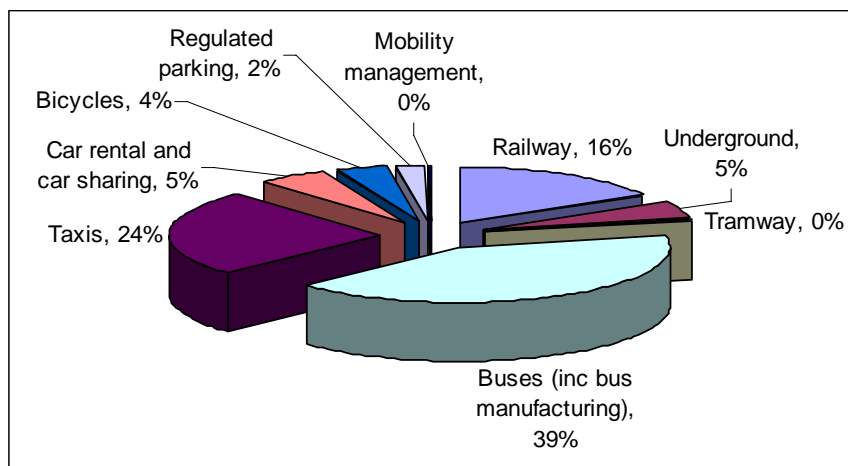
A study for Germany estimates the potential increase in employment under various policy packages for transport. It concludes that increasing the modal share of public transport by 10% by 2030 would increase employment in the transport sector by 5.3%. For measures aimed at increasing cycling and walking by 10%, the employment increase is slightly smaller at 4.2%^{xxiv}.

Other studies attempt to identify the number of jobs in green and healthy transport more systematically. Studies for Spain conclude that there are between 290,000 and 565,000 jobs in sustainable transport in the country, depending on the definition used (see Box 4). A similar study for the UK estimates that the number of direct and indirect (i.e. supply chain) jobs associated with the rail, light rail, bus/coach and cycling industries was around 450,000^{xxv}. Comparing this figure with the total number of transport jobs in the UK^{xxvi}, suggests that these jobs make up around 38% of the total number of transport jobs in the country. The proportion of the jobs in sustainable transport that were in cycling in the UK was 5%, which is similar to the figure for Spain (see Box 4).

Box 4: Jobs in green and healthy transport in Spain

It has been estimated that there were 297,109 jobs in sustainable transport in Spain in 2008, which is 33% of the total number of transport jobs in the country*. The breakdown of jobs in sustainable transport by category is provided in Figure 1.

Figure 1: Estimated breakdown of jobs in 'sustainable' transport in Spain



These figures are based on the actual number of jobs in the relevant industries according to the respective public authorities and organisations. This is supplemented by an estimate of the number of indirect jobs taking account of jobs such as those in the bus manufacturing industry and indirect public transport jobs, including security and cleaning jobs^{xxvii}.

Another report estimates that the number of direct and indirect jobs in sustainable transport in Spain was 565,000, which is 62% of Spain's total number of transport jobs*. This higher number includes jobs related to the manufacture of low emission vehicles and those in "efficient" infrastructure construction^{xxviii}.

*Note: The proportions relating to the total number of transport jobs in Spain compare the figures quoted to the total number of transport jobs in Spain in 2010^{xxix}.

Jobs in cycling and walking

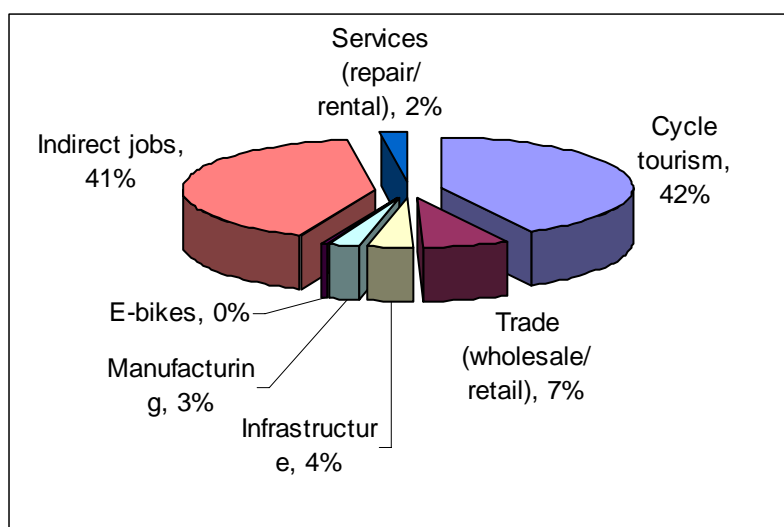
There are a number of estimates for the employment associated with cycling. In the US, it is reported that over 1.1 million jobs are generated by cycling^{xxx}. For Germany, it is estimated that there are 278,000 full-time jobs in the cycling industry, including in retail, tourism and infrastructure^{xxxi}. Separate studies conclude that there are around 18,000 jobs associated with cycling as a mode of transport in Austria and 33,000 in France (see Box 5 and Box 6).

Box 5: Range and number of jobs associated with cycling in Austria

A 2009 study estimates that there were 17,992 direct and indirect jobs associated with cycling as a mode of transport in Austria^{xxxii}. The study is based on the use of existing data and interviews; the breakdown of direct jobs is presented in Figure 2.

Both this study and the one for France discussed in Box 6, include the number of jobs associated with cycling sporting events. While the figures for the direct jobs associated with sporting events have been excluded from the figures presented in this paper, it is not possible to identify whether other jobs, such as those in bicycle manufacturing, are related to cycling as transport or cycling as a sport. However, to some extent this is a difficult distinction to make as the same bicycle can be used both for sport and for transport.

Figure 2: Estimated breakdown of cycling jobs in Austria

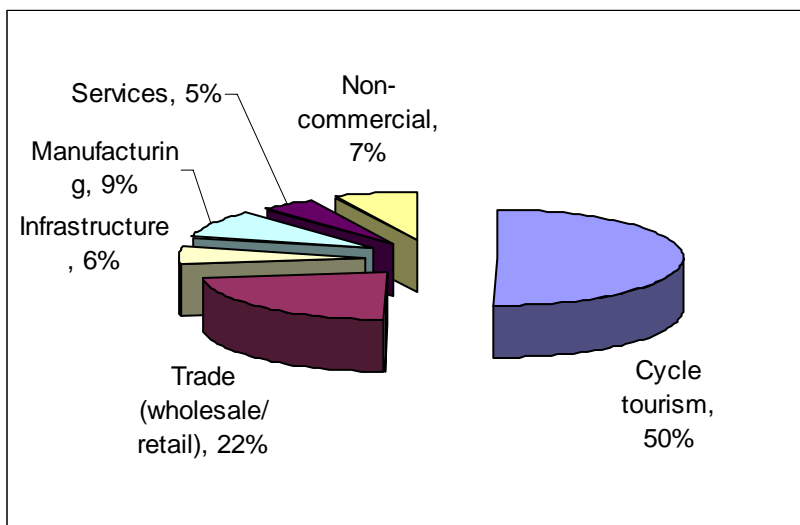


An important dimension in relation to jobs in cycling is the high number of jobs associated with tourism (see Box 5 and Box 6). Cycling tourism benefits the wider local economies, as cyclists will need to stay and eat locally, and hence jobs will be created in hotels and restaurants. Interestingly, cycling (and hiking) tourism also support the establishment of reception facilities such as small inns and bed and breakfast establishments, which may represent an interesting supplement to the incomes of households in areas that are attractive to cyclists. Touring cyclists are also likely to spend more locally, and thus benefit local jobs and the local economy more, compared to motorised tourists, because cyclists tend to travel lighter, e.g. with less food, and to use facilities away from main roads^{xxxiii}.

Box 6: Range and number of jobs associated with cycling in France

A study for France that aimed to demonstrate the extent of the cycling economy estimated that there were 33,000 direct jobs associated with cycling as a mode of transport in the country (see comment on cycling as a sport in Box 5)^{xxxiv,xxxv}. The study was supported by the French government and based on empirical evidence. A breakdown of the type of job is given in Figure 3. It was also estimated that there were nearly 10 jobs in bicycle industry per €1 million of turnover, compared to 2.5 per €1 million of turnover in the car industry.

Figure 3: Estimated breakdown of cycling jobs in France



A study for Canada estimates the increased number of jobs per household if all of Canada had the same modal share of active transportation as the city of Victoria. For cycling, this would mean an increase in its modal share from 1.2% to 4.8%, whereas the modal share of walking would rise to 10.4% from 6.6%. The report estimates that such increases nationally would generate an additional 437 jobs per 100,000 households^{xxxvi}.

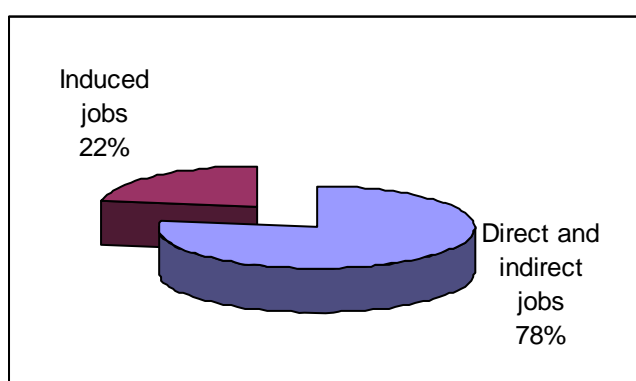
Investing in green and healthy transport generates more jobs than investing in roads

A number of studies estimate the **intensity of jobs** in green and healthy transport. In the US, it is estimated that \$17.8 billion of capital investments and \$37.8 billion of spending on operations support two million public transport jobs^{xxxvii}. This figure is based on a report that aimed to estimate the potential jobs that might be associated with a certain level of expenditure. This report estimates that 36,000 jobs are supported for one year for every \$1 billion of annual spending on public transport. Of these jobs, around 17,500 are direct, nearly 4,500 are indirect with a further 14,000 being induced^{xxxviii}. A similar study has been undertaken for the EU (see Box 7), which estimates that investing €1 billion a year in railways and public transport would generate 21,500 additional jobs. As noted in Box 6, it has been estimated that there are nearly 10 jobs per €1 million of turnover in the cycling industry in France, compared to around 2.5 per €1 million of turnover in the car industry.

Box 7: Case study – Job intensity of rail and mass transit jobs

In a study that aims to identify the potential number of green jobs that might be created from investments under the EU budget, GHK estimates that an additional 21,500 jobs in railways and public transport might be created from investing €1 billion per annum in these modes. The estimates are based on numbers taken from case studies in the literature. The job intensity of investment in sustainable transport is higher than from some of the other areas of sustainable investment that are considered, and is comparable to investments in energy efficiency^{xxxix}.

Figure 4: Estimated proportion of direct/indirect and induced jobs generated by investing €1 billion per annum in railway and public transport



Generally, investment in public transport and active transport has been found to be more labour-intensive than investment in road infrastructure. Studies for Germany have found that the construction of railways is more labour-intensive than the construction of roads. Indeed, it was concluded that road construction creates the fewest jobs of any public infrastructure investment. Furthermore, in the course of its operation, public transport requires many more jobs than private road transport, as the trains, trams and buses need to be operated and maintained. In congested urban areas, efficient and high quality public transport systems are the most efficient way to enable people to access employment and education, which are crucial for a prosperous society^{xl}.

A US study concluded that investments in cycling and walking are also more labour-intensive than investing in roads. After a review of a number of studies, it was estimated that on average cycling projects generated 11.4 jobs per each \$1 million invested, while the equivalent figure for pedestrian-only projects was 9.9. These numbers compare to a figure for road-only projects of 7.8 jobs for each \$1 million invested^{xli}. The US figures for the job intensity of cycling infrastructure are similar to those identified for the UK^{xlii}.

Investing in green and healthy transport creates local jobs

Another important aspect of jobs in green and healthy transport is that many of the jobs that will be created will be **local jobs**. Hence, these jobs will increase the average income of the local population and thus benefit the local economy, because much of the increased levels of local income will be spent on local services. Indeed, apart from the manufacture of the trains, buses and cycles, the

majority of the other jobs associated with green and healthy transport will be local in character. This is largely a result of the number of jobs in the service industries that are required, such as drivers, ticket sellers, retailers, cleaners and security people, as well as administrative and management jobs in local operators and local authorities (see Box 4). Similarly for cycling, jobs will be created locally in retail, infrastructure and services. While jobs associated with cycling tourism will largely be outside of the cities, they will be local to the areas concerned.

Investing in green and healthy transport generates a broad range of jobs

As is evident from their description, a **range of different types of skilled and unskilled jobs** will be generated by investing in green and healthy transport. The type of job, and whether it will be temporary or permanent, will depend on the sector of green and healthy transport that is being considered. Where infrastructure is being constructed, short-term engineering and construction jobs will be replaced by permanent operation and maintenance jobs. Jobs in the design and development of information technologies, e.g. for mobility management, and of low emission vehicles have the potential to be more permanent, due to continuous progress in technology. There is even the potential for new jobs to be created from new types of green and healthy transport services, such as car and bike sharing schemes (see Box 8).

Box 8: New opportunities for creating jobs in cycling: bike share schemes

The first large urban bike sharing scheme was launched in Copenhagen in 1995, since when many schemes have been set up around the world, including in Barcelona, Paris and London. However, it is not just in such large cities that bicycle sharing schemes have implemented, as various cities in Central and Eastern Europe, including Warsaw, Ljubljana, Tirana, Bucharest and Prague, and more recently Moscow have also set up schemes. Many of the newer schemes use smart cards, or other types of information technology, to facilitate use and to increase security.

From the perspective of job creation, schemes typically generate between 10 and 50 jobs, depending on the type and extent of the scheme. In larger cities, the numbers of jobs created can be over 200, e.g. Barcelona's scheme employs 230 people, whereas those in Paris and London have generated over 280 and 300 jobs, respectively^{xliii,xliv,xlv}.

The challenge of identifying the true potential for jobs in green and healthy transport

As can be seen from this discussion, there are many different figures available for the number of jobs associated with green and healthy transport. However, identifying the true potential for such jobs is challenging. Most of the figures quoted do not cover the range of jobs that might be considered to be a green and healthy job, as set out in Box 2, or apply the definition proposed in Box 3. They have also been produced using a range of different methods and to meet a range of different objectives. Even the two studies that estimate the number of jobs in sustainable transport

in their respective countries refer to different types of jobs. The study for the UK focuses on the direct and indirect jobs in the supply chains of the relevant industries^{xlvi}, whereas the study for Spain covers a wider range of jobs, including those in administration, taxi and car rental services (see Box 4)^{xlvii}.

As a result of these issues, it was not possible to identify the current level of, or indeed the future potential for, all jobs in green and healthy transport. However, the information on cycling was more consistent and comprehensive than the data on public transport or walking. Consequently, it was decided to estimate the potential number of additional jobs in green and healthy transport that might be generated from increased levels of investment in cycling.

Increasing the level of cycling in selected cities to the same level as Copenhagen could create 76,600 jobs

The Danish capital Copenhagen is one of the leaders in the pan-European Region for cycling. Twenty six per cent of all trips starting or ending in the city are undertaken by bicycle, while a bicycle is used on 36% of all trips to work or to educational institutions^{xlviii}. These proportions are much higher than those in most other cities in the region; in fact Copenhagen is only rivalled by Amsterdam in the Netherlands (see Table 1). Additionally, information on the numbers of some of the direct jobs associated with cycling is available for Copenhagen^{xlix}.

Hence, in order to estimate the potential number of additional cycling jobs that might be created in the pan-European Region, it was assumed that one major city in each country achieved the same cycling modal share that exists in Copenhagen. This estimate was made using a simple methodology and several assumptions had to be made with respect to the data used (see the Annex). Using this method, it was estimated that if the selected cities invested in cycling to attain the same modal share as Copenhagen an additional 76,600 jobs could be created.

Table 1: Populations of the selected major cities, their cycling modal shares, the estimated number of current jobs associated with cycling and the potential additional jobs from increasing cycling's modal share to the level of Copenhagen

Country	City	Population	Cycling modal share	Estimated number of existing jobs	Potential additional jobs
Albania	Tirana	536,998	3%*	73	562
Andorra	Andorra-La-Vella	22,256	3%*	3	23
Armenia	Yerevan	1,121,933	3%*	153	1,175
Austria	Vienna	1,721,573	6%	470	1,568
Azerbaijan	Baku	2,122,300	3%*	290	2,223
Belarus	Minsk	1,885,100	0%	17	2,215
Belgium	Brussels	163,210	5%	37	156
Bosnia and Herzegovina	Sarajevo	305,242	3%*	42	320
Bulgaria	Sofia	1,170,009	1%	53	1,332
Canada	Ottawa	1,239,140	2%	113	1,354

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Croatia	Zagreb	792,875	5%	181	758
Cyprus	Nicosia	55,014	3%*	8	58
Czech Republic	Prague	1,241,664	1%	57	1,413
Denmark	Copenhagen	549,050	26%	650	0
Estonia	Tallinn	401,072	4%	73	402
Finland	Helsinki	595,384	7%	190	515
France	Paris	2,234,105	3%	305	2,340
Georgia	Tbilisi	1,167,600	3%*	159	1,223
Germany	Berlin	3,501,872	13%	2,073	2,073
Greece	Athens	655,780	2%	60	717
Hungary	Budapest	1,740,041	1%	79	1,981
Iceland	Reykjavik	117,980	3%*	16	124
Ireland	Dublin	527,612	3%	72	553
Israel	Tel Aviv	404,543	9%	166	313
Italy	Rome	2,761,477	0%	50	3,219
Kazakhstan	Astana	661,700	1%	30	753
Kyrgyzstan	Bishkek	889,600	3%*	122	932
Latvia	Riga	650,478	3%*	89	681
Liechtenstein	Vaduz	5,207	3%*	1	5
Lithuania	Vilnius	552,008	1%	25	628
Luxembourg	Luxembourg-Ville	99,852	3%*	14	105
Malta	Valletta	6,221	3%*	1	7
Moldova	Chisinau	789,500	3%*	108	827
Monaco	Monaco City	36,371	3%*	5	38
Montenegro	Podgorica	180,810	3%*	25	189
Netherlands	Amsterdam	1,068,724	33%	1,606	**
Norway	Oslo	599,230	5%	136	573
Poland	Warsaw	1,710,130	5%	374	1,651
Portugal	Lisbon	474,696	1%	22	540
Romania	Bucharest	1,937,421	1%	88	2,205
Russian Federation	Moscow	11,541,000	3%*	1,576	12,086
San Marino	San Marino	4,479	3%*	1	5
Serbia	Belgrade	1,639,505	1%	75	1,866
Slovakia	Bratislava	411,884	3%*	56	431
Slovenia	Ljubljana	272,554	10%	124	199
Spain	Madrid	3,265,038	1%	149	3,717
Sweden	Stockholm	864,324	1%	39	984
Switzerland	Berne	124,381	11%	62	85
Tajikistan	Dushanbe	704,000	1%*	32	801
The FYRO Macedonia	Skopje	316,849	3%*	43	332
Turkey	Ankara	4,890,893	3%*	668	5,122
Turkmenistan	Ashgabat	637,000	3%*	87	667
Ukraine	Kiev	2,772,736	1%*	126	3,156
UK	London	7,826,000	3%	1,069	8,196
United States of America	Washington DC	617,996	3%	84	647
Uzbekistan	Tashkent	2,296,500	1%*	105	2,614

Notes: * This indicates an assumed modal share, which is likely to be an over-estimate.
** There are no additional jobs for Amsterdam, as its cycling levels are already above those of Copenhagen.

76,658

Source: See Annex for details of the methodology used and the sources of the information.

For some cities the potential number of additional jobs that might be created by increasing cycling to the level seen in Copenhagen is significant. In particular, the additional number of jobs in Moscow could be as high as 12,000, while the figure for London could be over 8,000. Overall, 21 of the selected cities have the potential to increase the number of jobs by over 1,000 if they achieved the same cycling modal share seen in the Danish capital.

It must be underlined that these figures are only indicative. They represent the potential number of jobs associated with cycling if all of the selected cities had the same level of cycling as Copenhagen and if the numbers for the Danish capital can be estimated in the way that is described in the Annex. The figure would be higher if the methodology used took account of other major cities. It would be greater still if it had been possible to make assumptions about the potential for cycling tourism, for example. Additionally, it must be remembered that the figure is only for the potential number of additional cycling jobs, which account for a small proportion – perhaps 5% – of the total number of jobs in green and healthy transport. Hence, the potential for job creation from investing in green and healthy transport in the pan-European Region is probably much higher.

If all of the selected cities had the same level of cycling as Copenhagen, **XX premature deaths could be prevented**

Add once have data (include numbers in Table 1) from WHO

Unlocking the job creation potential of public transport, cycling and walking

The promotion of public transport and of the active modes of transport, particularly in urban areas, is increasingly recognised as important to improve the environmental performance of transport. However, the consideration of the economic benefits of such policies, particularly in terms of the potential to generate new jobs, has only begun relatively recently. In particular, the *Partnership on jobs in green and healthy transport* under THE PEP is seeking to increase the understanding of the potential of investment to generate jobs in green and healthy transport. Many activities might be considered to be a job in green and healthy transport, including many ‘indirect’ jobs in the supply chains that support green and healthy transport.

Sufficient evidence has been identified to suggest that the green and healthy transport sector has the potential to be a significant employer and contributor to the green economy. However, evidence on the potential number of jobs – and the additional jobs that might be created from investing in public transport, cycling and walking – is not consistent or comprehensive. The figures for cycling were considered to be the most comprehensive, consistent and transparent.

Consequently, it was decided to identify an indicative figure for the potential number of additional jobs that might be generated if one major city in each country of the pan-European Region achieved the same modal share for cycling as one of the leading cycling cities, the Danish capital Copenhagen. Using a simple methodology, it was estimated that there is the potential to create around 76,600 jobs if all the selected cities achieved the same modal share for cycling as Copenhagen, i.e. 26%. In 21 of the selected cities, there is the potential to increase the number of jobs by over 1,000 if they achieved the same cycling modal share as the Danish capital.

However, these jobs are only part of the potential number of jobs in green and healthy transport that might be created for several reasons. First, the figure is only based on some direct jobs associated with cycling that might be generated, and therefore does not capture indirect and induced jobs that might also be created or any jobs associated with cycling tourism. Second, the estimate assumes that such cycling levels are achieved in only one city in each of the countries of the pan-European Region. There is no reason why more jobs associated with cycling might be created in other major cities.

Third, the figure only relates to jobs that might be generated by achieving Copenhagen's current modal share for cycling. The city's authorities have plans to increase its cycling rates further^{1,8}, which is likely to create additional jobs. Fourth, as can be seen from Box 4, the proportion of jobs in green and healthy transport that are associated with cycling is small (perhaps 5%). Even though public transport already has a much higher modal share than cycling in many urban areas, investing in it will still deliver jobs, perhaps in the order of 21,500 per €1 billion spent (see Box 7). If the number of all of the potential jobs in green and healthy transport (as set out in Box 2) was identified, it is likely that the potential number of jobs from investing in these modes would be much higher.

The jobs created have the added benefit that they will be local jobs, as they require people to manage, operate and maintain the vehicles and the wider transport system. In turn, the generation of additional green and healthy jobs will be of benefit to the local economy, as increased local incomes will be spent on other local services. There will also be a wide variety of skilled and unskilled jobs needed in urban areas, but also in rural areas if cycling tourism is encouraged. In addition to the employment benefits, investing in public transport and the active modes will also deliver health and environmental benefits, which are often not quantified. Investing in public transport, cycling and walking will also create more jobs than investing similar amounts of money in roads. **Add something here on the results of HEAT.**

In urban areas in particular, there are many opportunities to increase the use of public transport and the active modes, and thus create jobs and deliver a wide range of economic benefits. In Europe, half of all car journeys are less than 5 km in length, while over 30% are less than 3 km. Many of these journeys will be in urban areas, so could easily be replaced by public transport, and even cycling and walking. Indeed, such distances might take between 15 and 20 minutes to cover by bicycle and 30 to 50 minutes at a brisk walking pace. The increasing use of electric bicycles would further reduce the times needed to make such journeys^{i,iii}.

⁸ The plan is to increase the proportion of trips to work and educational institutions undertaken by bicycle from its current level of 36% to 50%.

Although more research is needed, there is sufficient evidence to start taking action now

This paper has presented evidence of the potential number of jobs in green and healthy transport that currently exist, as well an indication of the potential additional number of jobs that might be created from increased investment in cycling. However, there are significant data gaps. Hence, it is important to undertake more work to identify the current level of jobs in green and healthy transport, and the potential additional jobs that might be created from further investment. This work will need to take a consistent and coherent approach by defining and applying a common methodology, including definitions, to estimate the number of jobs in green and healthy transport. In this respect, it might also be important to develop a relevant indicator that could be used as a measure of the potential benefits of investments in green and healthy transport.

However, the need for additional work to better understand the scope and potential for investing in jobs in green and healthy transport should not prevent investment in jobs in green and healthy transport in the short-term. On the basis of the evidence collated so far, there are clear benefits in terms of job creation from investing in green and healthy transport. In urban areas, in particular, there are opportunities to increase the use of public transport and the modal share of the active modes. In this respect, the provision and the quality of relevant transport infrastructure are crucial, which includes the provision of infrastructure for the active modes, as is the density of development^{liii}.

Finally, it should be remembered that, as well as generating jobs, investing in green and healthy transport will also help to address a number of other policy challenges. Such investment will contribute to improving the environment and the health of the local population, not only by reducing the adverse health impacts associated with transport, but also by increasing the amount of physical activity, and so reduce associated health service costs. It will also improve the efficiency of urban transport (and so contribute to reduced congestion), as well as benefitting the local economy. Consequently, increasing investment in public transport and the active modes of transport is a vital step along the path to a green economy.

Annex: Methodological aspects

Overview of methodology

The number of additional jobs that might be created if one major city in each country of the pan-European Region had the same cycling modal share as Copenhagen, i.e. 26% of all trips^{liv}, was estimated using a simple extrapolation, which is a simple statistical method. The extrapolation was based on the population of the various cities compared to Copenhagen and the proportion by which the respective modal shares of cycling would have to increase to reach the levels of Copenhagen.

For example, the City of Copenhagen has estimated that the number of jobs associated with cycling in the city is 650^{lv}. The population of Berlin is around 6.4 times that of Copenhagen^{lvi}, so could be expected to have around 6.4 times as many cycling jobs (i.e. around 4,146 jobs) if it had the same cycling modal share as Copenhagen. Cycling's modal share in Berlin is 13%^{lvii}, half that of Copenhagen. Hence, around half of the potential 4,146 cycling jobs in Berlin probably already exist, which means that an additional 2,073 jobs would be created if Berlin were to increase its cycling modal share to the same level as Copenhagen.

However, it must be underlined that the extrapolation method used is simple. It assumes that the potential number of additional jobs can be scaled up on the basis of population **and** the increase in modal share needed in the cities to reach the levels of Copenhagen. In practice, the number of additional jobs in cycling, and indeed a city's potential for cycling, will depend on a range of other factors, including wider policies, as well as a city's size, climate and topography.

Data sources and issues

In order to undertake the extrapolation, three sets of data were needed: i) information on jobs associated with cycling in Copenhagen; ii) a recent figure for the modal share of cycling in one major city of each country of the pan-European Region; and iii) the population of one each of these cities.

Information on some of the direct jobs associated with cycling in Copenhagen was taken from a 2011 report produced by the Copenhagen city authorities, but this did not include indirect and induced jobs^{lviii}. The Copenhagen city authorities confirmed in a personal communication that there was no more up-to-date or comprehensive information on the jobs associated with cycling in the city.

Information on the cities' cycling modal share was obtained from various sources. The initial focus was on the capital cities of the pan-European Region. EPOMM's modal split website provided data for 19 capital cities^{lix}. Information for another 13 capital cities was obtained from a range of other sources (see Box 9). For three of these – Dushanbe, Kiev and Tashkent – a modal share of 1% was assumed as the references quoted suggested that there was almost no cycle use in these cities. Together, this information covered 65% of the total population of the capital cities of the pan-European Region, but data was still missing for 24 countries. For the countries for which it was not possible to identify data relating to its capital, data relating to another major city in that country were used, where these were available. For the remaining countries, i.e. those for which no information was identified for the capital or another major city, a low modal share for cycling of 3%

was assumed for its capital. This is likely to be an over-estimate, as only around one quarter of the cities for which information was identified had cycling modal shares higher than this.

The populations of the capital cities were taken from a UNECE publication^{lx}, while populations of other major cities were taken from a UN database^{lxi}.

As the data for modal share came from a variety of sources, it was difficult to identify the extent to which the different numbers were compatible. Figures related to different years and had been estimated for various purposes using different methodologies. Additionally, data for a number of capital cities had to be assumed, as relevant information for it or for another major city in the country were not available. However, for many of the capitals for which the cycling modal share was assumed, anecdotally it appeared that cycling levels were relatively low. It was clear, therefore, that the modal share of cycling in many cities was nowhere near the modal share of cycling in Copenhagen, so it could be expected that additional jobs would be created if cycling elsewhere increased to the levels of the Danish capital.

Box 9: Sources of data on the modal share of cycling in cities (other than EPOMM, 2014)

Amsterdam	EMTA (2012) “EMTA Barometer of public transport in European metropolitan areas (2009)”; see http://www.emta.com/IMG/pdf/barometer_report_2012_data_2009_.pdf (accessed 13 January 2014)
Astana	Dutch Cycling Embassy (2012) “Dutch Cycling Embassy Work Visit to Astana”; see http://www.dutchcycling.nl/library/file/Final%20Report%20work%20visit%20Astana%20may%202012.pdf (accessed 13 January 2014)
Belgrade	Urban Planning Institute of the Republic of Slovenia (2013) “Mid-term evaluation of the GEF/UNDP project ‘Support to the sustainable transport in the city of Belgrade’”; downloaded from http://erc.undp.org/evaluationadmin/manageevaluation/viewevaluationdetail.html?evalid=5288 (accessed 13 January 2014)
Dublin	ECF (2011) “Quality of life in cities and sustainable development – Kiev”, presentation by B. Ensink, Veloforum conference, Kiev, 4 June 2011; see http://www.slideshare.net/viktoza/110604-veloforum-kiev-quality-of-life-final-version (accessed 13 January 2014)
Dushanbe	Government of the Republic of Tajikistan, GEF and UNDP (2010) “Support to Sustainable Transport Management in Dushanbe – INDP-GEF Medium-Sized Project”; see http://www.undp.org/content/dam/tajikistan/docs/projects/environment_and_sustainable_development/00057057_ProDoc_PID%2000070334_Transport%20management_eng.pdf (accessed 13 January 2014)

Kiev	Siemens (2009) "City Portrait: Kiev"; see http://www.siemens.com/entry/cc/features/greencityindex_international/all/en/pdf/kiew.pdf ; downloaded from http://www.siemens.com/entry/cc/en/greencityindex.htm (accessed 13 January 2014)
Minsk	Belarusian Association of experts and surveyors transport Scientific and Production Private Unitary Enterprise (2011) "The concept of the urban system cycling in Minsk" (in Russian); see http://bike.org.by/sites/bike.org.by/files/documents/2011/06/minsk_bike_concept-2010.pdf (accessed 13 January 2014)
Prague	Land Transport Authority (LTA) Academy (2011) "Journeys: Sharing Urban Transport Solutions"; see http://ltaacademy.lta.gov.sg/doc/JOURNEYS_Nov2011.pdf (accessed 13 January 2014)
Rome	Spicycles (2009) "Cycling on the rise: Public Bicycles and other European Experiences"; see http://spicycles.velo.info/Portals/0/Deliverables/SpicyclesFinal_Booklet_sm_all.pdf (accessed 13 January 2014)
Tashkent	Akimov, A. and D. Banister (2011) "Urban transport post-communist transport: The case of Tashkent, Uzbekistan"; see http://cais.anu.edu.au/sites/default/files/Akimov_Banister-Urban%20transport.pdf (accessed 13 January 2014)
Tel Aviv	Abramov, R. (2013) "Tel Aviv is on the bike!", MOVE - The CIVITAS Initiative Quarterly Newsletter, June; see http://www.civitas.eu/sites/default/files/documents/file/civitas_move_14.pdf (accessed 22 January 2014)
Warsaw	EMTA (2012) "EMTA Barometer of public transport in European metropolitan areas (2009)"; see http://www.emta.com/IMG/pdf/barometer_report_2012_data_2009_.pdf (accessed 13 January 2014)
Washington DC	Grabow, M., <i>et al</i> (2012) "Air Quality and Exercise-Related Health Benefits from Reduced Car Travel in the Midwestern United States", University of Wisconsin, Madison; see http://thedataweb.rm.census.gov/TheDataWeb_HotReport2/EPA2/EPA_Transportation2.html?STATE=10&COUNTY=1& (accessed 17 January 2014)
Zagreb	EEA and UNEP (2007) "Sustainable consumption and production in South East Europe and Eastern Europe, Caucasus and Central Asia: Joint UNEP-EEA report on the opportunities and lessons learned"; see http://www.unep.ch/scoe/documents/SCP_report_final_October_2007.pdf (accessed 13 January 2014)

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- ^{xxii} Crossrail Ltd (2011) “Crossrail Business Case Update: Summary Report”, London: Crossrail Limited
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