The Carbon Value of Cycling

Calculations of carbon dioxide reductions by cycling in the Netherlands, Germany and Bogota present an indication of the carbon value of cycling. The contribution by walking has not been taken into account. We recommend a future approach that integrates cycling and walking, in transport strategy, planning and design and impact assessment.

The carbon value of cycling differs for every particular context. This paper highlights three examples: two countries (the Netherlands and Germany) and the city of Bogotá in Colombia.

Netherlands

The Dutch use a bicycle for 27% of all trips. Notwithstanding the high car density, most Dutch people opt for the bicycle for many trips as cycling is convenient and attractive. These trips make up 14.4 billion kilometers travelled in 2005 compared to 148.8 billion kilometers with a car[1]. Per day the Dutch travel on average 2.6 km on the bicycle, 3.3. km by train; 1.1 km by bus, tram and metro; 24.9 km in a car; 0.6 km walking and 1.0 km with other modes. The number of cycling kilometers is 7.8% of the total in transport of people[2]. The CO2 value of these cycling kilometers (Mt CO2 avoided by current cycling) has yet not been established - research is on its way - but considering that in 2008 transport related CO2 emissions in the Netherlands were 39.6 Mt, [3] the CO2 value of cycling might avoid about 3Mt. We have to take into account that cycling as a feeder also makes people to choose for the train instead of the car and is co-responsible for a part of train instead of car km's.

If bicycle use in all Dutch cities would raise to the level of their best performing cities, another 0.9 Mton CO_2 would be avoided. That represents more than 2% of the current CO_2 emissions by transport in the Netherlands and 4-5% of the emissions by cars[4]. The ambitions of the Dutch government for CO2 emission reduction in the transport in 2007 were for energy efficient driving 0,3 Mt; congestion pricing for car's and van's 0.3 Mt; congesting prizing for lorry's 1 – 3 Mt and for the implementation of the EU norm for car's to 120 gram CO2/km: 1,3 – 5,4 Mt[5]. One might conclude that cycling competes with other kind of measures in the transport sector to control CO2 emissions.

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[1] Cycling in the Netherlands, Ministry of transport, 2007; www.fietsberaad.nl

[2] Mobiliteitsonderzoek Nederland (Mobility survey the Netherlands), 2009, Ministry of Transport

[3] In 2008 the total CO2 emissions in the Netherlands was 175.6 of which 39. 6 was transport related. The total of GHG emissions was 209.4 (see www.energie.nl and for forecasts: http://www.ecn.nl/docs/library/report/2010/e10004.pdf

[4] Wat kan fietsbeleid betekenen voor het klimaatbeleid (What is the potential of cycling policy for climate policy)? Hans Nijland, 2009; http://www.pbl.nl/images/Fietsbeleid%20en%20klimaatbeleid_tcm60-43673.pdf

[5] Schoon and zuinig (Clean and economical); Policy by the Ministry of Transport in 2007, to bring down GHG emissions by 30% from 1990 – 2020.
http://english.verkeerenwaterstaat.nl/onderwerpen/begroting/begroting_venw/schoon_en_zuinig/

The high modal share of cycling is a result of firm policies by the local, regional and national government. Dutch cycling-inclusive planning and design of road infrastructure makes congestion in urban areas relatively marginal and results in one of the highest standards of road safety in the world. Nowadays, national, regional and local governments still invests 400 million euro per year in cycling policies. Of that amount, the national government contributes 50 million euro.

Germany

The share of cycling in Germany is 10% of all trips. The German National Cycling Plan 2002-2012 supports local governments in implementing cycling facilities. The Federal Ministry of Transport, referring to the best practices in the country, concludes that cities could increase their bicycle usage by a third combined with a reduction in the number of car trips of 10 %, over a period of eight years.

Extrapolating these CO_2 reductions to the entire population of Germany (82 million) this shift from current car use to cycling amounts to a potential reduction of around 3 Mton of CO_2 per year[6]. In 2002, when the national cycling plan was launched, this would equate to 15-20 % of the traffic-related CO_2 reduction required by the German national climate protection program.

Germany also invests substantially in cycling and cycling is increasingly popular in Germany. In 2002 the budget for building and maintaining cycle lanes within the federal remit was € 100 million. As in other countries, the diversity of bicycle provisions increases, including public bike systems. (Still the quality of German cycling infrastructure lags behind the Dutch. Upon that the Dutch urban transport policies distinguishes one's self in the combined approach of car control interventions with cycling facilities. When travel time on the bicycle becomes shorter than by car through e.g. traffic circulation and the costs for car parking become influential enough, the share of cycling increases at the expense of car use.)

Bogotá

A case study has been performed on Bogotá, Colombia, to estimate the CO2 value of cycling. Cycling in Bogotá has a modal share of 3.3 % on a total of 10 million daily trips, Application of the Opportunity Cost Model results in a Climate Value of Bicycling of 55.000-62.000 tCO_2 per year[7]

[6] National Cycling Plan 2002-2012; Ride your bike! Measures to Promote Cycling in Germany; Federal Ministry of Transport, Building and Housing, Berlin, 2002

[7] Estimating the climate value of cycling in Bogota, Colombia, using a Shadow Pricing Methodology, Massink, 2009, UTwente http://essay.utwente.nl/59405/1/scriptie_R_Massink.pdf