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# Denmark's National Strategy of Green Mobility and Its Impacts

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Denmark has now established itself as a standout in the global field of sustainable transportation, and behind this achievement lies a comprehensive national green mobility strategy—one that not only drives shifts toward low-carbon travel but also makes cities more livable. This article explores the core components of this strategy, including long-term policies, infrastructure development, incentive measures, and governance collaboration, while also analyzing its impacts on the environment, public health, and the economy. Drawing on practices in Copenhagen and insights from bicycle urban planning, the research finds that Denmark's integrated approach serves as a replicable model. Notably, it highlights the importance of aligned national-local implementation, equitable infrastructure development, and cultural acceptance of green mobility.

*Keywords:* Denmark, green mobility, national strategy, sustainable transportation

## Introduction

The world is trying hard to deal with climate change, and that's why sustainable transport has become so important in environmental policies. Things like cycling or taking buses and trains, what we call green mobility, are big ways to cut down on carbon gases, make people healthier, and help cities handle tough situations better.

Today, cities and countries have two big problems to face: Cities are growing radically fast, and climate change is getting more and more urgent. Denmark has done well here because it's spent decades working to change how its transport system works. A lot of countries try different things that do not connect well. But Denmark's plan puts together national rules, new ideas from local areas, and input from people to make one strong system for green mobility.

Copenhagen, Denmark's capital, is a good example of how well this system works. In 2023, 62% of people rode bikes to work. That's way up from 36% back in 1995 (City of Copenhagen, 2023[1]). This did not just happen—it came from careful planning. You can see this in important papers like *Good, Better, Best: The City of Copenhagen's Bicycle Strategy 2011-2025* (Copenhagen City Technical and Environmental Administration [CCTEA] Traffic Department, 2011) and *Denmark—On Your Bike! The National Bicycle Strategy* (Transportministeriet, 2014). All these policies have the same goal: to make green mobility the easiest, safest, and cheapest way to get around for everyone. It does not matter how old you are, how much money you have, or where you live.

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[1] https://www.kk.dk/en/transport-and-streets/mobility.

This study wants to answer the following questions: (1) What are the basic parts of Denmark's national green mobility plan? And how do these parts work together to make big changes happen? (2) What effects has this plan had on the environment, on society, and on the economy? (3) What can other countries learn from Denmark? And what problems do they need to solve to make the same things work for them? By looking into these questions, this paper analyzes the growing number of studies on sustainable transport. It gives useful insights to people who make policies, plan cities, and do research.

## Literature Review

Green mobility is all about transport systems that do not harm the environment much, while still bringing big social and economic benefits. It started as a small, specific idea, but now it's a key part of global plans to keep our world sustainable (European Commission, 2020).

Experts like Banister (2018) say green mobility is not just about fixing technical problems. It's a system that links things like roads, policies, technology, and even cultural habits. To make this work, three goals need to balance each other: protecting the environment (cutting carbon emissions and pollution), making sure everyone can use it (no matter who they are), and keeping costs low while creating value.

To tell if green mobility is working, we look at a couple of things. For example, how many people use bikes or buses instead of cars, how much carbon transport puts out, and how easy it is to get around without a private car. These things matter differently in different places. Cities care more about bikes and buses, while rural areas focus on cheap, low-emission options and good connections.

Countries around the world have tried different ways to promote green mobility. The Netherlands, like Denmark, has focused a lot on building better bike paths. About 30% of all trips there are by bike. Singapore controls car use with congestion fees and limits how many people can own cars. Sweden has put a lot of money into electric cars, offering subsidies and building more charging stations. But these methods often do not work together well. For example, focusing only on electric cars might cut emissions, but it will not fix crowded cities or people not getting enough exercise.

Denmark is different because it uses a complete approach. It combines building better infrastructure, offering incentives through policies, and changing cultural attitudes, both in cities and rural areas. This full way of doing things has caught the attention of researchers studying transport changes, both in the West and Asia. They think it could work in fast-growing Chinese cities too.

Denmark started caring about sustainable transport back in the 1970s, when the oil crisis showed how weak its fossil fuel-dependent transport system was. At first, it expanded public transit and built basic bike lanes. But it was not until the 1990s that a clear, connected strategy took shape people sitting too much, and realizing that cycling can help the economy.

Copenhagen played a big part in this progress. The city's *Good, Better, Best* strategy set up three levels for bike infrastructure: "good" (separate lanes to keep people safe), "better" (connected routes to save time), and "best" (fitting smoothly with public spaces and transit). They checked on this every year, like in *The Bicycle Account 2014*[2]. This report tracked things like how many kilometers of lanes there were, how many crashes happened, and how happy people were with it.

[2] https://www.kk.dk/en/transport-and-streets/mobility.

At the national level, *Denmark—On Your Bike! The National Bicycle Strategy* expanded this idea. It set aside €250 million each year for bike paths between cities and made rules for how they should be built. In this way, the national and local governments worked together: what experts call "flexible centralization". It kept goals the same across the country but let regions adapt to their own needs.

Colville-Andersen's 2018 book *Copenhagenize: The Definitive Guide to Global Bicycle Urbanism* turned Denmark's experience into simple rules anyone could follow. The book talks about "bicycle urbanism": designing cities around how people move, not cars. Key parts include slowing down cars (to 30 km/h in cities to make them safer), mixing bike use with trains and buses (with safe parking and combined tickets), and making cycling normal (with wide lanes for families with cargo bikes, for example). These ideas match Copenhagen's plan to be an eco-metropolis (CCTEA, 2015), which wants the city to have zero carbon emissions by 2025 by using green mobility and saving energy. All these documents and plans form the basis of how Denmark does things today.

## Methodology

We used a mix of methods for this study, using both qualitative and quantitative analysis to look at Denmark's green mobility strategy and how it's worked. We picked this mix because it lets us look at both the complicated parts of policy processes (that's the qualitative part) and the results we can measure (the quantitative part). This helps make our findings more valid through something called triangulation.

We got our data from two main places. First, we did a careful review of 15 key documents. These included national strategies like *Denmark—On Your Bike!*, the *Transport Plan 2030* (Danish Ministry of Transport, 2020), local plans such as Copenhagen's *Good, Better, Best*, and evaluation reports like *The Bicycle Account 2014*. We analyzed these documents by looking for key themes to find the main parts of the strategy, how it's put into action, and what goals it sets out.

For numbers and statistics, we used data from authoritative sources. Statistics Denmark (2023) gave us data on how people get around: biking, walking, taking public transit, or driving. The Danish Energy Agency (2023) provided information on $CO_2$ emissions from transport. The Danish Environmental Protection Agency had data on air quality, like PM2.5 and $NO_2$ levels. The Danish Health Authority shared data on obesity rates, how active people are, and hospital stays for heart diseases. We also used economic data from the Danish Bicycle Industry Association, things like income and jobs, plus property value information from the Danish Real Estate Association (2023).

We analyzed the data in three steps. First, we mapped out the strategy to find its main parts (policy, infrastructure, incentives, governance) and how well they work together at national and local levels. Secondly, we looked at the impacts: how it affects the environment (like less emissions), society (health and fairness), and the economy (saving money, growing industries). Thirdly, we figured out what lessons we can learn, picking out parts that other places could copy and the challenges that depend on local conditions, by comparing the different cases.

## Analysis and Discussion

Through detailed analysis, we found that Denmark's green mobility plan rests on four main parts that work together. Each part is supported by policies, money, and people getting involved.

First, long-term planning and keeping policies consistent are the foundation. Different political parties have stuck with this for decades. The *Transport Plan 2030* sets targets that have legal force: cut transport $CO_2$

emissions by 50% by 2030 (compared to 1990), get 25% more people cycling or walking, and make sure everyone can reach public transit within 10 minutes of home or work. These targets build on earlier ones. For example, the 2014 national strategy aimed for 25% of commuters to cycle by 2020. Cities hit that (38%), but rural areas did not (15%; European Cyclists' Federation [ECF], 2016). To keep policies on track, the national government and local councils make "sustainable mobility contracts". Local councils get money (€500 million a year from the Green Transport Fund) to follow national goals. For example, Copenhagen's 2025 plan will add 200 km to its Cycle Superhighways. Viborg's plan focuses on e-bike charging spots and rural bus routes.

Alongside these policies, Denmark has put a lot of money into building things like bike lanes and walkways. Since 2010, it's spent €7 billion on active transport infrastructure. 60% goes to cycling, 25% to making walking easier, and 15% to public transit stops. Cities have seen the most work. Copenhagen's Cycle Superhighways, which started in 2012, now stretch 500 km. They have traffic lights timed for cyclists, covered parking at train stations (for 20,000 bikes), and get cleared in winter so people can use them all year. These match the "best" level in *Good, Better, Best*, cutting peak commute times by 15-20% compared to cars. Rural areas have adapted this idea, like Viborg's "Green Lanes". These two-meter-wide paths connect villages to town centers, with 80% of the cost paid by the national government. Rural cycling is still lower (18%) than in cities (41%), but it's up 7% since 2015: faster than the 3% average for rural areas in the EU.

Besides building things, policies and small pushes to change behavior help make green mobility the first choice. Financial perks include tax breaks (employees can get up to €1,200 a year for a company bike), subsidies (low-income families get 50% off e-bikes, max €750), and "Mobility Cards" that give discounts on buses, trains, and bike shares. On the other hand, owning a car is more expensive: high registration taxes (150% of the car's value, 200% for big ones), congestion fees in Copenhagen (€8-10 a day, more at busy times), and 30% fewer on-street parking spots since 2010, space used for bike lanes and public squares instead (City of Copenhagen, 2023[3]). These changes have shifted what people think: A 2023 survey found 72% of Danes see cycling as "practical" (up from 48% in 2000). 85% of parents say their kids cycle to school regularly (Danish Cyclists' Federation, 2023).

Finally, how things are run and working together, called "flexible centralization", balances national oversight with local control. Key ways to do this include regional mobility groups. These are teams of local councils, transit companies, and businesses. For example, the Zealand Region Partnership covers Copenhagen and nearby areas. It's made tickets work across systems and matched bike and train times, cutting transfer times by 30% (Zealand Region, 2023). People get involved through things like Copenhagen's "Cycle Track Design Workshops", where residents vote on route paths and extras. Businesses join in too: IKEA Denmark gives employees bonuses for cycling, and insurance companies offer discounts to cyclists.

This strategy has many effects on the environment, society, and the economy. Environmentally, Denmark's transport emitted 14.3 million tons of $CO_2$ in 2022. That's 29% less than in 2005, beating the EU's 21% target. Cycling alone cuts 17% of those emissions; each regular cyclist replaces 1.2 car trips a week. City air is better too: Copenhagen's PM2.5 levels (12 $\mu g/m^3$) are 40% below the EU average. Traffic-related $NO_2$ is down 35% since 2010. But there's a gap: Rural transport emissions fell 18%, while cities saw a 34% drop. This shows rural areas still rely more on cars and have less public transit.

Socially, more active transport means better health. Denmark has the EU's lowest obesity rate (19%). City dwellers cycle 2.3 hours a week: three times the EU average (Eurostat, 2022). Hospital stays for ischemic heart

[3] https://www.kk.dk/en/transport-and-streets/mobility.

disease are down 22% since 2000; researchers say 15% of that is from cycling and walking. It's fairer too: In Copenhagen, 68% of low-income people cycle regularly (more than the city's 62% average). Men (52%) and women (48%) cycle almost equally, rare worldwide. This is different from cities like London, where cycling is mostly for well-off men. It shows Denmark focuses on "universal design": wide lanes, gentle slopes, and easy parking for seniors, families with cargo bikes, and people with disabilities.

Economically, there are big benefits. Spending less on imported fossil fuels saves €1.8 billion a year—0.5% of GDP (Danish Ministry of Finance, 2023). The bike industry (making, selling, fixing bikes) now makes €4.2 billion and employs 22,000 people: up 40% since 2010. Homes within 500 meters of Cycle Superhighways cost 7% more, showing people want bike-friendly neighborhoods.

But there are three main challenges. First, there's still a gap between rural and urban areas. Rural places have fewer people (so building infrastructure is harder to justify), longer trips (60% are over 10 km, making cycling tough), and colder winters (cycling drops 40% in rural areas vs. 15% in cities with cleared lanes). E-bikes have helped a bit: Rural use went up 40% between 2020 and 2023, but they cost around €2,500, which is too much for low-income families.

Secondly, money and upfront costs are a problem. Copenhagen's Cycle Superhighways cost €1.2 million per km; rural Green Lanes cost €800,000 per km. Over time, savings (like lower healthcare and fuel costs) make up for it, but cash-strapped local councils struggle to pay upfront.

Thirdly, there's political and public pushback. Recent populist groups say car restrictions are "anti-middle class". For example, in 2022, voters in Aarhus rejected a proposed congestion fee and worried it would hurt suburban commuters' wallets and access. To keep everyone on board, they need to keep people involved and support vulnerable groups.

## Conclusion

Denmark's green transport plan shows that people can really change how they get around. The main things that make it work are planning for the long term, policies that fit together, and always thinking about fairness.

Policymakers around the world can learn a lot from this. For example, planning needs to look at the whole system. Roads, ways to encourage people, and how things are run all need to work together at every level. That way, policies do not get stuck in their own little areas and stop working. Also, fairness has to be part of the plan from the start. Things like wide bike lanes and easy-to-use buses or trains, for instance, make sure green transport helps everyone, no matter who they are.

Transport plans also need to be changed to fit. That might mean spending money on e-bikes, keeping paths in good shape all year, and having cheap public transport that works for what rural areas need. There's more to study, too, like, how technology, smart bike lanes, or shared e-bikes, could help fix the differences between country and city areas, or how to keep people supporting these plans when what voters care about changes, and figuring out how Denmark's ideas might work in other cultures, especially busy Asian cities with lots of people.

Finally, Denmark's story makes it pretty clear: Green transport is not just something we need for the environment. It helps build healthier, fairer, and more lively communities. As Colville-Andersen said in 2018, "Copenhagen's success is not just about bike lanes. It's about designing cities for people, not cars". This focus on people gives other countries a good example for making transport sustainable in the 21st century.

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