



# Delivering hydrogen transport

*A best practice guide for cities and regions*

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## Introduction

There is an increasingly urgent need for cities across Europe and beyond to address poor air quality, which has significant impacts on citizens' health and is largely caused by road transport emissions. In addition, many countries have committed to reducing greenhouse gas emissions and reliance on fossil fuels. There is strong interest in hydrogen transport as a solution to these challenges, with high levels of investment in developing and demonstrating the technology in recent years, and a number of countries implementing national rollout plans.

Successful development of the hydrogen transport market will see vehicle volumes increase as zero emission hydrogen-fuelled vehicles replace petroleum-fuelled incumbents, leading to cost reductions in hydrogen and fuel cell technology that will allow fuel cell electric vehicles (FCEVs) to compete with alternative powertrains in the mass market.



However, there are a number of challenges in the short term (high vehicle prices, lack of refuelling infrastructure, etc.) which mean that hydrogen transport systems will not be delivered by the private sector alone. With a good understanding of the needs of citizens and various policy tools at their disposal, local regions have an important role to play in stimulating the uptake of hydrogen transport in the early phases of commercialisation.

This document is a summary of the *best practice guide on the role of cities and regions in the early rollout of hydrogen transport*, which explores the challenges facing the sector and the supportive actions that can be taken at a regional / city level to deliver the benefits available.

## Benefits of hydrogen transport

Fuel cell electric vehicles offer all the positive features of battery electric vehicles (no harmful emissions at point of use, shift from petroleum-based fuels etc.), with the further advantage of long range (500km+) and fast refuelling times (c.3 minutes). The lack of compromise in offer to drivers compared to conventional vehicles explains automotive OEMs' investments in developing the technology over decades (which run into €billions).



National governments are interested in the technology due to the overall benefits a transition to a hydrogen-based transport system can yield:

- **Road transport decarbonisation** – since hydrogen can be produced from various energy sources, including renewables.
- **New economic opportunities** – local production and supply of fuel (and potentially vehicles) creates new opportunities across the value chain.
- **Diversity of energy supply** – reducing reliance on imported fossil fuels.

- **Reduced local environmental impact** – FCEVs offer quiet operation and no harmful tailpipe emissions.

### Early market challenges

The full benefits will only be delivered following a wholesale transition to zero emission vehicles, a process that will take decades and that must start with a successful initial commercialisation phase. Some of the immediate economic challenges facing the sector include:

#### Fuel cell electric vehicle costs

Vehicle costs are likely to be high while production volumes are low, which implies high FCEV prices and / or unprofitable business for OEMs in the early years.

#### Hydrogen refuelling station (HRS) coverage

Networks of refuelling stations are generally needed before vehicle deployment to make a plausible offer to potential customers. However, there is little incentive to provide stations in the absence of vehicles and with high levels of uncertainty regarding demand for hydrogen. Furthermore, low initial utilisation of HRS networks leads to a significant challenge in terms of making a return on investments in refuelling infrastructure.

#### Lack of first mover advantage

Expectations that vehicle and infrastructure costs will fall in future due to economies of scale and technology development leads to a first mover disadvantage and challenges to securing investments in initial HRS networks.

#### Need for coordinated action

Vehicle and infrastructure providers must act in a coordinated fashion to create viable business cases for hydrogen transport in the medium term.

#### Cost / benefit split

Without intervention the costs fall on specific parties (OEMs, HRS providers, early adopters), but the benefits of increased uptake of FCEVs accrue to society as a whole.

To overcome these challenges many countries have implemented (or are planning) national level support mechanisms for hydrogen transport, often as part of a suite of measures aimed at supporting the uptake of low / zero emission vehicles in general. However, even with national incentives in place, the case for adopting hydrogen transport in the short term (which needs investments from industry and an attractive offer to customers) may not be compelling. Local authorities can play a supporting role in the early phase of hydrogen transport deployment by taking action to improve the proposition to early adopters and thus help initiate launch markets for the technology. There exists a range of measures available to local authorities which can be used to supplement national-level incentives, as summarised below.



	Short term (early commercialisation)	Medium term (to 2020 and beyond)
Vehicles	<ul style="list-style-type: none"> <li>• Free parking</li> <li>• Fast-track parking permit applications</li> <li>• Local tax exemptions</li> <li>• Access to bus lanes / high occupancy vehicle lanes</li> <li>• Exemption from toll charges (ferries / bridges / motorways)</li> <li>• Public sector procurement</li> </ul>	<ul style="list-style-type: none"> <li>• Air quality directives (low emission zones)</li> <li>• Access to restricted areas (quiet zones)</li> <li>• Regulation to force uptake in certain segments (e.g. taxi fleets, delivery vehicles)</li> </ul>
Infrastructure	<ul style="list-style-type: none"> <li>• Identify / earmark sites for HRS</li> <li>• Direct support for infrastructure (grants / loans / equity investment)</li> </ul>	<ul style="list-style-type: none"> <li>• Implement local planning regulations to favour HRS</li> <li>• Develop a consensus on network planning</li> <li>• Provide tax reductions for businesses that offer land for HRS</li> </ul>
Awareness	<ul style="list-style-type: none"> <li>• Develop an overall awareness-raising strategy and coordinate activities at a city / regional level</li> <li>• Support promotional events (e.g. attendance of high profile individuals at station openings, first FCEV introductions, etc.)</li> <li>• Place FCEVs with high profile fleet users</li> <li>• Organise regular local promotional campaigns</li> <li>• Facilitate training of fire service, regulators, end users</li> </ul>	<ul style="list-style-type: none"> <li>• Educational programmes (e.g. education centres at selected HRS)</li> <li>• Dissemination of experiences of early adopters (e.g. public sector fleets) to targeted audiences and the general public</li> </ul>

**Measures available to cities / regions to support the uptake of hydrogen transport**

The palette of mechanisms above includes short-term actions that can be taken to support the early market for hydrogen transport at a local level, and options better suited to implementation in the medium term, but which should be signalled early to facilitate the market preparation phase.

The most appropriate measures will be region-specific and depend on what is most valuable to the local residents, any limitations on the types of support that can be offered, other related policies, etc.; while the effectiveness of local action is dependent upon:

- A national strategy and supportive policies for hydrogen transport – it is generally accepted that regional policies in isolation are unlikely to be sufficient to initiate local markets for hydrogen transport.
- Recognising the gradual nature of the expected uptake and providing medium to long-term clarity on supportive measures, e.g. signal duration of support for early adopters of FCEVs, provide advanced warning of plans to implement policies such as low emission zones or mandating zero emission vehicles in selected fleets.

Policy development must take into account the remaining uncertainties, which include availability and price of FCEVs, rate of uptake of the technology, timescales for introduction of second generation (lower cost) models etc. These uncertainties and risks can be addressed to some extent by close dialogue with the industry; a further mitigation strategy is to implement policies that apply to a range of zero emission vehicle types.

## Recommendations

The following advice is offered to local regions interested in becoming launch markets for hydrogen transport:

1. **Clarify intentions** – while the successful commercialisation of hydrogen transport will require action in multiple areas in parallel, some regions will not be suitable launch markets. Local authorities should decide whether or not to support hydrogen transport (e.g. based on national plans, the technology’s fit with local strategic priorities etc.) and commit to the decision.
2. **Develop a hydrogen transport strategy** – regions seeking to support the technology should develop a comprehensive strategy that justifies and informs the actions to be taken. Ideally, the strategy should be underwritten by public buy-in and cross-party political support, be informed by consultation with industry, and set out the long-term vision for hydrogen transport in the local area.
3. **Evaluate policy options** – additional measures may be required to support the market and achieve the ambitions of the local hydrogen transport strategy. Selection of appropriate measures should take account of existing policies, national level incentives, the issues faced by local drivers, etc.
4. **Take action** – local authorities should implement the selected policies / measures, provide clarity on the duration of any incentives, and give advanced warning of future plans.
5. **Monitor progress** – the effectiveness of the measures taken should be evaluated by keeping track of progress towards the defined vision. This may include monitoring developments in the industry and the rate of deployment of infrastructure and vehicles in the local area.