

# Joint procurement of fuel cell buses

## Lessons learnt

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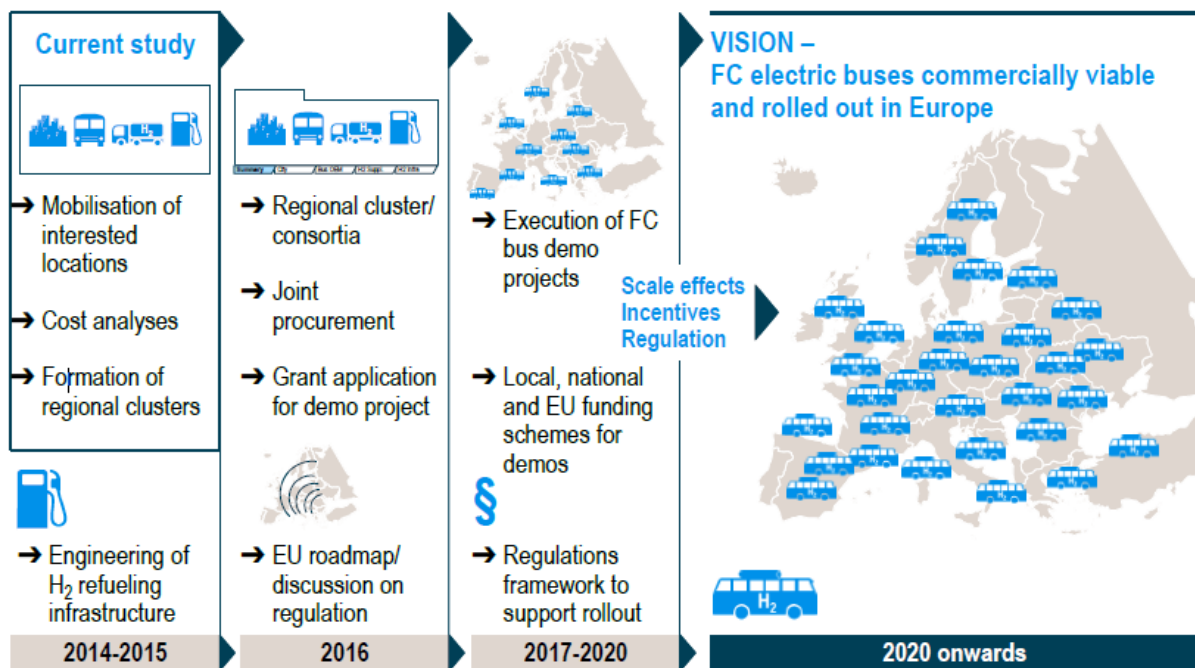
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## Introduction

The JIVE projects (JIVE and JIVE 2) are supporting deployment and operation of new fleets of fuel cell buses in over 20 cities across Europe. In total, around 290 new vehicles are due to be demonstrated via these projects. A key aim of this initiative is to reduce the costs (and hence prices) of fuel cell buses by deploying large fleets of standardised vehicles. Joint procurement approaches whereby cities with similar needs agree on common base specifications for vehicles and then coordinate their tendering exercises are core to realising the economies of scale required to bring about the cost reductions in line with the project's aims.

This approach is consistent with the recommendations of the 2015 fuel cell bus commercialisation study: *"cities and operators need to engage and jointly prepare for large-scale deployment projects. Preparing joint procurement of FC buses is expected to stand at the centre of the work in regional clusters. Jointly procuring FC buses in cooperation with other bus operators and/or public transport authorities in the same region can help to achieve the scale effects required for a price reduction."*



FCH JU fuel cell bus commercialisation vision<sup>1</sup>

The FCH JU funded a group of “cluster coordinators” to support cities in five geographic clusters in preparing for and executing joint procurement exercises for fuel cell buses. This cluster coordination activity began in autumn 2015 and was carried out in two phases to the end of 2017. Further context and information on the activities carried out by the cluster coordinators is available from the study reports.<sup>2</sup>

As of 2018, joint procurement exercises have been prepared / executed in three of the five clusters: the UK, Germany / Northern Italy, and Northern / Eastern Europe. Joint procurement processes have also been explored and developed in the French and Benelux clusters, and work in this area is on-going as part of the JIVE 2 project (which includes cities from these two regions).

<sup>1</sup> Source: *Fuel Cell Electric Buses – Potential for Sustainable Public Transport in Europe*, Figure 5, p.16 (2015).

<sup>2</sup> See [www.fch.europa.eu/publications/strategies-joint-procurement-fuel-cell-buses](http://www.fch.europa.eu/publications/strategies-joint-procurement-fuel-cell-buses).

This report summarises the processes followed by the first mover cities in JIVE in relation to joint procurement of fuel cell buses. The main purpose is to capture key lessons for future projects and to inform the decision making of other cities within the JIVE / JIVE 2 projects. As procurement exercises are on-going (as of mid-2018), this report will be updated later in the project to capture the full range of lessons learnt following conclusion of the tendering processes.

## Joint procurement in the UK

### Context

In 2014 a group of cities with an interest in deploying zero emission buses began collaborating on a programme with an overarching ambition to deploy approximately one hundred fuel cell buses by the early 2020s. Generally speaking, city councils in the UK are interested in fuel cell buses for similar reasons, primarily an urgent need to act to address poor air quality and commitments to reducing greenhouse gas emissions. The planned Ultra Low Emission Zone in London and Clean Air Zone in Birmingham, both of which will place strict limits on vehicle emissions by the end of the decade, are concrete examples of regulation providing a strong impetus for procuring zero emission buses.

The project was initiated at a time when the level of fuel cell bus deployment in the UK (and elsewhere) was limited – e.g. as of early 2015 there were just 18 fuel cell buses operating in the UK (ten in Aberdeen and eight in London). Furthermore, the choice of vehicles was very restricted, with only a small number of suppliers offering fuel cell buses and a limited model choice (single deck only). The UK's "100 Fuel Cell Bus Project" was conceived as part of a broader, Europe-wide effort to support the commercialisation of the technology, which included a project investigating options for joint procurement of fuel cell buses between cities with similar requirements.<sup>3</sup>

### Process

The implementation of a joint procurement process for fuel cell buses followed three stages:

- 1) **Development of an approach to procurement** – in the first stage a working group comprising representatives of a selection of the interested cities was formed. Working with procurement experts, this group considered the advantages and disadvantages of a range of options for joint procurement, and narrowed down the options to a preferred approach.
- 2) **Preparation for procurement** – in the second stage the group developed the documents required to carry out a procurement process that complies with public procurement regulations. This involved consultation with bus operators and early market engagement with potential suppliers to collect information that informed the details of the procurement strategy.<sup>4</sup>
- 3) **Formal procurement** – the formal procurement process was launched with the publication of the invitation to negotiate in April 2017.<sup>5</sup>

<sup>3</sup> *Strategies for joint procurement of fuel cell buses*, Element Energy et al. for the FCH JU (June 2016). [www.fch.europa.eu/publications/strategies-joint-procurement-fuel-cell-buses](http://www.fch.europa.eu/publications/strategies-joint-procurement-fuel-cell-buses).

<sup>4</sup> For example, a request for information was published in January 2016.

See [www.publiccontractscotland.gov.uk/search/show/search\\_view.aspx?ID=JAN231981](http://www.publiccontractscotland.gov.uk/search/show/search_view.aspx?ID=JAN231981).

<sup>5</sup> The OJEU notice was published here: <http://ted.europa.eu/udl?uri=TED:NOTICE:157506-2017:TEXT:EN:HTML&src=0>.



## Requirements

The procurement process was developed to satisfy the following requirements:

- Facilitate the acquisition of hydrogen fuel cell buses by public and private sector organisations across the UK and beyond from 2017 to the early 2020s. This implies the need to comply with relevant procurement regulations and the policies of each partner involved.
- Allow the introduction of these vehicles into daily fare-paying passenger service over a period of many years. This implied the need for on-going maintenance support, and a mechanism to allow benefits of technology development and cost reductions to be captured.
- Aggregate demand for vehicles in the UK and coordinate with similar initiatives elsewhere in Europe to enable suppliers to scale up production and thus reduce costs in line with commercialisation targets.
- Accommodate a range of ownership structures to reflect the different models for delivering bus services in cities across the UK.
- Support the commercialisation of fuel cell buses by encouraging multiple suppliers to develop offerings, signalling the future demand for such vehicles, and creating competition that encourages new innovations and price reductions.

## Options considered

The procurement working group that was formed as part of the *100 Fuel Cell Bus Project* considered various ways in which the procurement exercise could be run. The group quickly concluded that a fully compliant procurement exercise would be preferable to a less formal approach (such as a market test or partnering request). Despite the limited number of suppliers offering fuel cell buses when these issues were being considered (mid-2015), it was felt that an open, competitive procedure would be the most appropriate approach to (a) stimulate the market and (b) ensure best value for money.

Having agreed to run a full procurement process, the group then explored how this would be executed. The main options evaluated were:

- Joint procurement – i.e. combining the procurement actions of two or more contracting authorities (with one tender on behalf of all.)
- Simultaneous bilateral procurement – whereby each authority seeks to procure the same products but in a coordinated manner.

The joint procurement process was preferred as it lowers the risk of failing to achieve sufficient scale and offers efficiency benefits due to only needing to run one procurement exercise.

The structure of the joint procurement exercise then had to be considered. Again, several options were available:

- Lead authority approach – in which one authority takes the lead, with others feeding into the specification and evaluation phases.
- Specialist procurement agency – using an existing organisation that carries out joint procurement for public sector bodies (e.g. Crown Commercial Service, CMAL, Scotland Excel). While this was raised as an

option, the consensus was that these types of organisations are better suited to procurement of commodities / utilities than innovative vehicles.

- New entity – forming a new legal entity could allow shared responsibility for procurement and give the flexibility for different types of organisations to procure vehicles on the same terms. Different variations of this option were also considered, e.g. an entity to simply carry out a compliant procurement exercise, through to the new entity procuring then owning and leasing the vehicles to operators.

The working group concluded that the lead authority approach offered a relatively simple, pragmatic solution and given willingness from partners within the project to take on the lead authority role, this was the chosen solution. In terms of type of procurement, the EU Public Contracts Directive (2014) defines five main award procedures:

- **Open procedure** – all interested parties may respond to OJEU advertisement by submitting a tender.
- **Restricted procedure** – includes a selection process for those who respond to the OJEU advert and only selected companies are invited to submit a tender for the contract.
- **Competitive dialogue procedure** – a selection of those who respond to the advert is made and the contracting authority enters into dialogue with potential bidders to develop one or more suitable solutions. It is on this basis that bidders are then invited to tender.
- **Competitive procedure with negotiation** – a selection of those who respond to the advert is made and only selected companies are invited to submit initial tenders for the contract. The contracting authority can then start negotiations with the tenderers to seek improved offers.
- **Innovative partnership procedure** – a selection of those who respond to the advert is made and the contracting authority invites suppliers to submit ideas to develop innovative works / supplies / services to meet a need for which there is no suitable existing product on the market. Partnerships may be awarded to more than one supplier.

Given the relatively limited number of suppliers able to offer fuel cell buses that will meet the required specification and the anticipated developments in the sector, the group chose the competitive procedure with negotiation.

## Solution

The procurement approach taken involved Transport for London tendering to establish a framework of suppliers able to offer fuel cell buses in two “lots”:

- Single deck fuel cell buses.
- Double deck fuel cell buses.

The rationale for forming distinct “lots” was mainly based on the desire to avoid inhibiting the potential supply base – i.e. some suppliers may be able to offer certain solutions only and the intention was to encourage as many as possible to offer suitable products.

The concept was to appoint qualified suppliers on to the framework via a competitive OJEU process, and then for vehicle orders to be placed via a series of mini competitions (“call offs”) amongst the appointed suppliers.<sup>6</sup> The framework will be in place for at least three years, with an option to extend by a further year. This provides a sustainable mechanism for on-going procurement of fuel cell buses over the medium term. The framework approach also aims to encourage continued development of the technology by manufacturers by allowing

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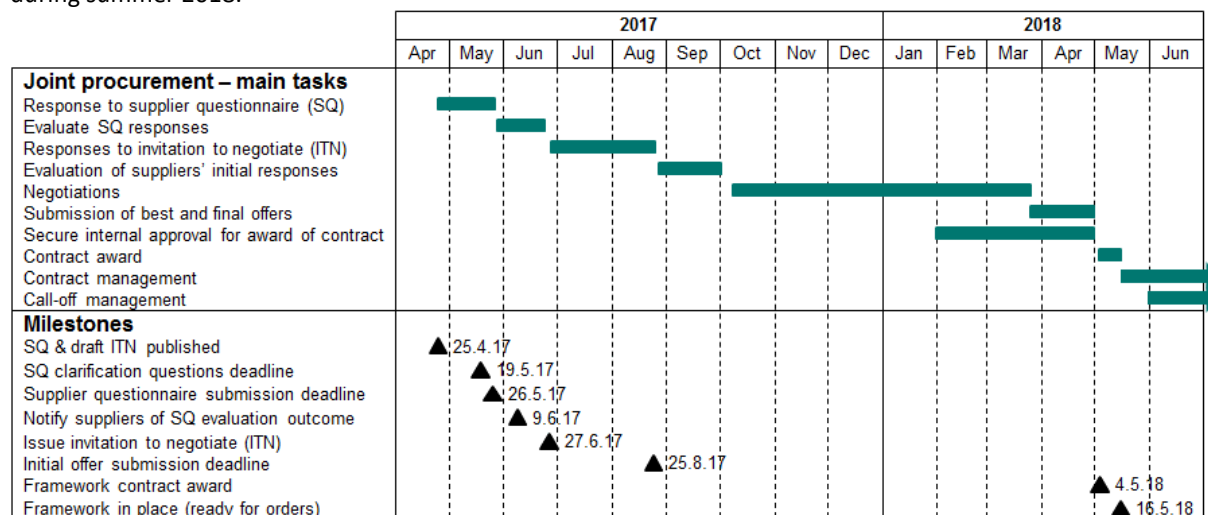
<sup>6</sup> Note that the procurement arrangements also allow direct award of contracts for bus supply to selected suppliers on the framework.

multiple suppliers to participate, thus avoiding the risk of creating a monopoly position and discouraging competition.

Other characteristics of the framework approach include:

- At the call off stage, contracts are put in place between the selected supplier(s) and individual authorities / operators procuring the buses. Although TfL runs the procurement exercise and manages the framework, TfL will not enter contracts for bus supply on behalf of other cities / regions.
- A series of call offs are envisaged throughout the life of the framework. The intention is to secure best value for money by enabling any cost reductions achieved as the sector scales up to be reflected in prices offered at different points in time.
- Provisions are in place to enable a wide range of public and private sector organisations to use the framework. While the exercise is designed around buses for the UK market, the option of organisations from other countries using the framework exists.

The formal procurement exercise for appointing suppliers to the first two lots was launched in April 2017 and followed the timescales below. After a protracted negotiation period, the framework was awarded in early May 2018. The cities involved in the joint procurement process are planning to place the first order for buses during summer 2018.



## Lessons learnt

While the overall process to establish a joint procurement framework took longer than anticipated, and involved a far higher level of effort than originally envisaged, this exercise has been a success in that multiple suppliers have confirmed their ability to offer vehicles that meet the required technical and commercial conditions. The following lessons can be drawn from the experience to date:

### Overall approach to procurement

- One concept considered early in the process was based on selecting a preferred bus supplier before acquiring funding for the buses (from the FCH JU and other sources), and then entering into firm contracts for bus supply. The idea was that by working with a preferred supplier, applications for grant funding would be strengthened. However, the procurement working group concluded that it would be preferable to avoid committing to one supplier too early and that keeping options open would ultimately lead to greater competition and hence more attractive offers.



- An early conclusion of the procurement working group was that it is necessary to run a fully compliant procurement exercise for the buses given that (some of) the expected customers are public sector organisations.
- At one stage the group considered giving the lead role on procurement to a private sector bus operator, who could also conduct a compliant procurement exercise. The rationale for this concept is that large private operators purchase hundreds of buses per annum and are therefore well placed to use their purchasing power to achieve more attractive commercial terms. The group decided that on balance it was preferable to retain control over the process within the public sector bodies that are driving the fuel cell bus deployment initiative.
- The level of resource required to run a joint procurement exercise of this type should not be underestimated. There is a need for procurement experts, technical input (e.g. writing specifications), and legal advice as per any standard procurement for vehicles. In addition, time needs to be budgeted for coordinating between multiple councils / authorities and collecting input from a broad range of stakeholders (e.g. details of how bus specifications vary by city).
- The group also considered the option of jointly procuring hydrogen refuelling stations / hydrogen supplies, but concluded that given (a) the differing requirements in different locations and (b) the limited scope for economies of scale effects to reduce costs, it is more appropriate for cities to develop their own refuelling infrastructure plans.

#### **Procurement process and timescales**

- There is a need for a procurement strategy document that sets out the terms of reference for the group and responsibilities of all involved. Creation and agreement of such a document is generally the first step in any procurement process.
- It will have taken over three years from initially considering options for joint procurement to the first orders of buses. This is far longer than originally envisaged and not a timescale that others embarking on a similar exercise should seek to replicate. Delays occurred at various stages in the process and for many different reasons. For example, there was a change to the lead authority after the initial phase of work. There were also delays in issuing tender documents due to factors beyond the control of the core project team.<sup>7</sup> Following the launch of the formal procurement exercise, the timescales had to be revised to account for constraints faced by the potential suppliers (e.g. summer factory shutdowns, availability of appropriate representatives to attend negotiation discussions).
- While delays in the procurement process caused some frustration amongst parties seeking to deploy the zero emission buses as soon as possible, there were some advantages to the extended timescale. For example, there was more time for the potential suppliers to develop their products and improve their offers, an important factor in a market such as this where one of the aims was to encourage new suppliers to offer new products. The delays also provided additional time for the cities to secure all the funding necessary to commit to purchasing fleets of fuel cell buses and to progress with plans for refuelling infrastructure deployment.
- One of the important factors behind the success of this exercise has been early market engagement. Dialogue with potential suppliers was initiated early in the process and proved useful for informing suppliers of the emerging opportunity while allowing the buyers to tailor the process to maximise the chances of a desirable outcome.

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<sup>7</sup> For example, shortly before the planned ITN publication date (the point at which the tender documents, including the draft contract, were published), concerns over certain details in the draft contract were raised by legal experts reviewing the documents. Due to exceptionally high workload (from other areas of the business), the process of refining these details took several weeks.

## Joint procurement in Germany / Northern Italy

### Overview of approach

The approach to joint procurement in the German cluster was similar in many respects to the process followed in the UK, with one city leading a fully compliant procurement exercise on behalf of a consortium. Like in the UK (where there was potential demand for two main types of bus: single deck and double deck), the demand from cities in the German cluster required a mix of vehicle configurations: some standard (c. 12m long) buses and some articulated (c.18m long) buses. The main difference compared to the UK was that the German joint procurement exercise did not seek to establish a framework for on-going orders of buses, instead the German cluster plans to run follow-on procurements for additional buses as demands increase.

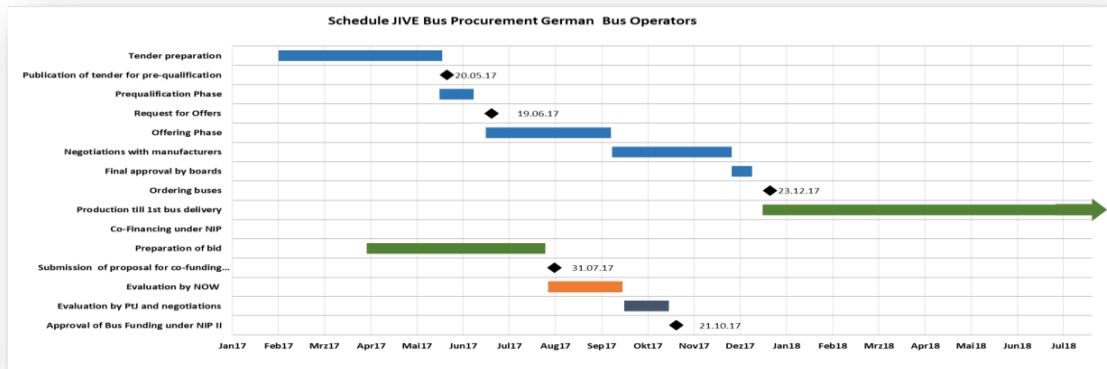
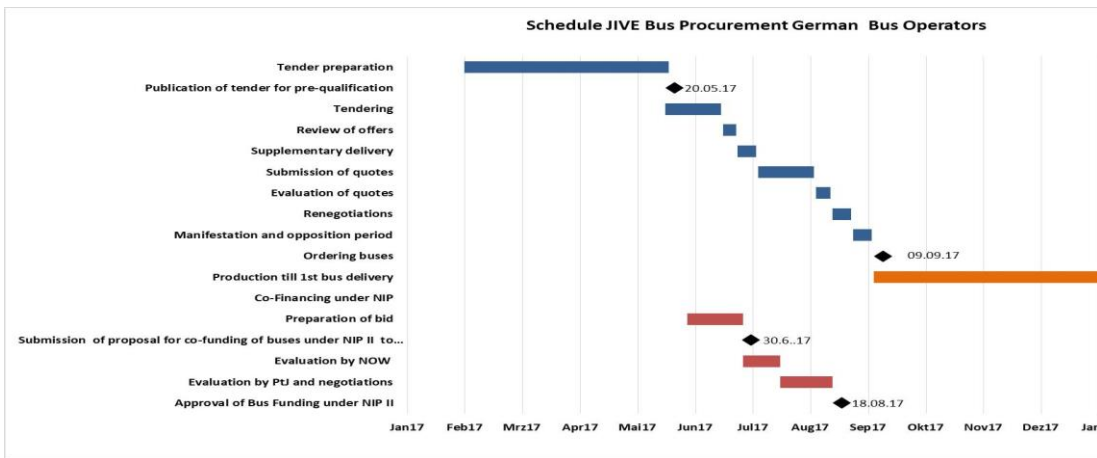
The joint procurement exercise for fuel cell buses in the German cluster was launched in May 2017. This exercise was led by WSW mobil GmbH (Wuppertal) and covered 63 fuel cell buses for operation in public transport. WSW coordinated the joint procurement for its partners Verkehrs-Verbund Mainz-Wiesbaden GmbH, traffiQ Frankfurt, Regionalverkehr Köln GmbH (all Germany) and SASA SpA-AG in Bolzano (Italy), which will operate these buses. The joint procurement was based on a common specification developed by the partners during late 2016 and early 2017. Within this activity functional differences in the buses and in the transport operation (topography, speed) were overcome to realise a largely standardised vehicle specification. In addition, the cities involved developed an assessment matrix for assisting in the evaluation of incoming offers. The tender was published in May 2017<sup>8</sup> and the deadline for responses was 14.00 CET on 19<sup>th</sup> June 2017.

In parallel to this joint procurement exercise, preparations for the procurement of the necessary hydrogen refuelling stations started in each city. The operators began this process by considering the various options for hydrogen delivery or onsite production via discussions with several potential suppliers.

### Timescales

The original timescales for joint procurement of fuel cell buses in the German cluster are shown below (upper Gantt chart). As the tender exercise progressed, it became necessary to revise the programme in response to the levels of responses received from potential suppliers, e.g. the negotiation period was extended and target date for ordering buses moved back towards the end of 2017. The latest schedule for the joint procurement exercise is shown in the lower Gantt chart below.

<sup>8</sup> <http://ted.europa.eu/udl?uri=TED:NOTICE:194439-2017:TEXT:DE:HTML&src=0>.



**Above: Timescales for joint procurement in the German cluster: original plan (first chart) and revised schedule (second chart)**

Tendering for fuel cell buses in the German cluster took place in parallel to the UK cluster’s joint procurement process. In both clusters the provisional timescales were revised after the publication of the ITT in response to feedback from potential suppliers.

### Lessons learnt

Prior to the launch of the formal tender in May 2017, representatives of the German cluster contacted many of the major European bus OEMs as part of the early market engagement activities. The focus of the discussions with the manufacturers was on the question of when the next stage of development of fuel buses for everyday service can be expected. It was found that the development of battery buses is a priority both in time and in terms of development dynamics with most of the European bus manufacturers (Volvo, MAN, Daimler, Scania, Solaris). In this context, it is not expected that any of these manufacturers will be willing to provide the market with mature (pre-series) fuel cell buses before 2020.

Besides the problem with the delivery date the discussions also revealed that some of the manufacturers (OEMs) have changed their future vehicle concepts, with a trend towards offers being based primarily on battery buses, potentially with a fuel cell as range extender. Depending on the manufacturer, either battery (Daimler) or fuel cells (Solaris) are supposed to be used as the primary energy source.

Other insights gained from the German joint procurement exercise include:

- The number of OEMs prepared to respond to the formal tender in 2017 was lower than anticipated, with only two suppliers willing to provide vehicles and able to demonstrate an ability to satisfy all conditions of the tender.
- The main reason for this disappointing response appears to be that many of the incumbent bus OEMs in mainland Europe have not yet decided on the optimal technical solutions for zero emission buses. Given that these companies have limited engineering resources available, the current focus on battery electric buses appears to be restricting the rate of progress on the fuel cell option.
- Besides mature buses, a high level of local aftersales support needs to be available to allow the buses to operate reliably in daily operation.
- For a cluster-wide identical tender it is necessary to find a simple specification and at least a uniform bus. But since every customer has different requirements (topography, length of lines etc.) and wishes regarding the equipment (e.g. driver's working place, announcement system, number of seats, doors), joint procurement of an identical bus in the German public transport bus business is a larger challenge than expected.

## Northern / Eastern Europe

### Context

Riga municipal limited liability company "Rīgas Satiksme" is responsible for all public transport in Riga and manages the city's public transport networks, with a fleet of 224 trams that operate on 9 tram routes and carried nearly 34.7 million passengers in 2014, 267 trolleybuses that operate on 19 trolleybus routes and carried approx. 47 million passengers in 2014, and 432 buses that operate on 53 bus routes and carried approx. 68.9 million passengers in 2014. The public transport network of "Rīgas satiksme" (trams, trolleybuses, buses) runs a distance of about 45 million kilometres and carries nearly 150 million passengers a year. Due to the high mileage of the public transport and the architecture of Riga (with old canyon, tightly built streets, where the height of buildings is greater than the width of the road) there are problems with air quality as the pollutants do not readily disperse.

Riga City Council is taking steps to address the challenges of both decarbonisation and lowering of air pollution arising from transport in and around the city. In particular, the problem with local emission levels exceeding the EU-legislated maximum values has underlined the pressing need to move towards an emission free transport sector. Riga City Council has approved the "Riga City Sustainable Energy Action plan for Smart Cities 2014-2020" that estimates the basis for work towards a climate neutral provision of energy, gradually replacing public transport with zero emission vehicles (FCEV and BEV) to reduce the emission of CO<sub>2</sub> by 20% by 2020.

Riga typically purchases around 40 new buses per year and is developing plans for all new buses to be zero emission from 2018; including an ambition to deploy over 200 fuel cell buses within the coming years (most of which will be articulated vehicles). The fuel cell buses to be introduced as part of the JIVE project represent an initial step towards achieving this objective.

### Status of (joint) procurement of fuel cell buses

Fuel cell bus project development activities in the Northern Europe cluster were coordinated by the Latvian Academy of Sciences and spanned an area including Denmark, Norway, Sweden, Finland, Estonia, Latvia, Poland and the Czech Republic. Of all the cities in this region interested in fuel cell buses, Riga had the most advanced plans and in its role as a partner in the JIVE project, Rīgas Satiksme launched a public procurement in October 2016. This procurement exercise sought ten fuel cell buses (12m) as part of the JIVE project and ten

fuel cell range extended trolleybuses as part of the Action “H2Nodes – evolution of a European hydrogen refuelling station network by mobilising the local demand and value chains” funded by Connecting Europe Facility. To date the contract has been awarded only for the fuel cell range extended trolleybuses part of the procurement. These vehicles were produced by Solaris and delivered to Riga in November 2017.

As of mid-2018, negotiations between Rigas Satiksme and Solaris related to the 12m fuel cell buses are on-going. If both parties can agree on the commercial terms for supply of these additional ten buses (e.g. achieving pricing levels consistent with the conditions associated with the JIVE funding), an order for these vehicles will be placed during summer 2018.

Despite extensive efforts to develop a joint procurement approach in the Northern Europe cluster, it is unlikely that this type of procurement will be possible for various reasons (see below). Instead, a more pragmatic approach is expected to involve several parallel procurement exercises by cities from across the region based on a technical specification that is standardised as far as possible.

## Lessons learnt

Compared to the other areas involved in this project, the Northern Europe cluster is unusual given the larger number of different countries (and very wide geographic area) represented. The work on supporting cities across this region with developing business cases and procurement plans for fuel cell buses revealed the following:

- Achieving the original ambition to establish a joint procurement approach encompassing all cities / regions in the cluster was fraught with difficulties arising from a combination of factors. These include differences in legal frameworks, languages, ownership arrangements, commercial structures, technical requirements, readiness to deploy fuel cell buses and levels of commitment to such projects between the different cities.
- Partners in the Northern Europe cluster considered using the UK framework for bus supply and although this remains an option in theory, in practice this is an unlikely procurement route given the differences in bus specifications and a lack of familiarity with suppliers on the framework amongst customers in the Northern Europe cluster.
- The fact that Rigas Satiksme was involved in live discussions with a potential bus supplier, and that there was a change in planned deployment city in Denmark in the JIVE project during 2017, hampered efforts to develop a joint tender for the first wave of JIVE buses in this region. As mentioned above, the most appropriate procurement approach in this cluster is expected to be based on a group of coordinated tenders with shared technical specifications. Further coordination and support of the cities is likely to be required to ensure that all cities in this region are ready to proceed with bus orders within similar timescales.



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