**Table 3-2: Procurement of HRS – Challenges and Best Practice Solutions.**

| Challenges | Best Practice Solutions |
|---|---|
| **1. Developing Tender Documents** | |
| • Specifying the HRS requirements so that the station meets vehicles' fuelling requirements; lack of HRS standardisation<br>• Determining capacity and redundancy needed<br>• Meeting innovative technology requirements; developing the evaluation criteria to match the requirements<br>• Permitting requirements<br>• Synchronising bus and HRS delivery<br>• Implementation of HRS in bus depot with limited space and coordinating with other new technologies (e.g. BEBs); allowing for flexible solutions<br>• $H_2$ pre-cooling requirements add to expense (CAPEX, OPEX); some sites have found that it can be avoided, at least with low ambient temperature and limited $H_2$ flow rates, while standardisation and an aligned approach of HRS suppliers is pending | • Write technical specification output-based; consider the need for redundancy (e.g. two compressors in parallel to account for possible outages, pipes, dispensers) and fully understand implications of pre-cooling<br>• Set targets for technical outputs e.g. fuel fill times, but do not score or pay more for times that beat them; ensure contract includes data provision to monitor performance<br>• Be clear on outcomes required and their consequences (revenue implications; warranties; maintenance) and have them confirmed by the potential suppliers<br>• Require at least one visit of potential suppliers to location for HRS; the site specifics will affect proposal details and agreement to work with FCB supplier<br>• Choose correct tendering procedure: large gas companies and smaller companies can provide the HRS, the latter may be more interested in submitting a proposal<br>• Set target fuel price (combined fuel and maintenance) and set a price cap.<br>• Consider whether to separate into two:<br>1. HRS hardware; 2. Fuel supply contract (see also following table) |
| **2. Selecting Supplier** | |
| • Manufacturers unresponsive; poorly written proposals<br>• Matching proposal specifications with tender specifications / technology offered not meeting expectations<br>• Deciding which supplier is best choice due to quite different concepts presented | • Invite quotes for standard and variant bids (delivered or on-site) to see what can be offered<br>• Include 'innovatory solutions' as one of the evaluation criteria – technical and commercial (e.g. scalability)<br>• Evaluate on TCO basis, including 'beyond project' costs |
| **3. Developing Contracts** | |
| • Negotiating the whole package to a commercially viable cost | • Be flexible with proposed solutions<br>• Clarify issues of ownership and responsibility (see Table 3-1) |

**Table 3-3: Procurement of $H_2$ Supply – Challenges and Best Practice Solutions.**

| Challenges | Best Practice Solutions |
|---|---|
| 'Green' $H_2$:<br>• A widely agreed definition of 'Green' $H_2$ is still not available<br>• 'Green washing' by providers is also still an issue.<br>• Funding bodies generally want Green $H_2$; | The CertifHy projects have developed a system for guarantees of origin for Green $H_2$ (originating from renewable sources as defined in article 2 of RED II) having a GHG balance below a defined threshold. (See https://www.certifhy.eu/go-labels/).<br>There is also "CERTIFHY™ LOW-CARBON HYDROGEN", originating "from non-renewable origin, nuclear or fossil energy using carbon capture and storage (CCS) and potentially carbon capture and utilization (CCU) which is yet to be defined by European Law and having a greenhouse gas balance below a defined threshold. (quote from https://www.certifhy.eu/go-labels/). |
| $H_2$ Price: Difficult to get a definitive price | • Set up fuel supply contracts for as long a term as possible (such as 10 or 15 years) to help encourage new investors and to improve price offered<br>• Co-locate with an industrial large-scale hydrogen consumer for better prices<br>• It is possible to get a long term contract at a better price if significant volume is assured. These contracts can contain break clauses (see Table 2-1).<br>• Set a target price and a price cap<br>• Evaluate on TCO basis, including 'beyond project' costs |
| $H_2$ Purity: Purchasing very pure $H_2$ required by fuel cell manufacturers can be difficult | High levels of purity are obtainable but at increased price; changes to the purity standards are being discussed but have not as yet been implemented |
| $H_2$ Metering: Measuring accurately enough the amount of $H_2$ refuelled (and supplied from external sources, if applicable) is still not a fully resolved issue | Ensure this issue is discussed with suppliers and understood by the local stakeholders; enhanced protocols for fast and reliable gauging have been developed but still need to be verified and approved by weights and measures authorities |