Table3-2: 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 • Determining capacity and redundancy needed • Meeting innovative technology requirements; developing the evaluation criteria to match the requirements • Permitting requirements • Synchronising bus and HRS delivery. • Implementation of HRS in bus depot with limited space and possibly coordinating with other new technologies (e.g. BEBs); allowing for flexible solutions • 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 output-based technical specifications; 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 • Set targets for technical outputs e.g. time to fill, but do not score or pay more for times that beat them; ensure contract includes data provision to monitor performance; refer to (emerging) standards like ISO 19880-1:2020 (see Table 2-7) • Be clear on outcomes required and their consequences (revenue implications; warranties; maintenance) and have them confirmed by the potential suppliers • Require a) at least one visit of potential suppliers to location for HRS (site specifics will affect proposal details) and b) agreement to work collaboratively with FCB supplier • Choose correct tendering procedure: while large gas companies and smaller companies can both provide HRS, the latter may be more interested in submitting a proposal; experience is highly desirable • Set target fuel price (combined fuel and maintenance) and set a price cap • Consider whether to separate into two: 1. HRS hardware; 2. Fuel supply contract (see also following table)
2. Selecting Supplier	
• Manufacturers unresponsive; poorly written proposals • Matching proposal specifications with tender specifications / technology offered not meeting expectations • Deciding which supplier is best choice due to quite different concepts presented	• Invite quotes for standard and variant bids (to see what can be offered) • Include 'innovative solutions' as one of the evaluation criteria – technical and commercial (e.g. scalability) • 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 • Clarify issues of ownership and responsibility (see Table 3-1)

Table 3-1: Procurement of H_2 Supply – Challenges and Best Practice Solutions.

Challenges	Best Practice Solutions
'Green' H_2 (situation pre-2023): • A widely agreed definition of 'Green' H_2 is still not available • 'Green washing' by providers is also still an issue. • Funding bodies generally want Green H_2	A definition of renewable/green H_2 for the EU is now in place, see Table 2-5 and Table 2-7. To be sure that the hydrogen purchased meets the EU definition, certification may be needed. Some service providers offer such certification. The European Commission refer to 'Certification through voluntary schemes' and announce that they '… will remain in close contact with stakeholders and certification schemes to support the practical implementation of the framework and will also monitor its implementation. To this end, it is planned to launch a dedicated study in 2024: • https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/renewable-hydrogen_en#certification-through-voluntary-schemes
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 • Price clauses in supply contracts must be well understood to avoid surprises in the case of an energy crisis, like in Europe in recent years • It is possible to get a long-term contract at a better price if significant volume is assured. These contracts can contain break clauses (ability to stop the contract at defined points in the future) • Co-locate with an industrial large-scale hydrogen consumer for better prices • Set a target price and a price cap • 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 yet been implemented
H_2 Metering: Measuring accurately enough the amount of H_2 refuelled (and supplied from external sources, if applicable), to meet weights and measures authorities' requirements, is still not a fully resolved issue for 350 bar refuelling	Ensure this issue is discussed with suppliers and understood by the local stakeholders