

ABSTRACT

The Centre for Best Available Techniques (BAT) is founded by the Flemish Government, and is hosted by VITO. The BAT centre collects, evaluates and distributes information on environmentally friendly techniques. Moreover, it advises the Flemish authorities on how to translate this information into its environmental policy. Central in this translation is the concept "BAT" (Best Available Techniques). BAT corresponds to the techniques with the best environmental performance that can be introduced at a reasonable cost. This report identifies BAT for the safe and environmentally friendly operation of hydrogen filling stations.

The BAT selection and advice were established on the basis of, among other things, a socio-economic sector study, a comparison with standards and foreign (BAT) documents, company visits, and consultations with representatives of relevant federations, suppliers, specialists from the administration and consultancies. The formal consultation took place in an advisory committee, where the sector and the government were represented. In parallel, this study was reviewed by a panel of external lecturers with a diverse background in terms of expertise. The composition of the supervisory committee and the external lecturers is shown in Appendix 1.

In consultation with the steering committee, the scope of the study was determined, ranging from the local on-site production of hydrogen, the supply of hydrogen via battery vehicles and tube-trailers, to the distribution of hydrogen to vehicles and all the processes in between. In Flanders and Europe, the hydrogen industry focuses mainly on the roll-out of gaseous hydrogen; as a result, the supply and storage of liquid hydrogen falls outside the scope.

The main potential impact of hydrogen filling stations on the environment and its surroundings is safety-related. Preventing an (uncontrolled) release of hydrogen gas is the central motif around which this study has formulated many preventive and damage limiting measures. In addition, but to a lesser extent, energy efficiency and noise are also relevant environmental aspects during the operation of hydrogen filling stations.

In Chapter 4 of this study, 31 techniques were described as candidates for best available techniques, after which, in consultation with the supervisory committee, and after evaluation of these techniques in Chapter 5, a set of 28 best available techniques were selected. The level of detail in the description of the measures is not always comparable. Measures can be result-oriented (eg "Shielding of sensitive installation parts"), and can be obtained with different techniques or in different ways. In other cases, the measures involve the application of a well-defined technique that has been described in more detail (e.g. "equipment of hydrogen discharge hoses with fast-melting compressed air tubes"). Finally, Chapter 6 recommendations are made for sectoral conditions in VLAREM for installations supplying motor vehicles with hydrogen.

Because safety is the central aspect of this study, an external safety expert was consulted to establish internal and external safety distances. In conjunction with this, this expert also developed two self-evaluation tools that operators themselves can use to calculate safety distances and estimate the societal risk of their hydrogen filling station before the permit application phase. This user-friendly tool will be made publicly available on the EMIS website together with this BAT study.

This study describes the current state-of-the-art in the rapidly evolving international context of infrastructure works, technology development, formulation of guidelines, and expansion of the possible application of hydrogen. We therefore advise to read this document in a time perspective and to keep an eye on the most recent evolutions with

regard to the aforementioned themes. Finally, a Chapter 7 was included in this study, which focuses on certain "emerging techniques". Some of the aforementioned developments are described in this final chapter. Finally, this same chapter also formulates "recommendations for further research", with the aim of overcoming the shortcomings identified during the course of the study in the future.