hour with the hydrogen system must come down to the values of today's lead acid batteries and thirdly, the technical reliability of the complex hydrogen system must be as high as with conventional batteries. The hydrogen storage system is far away from all these goals and these goals will be hardly achieved within the next decade.

One interesting line of development is the reversible fuel cell RFC. RFCs fulfil the functionality of the electrolyser and the fuel cell at the same time. As the process is completely reversible, this is an obvious solution. Technical problems concerning the catalysts and the gas and water management within the cell have to be solved [37]. No commercial products for field applications are available in this technology today.

Applications in autonomous power supply systems will have a combined storage system made from a conventional battery and the hydrogen system. Figure 18.30 shows a principle system design as it is currently under development within an R&D project [38]. The hydrogen system here substitutes the conventional motor generator, which is used today in hybrid systems to bridge the energy gap between summer and winter. A conventional lead acid battery (five days of autonomy) is assisted by the hydrogen storage systems. During summer, the energy excess from the PV generator is used to produce hydrogen in the electrolyser (oxygen is released to the atmosphere). The hydrogen is stored in a metal-hydride tank. During winter, in long periods with low energy supply

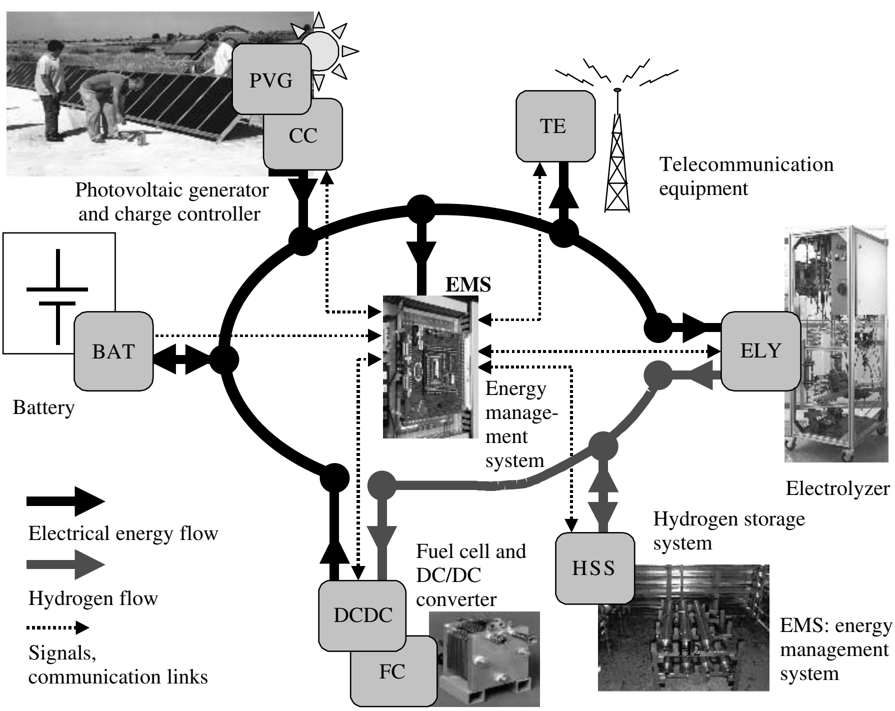

Figure 18.30 Example of an autonomous power supply system for telecommunication with a PVgenerator, a lead acid battery for short-term storage (five days of autonomy) and a hydrogen storage system for seasonal energy storage. The system and components have been developed by partners in the EC co-financed project FIRST [38]