



# DOE's Hydrogen Contamination Detection Workshop

June 12, 2014

Troy, Michigan

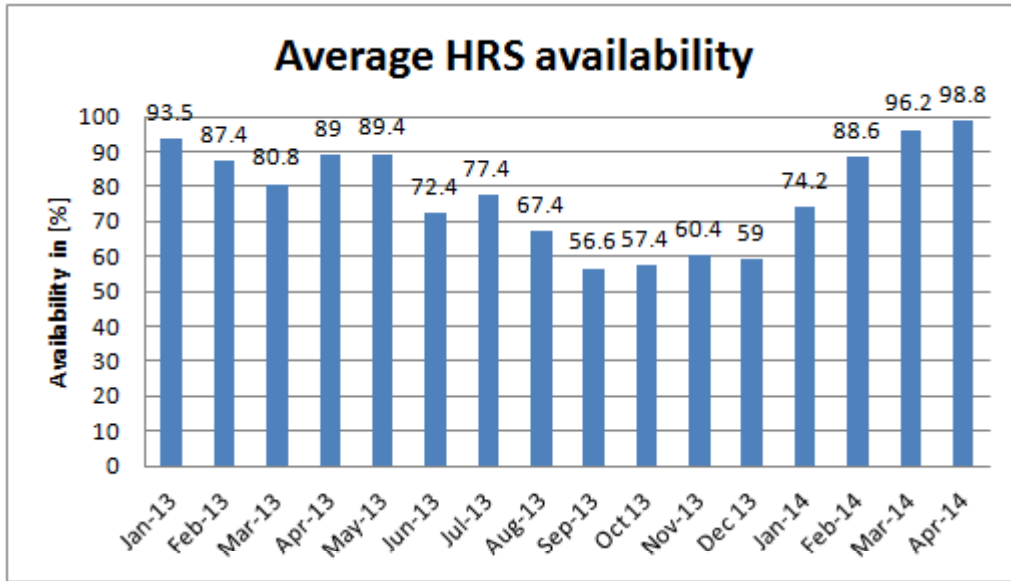
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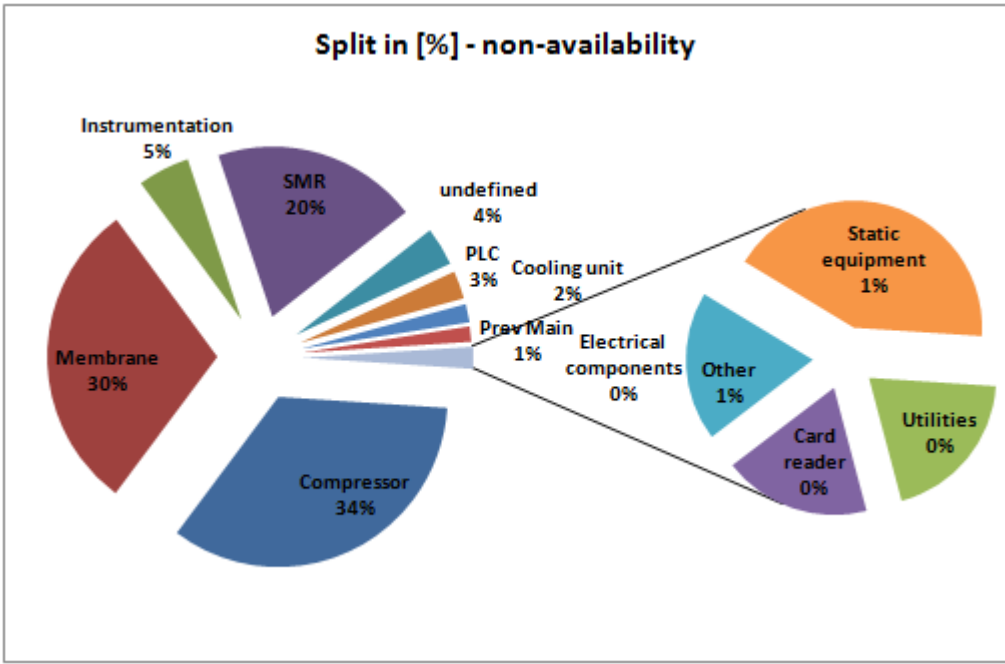
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# HRS – Availability and Reliability



- Annual routine external lab hydrogen quality analyses are performed.
- Several purging cycles performed during maintenance, hydrogen quality analysis done when major equipment (e.g. purifier) is replaced.

- Hydrogen purifier membranes have failed resulting in out of spec fuel being dispensed.
- At the moment of failure, no method for continuous hydrogen contamination detection existed.



## Hydrogen Contamination Detectors – Current Technologies for HRS

- ❑ Conventional gas analyzers will likely be implemented at HRS, but these are neither cost effective nor sufficient, since they may be limited to measure one or a few contaminants and the equipment cost is high.
- ❑ Some of potential existing technologies may be suitable for a lab environment, but they have not yet been proven to be 'field-ready' for installation on a HRS.
- ❑ Other promising technologies may be currently in an investigation/development phase.

## Hydrogen Contamination Detectors – Basic Requirements for HRS

- ❑ The need for a HCD and the contaminants to be detected will depend on the H<sub>2</sub> supply. With sufficient upstream quality control, detection at the station may not be necessary in case of trucked in H<sub>2</sub>. It may also not be necessary to measure all the contaminants individually. A HCD could give a value for the overall impact of the H<sub>2</sub> on a fuel cell. A risk analysis should be used to decide on the level of detection necessary.
- ❑ Minimum functionality of such a sensor is that it give a yes/no (continue or stop dispensing) signal as to the quality of the hydrogen.
- ❑ Cost for the HCD should not be a significant one when compared to the rest of a hydrogen station.
- ❑ The positioning of the device, or even the decision if a HCD is needed at a specific station, depends on the risk of contamination occurring. This will depend on the H<sub>2</sub> supply, including the upstream quality control process and the station equipment. A HCD should have enough flexibility to be used at different parts of the HRS or upstream supply chain.
- ❑ In terms of the response time, a system that would prevent fuelling wrong quality to more than 2 or 3 cars would be the minimum.

