H2Sense

Contract no. 325326

Thomas Hübert

BAM Federal Institute for
Materials Research and Testing

http://www.h2sense.bam.de/

PROJECT OVERVIEW

- Cost-effective and reliable hydrogen sensors for facilitating the safe use of hydrogen
- SP1-JTI-FCH.2012.5.1: Hydrogen safety sensors
- Start 01 June 2013 and end 31 August 2014
- Budget: total 785,290 €, FCH JU 380,348 €
- Consortium : 3 SME, 3 public Institutes

UST UMWELT SENSOR TECHNIK

sensitron GAS EVOLUTION

AppliedSensor

JRC-IET

BAM Federal Institute for Materials Research and Testing

ZSW

European Commission

- Purpose: Establish and strengthen the contribution of sensors for the safe use of hydrogen
- Stage of implementation (100 % project duration passed)

PROJECT TARGETS AND ACHIEVEMENTS

Status before project	AIP target	Project Target	Achievement
(1) Limited knowledge on sensor performance for specific applications	Assessment of state-of-the-art Evaluation of COTS H2 sensors Trends in development	- Market survey COTS H2sensors - Emerging sensor types - Sensor production & signal processing - Laboratory Testing	■ Provided overview of distribution of sensing platforms: H2Sense data base ■ Gathered information on trends in sensor development, Development of testing protocols ■ Execution of joint experimental programme
(2) Limited matching of performance requirements to applications	Application-specific requirements for key-term end users	Identification of key near term applications and corresponding performance requirements	■ Overview of key near term applications ■ Review of general sensor performance requirements ■ Identification of application specific requirements

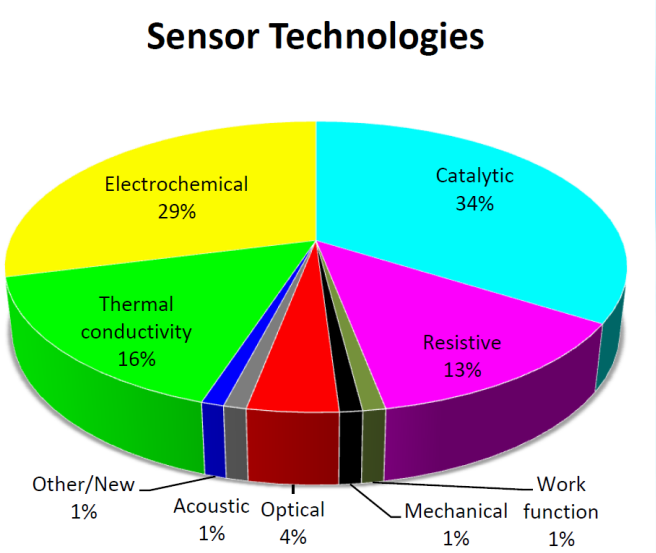
PROJECT TARGETS AND ACHIEVEMENTS

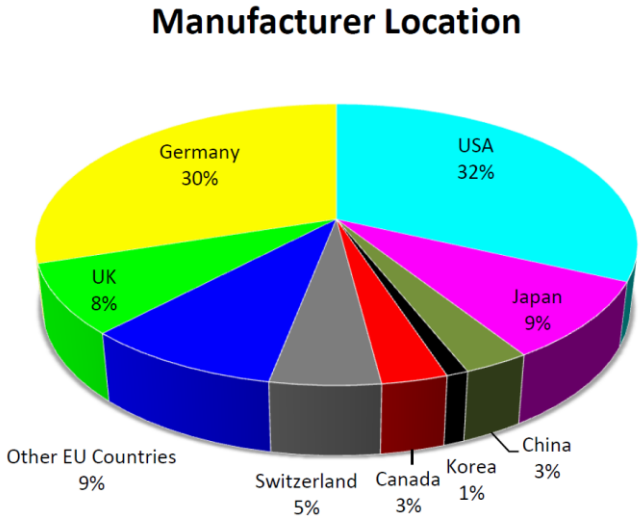
Status before project	AIP target (II)	Project Target	Achievement
(3) Limited public information available No clear selection and deployment guidance	- Identification of gaps in sensor - R&D to facilitate development, testing and application - Compendium of Applications	- Performance gaps and mitigation means - Guideline for sensor deployment	■ Anticipation of future performance requirements (e.g. for FCVs) ■ R&D recommendations ■ H2 sensor broschure ■ H2Sense data base
(4) No joint market analysis available	Cost-effective sensor manufacturing Barriers to commercialisation	- Market analysis - Barriers and approaches to overcome - RCS	■ Market analysis ■ Analysis of barriers ■ Identification of best approaches ■ Critical success factors ■ Recommendations for RCS

PROJECT TARGETS AND ACHIEVEMENTS

Market survey of COTS H2 sensors

Commercially available sensing platforms



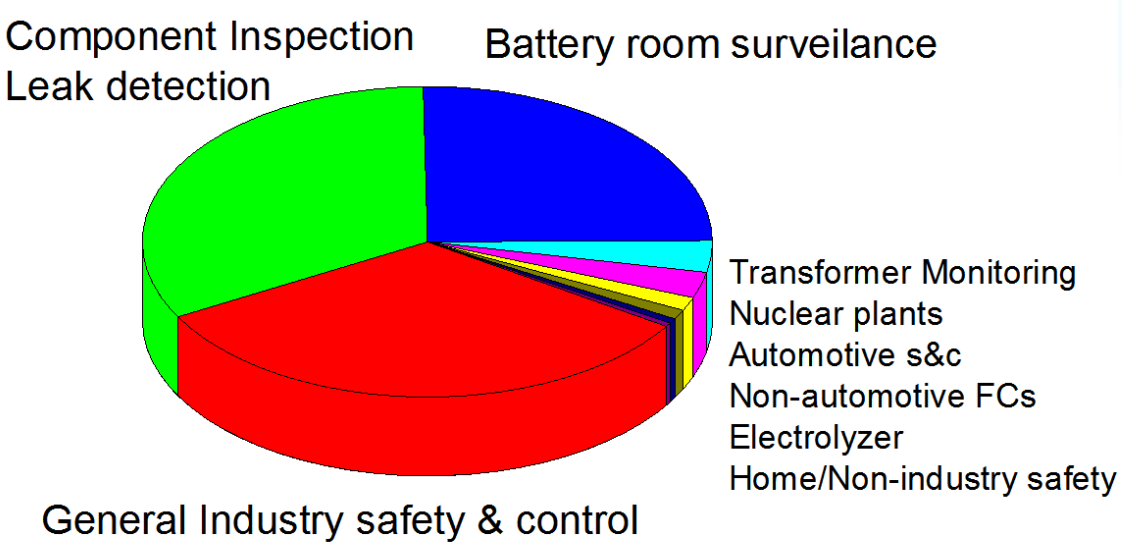


Identification of sensor suppliers

PROJECT TARGETS AND ACHIEVEMENTS

Overview on Sensor market

- Hydrogen production
- Hydrogen infrastructure
- Energetic use of hydrogen
- Use of hydrogen in large scale technical processes
- Indication of technical faults



PROJECT TARGETS AND ACHIEVEMENTS

- Knowledge dissemination

H2Sensor brochure:

H2Sense Hydrogen Sensor data base:

http://www.h2sense.bam.de/en/h2sense_

/hydrogen_sensor_database_2014_datasheets.pdf

Manufacturer ▪ City ▪ Country
Sensor Model ▪ Sensing Technology Description/Remark ▪ Application
⇨Link to the manufacturer ⇨Link to Data sheet
Detection range ▪ Certificates

PROJECT TARGETS AND ACHIEVEMENTS

- Market barriers for commercialisation
  - Barriers due to lack of knowledge
  - State-of-the-art not always accepted
  - Linked to technology perspective
  - Production costs and pricing
  - High certification efforts

- Critical success factors for production and commercialization
  - Dispel preconceived ideas about sensors
  - Improvement of sensor performance
  - Achieving positive economy of scale and scope

RISKS AND MITIGATION

- RISKS
  - Uncertainty of market analysis and estimated sales
  - Unclear speed and volume of implementation of new hydrogen technologies, especially in automotive industry
  - Comparability of quantitative test results BAM-JRC-NREL
- MITIGATION
  - Dissemination of knowledge on sensor contribution to hydrogen safety
  - Reduction of sensor cost
  - R&D for increased sensor performance
  - Rounding off RCS

SYNERGIES WITH OTHER PROJECTS AND INITIATIVES

- Overview of support received via national programmes or other agencies
  - "FCH2" (BmWE to UST)
- Extent to which project builds on previous FCH JU/EU-funded projects
  - HySafe, Inshyde, StorHy, HyIndoor
- Interactions with any international-level projects or initiatives
  - H2FC- European R&D infrastructure
  - Hydrogen sensor activities supported by US Department of Energy (DoE) and executed by the National Renewable Energy Laboratory (NREL).

DISSEMINATION ACTIVITIES

- Conferences, workshops organised/attended by project
  - 6 oral presentations (ICHS2013, WHEC2014, IMCS2014)
  - Workshop “H2 Sensors – the right one in the right place at the right price”, 2013, Brussels
- Publications, arising out of project and its results
  - 7 papers (IJHE, Proc. ICHS, Proc. WHEC)
  - Brochure
  - H2 sensor data base on web.

HORIZONTAL ACTIVITIES

- Training activities
  - Contribution to : European Technical School on Hydrogen and Fuel Cells 2014, Sensors for Hydrogen and Hydrogen Application Related Quantities
- Regulations, Codes, Standards
  - ISO TC 197: ISO EN 26142
  - IEC-TC 31 : IEC EN 60079-29-1, IEC 61508 & EN 50402 (Functional Safety - SIL)
  - Suggestions for further RCS activities
- General public awareness
  - Press release
  - Coverage in specialist press: HZwei (2014), 35-37.
  - Posters, flyers (e.g. Sensor+Test Nuremberg 2014)
  - website

EXPLOITATION PLAN/EXPECTED IMPACT

- What has your project changed in the panorama of FCH technology development and/or commercialisation?
  - Recognition of the essential contribution of Sensors in hydrogen safety
- How will the project's results be exploited?
  - When? ⇨Now
  - By whom? ⇨ Sensor manufacturer and end-user of sensors to increase hydrogen safety