Activities on H2 and FC at JRC Institute for Energy in FP6

HarmonHy Final Conference
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JRC Mission Statement

to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies

The JRC functions as a centre of science and technology (S&T) reference for the EU independent of commercial and national interests...

Hydrogen-related efforts at JRC Institute for Energy, Petten (NL)

no development of new technologies, but

1) "enabling" activities in areas of:

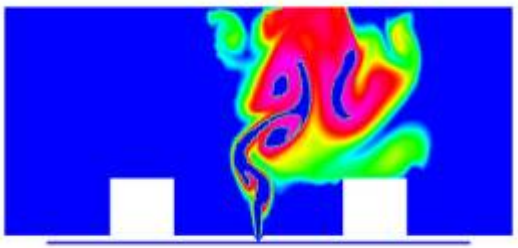
- process issues related to alternative fuels and hydrogen from biomass
- characterisation and performance assessment of
  - fuel cells, stacks and systems
  - hydrogen storage technologies
  - hydrogen sensors

2) techno-economic assessment of energy technology issues

through own research and networking with EU stakeholders

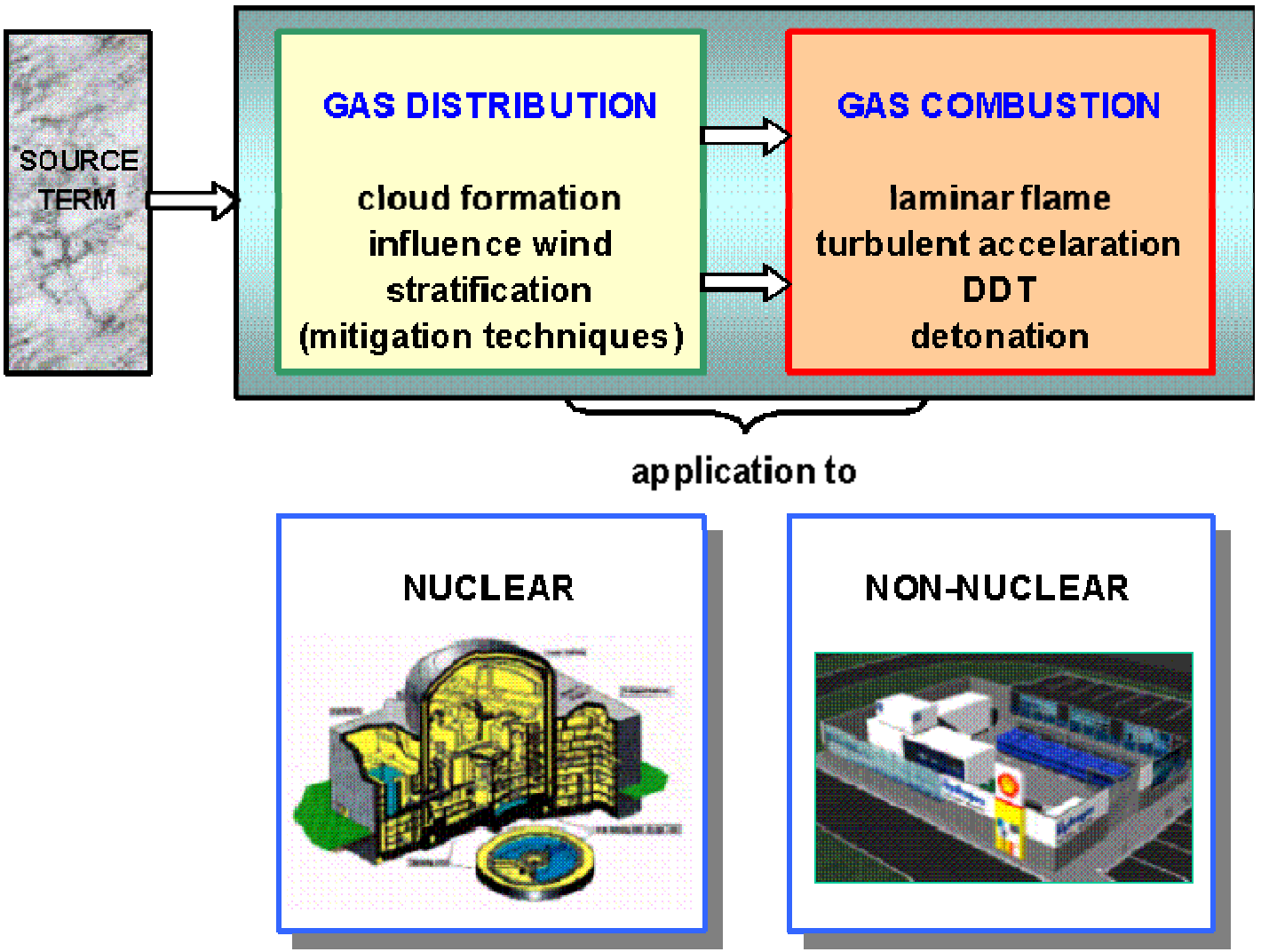
H2 Storage, Distribution and Safety Activities

High Pressure H_2 Storage	Solid-state H_2 Storage	On-board safety sensors	Modeling H_2 release
GasTeF Safety bunker for stationary & cyclic testing facility up to 800 bar	SolTeF Laboratory for storage capacity characterisation	SenTeF Laboratory for sensor testing	2D and 3D CFD codes dispersion modelling

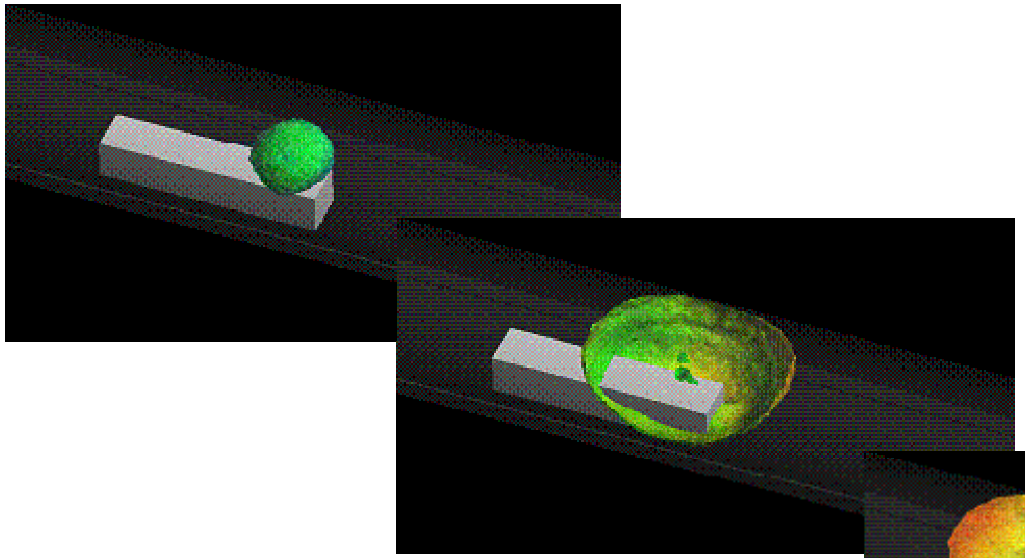


Hydrogen Safety / Risk

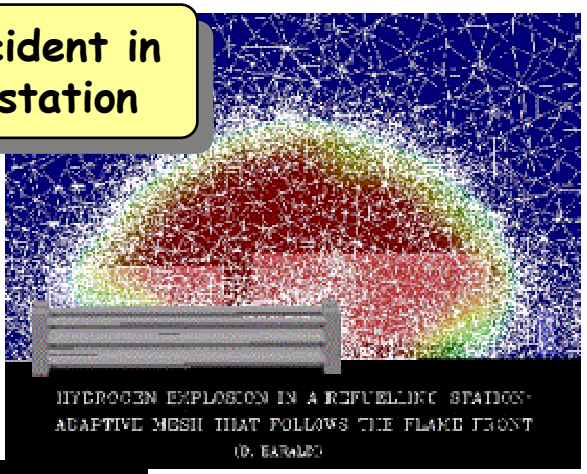
Application of expertise and tools developed and used in nuclear safety

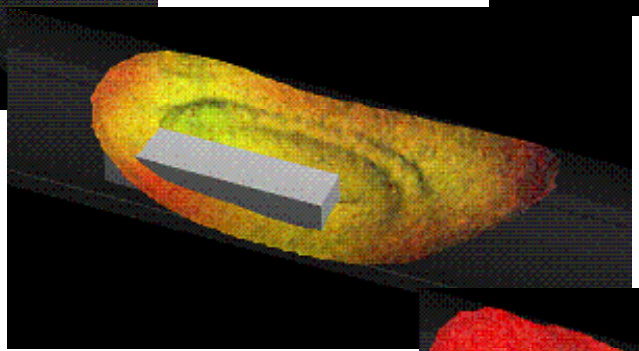


Joint Research Centre

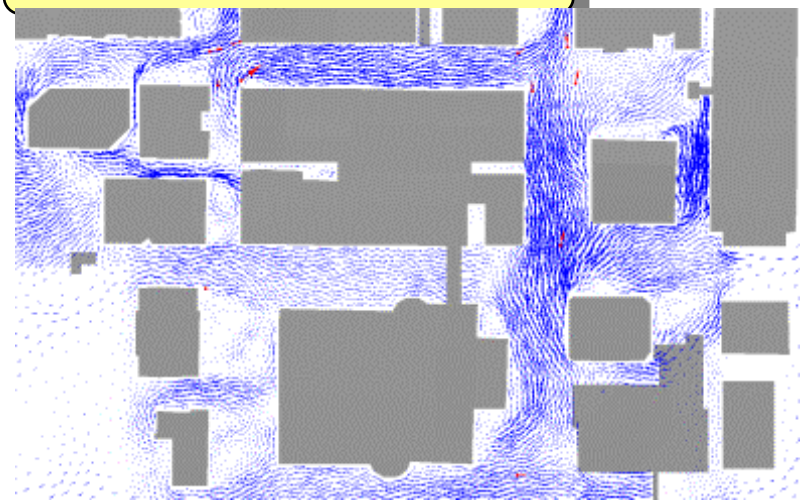


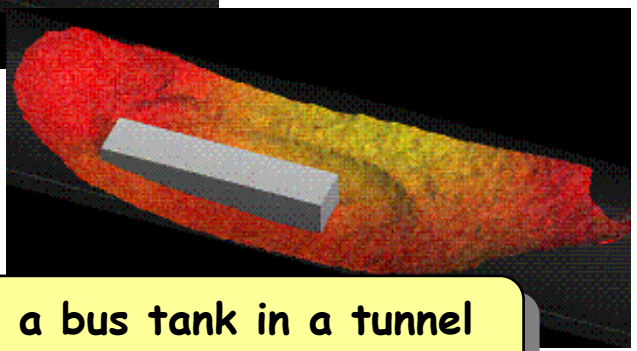
Explosion accident in a refueling station





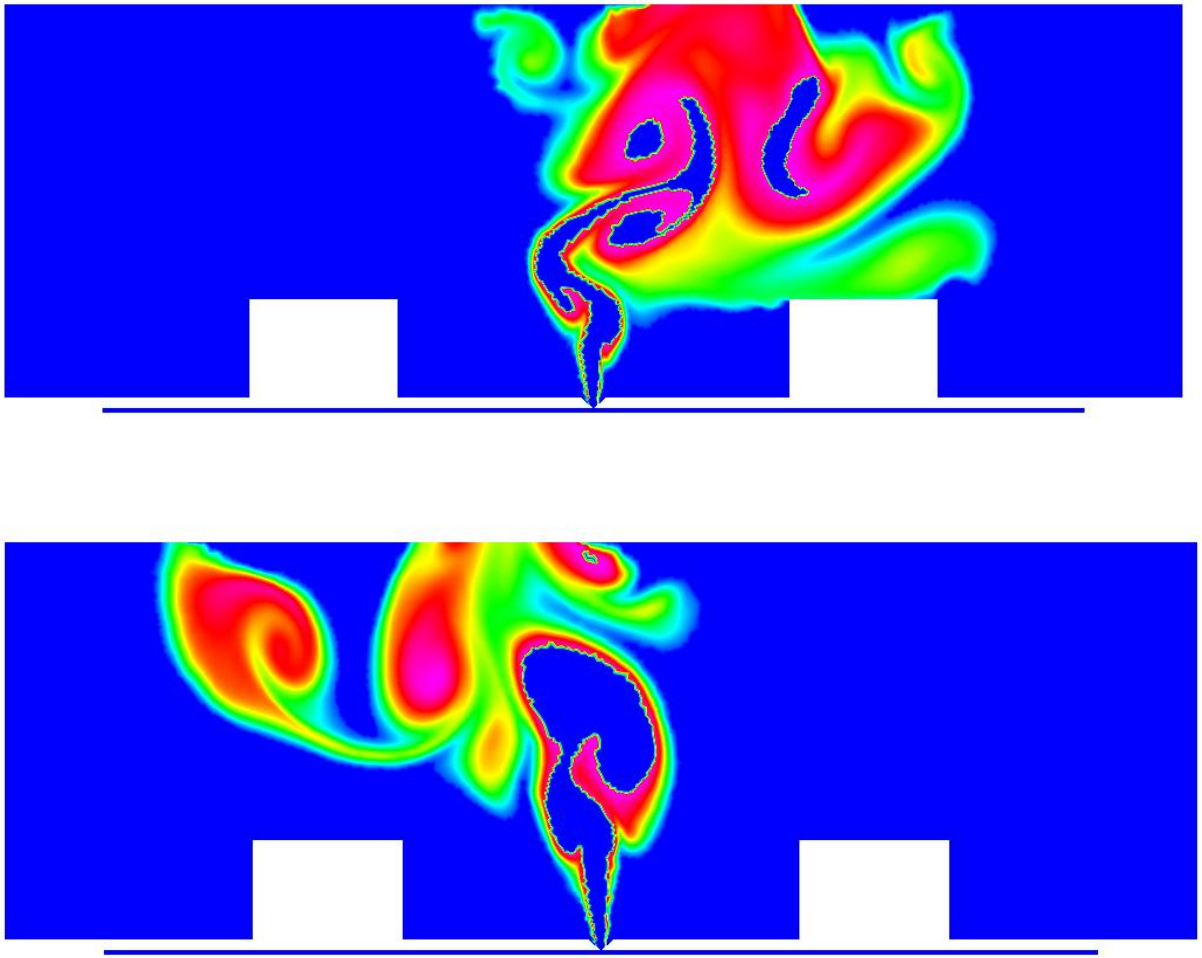
Flow path in streets with South-West winds





H_2 release from a bus tank in a tunnel
- pressure distribution on an iso surface of 350 K

Flammability limits in hydrogen gas dispersion



Hydrogen molar concentrations for wind (top) and no-wind (bottom) case.

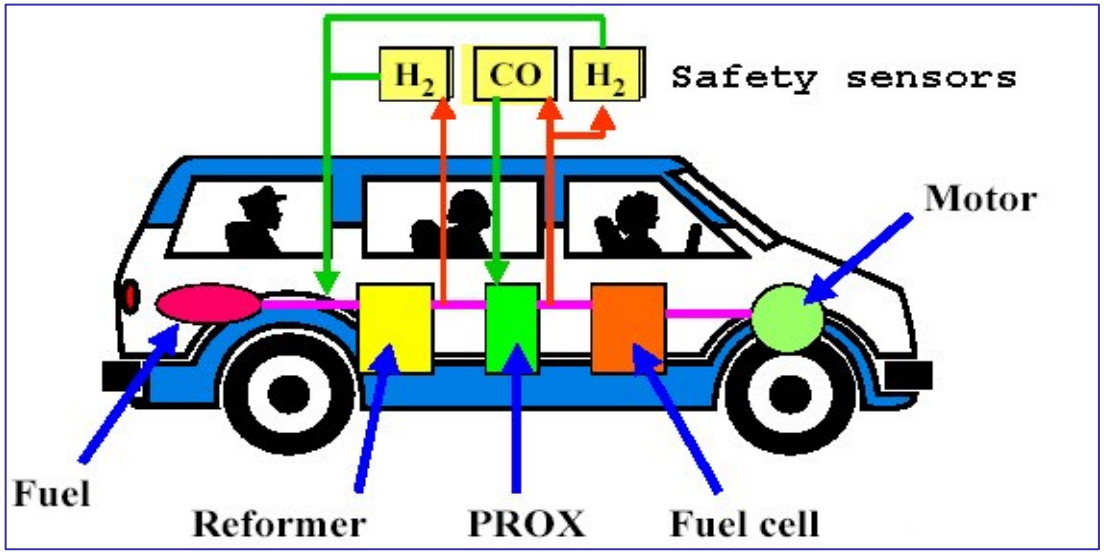
Shown are only concentrations within the flammability limit between 4 % and 70 %, all other concentrations are set to 0%.

Risk Assessment

- Development and operation of a European Hydrogen Incident and Accident Database (HIAD) - jointly performed by DNV and JRC
- Development of methodologies for risk evaluation, providing input for the definition of the HIAD database - together with DNV, Riso, TNO, Norsk Hydro (within HYSAFE)
- Comparative studies for different risk assessment methods

On-board vehicle hydrogen safety sensors

The challenge: sensors that can sense leaks within the target timeframe at the desired detection level, assess the hazard, trigger an alarm or activate a protective device, and be priced reasonably.



Objective: to establish testing procedures for Hydrogen safety sensor performance (lifetime, sensitivity, accuracy, reaction time, X-sensitivity,..) under real service life conditions

Temperature: -45 to 130°C
Pressure: 0.6 – 1.2 bar
RH: 0-100%
Gas composition: H2, O2, CO2, CO, HCs, H2S, SO2, NH3, NOx, alcohols, petrol

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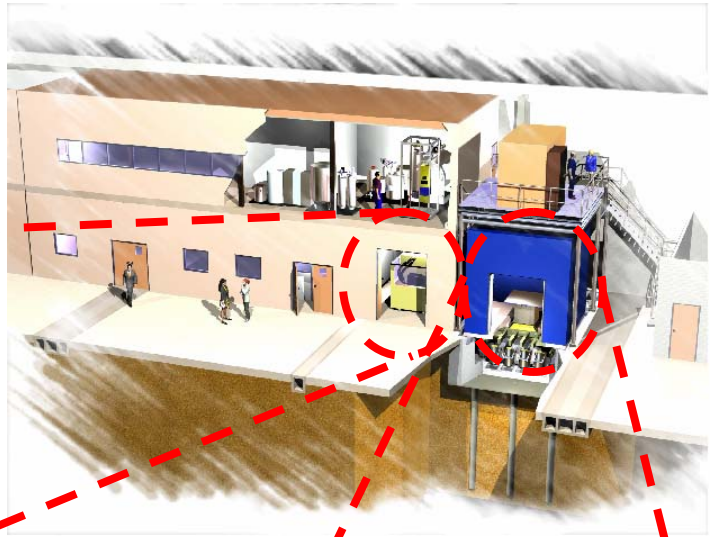
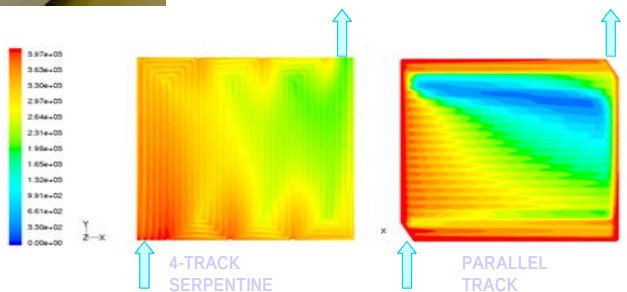
Validation and Verification of Fuel Cell technologies

Environmental and vibration testing of FC systems and their performance



efficiency, engine and evaporative emission testing



CFD modelling of FC performance & modelling validation

Institute for Energy

Involvement in H2&FC Indirect Actions

NoE HySafe
IP StorHy
STREP FCTESQA
STREP HyApproval
IP Nesshy
SSA FCTEDI
SSA HyCell-TPS

} all RCS content

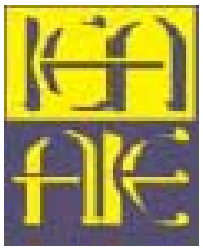
STREP FCAnode
RTN HyTrain
IP HyCom

From FP6 to FP7

- institutional H2&FC activities as JTI-projects
- additional work as deriving from ongoing discussions on JTI and compatible with JRC mission statement, i.e. representing and serving the interests of EU citizens
- e.g.:
  - validation of achievement of "quality gates" and of tests results in JTI projects
  - repository of test results
  - operating agent of EU H2 safety centre network
  - RCS ?
  - technical interface of JTI with non-EU RD[3] activities
  - checking coherence and consistence with work of other Technology Platforms
  - ….

International Outreach and Cooperation

- Implementation & Liaison Committee
- Scoping Paper on Regulations, Codes and Standards
- Education Task Force



- ExCo H_2 Implementing Agreement
- HIA Task 17 Solid and Liquid State Hydrogen Storage Materials
- HIA Task 18 Assessment of Integrated Systems
- HIA Task 19 Hydrogen Safety
- ExCo FC Implementing Agreement
- Bioenergy Task 37

CEN/CENELEC

- CEN/BT/WG/ 149 "Liquid and Gaseous Alternative Fuels"
- CEN/CENELEC mandate

Others: IEC-TC 105, ISO TC 197, US Fuel Cell Council, …

IPHE - RCSWG

ToR: facilitating progress towards common RCS

Functions of the RCSWG:

- analyse and develop recommendations on RCS for H2&FC technology development, demonstration and use
- identify and promulgate good practices between IPHE members
- in concertation with other international organisations:
  - reduce gap of international activities
  - encourage timely exchange of information on advancements
- establish and maintain network of IPHE experts and enlist expertise where needed for implementation of Action Plan

Action Plan

- meta-gap analysis for furthering IPHE activities
  included in work programme FCTEDI
- activities Development Workshop
  in connection with forthcoming ILC meeting
- explore mechanisms to provide up-to-date resources on global RCS activities and decisions
- review IPHE projects for maximum exploitation of RCS components