

Research call: KPN:

ENERGIX work programme

by the Research Council of Norway

<http://www.forskningsradet.no/no/Utllysning/ENERGIX/1254025808621/p1173268235938?progId=1253979646833&visAktive=true>

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Safe and Efficient Implementation of Hydrogen as Energy Carrier/Fuel

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Objectives

*The main objective of the proposed project is to increase **competence within safety of hydrogen technology**, especially focussing on use in **maritime transport** and operation/handling of hydrogen within a **(semi-)closed environment**.*

***Risk models** will be developed and verified with **fire tests**, while the knowledge gained is transferable to other relevant transport applications, like **trains, indoor fork-lifts and fleets of e.g. heavy duty vehicles and buses**. The second approach in the project is research to reveal and understand potential **obstacles and bottlenecks for early implementation of hydrogen**. Focus will be on the most important steps in the implementation process for **new transport technologies**, targeting all relevant actors like **the general public, authorities and industry**.*

*Thus, the project will contribute to **safe and efficient implementation of hydrogen as energy carrier/fuel, reduced emissions from transport and growth in existing and new Norwegian hydrogen and transport (supply) industry**.*

Approach

The project objective will be reached by:

- *Developing/improving/tailoring tools for risk assessment*
- *Filling gaps in testing and knowledge in hydrogen safety*
- *Addressing concerns and potential barriers in the society (public/authorities/industry) regarding implementation of hydrogen technology.*
- *Developing hydrogen related guidelines, public information and training material, relevant to Norwegian infrastructure.*

Expected impact in the following areas

- New technical knowledge that will **increase the relevance of risk assessments of hydrogen applications.**
- **Better understanding of requirements, procedures and guidelines** regarding hydrogen safety in road transport (tunnels, parking facilities and transport of hydrogen), rail and maritime applications.
- **Increased acceptance of hydrogen technology among the public, end-users, decision-makers and authorities** (bureaucrats, civil service, ...). Information material will be developed and events will be organised, e.g. open days at HRSs, public drive of FCEVs and public workshops.
- Improved acceptance that will lead to **accelerated introduction of hydrogen technology in transport applications**, thus contributing to reduced emission from transport as well as growth in the Norwegian hydrogen and energy industry.
- Update and development of new **procedures and training material for industry and fire brigades**, for events involving hydrogen and/or hydrogen technology.

Research tasks/work packages

- WP 1 Societal concerns and barriers
- WP 2 H₂ in closed environments and tunnels
- WP 3 Refuelling and handling of large H₂ volumes
- WP 4 Dissemination of knowledge and guidelines
- WP 5 Management and exploitation

WP 1 Societal concerns and barriers

- Reveal and understand concerns and potential barriers in the Norwegian society (public/authority/industry) regarding introduction of hydrogen technology.
- WP1 will use a multi-method approach [23], integrating existing data with novel survey and interview data. In-depth interviews with key actors will be carried out with stakeholders at the national and local level. In addition, focus group interviews and a stated-preference survey, targeted at the general public, will be conducted.
- Base work in 4 proposed cases => local activities (R&D at site)
- *Report: Potential **obstacles and bottlenecks** for early implementation.*

Case studies; hydrogen use

Challenges and experiences in phases

- Initialisation, establishing partners
- Planning, including risk/safety
- Application/approval
- Construction
- Operation



Cases to be studied

- ASKO Midt-Norge, Trondheim (in-door/outside)
- UNO-X, Bergen
- UNO-X, Oslo
- HyOP, Oslo risk/safety



WP 2 H₂ in closed environments and tunnels

- Transport of hydrogen in tunnels, focus on road, but also relevant for rail
- Underground and in-door use and storage of hydrogen – parking, fork lifts

Risk analysis models/tools, and safety and fire experiment(s) to verify these, for a selection of scenarios.

WP 3 Refuelling and handling of large H₂ volumes

- Refuelling of ferries, also relevant for trains and bus (and other) fleets
- Handling of large hydrogen volumes, e.g. at ports, during un-/loading tankers, hydrogen distribution centres, bus depots,

Risk analysis models/tools, and safety and fire experiment(s) to verify these, for a selection of scenarios.

WP 4 Dissemination of knowledge & guidelines

- The objective is to encourage acceptance and wider use of hydrogen technology by developing appropriate safety guidelines and information material and disseminate the project results. Key messages from the project will be adapted for different target groups; including scientific and industrial communities, authorities and the public.

WP 5 Management and exploitation

- The general objective of WP5 is to maximise awareness and outcome of the project in addition to coordinate the efforts. Coordination activities will ensure efficient work adapted to the specifics of the project and to achieve the objectives and goals. Further responsibility is to assure technical and financial reporting. Based on the knowledge created in the project, recommendations and guidelines for exploitation plans in the hydrogen industry will be developed.

Update Gantt & Pert diagrams

Research tasks

- WP 1 Societal concerns and barriers
- WP 2 H₂ in closed environments and tunnels
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- WP 5 Management and exploitation

Gantt

Tilbakemelding forrige søknad, nye aspekter

- Mer/tydeligere forskning og beskrivelse av planlagt arbeid. Anvendelse må ikke dominere over forskning. Krevende i KPN å kombinere relevans slik at industri og offentlige ser nytte, samtidig som det er et betydelig forskningsinnhold.
- Vi må vise bedre at vi er kjent med forskningsfronten, og at prosjektet bygger videre på den. Sammendrag av internasjonale aktiviteter/status quo og sette dette prosjektet i den kontekst. Hva er de viktigste bottlenecks?
- Flere industrideltakere
- Årets utlysning: Mer fokus på bruk og bredere enn i fjor



Teknologi for et bedre samfunn