

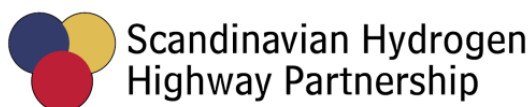


D3.3 Report "Integrating hydrogen in existing refuelling infrastructure"



Final Report

Dissemination level: PU



WP3 Deliverable D3.3

"Integrating hydrogen in existing refuelling infrastructure"

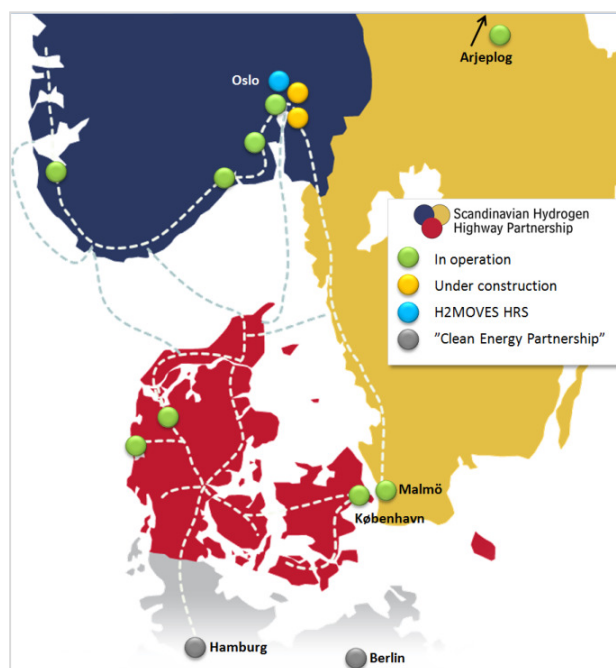
As part of the FCH-JU supported demonstration project, H2 MOVES Scandinavia an effort has been conducted in identifying a site for a new hydrogen refuelling station (HRS) in Oslo and ensure optimal integration with the existing network of HRS's in the City.

This report provides the results of the extensive analysis conducted in selection the site as well as placing of the HRS at the site. The report acts as the outcome of the deliverable D3.3 in the project.

1. Background, the Scandinavian & Oslo HRS network

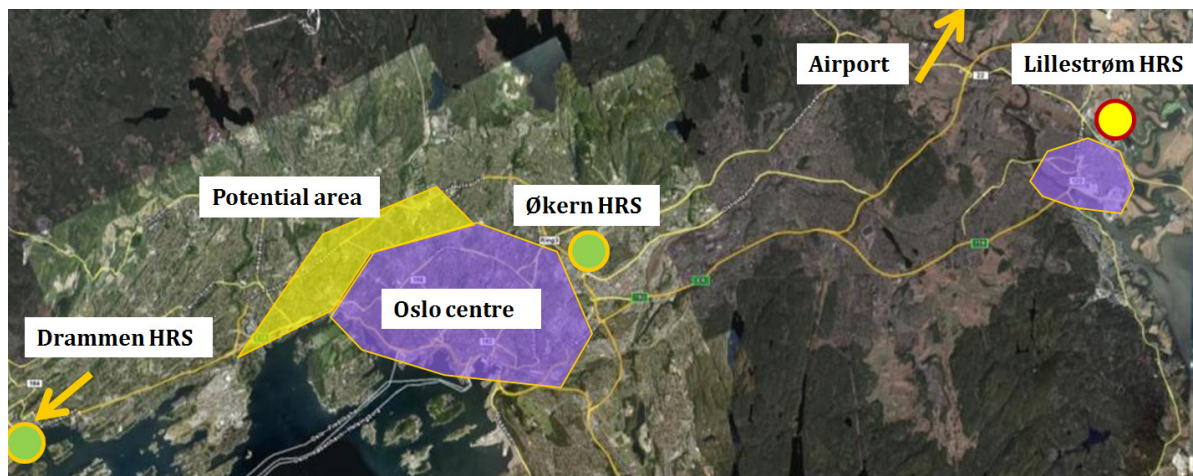
The new Oslo HRS would become part of the growing HRS network in Scandinavia. The site process in Oslo could therefore be build on the many experiences from past HRS placements in Scandinavia.

The Scandinavian Hydrogen Highway Partnership network consists of a variety of HRS's with different technologies and located at different types of sites, ranging from gasoline forecourts to stand-alone stations. Across the countries great experience therefore existed on parameters and considerations to take into account when selecting a site. Among other the Oslo site process benefitted from a recent HRS site process in Copenhagen, where the downtown area was analysed for potential HRS sites based on a set of evaluation parameters.



The site analyse in Oslo however was different from Copenhagen as Oslo already had two refuelling stations and with a third station planned. The placement of the new HRS therefore had to take into account the distance to the existing and planned HRS's to ensure a placement that could give optimal network coverage of the city.

The picture below shows the location of the existing (green) and planned (yellow) HRS's in Oslo.



Obvious areas for a new HRS could be pointed out from the map of existing and planned HRS's, namely the downtown area as well as on the west side of the city along the highway.

Despite these obvious locations, the site process in Oslo was not fixed from the beginning. Thus the analysis covered the greater area of Oslo both to the south, north, east and west. The reason for this broad scope was the general conditions in Oslo for placement of a HRS. Oslo is characterised with limited space inside the city due to hills and high land value, so only very few gasoline stations exists in the downtown area. Outside the city centre, e.g. around the city highway, sites have more room, but number of sites are also limited as HRS ideally should be placed close to highways and major roads. The picture below shows as an example one of the few downtown gasoline stations were room at the site is very limited and makes integration of an HRS challenging.



2. Overall site selection & placement criteria

Before commencing the site analysis process a set of criteria for the selection and placement were formulated. With the criteria several sites could be screened and only the most promising ones selected for a more detailed analysis.

The set of selection criteria are shown below and cover the main aspects to take into consideration in the initial site screening process.

Overall location

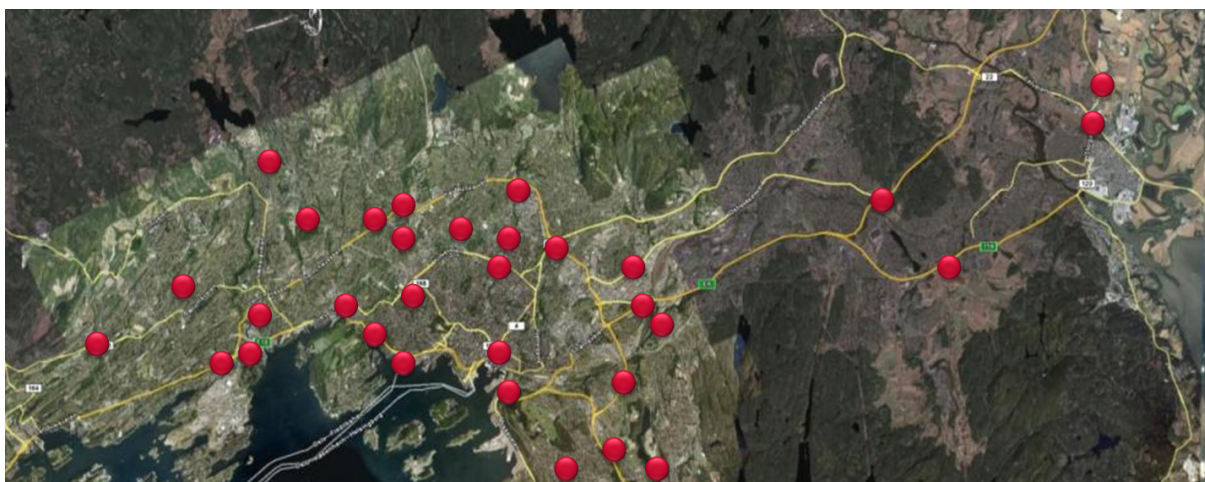
- Central location – visible, near major roads, high use frequency, if highway both directions should have access to site with exit ramp
- Visible location (increasing exposure of HRS)
- Sufficient/large site – easier HRS integration
- Site owner identification & evaluation (any initial limitations on potential use)
- Within or in close proximity to Oslo city centre or the greater Oslo area
- Located strategically within the Oslo HRS network
- Located in city centre or along west side of the city centre (e.g. along highway)

Placement at site

- Ensure necessary distance to adjoining property
- Avoid/reduce need for removal of existing installations (fence, oil vents/pipes etc.)
- Enable easy access for vehicles from both ends of HRS
- Reduce impact on existing driving lanes/parking at the site
- Ensure optimal visual & symmetric placement of HRS in relation to surroundings
- Space available at site for potential HRS placement
- Space around HRS for future capacity upgrade
- Potentially enable access for hydrogen delivery trucks and parking of tube-trailer
- Onsite infrastructure available & ease of access (plumbing & power connections)
- Ensure necessary distance to adjoining property & critical elements in the surroundings
- Sufficient space at site to comply with international safety distance (EIHP2, EIGA, ISO20100, NFPA55, NFPA 52 etc.).

3. Initial site screening & selection of potential candidates

An initial site screening was conducted across the greater Oslo area, identifying more than 30 potential sites. Various types of sites were identified e.g. parking lots, shops, existing gasoline stations, open land and others. The identified sites are shown on the map below.



Based on the selection criteria the identified sites were narrow down to only 8 candidates, as shown on the map below. Generally many of sites not selected were due to limited space at site and their location too far away from major roads. Also some sites were placed too close to existing HRS's or planned ones.



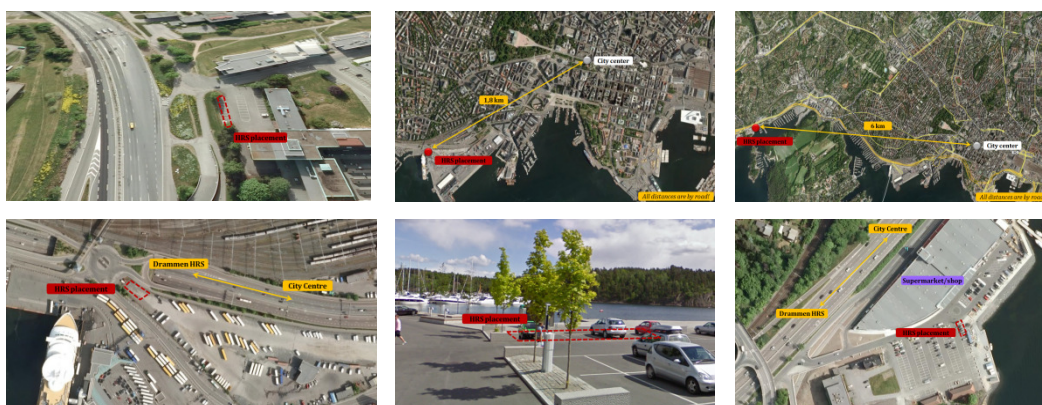
All of the 8 candidate sites were placed around the city centre thus within the area that were prioritized from the beginning. Also taken into consideration where the distance to the FCEV workshop of Daimler, to enable easy access to refueling during vehicle maintenance.

4. Detailed analysis of candidate sites & selection of final

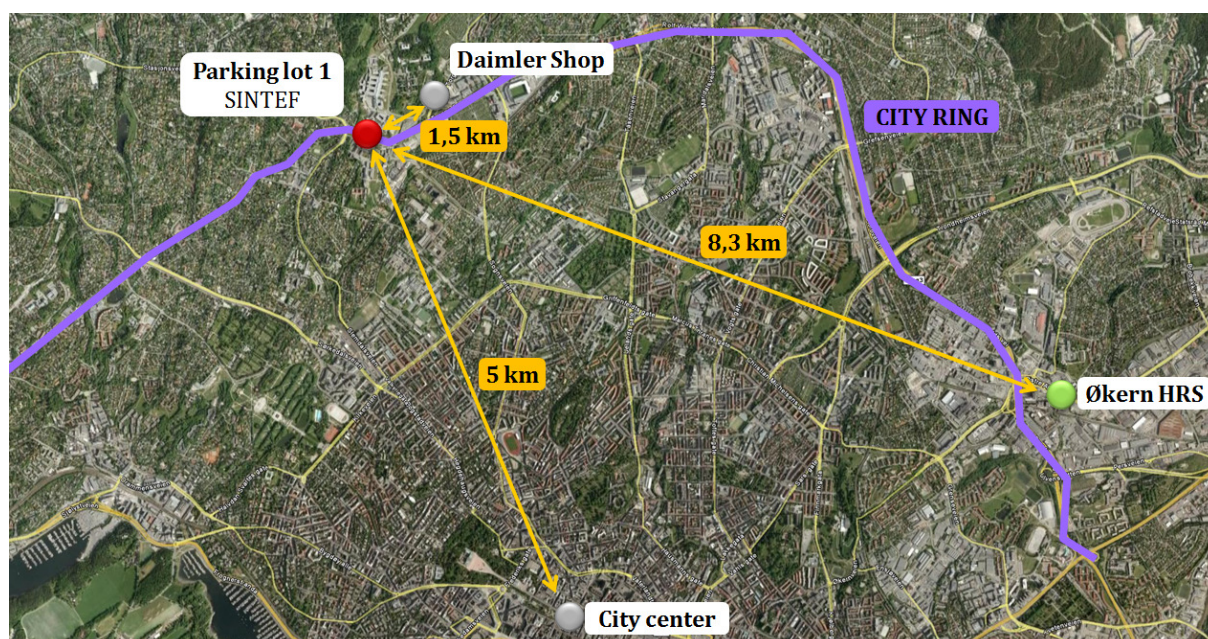
Each of the 8 candidate sites were analysed in detail, still using the overall selection criteria, but now also looking into details of e.g. potential placement of the HRS at the site.

In particular sites were analysed for their ability to enable a convenient placement of the HRS whilst taking into consideration the safety distances. This proved to be a challenge at many sites as an ideal placement of the HRS with regards to easy vehicle access often required space, which again was limited and thus compliance with safety distances became difficult.

Also considerations on distance to city centre and existing HRS's were analyzed for each site as well as their location with respected too easy access from major roads.



Of the 8 candidates a location at the parking lot of the Norwegian Research Organization SINTEF proved to be most suitable location. The site is only 1,5 km from the FCEV Daimler shop and with 8,3 km to the next HRS and only 5 km to the city center. Also the station is located ideally next to the highway around the city and on the west side. The SINTEF location is shown on the map below.



5. Placement at site

At the selected SINTEF site, four potential placements for the HRS were analysed. This included detailed indicative placement of the HRS and in-depth analysis of in particular, safety distances, to ensure that the selected site would pass the following building permitting process.



Based on the analyses the site A (shown in picture above) was selected and it is also where the new HRS is located today, as shown in the pictures below.

