Phases of Infrastructure Build-up

Result from Infrastructure Analysis Workshop (23 MAY 2006, Munich)

Three Phases of Infrastructure Build-Up
The infrastructure build-up is divided into three phases:

- **Phase I**: early start-up, very low hydrogen penetration (until 2015). 2-3 large scale **first user centres** in Europe. Additionally, possibly 1-2 small ones per MS.

- **Phase II**: early commercialisation 2015-2020: app. 2-5 "**early user centres**" per Member State; model applied under consideration of separately identified demonstration centers.

- **Phase III**: full commercialisation 2020 – 2030, **extension of existing** user centres and **development of new** hydrogen regions; dense network installed by 2030, model applied with reduced set of indicators (population, cars, purchasing power, the user centres from Phase II are taken into consideration).

Phase I is dedicated to lighthouse project and early start-up phase. No Member State-specific modelling is required and hence phase I is disregarded in the HyWays process.

The **early user centres** of **Phase II**, shall be detected by the MS representatives based on a defined list of indicators. The MS representatives will be provided with a table of tentative candidates for the early user centres. They should then, possibly under consultation of their stakeholders, and based on the set of indicators determine 2-5 regions they see as first user centres (ideally covering about 15-25% of the country's population). Each choice should be well-founded and justified (also, where necessary, comparing to other competing candidates; e.g. "Why A-city and not B-city?"). The demographic indicators of population density, cars per person and purchasing power will be provided as decision aid. Consent on the detected early user centres will be searched at the 2nd /5th MS Workshop.

In **Phase III**, the existing user centres will be expanded in terms of penetration (and, where possible, also regionally towards their catchment areas). Furthermore, new regions will be developed. A next step could be the fusion of adjacent user centres to larger regions (NB: This does **not** mean the development of a road network between regions! The latter will be treated separately). The further development until 2030 will be calculated based on the demographic indicators (population, cars per person and purchasing power). Scenarios for rather concentrated and rather distributed users will be evaluated from 2020 on. Also for Phase III, consent will be searched at the 2nd/5th MS Workshop.

HyWays
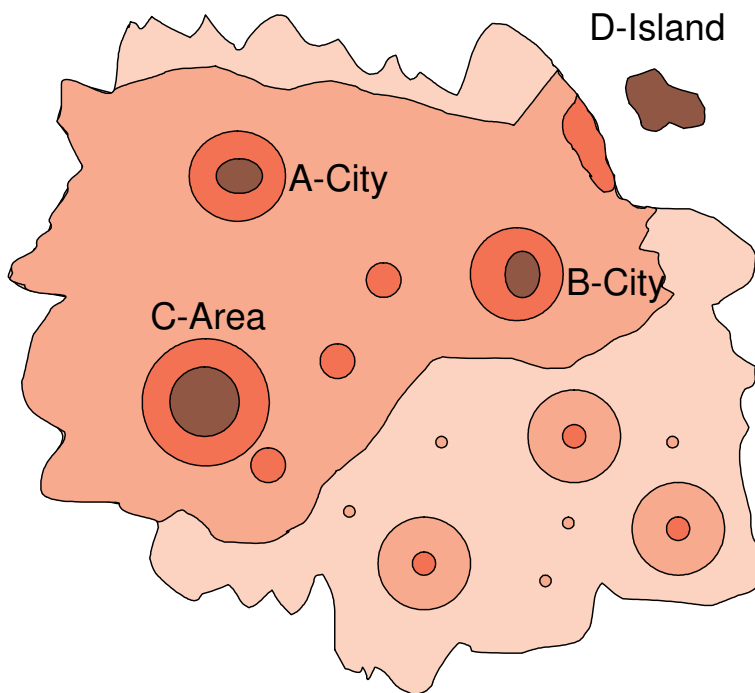
Phase II (2-5 early user centres: A-city, B-city, C-Area, D-Island)

Phase III – 2020 (extension of existing and development of new centres)

Phase III – 2025 (beginning fusion of adjacent user centres)

Phase III – 2030 (whole/most of the country supplied)

Figure 1: Pattern of infrastructure build-up in a fictive country.

Additional Indicators for Early User Centres (Phase II)

Besides the demographic indicators of population, cars per person and purchasing power, a number of further indicators that may foster or hamper the build-up of a local hydrogen demand and infrastructure have been suggested by the HyWays auto industry partners and other partners and stakeholders. The following regional indicators are considered most important:

- **Local pollution:** Places with extremely high pollution due to geological location (e.g. cities encircled by hills) could gain this indicator.

- **Cars per household (second cars)**: Assuming that second cars could be an easier market for hydrogen (without the need for long-distance travelling), a high number of cars per household (thus statistically more second cars) could be a positive indicator for early user centres. Demographic data for the regions are provided in the table.

- **Size of cars:** The share of large, premium cars may be a positive indicator for early user centres, as it indicates the cars' importance as a status symbol and

the readiness of people to spend money on them. If applicable, data are to be gathered from country statistics / car manufacturers.

- **Stationary use:** This indicator covers the prospects of a region for stationary H2 use (e.g. through regional commitment or the necessity for seasonal storage of renewables, e.g. on islands). Synergies between traffic and stationary use can be expected in such regions.

- **Expert community regions (availability of experts):** Availability of experts in hydrogen technology (e.g. car and equipment manufacturers) could be a strong driver for a region to develop a hydrogen infrastructure.

- **Already existing sites (demo-projects):** Places with today existing or planned hydrogen demonstration projects are expected to have a strong commitment and will, due to this, potentially be among the first regions to develop a hydrogen infrastructure.

- **Hydrogen production portfolio (renewable energy, byproduct):** Availability of by-product hydrogen or a vast potential of an energy source (e.g. renewables, lignite) could be a driver for the early development of a hydrogen infrastructure.

- **Customer base:** "Customer Base" is a measure for the number of potential customers at that particular site, comprising indicators like population density, purchase power, number of cars per capita, etc.

- **Commitment of regions (political commitment):** Today's political commitment of regions to hydrogen and environmental technologies is seen as a key driver for the early development of a hydrogen infrastructure.

- **Stakeholder consensus:** aggregates indicators concerning the interest of the various stakeholders to call a region a "promising region", as e.g. political framework, by-product availability or already existing demo sites.

This list may be extended, if further important criteria are identified by the MS stakeholders. Also, not all criteria apply to all regions/MS.