Hydrogen Production Method for Transport

Level 1

Level 1 assumes that 95% of hydrogen fuel demand will be met by coal reforming and remaining 5% by gas reforming in 2050. This is primarily due to the availability of the basic resources in the country and the commercial feasibility of these technologies.

Level 2

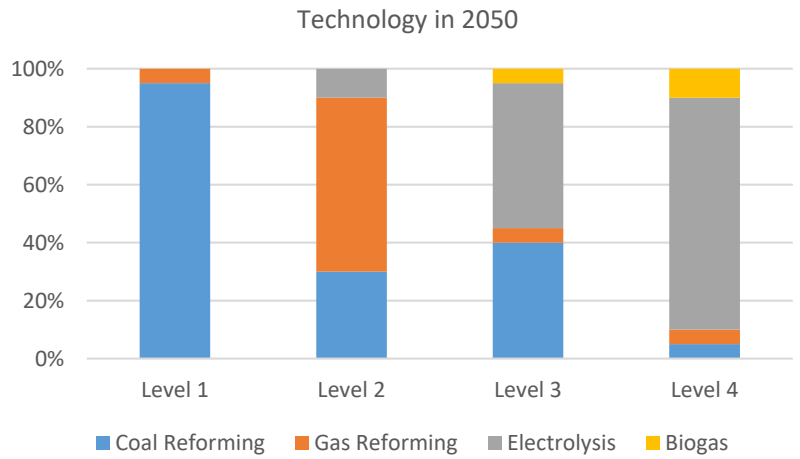
Level 2 assumes usage of electrolysis, although to a very small extent for production of hydrogen fuel. In 2050, 10% of the demand will be taken up by the electrolysis technology, 30% by coal gasification and 60% by natural gas reforming.

Level 3

Level 3 assumes a higher share of electrolysis and electro-chemical technology in meeting the hydrogen fuel demand. By 2050, 50% of the demand is met by electrolysis technology, 40% by coal gasification and 5% each by natural gas reforming and biomass gasification.

Level 4

Level 4 is a more aggressive scenario which assumes a higher share of electrolysis. In 2050, 80% of the hydrogen fuel demand is met by electrolysis, 5% by coal gasification, 5% by natural gas reforming and 10% by biogas reforming.



Hydrogen is a clean fuel and an efficient energy carrier. Various research and development projects have been carried out (including pilot demonstration project) across the globe, for demonstrating hydrogen fuel cells application for transportation. In India also, MNRE has been supporting research and demonstration activities to develop Hydrogen and Fuel Cell Technologies and their applications for more than a decade. As a result of these efforts, hydrogen operated motorcycles; three-wheelers and small generators have been developed in the country. The web tool assumes four methods of production for hydrogen. In natural Gas reforming, liquefying hydrogen in small-scale steam reformers is costly and requires a lot of space. Carbon emissions, which are approximately 140 g/MJ are a major disadvantage. CCS methods which can be used to reduce emissions during natural gas reforming add up to 25-30% of the total costs. In coal gasification, the high complexity of the technology and integration of CCS systems make small-scale production plants unattractive on both economic and environmental grounds. Another potential constraint is the large amounts of carbon dioxide emitted during this process. Hydrogen production from coal emits between 50 and 250 g/MJ depending on the level of CCS. In biomass gasification, the raw materials are extremely volatile, a problem which is managed in a two-step process. No system available in Europe is technically mature and run under commercial conditions for hydrogen production. Biomass gasification also produces carbon emissions but since it uses the same in its production it could be considered neutral. The main disadvantage of water electrolysis is that it requires large amounts of electricity. Efforts are being made to increase the efficiency and reduce electricity use. This lever analyzes hydrogen production plans in the state and lets user select mode of production of hydrogen for transportation sector, keeping in view the National Hydrogen Energy Roadmap developed by the MNRE.