

Yamanashi Kuninaka Area

Construction of Decentralized Clean Energy System

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Project Promotion

Project Director.....Koki Yokotsuka
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Chief Scientist.....Masahiro Watanabe
(Professor and Director, Clean Energy Research Center, University of Yamanashi)
Science and Technology Coordinator...Kazuo Ishii
Fumiaki Sato

Major Participating Research Organizations

Industries... Asktechnica Corporation, SCI Corporation, Kikusui Electronics Corporation., Sanyo Machine Works, Ltd., Tokyo Electron Ltd, Tokyo Gas Co., Ltd. Head Office and Kofu Branch, Tokyo Electric Power Company Head Office and Yamanashi Branch, Nistec Corporation, Nippo Precision Co.,Ltd., Fuji Electric Advanced Technology Co., Ltd., Matsushita Co.,Ltd., Yamato Scientific Co., Ltd., Yamanashi Prefecture Wine Manufacturers' Association
Academia... University of Yamanashi
Governments... Comprehensive Research Organization for Science and Technology Yamanashi Prefectural Government, Yamanashi Industrial Technology Center, Yamanashi Pref. Fuji Industrial Technology Center, Yamanashi Prefectural Agricultural Technology Center

Core Research Organizations

University of Yamanashi and Comprehensive Research Organization for Science and Technology of Yamanashi Prefectural Government

Aim of research and development

This project aims to establish a next generation energy system and the relating fundamental technologies, that use hydrogen produced from different resources such as water, fossil fuels, and biomasses, in cooperation with the core organizations of University of Yamanashi, promoting the fuel cell researches on the cutting edge, and Comprehensive Research Organization for Science and Technology of Yamanashi Prefectural Government, promoting industry, academia and government joint researches and the technology transfer, and the regional enterprises inside and outside of the prefecture.

Moreover, through the strong cooperation among the parties, the project directs to construct "Industrial Cluster for Environment and Next Generation Energy " accumulating newly allied industries that harmonize with the environment, the related techniques and know-hows.

The decentralized clean energy system is expected to contribute significantly to achieve a material-cycle society in the future, realized by promoting the researches and developments of the established fundamental technologies continuously towards their progresses.

Contents of research

1. Research and development for hydrogen production from various fuel resources

A. Elemental study for hydrogen production by high temperature water vapor electrolysis

High-performance electrodes in high temperature solid oxide electrolysis cell (SOEC) for efficient hydrogen production are developed. The preparation method of the electrodes on stabilized zirconia solid electrolyte is established.

B. Development of system for hydrogen production from biomass

The fermentation system that efficiently produces hydrogen and ethanol from the residue of the high energy plants such as sorghum and sweet corn which are special product of Yamanashi Prefecture is developed. Furthermore the technique for hydrogen production from the wastes of the fermentation and forest industries that are abundantly available in Yamanashi Prefecture is investigated.

C. Trial manufacture of reformers and evaluation of the performance

Fuel hydrogen for PEFCs can be produced conveniently from fossil fuels, for example, by steam-reforming, which needs catalysts for three steps of reforming, shift and preferential CO oxidation reactions. In this program, we aim to establish a mass production technology of these catalysts and to accumulate the basic data for the application to 1 KW-size reformer. In addition, we will clarify the most suitable operating conditions for massively producible catalysts and perform plans of the demonstration for the practical application.

D. Research, development and demonstration of ultra small reformers for pure hydrogen production and a hydrogen utilization system

In order to launch and spread the initial hydrogen market effectively, we research and develop a hydrogen production unit using reformed gas from natural gas. We build a demonstration system with the hydrogen production unit and hydrogen utilization system, and research on optimum introduction model of local hydrogen infrastructure by using the demonstration data.

2. Research and development of power generation device for fuel cell

E. Development of highly corrosion resistant and high performance metal separators, and the trial manufactures, evaluations and demonstrations in PEFC power generation system.

Low-cost, high durability, and compact metallic separators will be developed, which are essential to the fuel cells that become an important technology of the hydrogen energy society. The fuel cell stacks applied the separators will be also fabricated for the evaluation by replacing cells of the off-the-shelf stack system.

