

## COMPLETION REPORT

### **Comparison on potential of application of clean technology for protecting environment between Japan and Vietnam. Case study water hydraulics**

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A survey was conducted for analyzing the environmental situation in Vietnam. Especially, this research focused more detail on water pollution. Current status of continental surface water, groundwater and seawater environment is given for analysis and determination of pollution levels. According to statistics, Vietnam has 3,450 rivers and streams with a length of 10 km or more. These rivers and streams are located in 108 river basins distributed and spread across the country with a total area of over 1,167 million km<sup>2</sup>. Total annual surface water volume of Vietnam is about 830 billion m<sup>3</sup>, mainly concentrated in 8 large river basins. Surface water quality development is evaluated on the basis of water quality of large river basins spreading from North to South. In general, the upstream water quality of the river basin is relatively good. Pollution and water quality degradation are concentrated in the middle and downstream areas (especially the section running through urban areas, industrial parks and craft villages), many places are seriously polluted, as in Nhue- Day river basin, Cau river basin, Dong Nai river basin. The problem of oil pollution usually occurs only in the river sections with developed water transport activities or river sections receiving industrial wastewater from production facilities and port areas. Heavy metal pollution is concentrated mainly in river branches near mineral mining areas or industrial production facilities. It is estimated that the underground water reserve in Vietnam is about 172.6 million m<sup>3</sup>/day. Most of Vietnam's underground water quality is relatively good. Quality of coastal sea water in Vietnam is still quite good with most of the parameters typical for sea water quality within the allowable limits of Vietnam standard No.10-MT:2015/BTNMT. This study also pointed out the causes of water pollution. They are domestic wastewater, industrial wastewater, natural wastewater and urban wastewater.

Japan aims to develop Green economy through the promulgation and implementation of the new Growth Strategy in December 2009. The content of this Policy includes: green investment, R&D, infrastructure, low carbon, tax tools, labor market coordination with international education and cooperation policies. The development of green industry is one of the key issues. Recently, Japan is one of the leading centers for developing hydraulic water technology to replace traditional hydraulic technology using oil as pressure medium because of inherent merits of water hydraulics such as environmental friendliness, hygiene, washability, high safety against fire hazard, lower running cost, and availability of tap water. Owing to the outstanding advantages, water hydraulics, which uses pure tap water as the pressure medium has been applied in many fields, especially food, beverages, semiconductors, medicine processing, steel and glass production, ocean exploration, underwater robotics, nuclear power generation, underwater gait-training orthosis, wave/wind power generation systems, mining machinery, ocean development machinery, etc.

Following points should be considered for learning from Japanese experience for protecting environment in Vietnam.:

1. Vietnamese government should learn new Growth Strategy of Japan in December 2009 based on develop green economy.
2. Vietnamese government should find the way to reduce water pollution through increased monitoring, enforcement of sanctions to reduce emissions to the environment and especially the use of new and advanced technologies to reduce public emissions.
3. Vietnamese government should step up the development of preferential policies, especially preferential tax, fee, and financial loans for the business sector to encourage enterprises to invest in technological innovation towards green technology.
4. Vietnamese government should encourage environmentally friendly technology transfer from Japan.
5. Vietnam has the potential to apply water hydraulic technology to some areas such as especially food, beverages, steel and glass production.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

1. Pha N. Pham, Kazuhisa Ito, Ryo Yagisawa, Shigeru Ikeo, “Experimental Result for Energy-Saving Technology in Water Hydraulic Motor System”. The 10<sup>th</sup> JFPS international Symposium on Fluid Power, Fukuoka Japan, October 24-27, 2017.
2. Ryo Yagisawa, Kazuhisa Ito, Pha N. Pham, Shigeru Ikeo, Wataru Kobayashi “Energy Efficiency Improvement of Water Hydraulic Motor System with Reducing Pump Supply Pressure”, The 10<sup>th</sup> JFPS International Symposium on Fluid Power, Fukuoka Japa, October 24-27,2017.

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

N/A

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)

N/A