

Rehabilitation Project of Power Generation System at Karai 7 Mini Hydro Power Plant

Jakarta, 2019-Oct-21



Voith Fuji Hydro K.K. – Company Profile

History - Established October 1, 1997

- Joint Venture Company between Voith Hydro and Fuji Electric Co, Ltd.
 (Issued Capital 8 M € , 50/50)

Key Figures	Business Volume	Employees
	10 Billion JPY	134

Products Plant Engineering for Hydro Power Stations

- > Hydro Turbines and auxiliaries
- > Hydro Generator and auxiliaries
- > Control, automation and other el. equipment



Voith Hydro – Global Locations

● Production ● Service ● Project management & Sales ● Other

North America

- York (PA) / USA
- Chattanooga (TN) / USA
- Mississauga (ON) / Canada
- Montreal (Brossard, QC) / Canada
- Huixquilucan / Mexico

Latin America

- São Paulo / Brazil
- São Paulo / Brazil
- Manaus / Brazil
- Lima / Peru
- Santiago / Chile



Europe

- Heidenheim / Germany
- St. Pölten / Austria
- St. Georgen / Austria
- Västerås / Sweden
- Milano / Italy
- Oslo / Norway
- Trondheim / Norway
- Sarpsborg / Norway
- Tolosa (Ibarra) / Spain
- Pilsen / Czech
- Ankara / Turkey
- Inverness / Scotland / GB

Asia

- Shanghai / P.R. China
- New Delhi (Noida) / India
- Vadodara / India
- ★ Kawasaki / Japan
- Seoul (Wando) / Korea
- ★ Jakarta / Indonesia

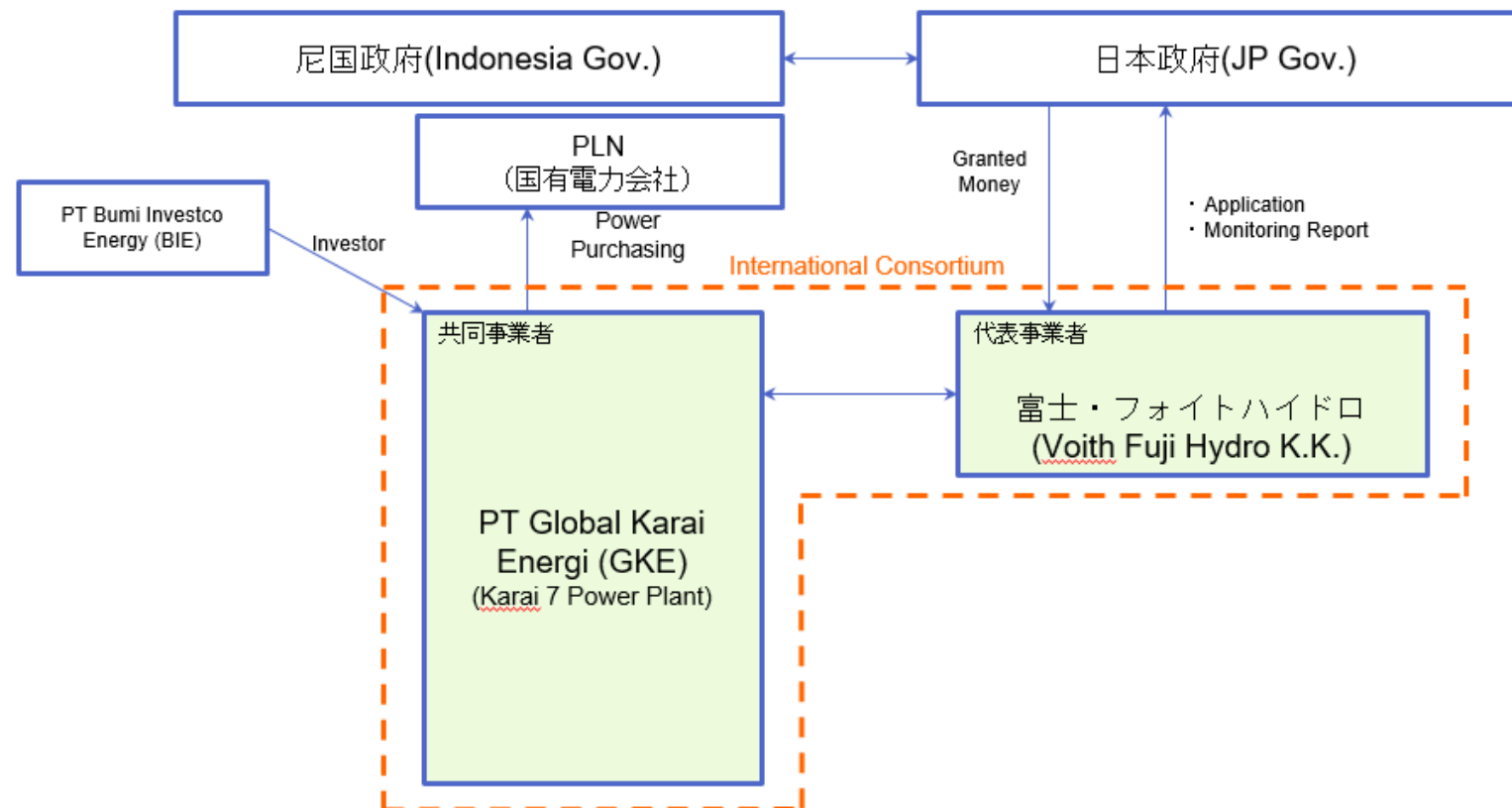


Project Scheme

JCM Model Project (FY2018) , approved in Feb 2019.

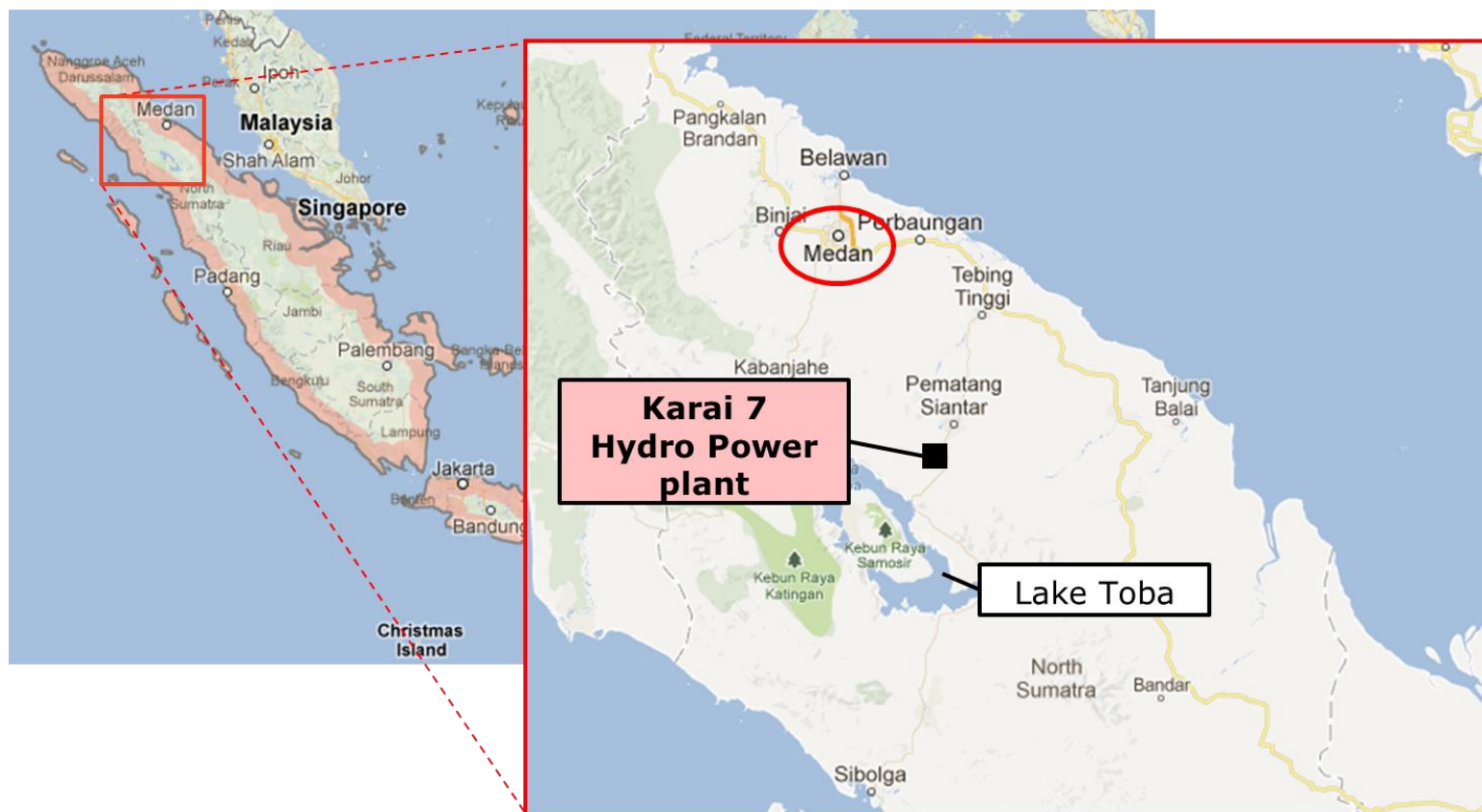
PP (Japan): Voith Fuji Hydro K.K.

PP (Indonesia): PT Global Karai Energi



Project Site

The Karai 7(2 x 3.54MW) hydro project is located in Simalugun province and is located approximately 100km south from Medan, Sumatra's main city.



Map data©2018Google

Component Condition before Rehabilitation

The existing equipment has poor performance due to serious cavitation and erosion.



Cavitation

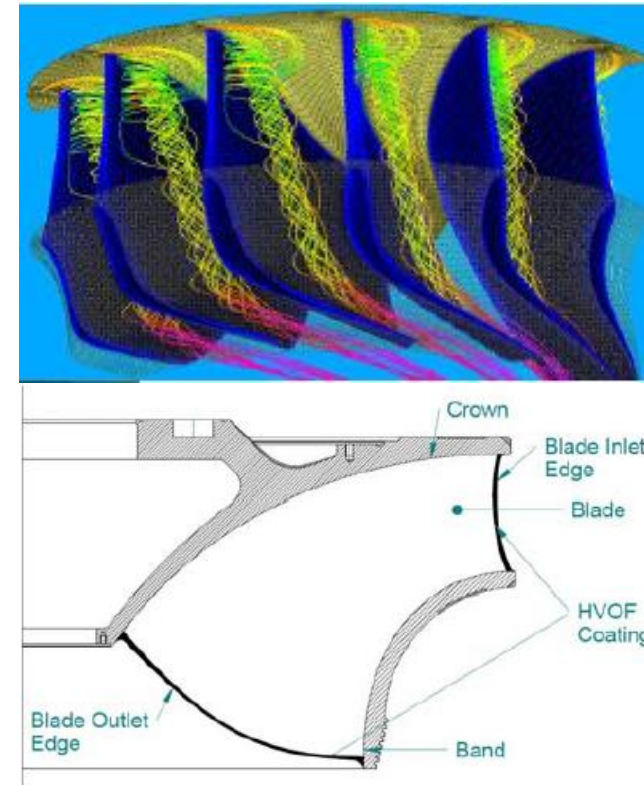
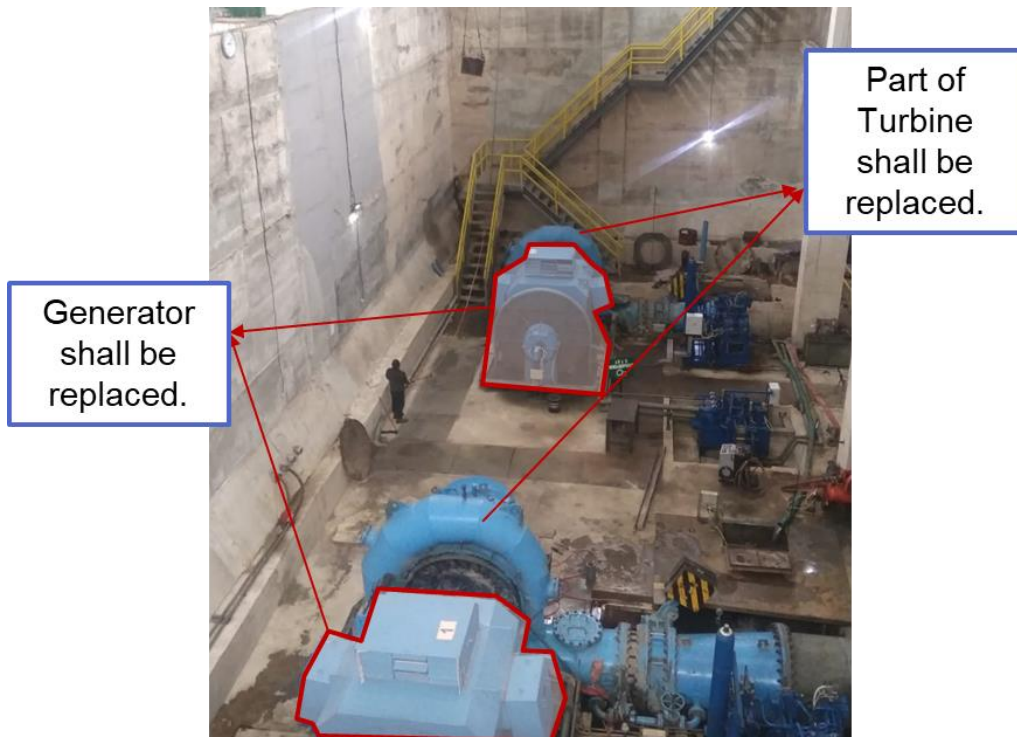


Erosion

Voith Technology is introduced

VOITH

By introducing the latest turbine technology of Voith Hydro, High Velocity Oxygen Fuel (HVOF) coating to increase wear resistance and replacement of generator, the maximum output and plant availability is expected to be increased by 19% & 8% respectively.



Voith Hydro-Automation State-Of-The-Art Control, Monitoring and Analysis

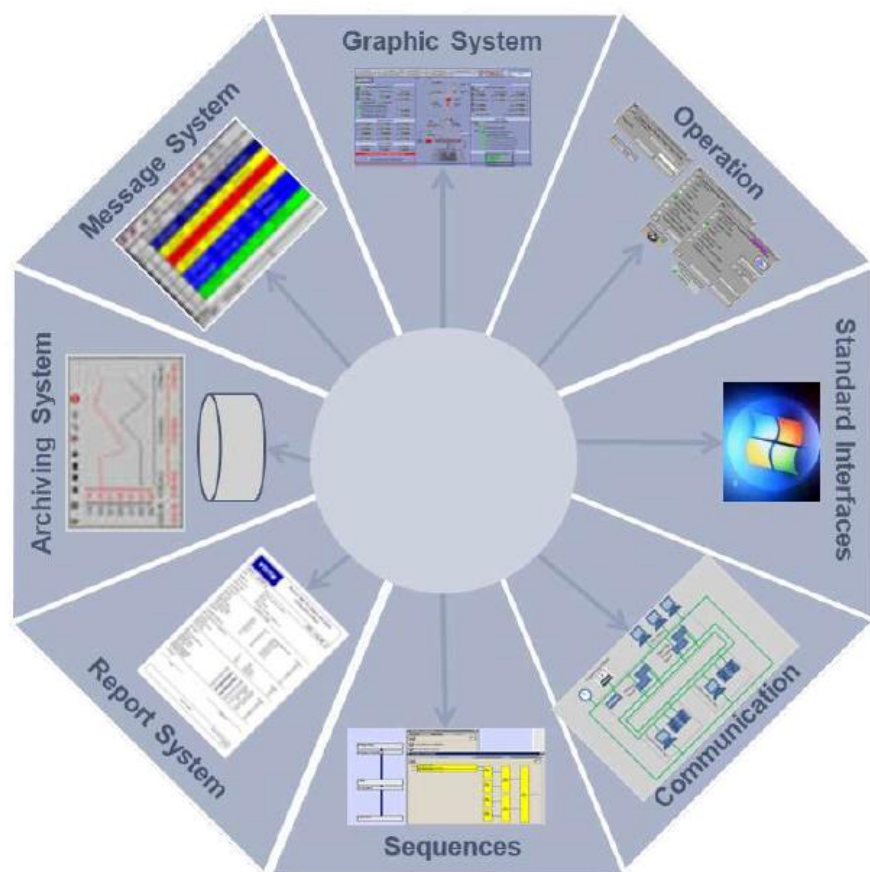


- Voith Hydro has developed full scale of automation products – governors and controls as well as sub-systems – since 1891.
- We have full knowledge of:
 - Plant equipment and processes
 - Selection and design of most suitable automation systems
 - Integration of all plant systems and plant-related functions
 - Needs of owners to ensure optimal plant specific functions



Karai Upgrade

HyCon Automation – SCADA – All functions on board



HyCon Automation supports all SCADA functions

- Message systems
- Graphics
- Operation
- Standard Interfaces
- Communication
- Sequences
- Reporting system
- Archiving system

Expected GHG Emission Reductions

1,133 tCO₂/year

= Reference CO₂ emissions [tCO₂/year]

- Project CO₂ emissions[tCO₂/year]

= (Power generation after rehabilitation[MWh/year]

- Power generation before rehabilitation[MWh/year])

× emission factor [tCO₂/MWh]

In 22 years, whole CO₂ emission is **24,926 tCO₂**

Project Schedule

Aug, 2019: Contract Signed

Oct, 2019 – Sep, 2020: Design and manufacturing of equipment

Sep-Nov, 2020: Installation and Commissioning

VOITH

Inspiring Technology
for Generations