Developing an Effective Maintenance Policy for Control Gates in Hydroelectric Power Plants

M. Burak Aktel
Industrial Engineering Department
Bahcesehir University
Istanbul, Turkey
mburak.aktel@gmail.com

Demet Ozgur-Unluakin
Industrial Engineering Department
Isik University
Istanbul, Turkey
demetou@gmail.com

Abstract

Energy consumption has been increasing rapidly in the world. That is why production of energy from renewable resources is getting more and more important today. Hydroelectric power is the largest source of renewable electricity generation in the world. Countries that have large resources of hydropower use hydroelectricity as a base load energy source because of its secure and reliable energy production. Maintenance scheduling in energy production plants is very crucial since any unexpected malfunction leads to very serious economic losses. It is essential to decide how and when to perform maintenance activities for power plants, especially if they are among base load electricity producers. The control gates are one of the vital components in hydroelectric power plants which control the movement of water. In this study, we formulate the maintenance problem of control gates using Markov Decision Processes. Our aim is to find an optimum maintenance policy for the gates by considering maintenance related losses such as equipment cost, lost sales and time spent during maintenance. We create and analyze different scenarios based on the physical conditions of the plant and cost structures.

Keywords
Maintenance, Markov Decision Processes, Power Plants

Biographies

M. Burak Aktel is currently working as a Planning Superviser in Akfel Gaz, one of the leading gas importers in Turkey. He is responsible for monitoring supply and sales contracts and carrying out contract related duties. He also extensively determines supply and sales portfolio by making forecasts and risk assessments to eliminate supply risks and create commercial opportunities. He holds a Bachelor of Science degree in Industrial Engineering from Boğaziçi University and does a Master's Degree in Industrial Engineering from Bahçeşehir University.

Demet Ozgur-Unluakin is an Assistant Professor in Department of Industrial Engineering at Isik University, Istanbul, Turkey. She earned B.S., M.S. and PhD degrees in Industrial Engineering from Bogazici University, Istanbul, Turkey. She has taught courses mainly in statistics, quality control, metaheuristics, stochastic models, decision analysis and probability. She has published journal and conference papers. Her research interests include maintenance, reliability, decision making, statistical analysis and applied operations research.