



HYDROELECTRICITY: AN OPERATIONS MANAGEMENT APPROACH

TEAM 3 - Executive Summary

APS1028H – S. Armstrong

Executive Summary

Hydroelectricity is undoubtedly one of the most sustainable, clean and abundantly accepted technologies in the global energy sector. The idea of using water as an energy source has found great deal of technological and industrial recognition. Hydroelectric power systems are large and complex systems which may be split into five stages, each with a unique set of operational challenges.

Planning, Design and Construction: This may be referred to as a preliminary phase of hydroelectric power plant in which we cover multiple stages that operations managers have to deal with. These include all processes from Lobbying, Licensing, Blueprinting to Vendor and Construction management; starting from the point of planning to completing building a Dam.

Power Generation: A Dam is also known to be the power plant where the electric energy is generated using a combination of water reservoirs, turbines and generators. Plant management has to ensure processes are conducted precisely and output power is maintained as per requirements.

Power Transmission: Power generated from the plant follows a strategic series of transmission lines set out to travel long distances. Lean thinking and advanced technology play a vital role in daily operations because reducing line losses and optimizing processes is of paramount importance in this phase.

Power Distribution: Transmission lines are finally directed towards towns and homes through a distribution network. A case study from Hydro One will help analyze the best operations practices; Operating Distribution systems using enhanced analytics, machinery, OEB Offerings and parts maintenance.

Customer Service: From a business stand point, the most important operations department could be that of customer service. The discussion involves adoption of consumer protection through sophisticated software applications, automation in billing and packaging, and real time monitoring and outage claim systems.

As a result of this research, we discovered that each of the five stages are managed independently and have completely unique set of operational challenges. However, for each stage, continuous process improvement is necessary as technology improves and allows for more sophisticated systems to be in place, especially in distribution systems and customer services where operations are more agile. Planning and construction are temporary phases where contractors and vendors need to be constantly dealt with; the stage applies more to the project management domain. Generation and Transmission are extremely large and complex domains in hydroelectric power lifecycle. The importance of adopting lean methodology in these areas can be a massive improvement in maximizing output power efficiency and minimizing line losses; small process improvements in these areas can save millions of dollars because of the scale in place.

However, with the current systems in place, the enormous challenges heading our way may not be easy to face. Adoption of next generation technologies including AI, Big Data and Automated Control Systems is the only solution to improve power efficiency, deploy smart systems, precise analytics and automate operations workflows. The first step is to apply these agile solutions to the last phase of the life cycle; customer service. This is where most of the innovative solutions can be tested and real data analytics can be applied. Based on the data collected, new solutions could then be implemented through a bottom up approach. Distribution can follow the lead and optimize based on customer requirements and the workflow can go all the way back to generation. The solution we present in this report is based on such bottom up diagnosis.