



A REVIEW ON HYDRO POWER PLANT

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ABSTRACT

Hydropower is a renewable, non-polluting and environment friendly source of energy. It is perhaps the oldest energy technique known to mankind for conversion of mechanical energy into electrical energy. Hydropower represents use of water resources towards inflation free energy due to absence of fuel cost. Hydropower contributes around 22 % of the world electricity supply generated. The total potential of small Hydropower of the whole world is 780,000 MW out of which 50,000 MW has already been utilized. Small hydro power plants (SHP) provide maximum benefits in minimum time. And offers the fastest economical means to enhance power supply, improve living standards, stimulate industrial growth and enhance agriculture with the least environmental impact and without heavy transmission losses. Due to less transmission losses there is a reduction in distribution cost as well. Its availability at the head of the irrigation canals and small streams is also a one of the added advantage of it[1].

KEYWORDS : Hydropower, SHP, Agriculture, Transmission Loss

1. Introduction

1.1 How Hydropower Works

Hydropower plants capture the energy of falling water to generate electricity. A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy .

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Hydroelectric power comes from water at work, water in motion. It can be seen as a form of solar energy, as the sun powers the hydrologic cycle which gives the earth its water. In the hydrologic cycle, atmospheric water reaches the earth surface as precipitation. Some of this water evaporates, but much of it either percolates into the soil or becomes surface runoff. Water from rain and melting snow eventually reaches ponds, lakes, reservoirs, or oceans where evaporation is constantly occurring.

Water vapor passes into the atmosphere by evaporation then circulates, condenses into clouds, and some returns to earth as precipitation. Thus, the water cycle is complete. Nature ensures that water is a renewable resource.

1.2 Generating Power

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mechanical energy into electricity

To generate electricity, water must be in motion. This is kinetic (moving) energy. When flowing water turns blades in a turbine, the form is changed to mechanical (machine) energy. The turbine turns the generator rotor which then converts this mechanical energy into energy form electricity. Since water is the initial source of energy, we call this hydroelectric power or hydropower for short. The dam creates height from which water flows. A pipe (penstock) carries the water from the reservoir to the turbine. The fast-moving water pushes the turbine blades, something like a pinwheel in the wind. The waters force on the turbine blades turns the rotor, the moving part of the electric generator. When coils of wire on the rotor sweep past the generator's stationary coil (stator), electricity is produced.

2. Literature Review

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Osamah Siddiqui., et.al. The output emissions inventoried in the study are carbon di oxide, methane, sulphur oxides, nitrogen oxides and total particulate matter. CML 2001 impact assessment methodology is utilized. Environmental impacts included are global warming potential, acidification potential, eutrophication potential, photochemical ozone creation potential and human toxicity potential. Hydro reservoir facilities with bio mass decay are found to have a life cycle GWP100 of 15.2 g CO2-eq/kWh, which is comparatively higher than wind (12.05 g CO2eq/kWh) and nuclear power life cycles (3.402 g CO2-eq/kWh). However, hydropower is found to have substantially low impacts when other environmental impact categories, such as acidification potential, eutrophication potential, photochemical ozone creation potential and human toxicity potential are considered. This indicates only greenhouse gas emissions are not sufficient to describe the environmental

performance of any product system.[3]

Prawin Angel Michaela., et.al. The best possible remedial measure in this scenario is to make use of the natural resources available to generate electricity. In an endeavour towards this end, the paper has been formulated for the electrification of Valara village in Idukki district of Kerala, India. Valara is a kind of locality in which there is a tribal settlement of about 120 families that do not have privilege of electrical energy supply. The present work focus on the preliminary studies carried out at the site for the development of a complete micro hydro power plant which focuses on three main fields such as technical as well as economic feasibility studies, design of civil works and selection of electro mechanical components. The results of the study reveal that there is a huge potential at the site to develop a micro hydro power plant which would meet the energy demand of the tribal settlement and thereby improving their living condition.[4]

Gaglianoa., et.al. Evaluates technical and economic feasibility of the repowering of one of the oldest Sicilian hydro power plant currently abandoned and disused. The reactivation of the Catarrate hydropower plant allows producing energy from renewable source contributing to the energy independence of the local community, with an energy yearly production of about 220 MW. Moreover, this study demonstrates the attractiveness of small hydropower as a local investment vehicle and at same time an occasion to preserve the historical industrial heritage of disused hydro plants.[5]

Markus J'agera., et.al. we propose a system concept and a prototype implementation for several small, private and independent hydro power plants to increase the energy production through a networked intelligent control system. We also show possibilities for avoiding events, which usually induced own times of the small hydro power plants. If the seven tscanbe minimized in number and duration, the overall energy production time is higher[6]

3. Objectives

- 3.1 To become a truly representative voluntary association of the entire Power Sector including Generation (Coal, Hydro, Nuclear, Renewable), Transmission, Distribution, Manufacturing, EPC Consultants, Testing, R&D, Academic and Regulatory institutions.
- 3.2 To promote Peer to Peer cooperation between Indian Power Sector Stakeholders.
- 3.3 To provide a platform for the top Experts in Power Sector and power plant operators for knowledge exchange and resolving related problems.
- 3.4 To share best practices in all areas of power sector and provide broad based expertise. 3.5 To identify challenges, develop common solutions and initiate joint action plans for power sector.
- 3.6 To create a "Technical Discussion Forum" for Indian Power Sector on EEC Website. 3.7 To promote policy initiatives of MOP, GOI by taking up suggested studies and giving feedback from stakeholders of Indian Power Sector.
- 3.8 To facilitate bilateral cooperation in the Indian Power Sector.
- 3.9 To engage pro-actively with foreign organizations such as VGB Germany, for Technical knowhow, Expertise, Consultancy, Studies and Reviews.
- 3.10 To raise awareness for the need of excellence in Power Sector.

4. Hydropower Feasibility Studies

Developing any new business venture is difficult. Taking a project from initiation of idea to operational stage is a complex and time consuming effort. It minimizes project failure -Most ideas, whether from cooperative or investor-owned businesses, do not develop into business operations. If these ideas make it to the operational stage, majority of them fail within first six months. Projects involve business operations that differ from Individual business. Feasibility study allows groups developing a business idea to preview potential project outcomes and decide if they want to continue developing the project. Though the cost of conducting a study can

seem high, almost always, these costs are relatively minor when compared to the total project cost. vii. Small initial expenditure on a feasibility study by a group can help to protect larger capital investments later. Feasibility study is a useful tool and is valid for many kinds of project. An effective feasibility analysis will provide the client with a solid foundation upon which a project is built. A feasibility study provides concept identification, estimates of supportable market, design parameters, attendance estimates, revenue projections, and net warranted investment. It essentially becomes a road map for your project.

4.1 Income-expense ratio

Levels of around -5% to +15% are common at this level of a project plan. • Estimates of capital investment, recurring and nonrecurring costs must be there. • Sensitivity analysis can be carried out on the estimated cost values to see how sensitive the project plan is to the estimated cost values [7].

4.2 Financial Analysis

This involves an analysis of the cash flow profile of the project The analysis should consider rates of return, inflation, sources of capital, payback periods, breakeven point, residual values, and sensitivity. This is a critical analysis since it determines whether or not and when funds will be available to the project

4.3 Project Impacts

This portion of the feasibility study provides an assessment of the impact of the proposed project Environmental, social, cultural, political, and economic impacts may be some of the factors that will determine how a project is perceived by the public

Conclusions and Recommendations

The feasibility study should end with the overall outcome of the project This may indicate an endorsement or disapproval of the project. • Recommendations on what should be done should be included in this section of the feasibility report [8].

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