Modern Concepts and Future Role of Hydropower

Hydropower does not discharge pollutants into the environment; however, it is not free from adverse environmental effects. Considerable efforts have been made to reduce environmental problems associated with hydropower operations.

Efforts to ensure the safety of dams and the use of newly available computer technologies to optimize operations have provided additional opportunities to improve the environment. Yet, many unanswered questions remain about how best to maintain the economic viability of hydropower in the face of increased demands to protect fish and other environmental resources.

Hydropower research and development today is primarily being conducted in the following areas:

- Fish Passage, Behavior, and Response
- Turbine-Related Projects
- Monitoring Tool Development

- Hydrology
- Water Quality
- Dam Safety
- Operations & Maintenance
- Water Resources Management

Today, engineers want to make the most of new and existing facilities to increase production and efficiency. Existing hydropower concepts and approaches include:

- Uprating existing power plants
- Developing small plants (low-head hydropower)
- Peaking with hydropower
- Pumped storage
- Tying hydropower to other forms of energy

Uprating

The uprating of existing hydroelectric generator and turbine units at power plants is one of the most immediate, cost-effective, and environmentally acceptable means of developing additional electric power.

Low-head Hydropower

A low-head dam is one with a water drop of less than 65 feet and a generating capacity less than 15,000 kW. Large, high-head dams can produce more power at lower costs than low-head dams, but construction of large dams may be limited by lack of suitable sites, by environmental considerations, or by economic conditions. In contrast, there are many existing small dams and drops in elevation along canals where small generating plants could be installed. New low-head dams could be built to

increase output as well. The key to the usefulness of such units is their ability to generate power near where it is needed, reducing the power inevitably lost during transmission.

Peaking with Hydropower

Demands for power vary greatly during the day and night. These demands vary considerably from season to season, as well. For example, the highest peaks are usually found during summer daylight hours when air conditioners are running. Nuclear and fossil fuel plants are not efficient for producing power for the short periods of increased demand during peak periods. Their operational requirements and their long startup times make them more efficient for meeting baseload needs.

Since hydroelectric generators can be started or stopped almost instantly, hydropower is more responsive than most other energy sources for meeting peak demands. Water can be stored overnight in a reservoir until needed during the day, and then released through turbines to generate power to help supply the peak load demand. This mixing of power sources offers a utility company the flexibility to operate steam plants most efficiently as base plants while meeting peak needs with the help of hydropower. This technique can help ensure reliable supplies and may help eliminate brownouts and blackouts caused by partial or total power failures.

Source :https://civilsolution.wordpress.com/category/civil-engineering/page/12/