

Hotel Energy Solutions

Micro Hydropower System

Micro hydropower is one of the most reliable and consistent sources of renewable energy available. A good water resource with a year-round flow and elevation drop can provide years of continuous power. Hydro resources are the most site specific, since your hotel must have a usable water source. If you are one of the lucky few hotels with a stream running down your hillside, it's the resource to assess first.



How does a micro hydropower energy system work?

Micro hydropower is a term used for hydroelectric power installations that typically produce up to 100 kW of electricity. A micro hydropower system can produce enough electricity for a small hotel. Micro hydropower is based on very simple concepts. Moving water turns a turbine, the turbine spins a generator, and clean electricity is produced. Hydropower systems use the energy in flowing water to produce electricity.

What are the basic components of a micro hydropower energy system?

The construction details of a micro hydropower plant are site-specific, but the common elements of all hydroelectric plants are always present. Micro hydropower energy systems consist of:

- Water conveyance—channel, pipeline, or pressurized pipeline (penstock) that delivers the water.
- Turbine or waterwheel—transforms the energy of flowing water into rotational energy
- Alternator or generator—transforms the rotational energy into electricity
- Regulator—controls the generator
- Wiring—delivers the electricity.

Designing your micro hydropower energy system

In order to take full advantage of the electrical potential of small streams, a suitable site is needed. Before you can begin designing your micro hydropower system or estimating how much electricity it will produce, you will need to make four essential measurements:

- Head (the vertical distance between the intake and turbine)
- Flow (how much water comes down the stream)
- Pipeline (penstock) length
- Electrical transmission line length

You'll need to determine the amount of power that you can obtain from the flowing water on your site. The power available at any instant is the product of what is called flow volume and what is called head. Water power is the combination of head and flow. Both must be present to produce electricity. Consider a typical micro-hydro system.

Water is diverted from a stream into a pipeline, where it is directed downhill and through the turbine (flow). The vertical drop (head) creates pressure at the bottom end of the pipeline.

The pressurized water emerging from the end of the pipe creates the force that drives the turbine. More flow or more head produces more electricity.

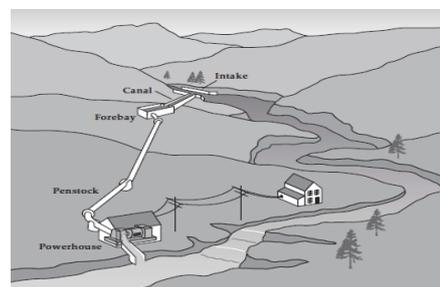
Which are the main requirements to install a micro hydropower system?

The obvious site requirement is to have a water source which is suitable for a micro hydropower system. The most important suitability criteria for the watercourse are:

- Head (difference in height between the water inlet and the turbines)
- Flowrate (volume of water passing per second)

The typical components of a system are:

- An intake to divert the flow of water from the water course
- A penstock pipe to convey water from the source to the turbines
- A generating set to convert the head and flowrate into electricity
- An outflow through which water is returned to the watercourse
- Cables, either overhead or underground, to bring the electricity to the hotel.



Do micro hydropower systems impact the environment?

All micro hydropower systems have an environmental impact. Water is abstracted from the main stream and diverted through a turbine before being returned to the main flow. During this stretch the flow in the main stream is depleted which could adversely affect biodiversity – because of this the amount of flow that can be taken from the flow will be regulated in order to leave an acceptable base ‘residual’ flow level. However a well-designed hydro scheme will mitigate any environment damage caused during construction and over time will generate ‘clean’ energy for many years.

Are micro hydropower systems fish friendly?

Where migratory fish exist in a river, a fish ladder must be installed to enable fish to complete their journey upstream. Turbines are not ‘fish friendly’ so adequate screening both up and down stream has to be provided to stop fish entering the turbine.

Link with other technologies?

Micro hydro systems complement PV solar energy systems because in many areas, water flow, is highest in the winter when solar energy is at a minimum.

BENEFITS FOR THE HOTELS



COST REDUCTION

- Water doesn't send monthly bills!!!

Whatever the upfront costs, a micro-hydro system will typically last a long time and is relatively maintenance free. There are many factors to consider when buying a system, but with the right site and equipment, careful planning, and attention to regulatory and permit requirements, small hydropower systems can provide you a clean, reliable source of power for years to come.



STAFF INVOLVEMENT

Train your staff as guides to show guests the micro hydropower energy system you have installed and explain them how it works, you can both attract more tourists and further involve your staff in order to get them feeling more responsible for their working place!



GUEST INVOLVEMENT

Install a demonstration diagram near your micro hydropower turbine to show your guests how the water flow is producing clean energy for your hotel. By motivating your guests, they will also feel more responsible and involved in taking care of your hotel! Guests will value the fact that your hotel is environmentally conscious.

BENEFITS FOR THE ENVIRONMENT



CARBON EMISSIONS REDUCTION

By investing in a small hydropower system, you can reduce your exposure to future fuel shortages and price increases, and help reduce air pollution.
