

SMALL SCALE HYDROPOWER

Fact Sheet Developed by the Pioneer Valley Planning Commission and the Franklin Regional Council of Governments

AT A GLANCE

Commercial \$ / kWh: ????

Average Size: 1 MW to 30 MW

Residential \$ / kWh: ????

Average Size: 100 kW to 1 MW

Energy Returned on Energy

Invested: Depends on site conditions

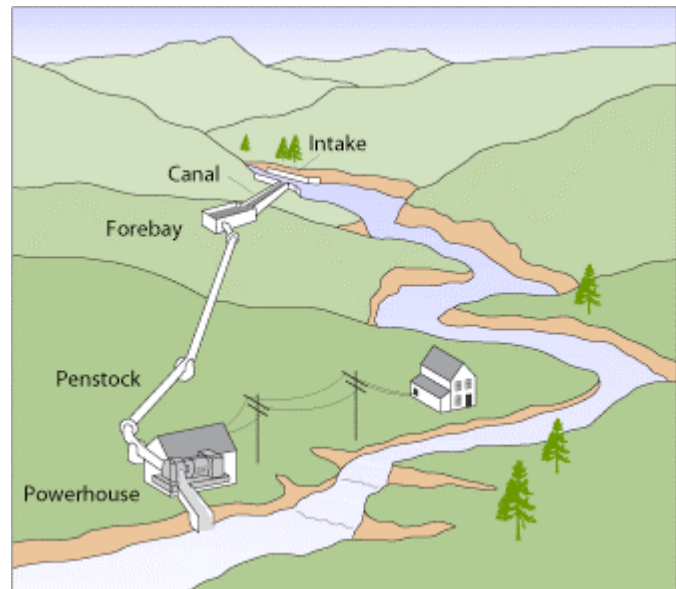
Ease of Development: Low (?)

Benefit to the Environment: High

Benefit to Local Economy: ?????

What goes in: Water

What comes out: Electricity



What is Small Scale Hydropower and how does it work?

Small-scale hydro has been increasingly used as an alternative energy source, especially in remote areas where other power sources are not viable.

Small-scale hydropower systems are those that generate less than 30 MW of electricity. They can be installed in small rivers or streams with little or no discernable environmental effect on things such as fish migration. All hydropower systems use the energy in flowing water to produce electricity or mechanical energy. In small-scale hydropower, run-of-the-river systems, which do not require large storage reservoirs, are often used. For run-of-the-river systems, a portion of the river's water is diverted to a water conveyance, such as a channel or pipeline, which delivers the water to a waterwheel or turbine. The moving water rotates the wheel, which spins a shaft. The motion of the shaft produces electricity, which can then be used directly or fed into the grid.

Why is Small Scale Hydropower considered a clean renewable energy technology?

Small-scale hydro plants producing less than 30 MW of power are often considered renewable sources of electricity. Hydropower is a renewable resource because it uses the continuous flow of rivers and streams to produce electricity without using up the water resource. It is also a clean technology because it does not rely on the burning of fuels like oil, coal, or natural gas to produce power.

Where is Small Scale Hydropower technology typically used?

There are different types of small-scale hydropower developments. Micro-hydro has a power output of 100 kW or less, and is typically used to supply electricity on a residential scale, for one or two houses. Mini-hydro has a power output of 100 kW to 1 MW, and is typically used for a small factory or isolated community. Small-scale hydropower is used for regional supply into a grid, and produces 1 MW to 30 MW of power.

What are the production and maintenance costs of Small Scale Hydropower?

Maintenance costs are generally minimal; however production costs for a small-scale hydropower project can vary, based on site conditions. A sufficient quantity of falling water must be available in order to make this economically feasible. This usually means that hilly or mountainous sites are best. To determine the amount of power available at the site, one would need to determine the "head" and "flow" of the water source. Head is the vertical distance that water falls. Most small hydropower sites are categorized as low or high head. The higher the head the better because one needs less water to produce a given amount of power, and smaller, less expensive equipment can be used. Flow is the quantity of water falling, usually determined in gallons per minute. A higher flow rate can produce more electricity, and therefore be more economically viable over many years.

Does a Small Scale Hydro installation have any environmental impacts?

Most of the environmental impacts of small-scale hydro developments can be avoided in part or in whole by a good design and appropriate construction and operating practices. Small-scale hydropower developments do not take up much space and rarely cause significant shoreline flooding or required river diversions.

What is the quality of the power produced by Small Scale Hydro?

The quality of the power will be dependant on the head and flow of the stream or river electricity is being generated from. Stream flows can be quite variable over a year, so the quality of the power can be varied throughout the year as well.

How long can I expect a Small Scale Hydro system to last?

With proper maintenance, a small-scale hydropower system can last over 50 years.

Sources:

- Massachusetts Technology Collaborative (www.mtpc.org)
- US Department of Energy, Energy Efficiency and Renewable Energy (www.eere.energy.gov)
- Renewable Energy Access (www.renewableenergyaccess.com)
- EPA Clean Energy (www.epa.gov/cleanenergy/hydro.htm)
- Renewable Energy Policy Project (www.crest.org)
- Canadian Renewable Energy Network (www.canren.gc.ca)
- Energy Alternatives Ltd. (www.energyalternatives.ca)
- Low Impact Hydropower Institute (www.lowimpacthydro.org)