Renewable energy: Why hydropower?
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Hydropower is energy that comes from water, which is used to generate electricity. Modern hydro turbines can convert as much as 90% of the available energy into electricity, while the best alternative energy plants are only about 50% efficient. Unlike fossil fuel plants, hydropower plants operate without producing greenhouse gas emissions. Some renewable energies are dependent on daily or seasonal fluctuations, whereas hydropower provides consistent and generally predictable power generation, provided the flow of water is consistent.

Hydropower is one of various options within the renewable energy spectrum. It is the most predictable amongst renewable energy sources and, when designed and maintained according to specifications, boasts highly efficient systems and very low maintenance costs.


Kruisvallei hydroelectric generation project

The Futuregrowth Power Debt Fund was one of the first institutional investors in the Renewable Energy Independent Power Producer Procurement Programme. The Fund is invested in a diversity of renewable energy deals, with R8.1 billion in committed deals across 30 projects. The Fund's recent investment in the Kruisvallei hydroelectric generation project is its first into this form of renewable energy.

Read: Kruisvallei hydroelectric generation project: Improving the lives of the local community

Run-of-river hydropower

The Kruisvallei Hydro project is a run-of-river plant. Advantages of this type of hydro power include:

- **Day and night production:** As the natural resource is a flow of water, it is able to generate electricity 24/7. The biggest risk to this is the necessary constant flow of water which obviously cannot be guaranteed in a natural river scenario. With Kruisvallei, however, this risk is largely mitigated as the plant is located along the Ash River whose water resource is the Lesotho Highlands Water Scheme with guaranteed minimum flows for the duration of the scheme. The scheme itself supplies water from Lesotho to Gauteng via the Vaal River System.

- **Longer life:** These plants are able to run for about 50 years with relative ease if maintained properly. Solar PV and wind generally run for up to 25 years before requiring a substantial overhaul.

Potential drawbacks can be:

- **Cost:** Hydro has a higher cost per MW compared to Wind and Solar PV and thus commands a higher tariff. However, considering that hydro can generate power for much longer than wind and solar plants, the higher cost can be justified.

- **Water scarcity:** It is often difficult to forecast the long-term flow of water from a natural river. This is significant in the context of global warming and growing water scarcity.

Overall, we believe that hydropower has a fitting place in a diversified local energy mix.

Types of hydropower

There are four broad hydropower types:

1. **Run-of-river hydropower** channels flowing water from a river through a canal or penstock to spin a turbine which generates power. Typically, this will have little or no storage facility.
2. **Storage hydropower** is typically a large system that uses a dam to store water in a reservoir. Electricity is produced by releasing water from the reservoir through a turbine. Its key advantage is its ability to be shut down and started up at short notice according to the demands of the system.
3. **Pumped–storage hydropower** is a derivative of storage hydropower, where the plant harnesses water which is cycled between higher and lower reservoirs. When electricity demand is high, water is released from the higher to the lower reservoir, utilising gravitational force to increase the velocity of the water flow through the turbines which, in turn, produce electricity. During low power demand, the water is pumped back to the upper reservoir. Eskom's Ingula hydropower schemes located in the Drakensburg fall into this category.
4. **Offshore hydropower** is a far less established but growing group of technologies that uses tidal currents or the power of waves to generate electricity from seawater.

These technologies often overlap. For example, storage projects can often involve an element of pumping to supplement the water that flows naturally into the reservoir. Run-of-river projects can also provide some storage capability.

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