

Hydro Energy

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Slide 2: *Hydro Energy*

- Moving water can be extremely powerful.
- The kinetic energy of flowing water can be used to drive all sorts of machinery, including electricity generators.

Slide 3: *Hydroelectric Power: Hydro Energy Converted to Electricity*

- Gravity makes water flow from a high to a low place.
- The moving water contains kinetic energy.
- Hydroelectric power stations are able to transform the kinetic energy in moving water to electrical energy.
- In a hydroelectric power station part of a river's flow is sent through pipes.
- The water turns the turbines.
- And the turbines turn the electricity generators.
- The water is returned to the river further downstream.
- In the conventional system, water is stored behind a dam wall.
- The power station is normally situated close to the dam wall.
- The water is released on demand, powering huge turbines that generate electricity.

Slide 4: *Hydroelectric Power: in SA*

- Eskom operates hydroelectric power stations at both the Gariep Dam and the Vanderkloof Dam.
- In South Africa its most important role is the storage of 'electricity' to meet peak demand fluctuations.
- These hydroelectric plants are also referred to as peaking power stations.
- In mountainous countries, hydroelectricity is an important source of energy.

Slide 5: *Hydroelectric Power: Pumped Storage Plant*

- A Pumped Storage Plant is currently the only practical way of storing 'electricity' on a large scale.
- The idea is simply to use surplus electricity – e.g. at night or weekends during low demand (off-peak) periods – to pump water to a mountain-top reservoir.

- In South Africa we have two such systems in operation: Palmiet (400 MW) and Drakensberg (1 000 MW), whilst Ingula (1 332 MW) is still under construction.

Slide 6: *Large Dams: Cahora Bassa*

- Cahora Bassa is a hydroelectric power station located in Mozambique that supplies power to South Africa.
- The power line can transmit 1 920 megawatts.

Slide 7: *Large Dams: The Issues*

Benefits:

- There are potential economic benefits, such as:
 - Flood control
 - Hydroelectric power.

Concerns:

- The relocation of people who have been or will be displaced by the rising waters.
- Siltation that could limit the dam's useful volume.
- Loss of numerous valuable biospheres, archaeological and cultural sites.
- Loss of habitat.

Slide 8: *Large Dams: Three Gorges*

- The biggest water storage project in the world is the Three Gorges in China.
- The Three Gorges Dam is a hydroelectric river dam that spans the Yangtze River.
- The total electricity generating capacity of the dam will reach 22 500 megawatts, at which point it will be the largest hydroelectric power station in the world.
- As with many dams, there is a debate over costs and benefits.

Slide 9: *Large Dams: Three Gorges*

- The rising water level on 7 November 2006 can be seen clearly from an aerial photo.
- Compare this to the water level on 17 April 1987.