Reinventing the Wheel

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With thanks to Ross Carruthers
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World End Weir, Edinburgh

- The old West Mill in Dean Village
- Land either side built up
- Major sewer network
- Gorgeous
- Very violent, foamy little river
- Previous study found site uneconomical
A Different View

- Nothing can be done to increase % of water used without sacrificing the environment.
- The main factor determining electrical output is generator efficiency.
- If the amount of water can be significantly increased.
  - Mechanical efficiency less important.
  - 90% of 20% = 18%.
  - 75% of 40% = 30%.
Where can you put a generator?

Archimedes Screws
Turbines
Water Wheel
Range of Flows

Wheel

Turbines
Japan
Impulse Wheels
Potential Energy Wheels
Type of Wheel
Cost Assumptions

1. *Opus Insertum* - stones cast into the concrete for wheel pit.
2. Galvanised steel parts, with high strength friction grip bolts
3. Wood planks for paddles.
4. Weir 4.2m high.
5. River flow, average 1.6m³/s
6. Minimum flow for fish pass 0.3m³/s
Costs

Item costs taken from industry standard estimates for generic items, and from manufactures’ catalogues.

Cost from itemised bill of quantities £200,000

Allowance for contingencies, 25% £50,000

Cost for economic calculations £250,000
The latest retail price for electricity for industrial users according to the government, gov.uk/government/collections/energy-price-statistics, is approximately 15p per kWh.

The NPV for the identified wheel, assuming a price of 12p/kWh, and 15p/kWh are given below.

It is assumed that the wheel will last 100 years, but income was only counted over 25.
Net Present Value, Assumptions

- Interest rate: 10%
- Annual maintenance: £3,000
- Average output: 50kW
- Hours running per year: 8,000hrs
- Price per kWh: £0.12
- Cost of installation: £250,000

NPV over 25 years: £158,467
NPV with all the previous assumptions, but with an electricity price of 15p/kWh is: £267,391
www.haivenu-vietnam.com

Thirty Six Views of Mount Fuji

