New Zealand Tidal Power

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Feasible Area

- Cook Strait
- Kaipara Harbour
- Manapouri
- Manukau Harbour
- Hokianga Harbour
Cook Strait

- Some of the strongest tidal flows
  - 5 knots
- 1 Tidal stream turbine
  - $10 million
- Enough tidal movement in the Cook Strait to generate 12 GW of power
  - 1.5 x New Zealand’s current requirements
Kaipara Harbour

- Could potentially power 250,000 homes
- 200 Turbines
  - 1.2 MW max
  - 0.75 MW average
- Harbour’s current is 9km/h
- Cost Estimate: NZD $600 million
- Issues:
  - Government funding
  - Concerns over effects on marine environment
    - Dolphins
    - Fish stocks
Manukau and Hokianga Harbour

- Each Harbour produces up to 6 knots of tidal flows
- Tidal flows up to 100,000 cubic meters per second
- These tidal volumes are 12 times greater than the largest New Zealand Rivers
Constraints

- Environmental Concerns
- Corrosion
- Fouling
- Cost
Environmental Concerns

**Tidal Turbines**
- Blades striking marine life
- High frequency sounds can effect dolphins
- Degrade water quality by build up of sediment

**Tidal Barrage**
- Could change the shoreline
- Could result in depletion of salt water
- Migrating fish can be blocked off of their areas
- High frequency sounds
- Blocks shipping lanes
Corrosion

- Salt water can cause corrosion in some of the metal parts
- Higher cost materials can reduce corrosion damage
- Mechanical fluids, such as lubricants, can leak out, which may be harmful to the marine life nearby.
Fouling

- The growth of marine organisms on the surface of a structure underwater
- Can cause decline in power production
Cost

- Cost is the main reason for lack of tidal power
- Very high initial cost
- Costs will go down with more advanced technology
- Estimated a 20 turbine system cost:
  - amortized annual cost of around $105 million USD
  - That would be 19.7 cents USD per KWh
    - More than nuclear plants
  - Larger systems can be cheaper