Hydropower in your Neighborhood?

IPRO 319: Feasability Assessment for Sustainable Hydroelectric Facilities in Northeastern Illinois

Problem:
Rising Cost and Dependence upon Foreign Oil
Pollution within the Chicago Megalopolis

Proposal:
Utilize Existing Dams on the Fox River to generate hydroelectricity as well as income for IIT.

Strategy:
Determine feasibility of converting one or more dams based upon the project's Economic Viability, Stakeholders, Permitting and Certification processes.

Stakeholders:
Environmental Organizations: concerned with the safe passage of fish through the dam.
Power generated would be sold to ComEd under a Power Purchase Agreement (PPA).

Permitting/Certification:
Project Approval depends upon the following government organizations:

1. USCOE U.S. Army Corps of Engineers
2. IDNR/OWR Illinois Department of Natural Resources, Office of Water Resources
3. IEPA Illinois Environmental Protection Agency
4. FERC Federal Energy Regulatory Commission
5. DOI U.S. Department of Interior

Average waiting period for certification of Hydroelectric Facilities: 4-5 years

Economic Analysis:
Four sites are determined to have the most potential using the power equation:

\[ P = \frac{\text{Head} \times \text{Flow}}{11.8} \times 0.75 \]

<table>
<thead>
<tr>
<th>Dam</th>
<th>Height ft</th>
<th>Q ft³/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algonquin</td>
<td>10.5</td>
<td>525</td>
</tr>
<tr>
<td>South Elgin</td>
<td>13</td>
<td>910</td>
</tr>
<tr>
<td>Montgomery</td>
<td>8</td>
<td>396</td>
</tr>
<tr>
<td>Stolp Island</td>
<td>12</td>
<td>400</td>
</tr>
</tbody>
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Case Studies:

Kankakee Hydroelectric Plant
Constructed: 1991
Size: 6.5 MW
Construction Cost: $8,566,000

Starved Rock Hydroelectric Plant
Constructed: 1994
Size: 8.0 MW
Construction Cost: $22,000,000

Results:

Of the Four sites, it was concluded that the Elgin Dam had the most profit potential.

Expected Output: .539 MW
Estimated Cost:
- Turbine Generator: $1,190,000
- Mechanical and Electrical Equipment: $920,000
- Operation and Maintenance Cost: $50,000
- Civil Work: $527,000
- Administration: $127,000
- Contingency: $421,000
- Total: $3,235,000
- Grant from State of Illinois: -$1,000,000
- Total: $2,235,000
- Cost per KW: $5532

Conclusion:

At this time, the Estimated Cost per KW is too high for dam conversion to be economically viable, HOWEVER:

- If The cost of fossil fuels continues to escalate,
- A strong PPA is negotiated with the Utility Company
- Cheaper and more efficient equipment is developed,
- The Public is made more aware of low head hydroelectric

A vast renewable resource could be tapped.