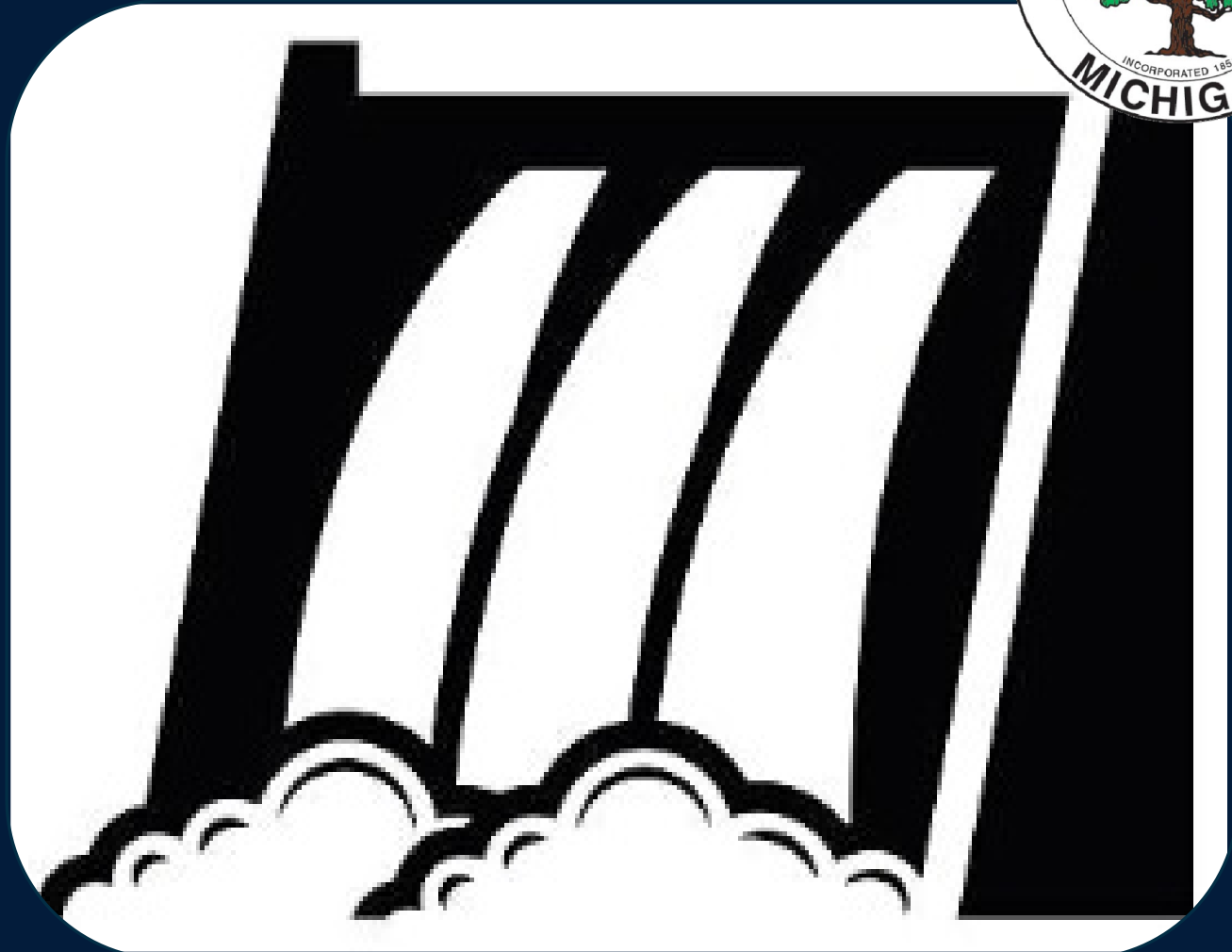


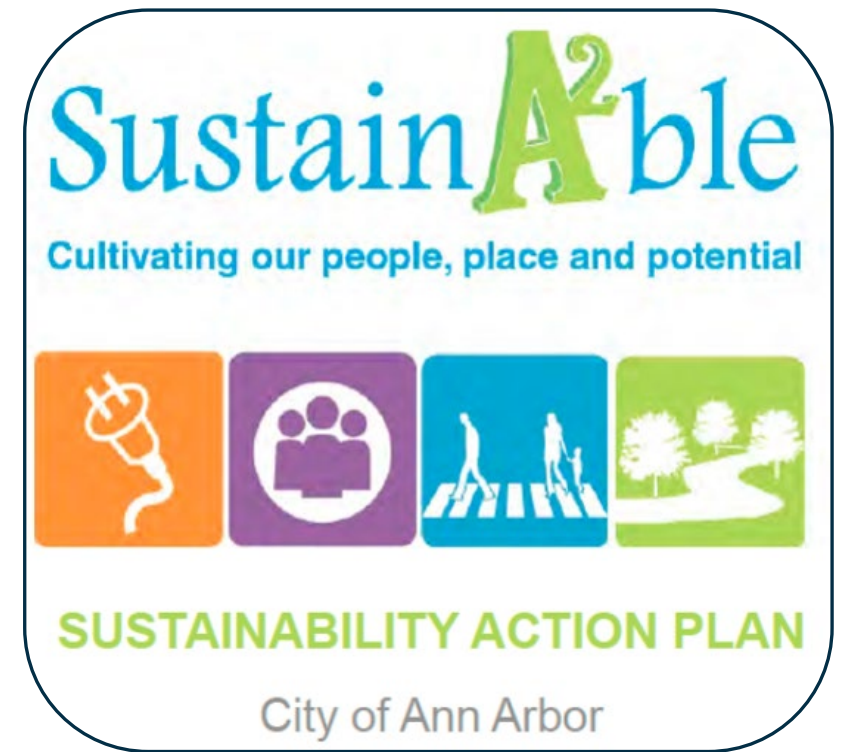
BARTON AND SUPERIOR DAMS ECONOMIC ANALYSIS

MARCH 2019



BACKGROUND & HISTORY

- Constructed in 1913 & 1918
- Characteristics & Capacity
 - Barton – 900KW
 - Superior – 550KW
 - Combined – 1,450KW
 - Power production = approx. 500 homes
 - Offset burning of 2,645 tons of coal/yr
 - Offset production of 4,838 MT/yr of CO₂

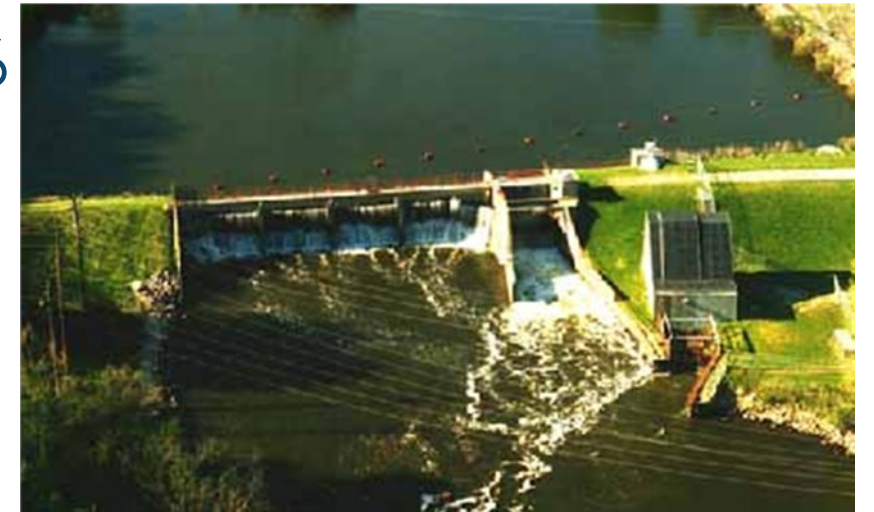


FINANCIAL BACKGROUND/NEEDS

- Annual Revenue Potential
 - \$450K/yr
 - Net for Barton = \$130K
 - Net for Superior = (\$5K)
- Moved to General Fund in 2006
- DTE Power Purchase Agreement expires in 2036
- Capital costs:
 - Dam structures/embankment (non-recurring)
 - Power generation equipment (recurring)
- Future Needs



Barton



Superior

FUTURE CAPITAL NEEDS

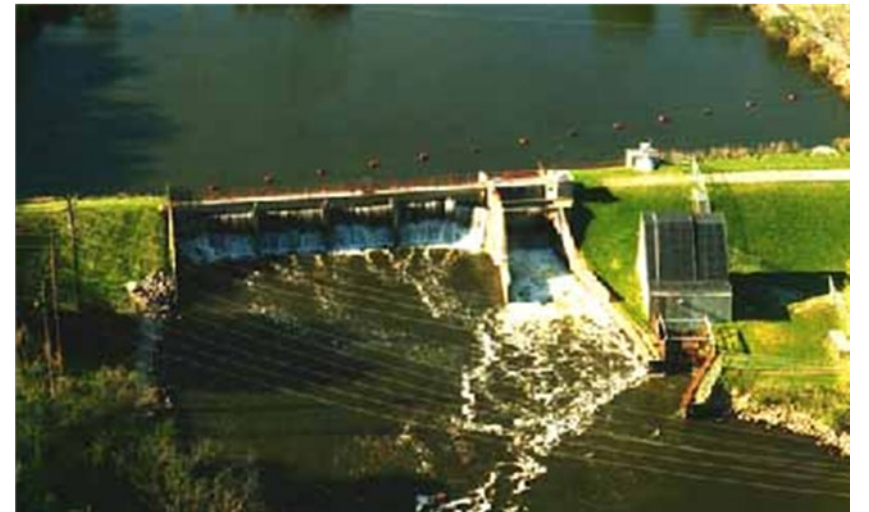
- Barton Dam
 - FY20 - \$42K (safety inspection follow up work)
 - FY20 - \$250K (embankment repair design)
 - FY21 - \$90K (air shaft repair design)
 - FY22 - \$700K (air shaft repair)
 - FY22 - \$1.6M (embankment repair)
 - FY22 - \$950K (gate painting and concrete repairs)
- Superior Dam
 - FY20 - \$49K (safety inspection follow up work)
 - FY21 - \$50K (gate painting)
 - FY22 - \$240K (gate painting and concrete repairs)
- Barton and Superior Dams - FY25 thru FY29
 - Concrete & Structural Steel Repairs - \$14.5M
 - Embankment Repairs - \$6.5M

PROJECT DRIVERS

- Assess long-term economic viability of hydro generation
- Pros and cons of operating hydros
- Develop and assess alternatives
 - Financial
 - Sustainability
 - Community Impacts
- Evaluate DTE challenges to PURPA requirements for QFs on future revenue potential



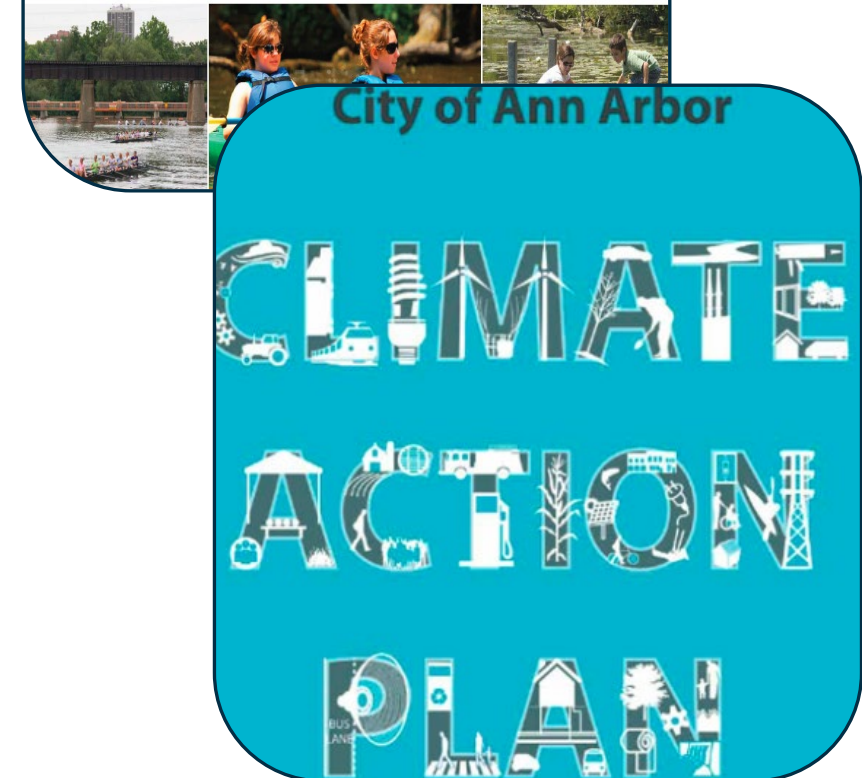
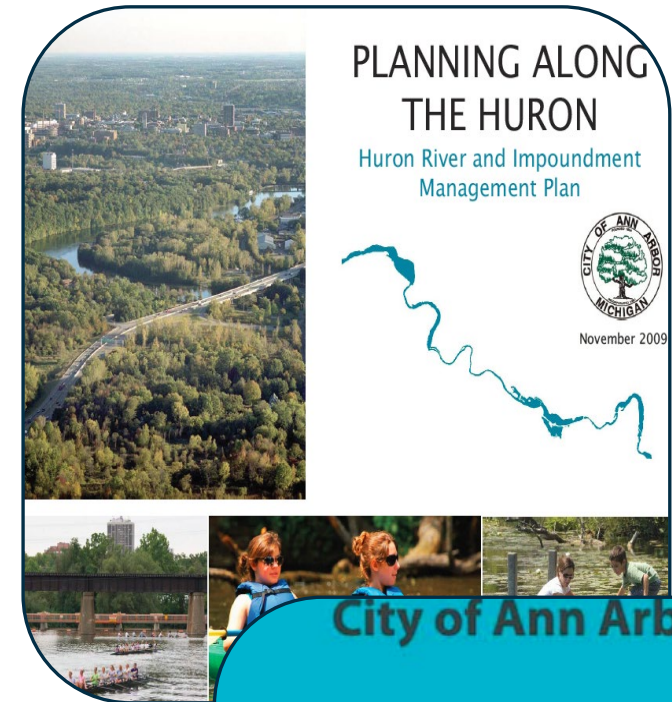
Barton



Superior

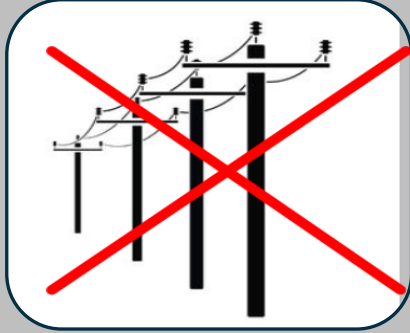
ASSUMPTIONS

- Used historical operations, maintenance and capital expenditures normalized averages to inform analysis
- Used average historical revenue data
- Forecasted capital needs for next 30 years
- Forecasted changes to O&M costs for decommission and dam removal options
- Forecasted revenues for next 30 years
- Extrapolated sediment volume and contaminant levels from samples collected at Superior to inform dam removal costs estimates



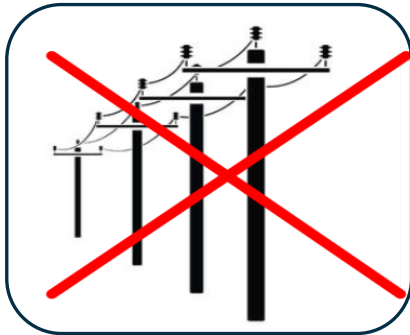
BARTON DAM ALTERNATIVES

1



**DECOMMISSION
HYDROPOWER**

2



**DECOMMISSION
HYDROPOWER +
RECOMMISSION**

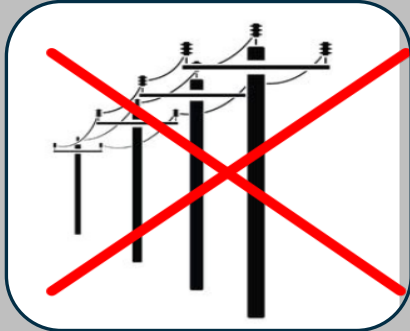
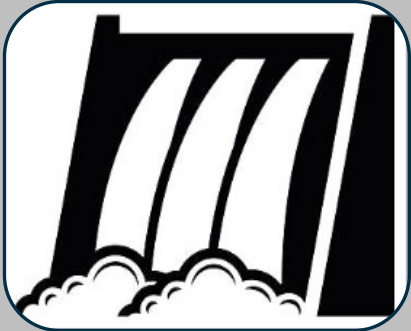
3



**REHABILITATE
HYDROPOWER**

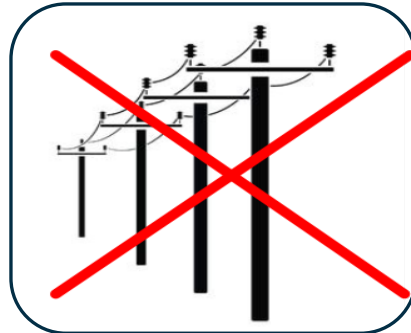
SUPERIOR DAM ALTERNATIVES

4



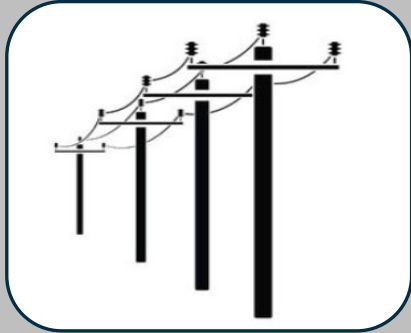
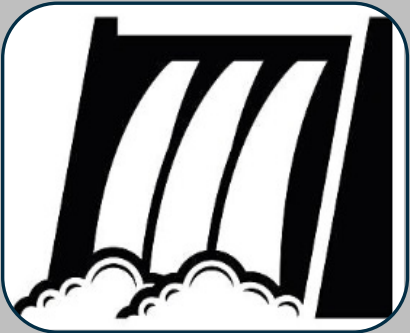
**DECOMMISSION
HYDROPOWER**

5



DAM REMOVAL

6

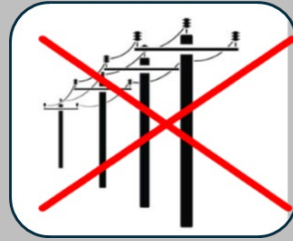


**REHABILITATE
HYDROPOWER**

SUPERIOR DAM SCENARIOS

APPLICABILITY TO CITY PLANNING GOALS

4



Lower Greenhouse Gas Emissions



Increase Renewable Energy Portfolio



5



Ecosystem Improvements



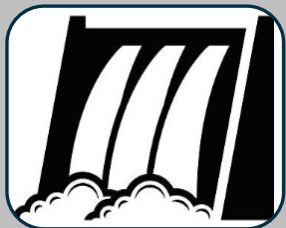
Increased Recreation Opportunities



Increased Stewardship/Education Opps



6



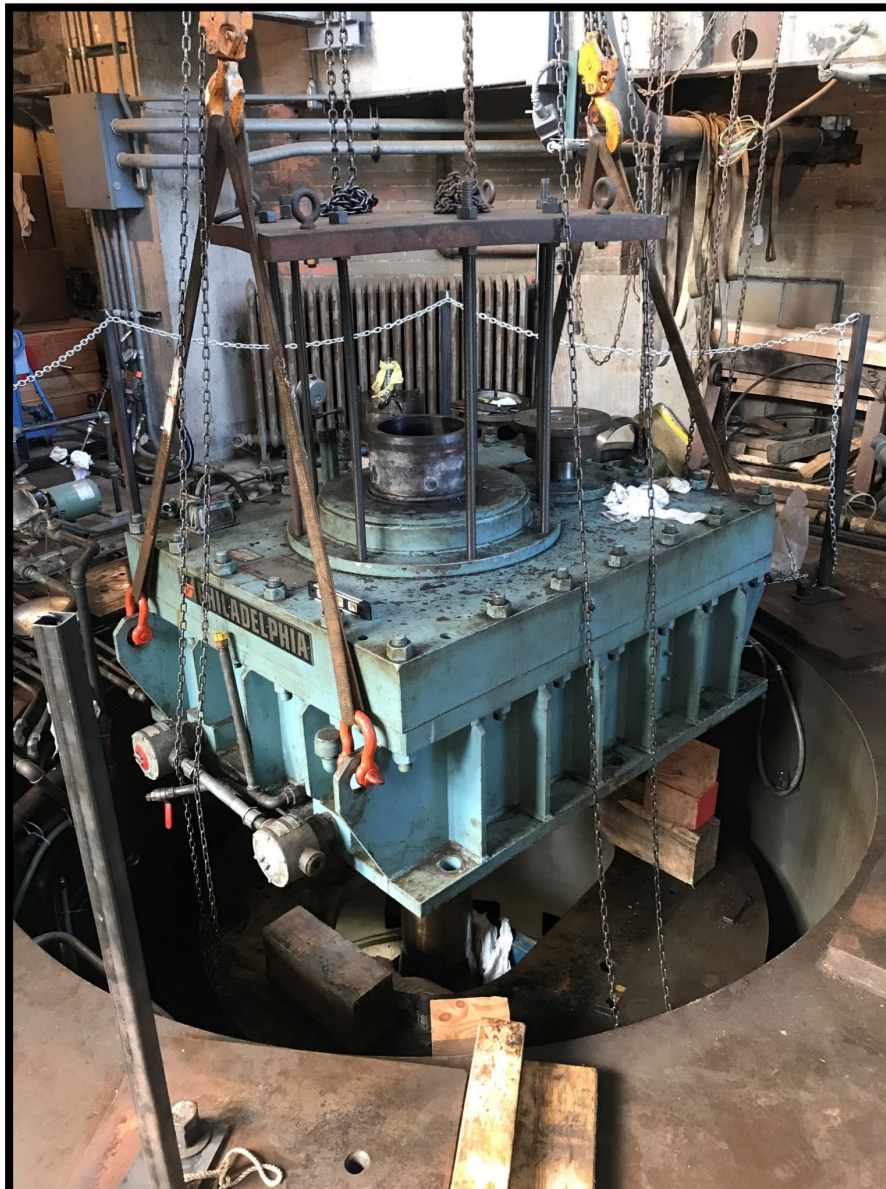
Sustain Lower Greenhouse Gas Emissions



Sustain Renewable Energy Portfolio



REHABILITATE HYDRO POWER

































REHABILITATE HYDRO POWER



REHABILITATE HYDRO POWER



Dam Alternative	Barton Dam Alternative 1 Decommission Hydropower	Barton Dam Alternative 2 Relicense Hydropower	Barton Dam Alternative 3 Hydropower System Rehabilitation	Superior Dam Alternative 4 Decommission Hydropower	Superior Dam Alternative 5 Dam Removal	Superior Dam Alternative 6 Maintain Dam and Improvements
Total Net Present Value (2018 Million Dollars)	\$(5.39)	\$(8.93)	\$(3.64)	\$(7.95)	\$(13.65)	\$(6.01)
1. Ecosystem						
3. Recreation						
4. Education and Stewardship						
5. Greenhouse Gas Emissions.						
6. Renewable Energy						

(No net contribution to a goal = white icon; net contribution = green icon; detriment to goal = red icon)

RECOMMENDATIONS

BARTON

1. Maintaining hydropower at Barton Dam
2. Reassess if revenue stream is impacted by PURPA ruling
3. Reassess before next major overhaul to ensure ROI

SUPERIOR

1. Generate hydropower at Superior Dam until the next equipment overhaul, then decommission
2. Removing the dam at Superior would be the most transformative alternative, but the contaminated sediment makes it the most expensive alternative and **not** recommended