Interactive Qualifying Project on Waste Water Energy Recovery

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Interactive Qualifying Project

- WPI’s Unique Curriculum “The WPI Plan”
- IQP completed Junior Year
- WPI’s answer to the study abroad program
- Interactive- students work outside their major
- Encourages collaboration + creativity
- Ranked 6th in the country for “Most Popular Study Abroad Program” by the Princeton Review
A Study of WASTE WATER ENERGY RECOVERY and its implementation in the Commonwealth of Massachusetts.

Climate change, a problem partially due to greenhouse gases in our atmosphere, has severe consequences for our environment. The use of renewable energy sources can reduce these emissions.
The Massachusetts Department of Energy Resources is looking for more renewable energy sources.

Waste Water Energy Recovery is a technology needing further study and promotion.
Project Goal

Increase the availability of green energy technologies in the Commonwealth of Massachusetts through the promotion of waste water energy recovery technology.
Lift Stations and Wet Wells

A manhole will be visible above ground.

Pressure pipe out of the pump chamber.

Wet well chamber

Gravity wastewater pipe into the pump chamber

Submersed pump

Please note: diagram is not to scale, for illustration purposes only.
Solid Liquid Separation

Self-cleaning screens

Macerator or grinder pump
Heat Pumps

Diagram showing the components of a heat pump system:
- Compressor
- Condenser
- Evaporator
- Expansion Valve
Project Objectives

1. Develop criteria for identifying and selecting high potential sites of implementation of WWER.

2. Propose a process for the selection and installation of pilot sites for WWER within the Commonwealth of Massachusetts.

3. Identify strategies for the future installation of WWER technology within the Commonwealth.
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Interviews
Results and Conclusions
Objective 1

- Project Deliverable
- Developed as a result of compilation of research
- Used to evaluate site potential
Criteria

Begin

Sewage Access
- Yes
- No

New Construction/ HVAC replacement?
- Yes
- No

Full-time Heating/Cooling Load?
- Yes
- No

Consequences of not meeting criteria
- Not Effective Implementation
- Long Payback. May not be able to payback before system life expectancy
Water Temp Between 50-85°

- Yes
  - Ideal Site

- No
  - Less effective, Longer Payback Period

Existing Monitoring Systems/Meters

- Yes
  - Ideal Site

- No
  - Extra cost for metering
Implementation Process Flow Chart

Objectives 2 & 3
Implementation Process Flow Chart

Objectives 2 & 3

- Begin (Pilot Site) → Research Potential Site → Contact Potential Site
- Conduct Preliminary Site Evaluation → Conduct Scoping Project → Conduct Cost Analysis → Design System → Install System
- Begin Funding Process → Begin Acquiring Permits

- Operate
- Monitor
- Maintain
- Promote

Ongoing
Recommendations

Objective 3

Education
• Use pilot site to encourage growth of technology

Regulatory
• Modify regulation to allow WWER to qualify for funding under APS

Future Site Selection
• Encourage sites to initiate installation process
Conclusion

Further knowledge, development, implementation of WWER

Additional renewable technology
Acknowledgments

DOER Renewables Division-Bram Claeys
DOER Green Communities-Aimee Powelka
WPI- Professor Paul Mathisen
WPI-Professor Seth Tuler

Hidden Fuels Representative-Peter Nelson
Huber Representatives- Chris Hubbard, Henry Russell, Richard Russell
International Wastewater Representative- Geoffrey Sauter
Kent County Representative- James Newton
MWRA Representative- Kristen Pateaude
Nova Thermal Representative-Jimmy Wang
QUESTIONS?