



COMMONWEALTH OF MASSACHUSETTS

*Deval L. Patrick, Governor  
Richard K. Sullivan, Jr., Secretary  
Mark Sylvia, Commissioner*

## **Wastewater Heat Recovery Request for Information**

*Aimee Powelka, Green Communities  
Division*

*Bram Claeys, Renewable Energy Division*

*Department of Energy Resources*

**The webinar will start in a few minutes...**

*Webinar*

*July 31, 2013*

*10:00 AM*

# Green Communities Division

Serves as the hub for all Massachusetts cities and towns on energy matters



*Helping Massachusetts Municipalities Create A Cleaner Energy Future*



# Green Communities Division

## Programs & Resources for Municipalities

- Green Communities Designation and Grant Program
- **MassEnergyInsight** energy tracking tool  
● ● ● ● ● POWERING EFFICIENCY
- Municipal Energy Efficiency Program
- Renewable Energy and Alternative Transportation
- Performance Contracting Technical Assistance (EMS)
- Website filled with tools & resources - [www.mass.gov/doer](http://www.mass.gov/doer)
- Email updates via listserv – Sign up by sending an email to: [join-ene-greencommunities@listserv.state.ma.us](mailto:join-ene-greencommunities@listserv.state.ma.us)



# CONTACTS - REGIONAL COORDINATORS

- Regional Coordinators act as direct liaisons with cities and towns on energy efficiency and renewable energy activities
- Located at each of the DEP Regional Offices:

← **Southeast – LAKEVILLE: Seth Pickering**  
[Seth.Pickering@state.ma.us](mailto:Seth.Pickering@state.ma.us)

**Northeast – WILMINGTON: Joanne Bissetta ->**  
[Joanne.Bissetta@state.ma.us](mailto:Joanne.Bissetta@state.ma.us)

**Central – WORCESTER: Kelly Brown ->**  
[Kelly.Brown@state.ma.us](mailto:Kelly.Brown@state.ma.us)

← **Western – SPRINGFIELD: Jim Barry**  
[Jim.Barry@state.ma.us](mailto:Jim.Barry@state.ma.us)



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# Recording & Presentation

- The webinar is being recorded and will be available on our website in approximately 48 hours at: [www.mass.gov/energy/greencommunities](http://www.mass.gov/energy/greencommunities)
- The slide presentation will also be posted at: [www.mass.gov/energy/greencommunities](http://www.mass.gov/energy/greencommunities)
- Websites are also listed at end of presentation



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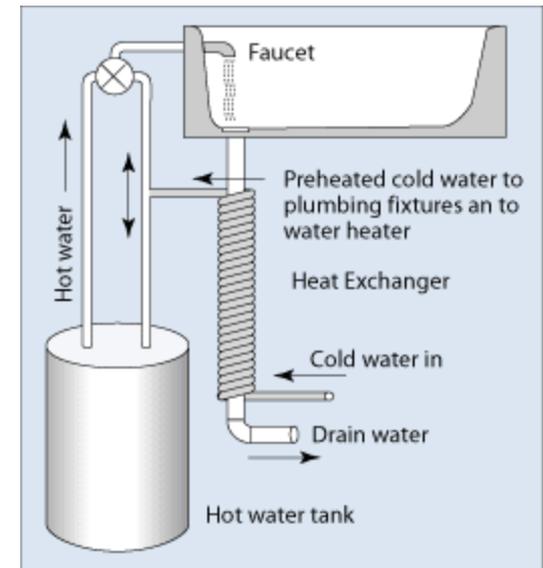
# Hot Water

- Water heating consumes
  - 12% of residential energy
  - 7% of commercial energy
- 80-90% of energy used to heat water in homes goes down the drain



# What Is Wastewater Heat Recovery?

- Capture the thermal energy of wastewater through heat exchangers and/or heat pumps
  - Use this energy to heat or cool buildings
  - Extract energy from wastewater drains and pipes exiting buildings or in the street
- Can be done at various locations:
  - within building
  - in sewer pipes
  - at wastewater treatment facility



# Wastewater As A Resource?



Water Resource Recovery Facility 3D Virtual Tour



Water Resource Recovery Facility 3D Virtual Tour

Water Environment Federation – Water Resource Recovery Facility 3D Tour

<http://www.youtube.com/watch?v=A2FmNrEmowE>



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# Rebranding Wastewater As A Municipal Resource

- Netherlands - sewage treatment as energy factories
  - Energy
  - Nutrients
  - Water
- U.S. – Water Environment Federation Energy Roadmap
  - Energy-positive resource recovery facilities
- MA – Clean Energy Results Program (MassDEP/DOER)
  - Goal of 20% net zero facilities by 2020
    - Efficiency
    - Renewable energy:
      - solar PV
      - Anaerobic Digestion
      - Wind
      - In-line hydro
    - Wastewater heat recovery



# Why Wastewater Heat Recovery?

- Millions of gallons of heated water flow through sewer and effluent pipes = thermal energy goes to waste
  - Opportunity: reduce energy use and greenhouse gas emissions
  - Helps reposition wastewater treatment facilities as a resource in public perception
  - Potential revenue source for municipalities and wastewater systems
  - Deep energy savings as Green Community



# Why Wastewater Heat Recovery?

- DOER has stated interest in alternative sources for heating and cooling of buildings
  - Global Warming Solutions Act: target to reduce GHG emissions with 25% by 2020
  - High reliance on high cost (oil, electricity) or constrained (natural gas) heating fuels
- Includes capturing waste heat
  - Demonstration pilot: \$1 million for wastewater heat recovery



# Poll Question 1

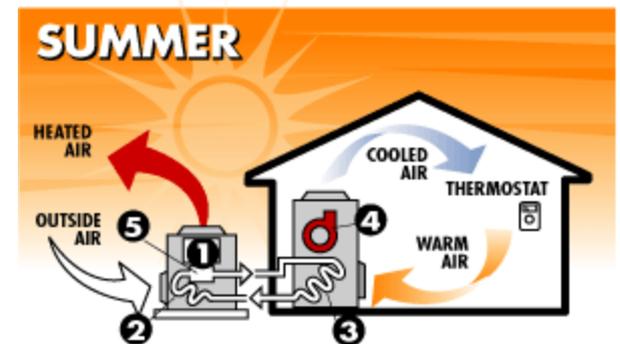
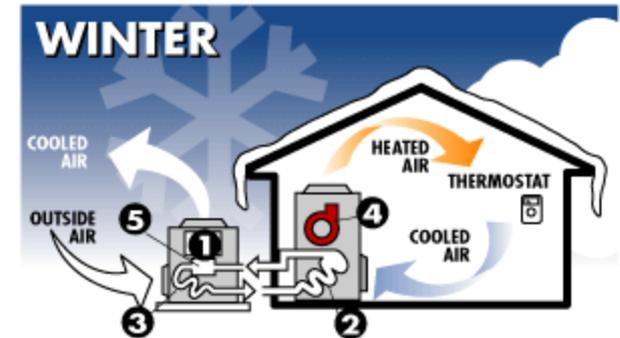
We would like to know our audience. Are you a:

- a) Wastewater or Municipal official/staff
- b) Wastewater consultant or engineer
- c) Representative from an energy service company or Vendor of energy technologies
- d) Energy/climate committee member
- e) Other

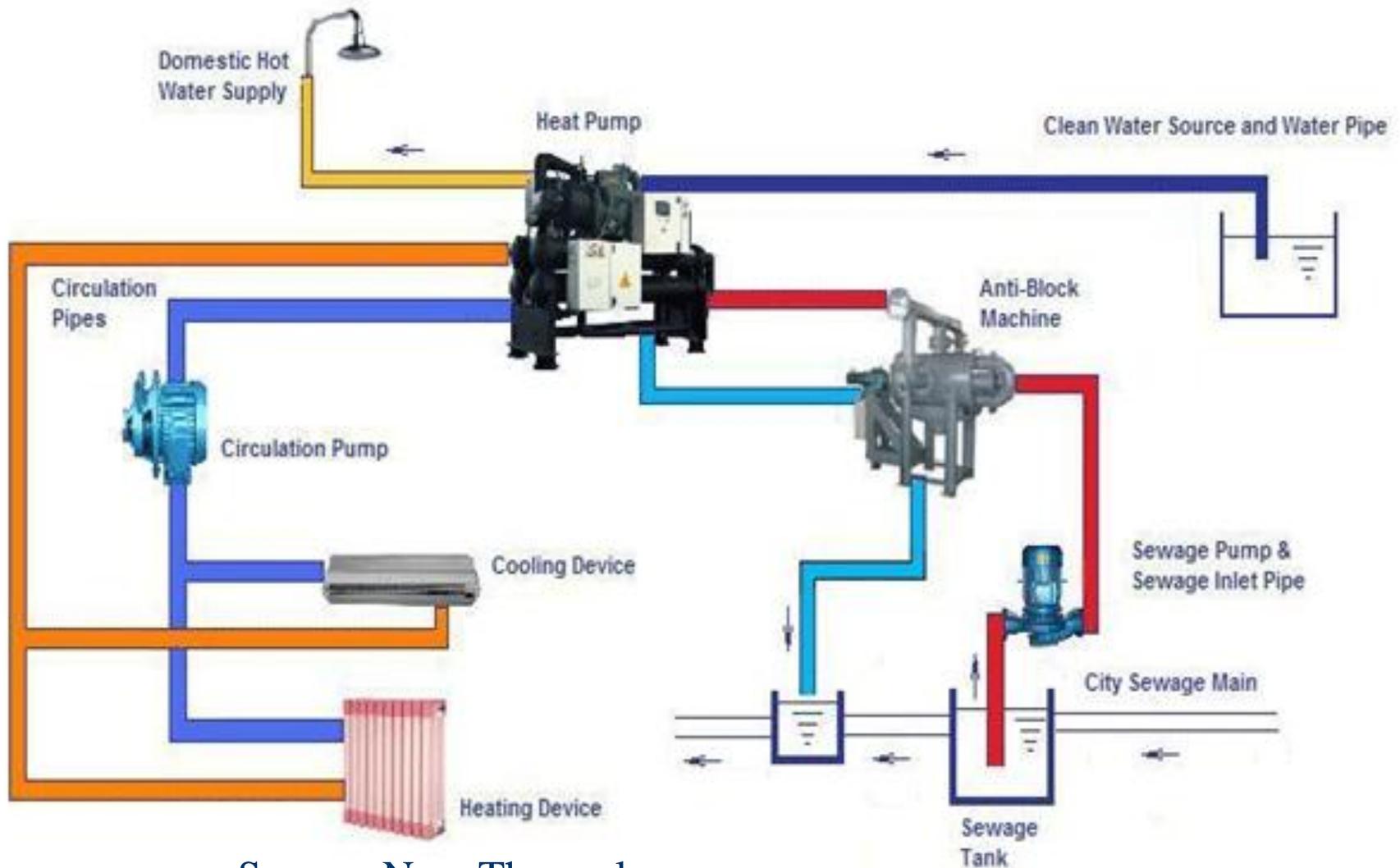


# Heat Pumps

- Heat pump technology is well established
  - Heat pumps are used in air conditioners, freezers
- Less tested in wastewater environments
  - Wastewater heat exchangers now available
  - Used in Europe, leaving the U.S. behind
  - Key factor is reasonable maintenance requirements



# How Wastewater Heat Recovery Works



Source: NovaThermal,  
<http://www.novathermalenergy.com>

# How Wastewater Heat Recovery Works



Source: Huber Technologies, <http://www.huber-technology.com>

# Wastewater Heat Recovery Example



Source: Metropolitan Water Reclamation District of Greater Chicago



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# Factors to Take Into Consideration

- Technical
- Financial
- Governance of wastewater
  - Within municipal government (DPW)
  - Independent governance (enterprise fund)
  - Regional entity
  - Wastewater treatment facility vs collection system can be independently governed, funded, and operated



# Wastewater Heat Recovery – The Energy Source

## Factors to take into consideration

- Distance to site of energy use
- Wastewater volume
- Wastewater temperature
  - Temperature gradient
  - Desired outlet temperature
- Maintenance capacity
- Relationship with energy recipient
  - Potential for 3<sup>rd</sup> party ownership/operation



# Wastewater Heat Recovery – The Energy Recipient

## Factors to take into consideration

- New construction vs retrofit
- Building size
- Building type
- Current heating fuel
- Heating/cooling needs
- HVAC system's age and condition
- Distance to site of energy recovery
- Access to wastewater pipes
- Relationship with energy source



## Poll Question 2

What do you think the potential for wastewater heat recovery is in your community?

- a) Unsure, this is first time have heard about it
- b) Is a real opportunity – going to explore options
- c) Think we may have a site and plan to respond to the RFI
- d) Already have a project under study
- e) No real possibility



# Request for Information

- Goal: to identify Massachusetts public wastewater systems and associated buildings that are potentially well suited to the installation of a wastewater heat recovery system.
  - In this stage DOER is most interested in sites that use drain or sewer pipes, not on the site of the WWTP
- DOER invites responses from municipalities and their wastewater systems who are interested in using wastewater heat recovery to heat/cool one or more buildings.



# Request for Information

- Additionally, DOER invites comments and suggestions from all interested parties, including:
  - Consultants
  - Vendors
  - Drinking water systems
  - Regulators
  - 3<sup>rd</sup> party financiers



# Request for Information

DOER Issues RFI	July 22, 2013
Webinar	July 31, 2013, 10-11 am
Deadline for Questions	August 2, 2013 5:00 pm <i>(extended to August 14)</i>
<b>RFI Response Due</b>	<b>August 19, 2013 5:00 pm</b>

Posted on Comm-Pass: ENE-RFI-2014-001

Questions to: [www.comm-pass.com](http://www.comm-pass.com)

Forum

Browse All Active Forums

By Entity/Department

Department of Energy Resources (click checked box)

RFI-ENE-2014-001



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# DOER Next Steps

1. Analysis of responses to the RFI
  - Assisted by team of WPI interns
2. Select 3-5 good candidate sites
  - Conduct in-depth study to assess feasibility of installing a waste water heat recovery project
    - Including cost/benefit and financing analysis
  - Close collaboration with local authorities and other state agencies (MassDEP, MassCEC...)
3. Provide cost share towards 1-2 best projects



## Poll Question 3

If your community installed a WWHR project, what building type would you select?

- a) Administrative building
- b) Public safety building
- c) School building
- d) Public works building
- e) Other



# Q&A



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# RFI Participant Information

- **Public Wastewater System/District Name (Thermal Energy Source / Energy Provider):**

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- **Wastewater System Contact Information**

Name \_\_\_\_\_

Title \_\_\_\_\_

Email \_\_\_\_\_

Phone \_\_\_\_\_

- **Municipality or Entity Name (Thermal Energy User / Energy Recipient):**

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- **Recipient Contact Information**

Name \_\_\_\_\_

Title \_\_\_\_\_

Email \_\_\_\_\_

Phone \_\_\_\_\_

- Please describe how the energy recipient and the energy provider have discussed working together to recover the latent energy in wastewater for use as a source of renewable thermal energy.

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# RFI Recipient Building Information

- **Site Name** \_\_\_\_\_  
Site Address \_\_\_\_\_  
Is this an existing building or proposed new construction? \_\_\_\_\_  
Building Type/Use \_\_\_\_\_  
Square Footage \_\_\_\_\_  
Distance between recipient building and the wastewater heat source (pipe or plant) \_\_\_\_\_
- **Occupancy** (# months/year, # days/month, # hours/day)  
Full occupancy: \_\_\_\_\_  
2/3-3/4 occupancy: \_\_\_\_\_  
Half occupancy: \_\_\_\_\_
- Please describe the current (or for new construction, the proposed) heating, cooling and hot water needs.  
\_\_\_\_\_
- **Current heating fuel source(s)** (natural gas, oil, propane, electric)  
\_\_\_\_\_  
Heating system type (steam, hot water, forced air) \_\_\_\_\_  
Age of heating system \_\_\_\_\_
- **Does the current heating system also heat hot water for building use?** \_\_\_\_\_  
If not, what is the fuel source(s) for hot water heating? \_\_\_\_\_  
Age of hot water heating system \_\_\_\_\_
- **Is the building cooled?** If yes, please indicate the cooling fuel. \_\_\_\_\_  
Cooling system type \_\_\_\_\_  
Age of cooling system \_\_\_\_\_



# RFI Wastewater System Information

- Is the wastewater system an independent district? If not, is it funded by an enterprise fund?

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- Will the heat recovery system harvest energy from raw wastewater or treated wastewater?

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- What is the average total daily flow for the last three years for the proposed site? If unknown, please provide the average total daily flow for the system.

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- Is the approximate average temperature of the wastewater known at the proposed site? If not, is there a point within the collection system at which the temperature of the wastewater is known? Please provide a description of the location and the average temperature.

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# RFI Third-Party Agreement

- Would the wastewater system consider a third party owning and operating a wastewater heat recovery system using the pipes that are owned and maintained by the wastewater system (similar to a third-party agreement that is often used with solar projects)?

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- What concerns would the wastewater system have about a third-party agreement for wastewater heat recovery?

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# THANK YOU!

- The webinar was recorded and will be available for viewing at your convenience on our website at:  
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- Contact Information:
  - [Aimee.Powelka@state.ma.us](mailto:Aimee.Powelka@state.ma.us)

