

Heat Recovery Systems and Services

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Outline

- CWWA – Who are we and what do we do?
- The utilities' regulatory framework.
- Utility responsibilities.
- Environmental technology initiatives.
- Thinking outside the box.
- Plumbing and other regulatory frameworks.
- Conclusions and Next Steps.

CWWA  ACEPU



Canadian Water and Wastewater Association
Association canadienne des eaux potables et usées

CWWA – Who are we and what do we do?

- **Role:**
 - the national voice on water and wastewater issues
- **Membership:**
 - corporate only and principally utilities, but includes private sector suppliers and others
- **Governance:**
 - Board has 15 municipal Directors and 6 member Association Directors

CWWA – Who are we and what do we do?

Mission:

- To be the recognized national voice on municipal water and wastewater issues

Ends:

- To inform Members of national issues
- To inform decision-makers of Members' views
- To inform the general public on water and wastewater issues
- To meet specific “ends” as established by the Board from time to time

The utilities' regulatory framework.

- Municipal water and wastewater services are directly regulated by the provinces and territories.

Water services are usually required to:

- meet standards for infrastructure – treatment plants and distribution/reservoir systems,
- have a certificate of approval for facilities,
- meet provincial standards in operations and monitoring, and
- meet provincial standards for water quality.

There are variations between jurisdictions.

The utilities' regulatory framework.

The role of the Federal Government:

- assists in the development of the *Guidelines for Canadian Drinking Water Quality* and *National Performance Standards for Wastewater Effluents*
- is directly responsible for water (and wastewater) services on Federal Lands and Properties (includes First Nations, National Parks, Defense Properties, etc.)
- regulates bottled water and ice under the *Foods Act*
- Regulates “sold” fertilizers, composts and biosolids under the *Fertilizers Act*.

Water utilities' responsibilities

To provide:

- good, safe drinking water that has the trust of consumers,
- continuously, and
- in sufficient quantities to meet customers' reasonable needs.

Also to provide water for fire protection purposes.

“Safe” and “fire protection” are legislated responsibilities

Water utilities' responsibilities

The five elements of a water delivery system are:

- Sources – aquifers and surface waters,
- Transmission lines from sources,
- Treatment systems and processes,
- Distribution systems, and
- Point-of-delivery distribution systems.

Each element presents contamination “risks”.

Each element provides opportunities or needs to create
“barriers to contamination”!

Utilities have no responsibility for the 5th element

Wastewater utilities' responsibilities

To:

- Collect and treat all wastewater generated within their jurisdiction,
- Protect against flooding in the community, and
- Discharge wastewater effluents to the environment of designated qualities.

Wastewater utilities' responsibilities

The four elements of a wastewater treatment system are:

- Pre-point-of-discharge collection and drainage systems,
- Municipal wastewater collection systems – sewers and storm drains,
- Treatment systems and processes,
- Discharges to the environment.

Each element presents “risks”.

Each element provides opportunities or needs to create “barriers to risk”!

Utilities have no responsibility for the 1st element

Environmental technology initiatives

All environmental technologies are intended to reduce the “environmental footprint”.

Some technologies apply:

- within municipal water production and distribution systems,
- within municipal wastewater collection and treatment systems,
- others apply within buildings, and some
- cross-over between the two.

Environmental technology initiatives

Most **in-system** technologies are intended to reduce:

- **water demand** (e.g., leak reduction, optimizing back-flush operations, etc.)
- **energy needs** (e.g., more efficient pumps, greater reliance on gravity, co-generation plants, etc.)
- **greenhouse gas production** (e.g., substitute power sources, reduce energy consumption, etc.)
- **chemical dosages** (e.g., optimizing chemical use, changing chemical treatment practices, etc.)

Environmental technology initiatives

Parallel technologies for **in-building** applications reduce the “environmental footprint” through:

- **water demand** (e.g., low flow and more efficient water appliances), and
- **energy needs** (e.g., heat recovery, solar hot water heating panels, etc.)

CWWA has advocated non-potable water uses and water conservation practices within buildings

Thinking outside the box

All “reduction” innovations or devices have “out- of-the-box” consequences.

- Low flush toilets – what happens to drain line carry distances?
- Low flow shower heads – how does the teenager respond? – longer showers?
- Single flow through water-based air conditioners – increased water demand!

Thinking outside the box

Water system heat recovery units:

- Toronto generates chilled water for urban air conditioning system:
 - treated water entering distribution system is marginally warmer but within aesthetic guidelines.
- Municipality X, AB extracts heat from municipal distribution system to heat a municipal building:
 - down stream users have colder water and have to add heat;
 - potential downstream contamination if heat exchanger fails.
 - Alberta now prohibits this type of installation!

Thinking outside the box

Water system heat recovery units:

- Private building in Municipality Y, MB proposed extracting heat from municipal distribution system to heat a building:
 - Municipality Y heats the water in the distribution system to prevent freezing;
 - down stream users have colder water and have to add more heat,
 - the downstream distribution system may freeze;
 - potential downstream contamination if heat exchanger fails.

Thinking outside the box

Wastewater system heat recovery units:

- In-building wastewater heat recovery units:
 - chilled water in sanitary drain pipes likely to lead to more frequent grease blockages and added clean-outs,
- End-of-building wastewater heat recovery units:
 - Chilled water entering the sewer system likely to lead to more frequent downstream grease blockages and added clean-out costs,
 - Wastewater treatment plant receives chilled water that reduces biological activity – may require added heat seasonally to meet bio-reactor minimum conditions.

Thinking outside the box

Wastewater system heat recovery units:

- On treatment plant effluent discharge pipes to surface water receiving bodies:
 - chilled water in discharge may eliminate a heat plume in the fish habitat, considered seasonally unacceptable.

Plumbing & Other Regulatory Requirements

- Are typically product certification standards
 - Material specifications
 - Some performance tests (pressure, leak resistance, etc.)
- May include installation and operation requirements
 - Presence of back flow valves, cross-connection controls
 - Inspection frequencies.
- Rarely include environmental performance requirements
 - Heat recovery efficiency

Plumbing & Other Regulatory Requirements

Attachments directly on municipal infrastructure

- may be breaching provincial infrastructure standards or may in any case, require pre-approval.
- may breach municipal by-laws (if any)
- probably in a regulatory “no-man’s land”

Attachments within buildings and after the meter may be breaching:

- plumbing or building code requirements – e.g., references to CSA B-125 plumbing fixtures,
- municipal bylaws – e.g., ban on use of water-based air conditioners based on single water flow through use.

Conclusions

- Environmental technologies are not opposed by CWWA or our members,
- CWWA cautions that “out-of-the-box” consequences may be negative on down-stream water system users,
- Applications should consider what is happening to:
private benefits vs. private costs
and
social benefits vs. social costs
- Are they in-balance (horizontally and vertically)?
- We do need standards to address these innovations.
- Good ideas when proliferated can cause problems.

Next Steps

1. Plumbing codes and standards have to address heat exchange units – on both water and wastewater systems – *what should they look like, what physical and public health standards need to be met?*
2. Provincial water and wastewater infrastructure standards have to address heat exchange systems fitted to municipal infrastructure –*can operational performance and risk management be assured?*
3. Municipalities have to address, through by-laws, restrictions if any on the installation of heat exchange units – *what is the impact on the water and wastewater system's operations and is it acceptable?*

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