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Drain Water Heat Recovery: 
On the Road to Becoming a Mainstream Supplemental Water Heating Technology 
by Gerald Van Decker, M.A.Sc., P.Eng.

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Manufacturer and Developer of:

POWER-PIPE
Drain Water Heat Recovery Systems

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What will be Covered in this Presentation

• Drain Water Heat Recovery: Definition, Opportunities and Benefits

• Falling Film Heat Exchangers: Why this class of technology is the most common used for Drain Water Heat Recovery
  Various proven applications

• Applications

• Market Challenges – A Technology Stuck between Rating Systems
  • There is no EnergyStar labeling program
  • Canadian method for calculating the "Combined Energy Factor for Water Heating"

• Sampling of Various Programs and Energy Performance Building Code Recognition
Drain Water Heat Recovery: Definition, Opportunities and Benefits
The Energy Resource

• Definition of DWHR: the process of using outgoing warm drain water to pre-heat incoming cold fresh water

• heat energy in drain water in most buildings is a huge untapped resource

• This heat energy can be safely and cost effectively recovered with Drain Water Heat Recovery (DWHR) technology

• Main Benefit: the energy saved by reducing the primary water heating energy load
Other Benefits of Drain Water Heat Recovery

- Cost-effective technology for both new construction and renovation

- Increased effective hot water capacity (reduce primary size) and/or

- Increased life of primary water heater(s)

- Low cost technology for green building program certification (e.g. LEED)

- Specification/design of systems is easily repeated and transferred to other projects

- Technology easily understood and installed
Energy Flow Diagram - Example of a restaurant

• Without DWHR

100 energy units of natural gas

20 energy units lost to water heater exhaust

80 energy units of hot water to dishwasher

75 energy units lost to drain

5 energy units in lost steam and to heat plates, cutlery, etc.
Energy Flow Diagram - Example of a restaurant

- With DWHR
Falling Film Heat Exchangers
“Plate and Frame” and “Tube-in-Shell” are the most common types of Heat Exchangers for Liquid to Liquid heat transfer

They work very well when both liquids are clean

They cannot pass large solids and tend foul quickly with dirty liquid

They are not double-walled and vented, therefore cannot be used for potable water with DWHR
Falling Film Heat Exchangers

- The center section in which warm drain liquid flows through is an open pipe which can easily pass large solids
- They rely on a principle caused by surface tension: as drain water falls through the center section, it clings to the inner wall
- high-efficiency, non-fouling and maintenance-free
- Made of standard, accepted plumbing parts
Falling Film Heat Exchangers

• Facts:
  - Heat transfer efficiency is not highly dependent upon contact time
  - Heat transfer efficiency is more dependent upon intimate contact between the fluid and the wall
• Drain water speeds up as it falls:
  - Forming a very thin, turbulent film
  - <1 millimeter thick
• Result:
  - Drain water film imparts its heat to the fresh water through the pipe wall
1- Potable Water Safety
- unit must be double-walled and vented
- two walls of separation between dirty drain water and fresh water

2- Water Pressure Loss
- minimize pressure loss so it does not cause fresh water flow problems

3- Counter-Flow
- two fluids flowing in opposite directions
- maximize efficiency
4- Efficient and Low Maintenance
- Excellent contact between the two walls
- Long service life, maintenance-free, do not foul over time

5- Variety of Sizes
- Drain diameters: 2in, 3in, 4in or 6in
- Drain lengths: 2ft to 10ft, increment of 6in
- Freshwater connection: ¾in or 1in
- Multi-pipe DWHR systems
  - Consist of 2 or more individual units
  - Recover heat from flows of up to 1000gpm
Sizing a DWHR Unit

- Many sizes available to fit many applications

- DWHR unit diameter should match existing drain pipe

- Normally specify longest DWHR unit that can fit in the vertical space

- High-flow applications may require multi-pipe drain water heat recovery units
  - Typically size for 5 to 10 usgpm per single unit
  - Contact the manufacturer or licensed Distributor for assistance
Three Generations of DWHR Design

First Generation

- single coil, ½in nominal, arranged on inner drain pipe
- good efficiency if made well because the are “counter-flow” so max efficiency is 100%
- high pressure loss in the freshwater supply line - which can lead to fresh water flow problems at times
Second Generation

- two or more fresh water coils arranged on inner drain pipe and connect in parallel
- low pressure loss
- Is not a “counter-flow” heat exchanger, resulting in diminished efficiency:
  - Max Achievable of 75% for 2 coils and less for more coils
Three Generations of DWHR Design

Third Generation
- multiple coils arranged in parallel on inner drain pipe
- “counter-flow” so max efficiency is 100%
- highest efficiency
- low pressure loss
- optimized model designs for residential and commercial applications
- patented and patents pending
Comparison of the 3 generations of DWHR

A) Pressure loss according to NRCan Study (2007)
Comparison of the 3 generations of DWHR

B) Efficiency according to NRCan Study (2007)

**Reported Efficiency of Drain Water Heat Recovery units from the Ministry of Natural Resources Canada Testing**

- **60" Power-Pipe** (3rd generation)
- **60" GFX** (1st generation)
- **60" Retherm** (2nd generation)
- **58" Watercycles** (1st generation)

*The Power-Pipe multi-parallel coil design has the highest efficiency among ALL units.*

**Shower Flowrate [USgal/min]**

- 30%
- 35%
- 40%
- 45%
- 50%
- 55%
- 60%
- 65%
- 70%
Applications
<table>
<thead>
<tr>
<th></th>
<th>Cost/Energy Reduction</th>
<th>Return on Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESIDENTIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Flow Showerheads</td>
<td>20-27%</td>
<td>&gt;100%</td>
</tr>
<tr>
<td>DWHR with eff of 53.7% (e.g. R3-60)</td>
<td>25-35%</td>
<td>10-50%</td>
</tr>
<tr>
<td>Standard On-Demand (tankless)</td>
<td>8-16%*</td>
<td>3-12%</td>
</tr>
<tr>
<td>Solar Water Heating (freeze protected)</td>
<td>35-55%</td>
<td>0.1-3%</td>
</tr>
<tr>
<td><strong>MULTI-UNIT RESIDENTIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWHR with eff of 55.7% (e.g. C4-72)</td>
<td>25-30%</td>
<td>20-40%</td>
</tr>
<tr>
<td>Solar Water Heating (freeze protected)</td>
<td>10-50%</td>
<td>3-10%</td>
</tr>
<tr>
<td><strong>INDUSTRIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWHR Multi-Pipe System</td>
<td>40-60%</td>
<td>50-300%</td>
</tr>
<tr>
<td>Other Heat Exchangers</td>
<td>5-20%</td>
<td>30-400%</td>
</tr>
</tbody>
</table>

*NOTE: The California State Energy Commission de-rates the EF of On-Demand Water Heaters with a factor of 0.92

**DWHR can provide:**
- High % savings impact
- Excellent Return on Investment,
- Long Maintenance-Free Operation, and
- NO negative impact on lifestyle (or process for industrial)
Typical Residential Installation

- divert entire freshwater supply through DWHR unit immediately after it passes through water meter or water softener

- May feed the kitchen sink with cold water upstream of DWHR, but not necessary

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Design Variation</th>
<th>Plumbing Configuration / Comments</th>
<th>Typical Hot Water Energy Load (% of total) A</th>
<th>Typical Reduction in Hot Water Load B</th>
<th>Typical Potential Savings of Total Energy Load (% of total) A*B</th>
<th>Typical LEED Points Achievable in IECC Climate Zones 6-8 - North</th>
<th>Typical LEED Points Achievable in IECC Climate Zones 1-5 - South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes - Detached</td>
<td>1-2 Washrooms (WC) in home</td>
<td>Equal Flow</td>
<td>20.0%</td>
<td>35.0%</td>
<td>7.0%</td>
<td>7.4</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td>CW or HW Pre-Heating Only</td>
<td></td>
<td></td>
<td>26.3%</td>
<td>5.3%</td>
<td>6.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Homes - Attached</td>
<td>Equal Flow</td>
<td></td>
<td>21.3%</td>
<td>35.0%</td>
<td>7.5%</td>
<td>7.7</td>
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</table>

*Please NOTE: The LEED Points listed here are subject to project specific approval and are provided for illustration purposes only*
• if the shower is on the second floor install drain water heat recovery unit in wall of main floor

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Retrofitting a Home

- DWHR unit to be installed in a home
  - ¾in. cold water line
  - 3in. Black ABS drain pipe
  - equal flow configuration

1. cut in the main cold water line
Retrofitting a Home

2. extend the freshwater water line to and from the location of the DWHR

3. cut the bottom of the existing drain pipe 4 in up from the bottom cleanout fitting
Retrofitting a Home

4. measure the vertical distance equal to the length of the DWHR unit along the drain pipe.

5. cut the drain pipe at marks
5. install DWHR unit and connect the freshwater line:
- the supply line to the bottom of the DWHR
- the return line to the top of the DWHR unit
Most common design option

- **Multi-Residential and lodging:**
  - Central water heating system with recirculation loop
- **Most common design:**
  - Install DWHR units throughout the building
  - Preheat the cold water for up to 6 washrooms
- **Good trade-off between performance and cost**
### 4 Washrooms per DWHR Unit

#### Financial Analysis

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<th>Typical LEED Points Achievable for Mid-Rise (HMR) Multi-Residential</th>
<th>Budgetary Total Cost Per Housing Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Res (2-4 apart's) w/ Central Water Heating</td>
<td>1-2 WC per DWHR Unit</td>
<td>CW Pre-Heating Only</td>
<td>18.4%</td>
<td>29.4%</td>
<td>5.4%</td>
<td>4.3%</td>
<td>5.4</td>
<td>$580.00</td>
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<tr>
<td></td>
<td>3-4 WC per DWHR Unit</td>
<td>CW Pre-Heating Only</td>
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<td>5-6 WC per DWHR Unit</td>
<td>CW Pre-Heating with 1.5gpm Showerheads</td>
<td>16.7%</td>
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**Typical Energy Savings:** 4% to 7%

**Typical Budgetary Cost:** $310 per suite

**Typical Payback Range:** 3 to 4 years
Equal Flow Pre-Heating

- Maximum energy savings from DWHR with the equal flow plumbing scenario

Apartment Buildings and Condos
- HUGE SAVINGS: Each apartment or condo ought to have its own water heater so user pays for consumption
- Small tank (20 gal) off-peak electric water heating installed without the worry of running out of hot water
Equal Flow Arrangement

4 WC Equal Flow arranged 2 by 1

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Equal Flow Pre-Heating

- **Financial Analysis**

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Typical Energy Savings: 6% to 9%

Typical Budgetary Cost: $260 to $580 per suite

Typical Payback Range: 4-6 years
DWHR for Commercial Buildings

- Commercial applications
- Recreational facilities; High school; Prisons
  - A) Gravity fed DWHR units
  - B) Slab-on-grade case
  - C) Choosing a pump

- Food Services
  - A) Dishwashers applications
  - B) DWHR system configuration
  - C) Examples -
    - DWHR with falling drain flow
    - Multi-pipe DWHR unit
    - Direct pumped drain flow
    - Drain water storage and pumping

- Laundry Facilities
- Modularity
## Commercial Applications

- Many types of commercial applications for DWHR
- Expected return on investment of 30% to 200%

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<tr>
<td>Foodservice (e.g. Restaurants, Cafeterias, etc.)</td>
<td>Batch Dishwasher</td>
<td>Any Load Size - savings estimated</td>
<td>15.6%</td>
<td>31.5%</td>
<td>4.9%</td>
<td>2.5</td>
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<tr>
<td></td>
<td>Continuous Dishwasher</td>
<td>2.5gpm - savings estimated</td>
<td></td>
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<tr>
<td></td>
<td>Continuous Dishwasher</td>
<td>5gpm - savings estimated</td>
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<tr>
<td>Hospitals - Inpatient</td>
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</tbody>
</table>

NOTE: DWHR from showers illustrated. Hospitals have other loads which DWHR can recover heat from at an even higher energy savings rate.

<table>
<thead>
<tr>
<th>Education (Locker Rooms in High School &amp; Colleges)</th>
<th>Multi-pipe DWHR Unit</th>
<th>Equal Flow</th>
<th>7.0%</th>
<th>48.2%</th>
<th>3.4%</th>
<th>1.7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multi-pipe DWHR Unit</td>
<td>Equal Flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: DWHR for locker room showers & cafeterias. Excludes dorms. Multi-pipe DWHR units are assemblies of 2, 4 or 8 standard units.

<table>
<thead>
<tr>
<th>Recreation Facilities</th>
<th>Multi-pipe DWHR Unit</th>
<th>Equal Flow</th>
<th>project specific</th>
<th>50.0%</th>
<th>project specific</th>
<th>project specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laundry Facilities</td>
<td>Multi-pipe DWHR Unit</td>
<td>Equal Flow</td>
<td>project specific</td>
<td>60.0%</td>
<td>project specific</td>
<td>project specific</td>
</tr>
<tr>
<td>Prisons</td>
<td>Multi-pipe DWHR Unit</td>
<td>Equal Flow</td>
<td>project specific</td>
<td>55.0%</td>
<td>project specific</td>
<td>project specific</td>
</tr>
</tbody>
</table>
Recreation Facilities, High Schools, and Prisons
- Gravity fed DWHR units

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Education (Locker Rooms in High School &amp; Colleges)</td>
<td>Multi-pipe DWHR Unit</td>
<td>Equal Flow - R-series DWHR units</td>
<td>7.0%</td>
<td>48.2%</td>
<td>3.4%</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Multi-pipe DWHR Unit</td>
<td>Equal Flow - C-series DWHR units</td>
<td>44.4%</td>
<td>3.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreation Facilities</td>
<td>Multi-pipe DWHR Unit</td>
<td>Equal Flow</td>
<td>project specific</td>
<td>50.0%</td>
<td>project specific</td>
<td>project specific</td>
</tr>
<tr>
<td>Prisons</td>
<td>Multi-pipe DWHR Unit</td>
<td>Equal Flow</td>
<td>project specific</td>
<td>55.0%</td>
<td>project specific</td>
<td>project specific</td>
</tr>
</tbody>
</table>

Gravity fed multi-pipe DWHR system
Slab-on-grade case

- slab-on-grade/drain flow in floor - elevate drain water using pump

- electrical consumption - only 1-2% of DWHR energy savings

- high schools/prisons - controller may not be required if showers are used all at once or not at all
### Dishwashers applications

- **Typical Energy Savings**: 5% to 7%, but can be double
- **Typical Budgetary Cost**: $1,000 (gravity fed, single unit) to $15,000 (large hospital operation)
- **Typical Payback Range**: 3-5 years

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Foodservice (e.g. Restaurants, Cafeterias, etc.)</td>
<td>Batch Dishwasher</td>
<td>Any Load Size - savings estimated</td>
<td>15.6%</td>
<td>31.5%</td>
<td>4.9%</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Continuous Dishwasher</td>
<td>2.5gpm - savings estimated</td>
<td></td>
<td>37.8%</td>
<td>5.9%</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>Continuous Dishwasher</td>
<td>5gpm - savings estimated</td>
<td></td>
<td>42.2%</td>
<td>6.6%</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Examples - DWHR with Falling Drain Flow

- water heater located downstream of return line
Examples - Drain Water Storage and Pumping

- batch dishwashers in slab-on-grade food services facilities - need drain water storage for next cycle

- drain water pumped to DWHR unit during next hot water filling cycle
The Power-Pipe® Unilever system provides:

- 90% measured Return on Investment
- Zero Maintenance Operation (over 5 years)
- Increased hot water capacity, eliminating need for additional water heaters when expansion. Peak thermal power performance is above 300 kW
- Increased life to primary water heater due to reduced “thermal shock” because inlet temperature is much warmer with large washing operations
- Savings of 130 Tonnes CO₂ per year
Market Challenge:
A Technology Stuck between Rating Systems
There is no EnergyStar labeling program for DWHR because, by itself, it is an Energy Saving Device.

Options:

1) Do nothing and limit energy saving opportunity for Americans

2) Create an EnergyStar label program

3) Create a different label/rating program
Energy Factor:
Current Rating methods not well suited for DWHR + Water Heater

Options:
1) Do nothing and limit energy saving opportunity for Americans
2) Adopt Canadian Test Procedures and “Modified Energy Factor Calculation Method” and allow for labeling
3) Allow/Include in future EF test procedures for each type of water heater
Energy Factor Testing Example:

Standard Gas: EF = 0.58

With Power-Pipe R3-60: EF = 0.80
But, tank did not turn on during the first draw
due to the high heat recovery from the
Power-Pipe, causing difficulty EF calculation

Canadian Calculation: EF = 0.87
Sampling of Various Programs and Energy Performance Building Code Recognition
Décrets, arrêtés, circulaires

TEXTES GÉNÉRAUX

MINISTÈRE DE L’ÉCOLOGIE, DE L’ÉNERGIE, DU DÉVELOPPEMENT DURABLE ET DE LA MER, EN CHARGE DES TECHNOLOGIES VERTES ET DES NÉGOCIATIONS SUR LE CLIMAT

Arrêté du 14 octobre 2010 relatif à l’agrément de la demande de titre V relative à la prise en compte du système « Power-Pipe® » dans la réglementation thermique 2005

NOR : DEVU1022036A
## Government of Canada - Retrofit and New Construct.

<table>
<thead>
<tr>
<th>Drain-Water Heat Recovery Systems Eligible for Energy Credits</th>
<th>Full Credit (kWh)</th>
<th>Half Credit (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EcoInnovation Technologies (ECO-GFX)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• S3-40 (75 mm / 3 inch drain at 39% steady state)</td>
<td>1418</td>
<td>709</td>
</tr>
<tr>
<td>• S4-40 (102 mm / 4 inch drain at 39% steady state)</td>
<td>1418</td>
<td>709</td>
</tr>
<tr>
<td>• G3-40 (75 mm / 3 inch drain at 46% steady state)</td>
<td>1673</td>
<td>837</td>
</tr>
<tr>
<td>• S3-60 (75 mm / 3 inch drain at 49% steady state)</td>
<td>1782</td>
<td>891</td>
</tr>
<tr>
<td>• S4-60 (102 mm / 4 inch drain at 51% steady state)</td>
<td>1854</td>
<td>927</td>
</tr>
<tr>
<td><strong>Watercycles Energy Recovery Inc. (Watercycles)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• DX-4048 (102 mm / 4 inch drain at 44% steady state)</td>
<td>1603</td>
<td>802</td>
</tr>
<tr>
<td>• DX-3058 (75 mm / 3 inch drain at 42% steady state)</td>
<td>1529</td>
<td>765</td>
</tr>
<tr>
<td><strong>Renewability Energy Inc. (PowerPipe)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• R3-30 (75 mm / 3 inch drain at 32.9% steady state)</td>
<td>1194</td>
<td>597</td>
</tr>
<tr>
<td>• R3-36 (75 mm / 3 inch drain at 37.9% steady state)</td>
<td>1378</td>
<td>689</td>
</tr>
<tr>
<td>• R3-42 (75 mm / 3 inch drain at 42.4% steady state)</td>
<td>1544</td>
<td>772</td>
</tr>
<tr>
<td>• R3-48 (75 mm / 3 inch drain at 47.3% steady state)</td>
<td>1725</td>
<td>863</td>
</tr>
<tr>
<td>• R3-54 (75 mm / 3 inch drain at 49.2% steady state)</td>
<td>1795</td>
<td>898</td>
</tr>
<tr>
<td>• R3-60 (75 mm / 3 inch drain at 53.7% steady state)</td>
<td>1961</td>
<td>981</td>
</tr>
<tr>
<td>• R3-66 (75 mm / 3 inch drain at 55% steady state)</td>
<td>2009</td>
<td>1005</td>
</tr>
<tr>
<td>• R3-72 (75 mm / 3 inch drain at 58.8% steady state)</td>
<td>2149</td>
<td>1075</td>
</tr>
<tr>
<td>• R3-120 (75 mm / 3 inch drain at 67.7% steady state)</td>
<td>2473</td>
<td>1239</td>
</tr>
<tr>
<td>• R4-24 (102 mm / 4 inch drain at 31.5% steady state)</td>
<td>1142</td>
<td>571</td>
</tr>
<tr>
<td>• R4-30 (102 mm / 4 inch drain at 40.4% steady state)</td>
<td>1470</td>
<td>735</td>
</tr>
<tr>
<td>• R4-36 (102 mm / 4 inch drain at 42.4% steady state)</td>
<td>1544</td>
<td>772</td>
</tr>
<tr>
<td>• R4-42 (102 mm / 4 inch drain at 46.1% steady state)</td>
<td>1681</td>
<td>840</td>
</tr>
<tr>
<td>• R4-48 (102 mm / 4 inch drain at 52.7% steady state)</td>
<td>1924</td>
<td>962</td>
</tr>
<tr>
<td>• R4-54 (102 mm / 4 inch drain at 54.7% steady state)</td>
<td>1998</td>
<td>999</td>
</tr>
<tr>
<td>• R4-60 (102 mm / 4 inch drain at 58.4% steady state)</td>
<td>2135</td>
<td>1067</td>
</tr>
<tr>
<td>• R4-66 (102 mm / 4 inch drain at 59.9% steady state)</td>
<td>2190</td>
<td>1095</td>
</tr>
<tr>
<td>• R4-72 (102 mm / 4 inch drain at 62.9% steady state)</td>
<td>2301</td>
<td>1150</td>
</tr>
<tr>
<td>• R4-120 (102 mm / 4 inch drain at 72.2% steady state)</td>
<td>2644</td>
<td>1322</td>
</tr>
</tbody>
</table>
State Tax Credits for Oregon Residents

Oregon Department of Energy provides Residential Energy Tax Credits for premium-efficiency appliances and equipment, and renewable energy systems installed in Oregon.

NOTE: There are specific energy efficiency standards and some systems may have specific performance and installation requirements. Please check the Web site at www.oregon.gov/energy or call 1-800-221-8035.

Oregon Residential Energy Tax Credit

<table>
<thead>
<tr>
<th>Item</th>
<th>Tax Credit Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerator</td>
<td>$50–$70 maximum tax credit</td>
</tr>
<tr>
<td>Clothes washer</td>
<td>$115–$180 maximum tax credit</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>$80 maximum tax credit</td>
</tr>
<tr>
<td>Electric heat pump water heater</td>
<td>$400–$560 maximum tax credit</td>
</tr>
<tr>
<td>Gas water heater</td>
<td>$340 maximum tax credit</td>
</tr>
<tr>
<td>Gas furnace</td>
<td>$350 maximum tax credit</td>
</tr>
<tr>
<td>Gas boiler</td>
<td>$225 maximum tax credit</td>
</tr>
<tr>
<td>Central air conditioning system</td>
<td>$260–$390 maximum tax credit Must use Tax Credit Certified Technician</td>
</tr>
<tr>
<td>Air-source heat pump</td>
<td>$300–$1430 maximum tax credit Must use Tax Credit Certified Technician</td>
</tr>
<tr>
<td>Heat pump/central AC commissioning</td>
<td>$250 maximum tax credit Must use Tax Credit Certified Technician</td>
</tr>
<tr>
<td>Duct sealing</td>
<td>$250 maximum tax credit</td>
</tr>
<tr>
<td>Furnace, heat pump, ground source heat pump</td>
<td>Plus $150 tax credit bonus if performed at the same time as tax credit qualified heat pump, furnace, ground source heat pump installation Must use Tax Credit Certified Technician</td>
</tr>
<tr>
<td>Air handler with hydronic system</td>
<td>$125 maximum tax credit</td>
</tr>
<tr>
<td>Ductless heat pump (mini-split)</td>
<td>$400 maximum tax credit</td>
</tr>
<tr>
<td>Whole house ventilation system (HRV/ERV)</td>
<td>$550–$830 maximum tax credit</td>
</tr>
<tr>
<td>Waste water heat recovery</td>
<td>$80–$100 maximum tax credit</td>
</tr>
</tbody>
</table>

Check the following Web sites for specifications, requirements and qualifying models BEFORE you make your purchase to ensure it qualifies for the incentive or tax credit.

- Oregon Residential Energy Tax Credit: www.oregon.gov/ENERGY/CONS/RES/RETCS.html
- Energy Trust of Oregon: www.energytrust.org

State of Oregon Tax Credit – for over 10 years
Water Heating: Simply Save Energy, Save Water and Stop Wasting Money

Drain Water Heat Recovery (DWHR)

Water heating is one of the largest energy expenses in the home, accounting for about 15-25 percent of residential energy costs. Yet, 90 percent of that heat goes right down the drain, costing you energy and money. Drain Water Heat Recovery (DWHR) technology can reduce water heating costs by up to 40 percent. This electric energy savings in turn translates into a reduction in greenhouse gas emissions by up to one ton per year.

"There are a hundred different ways to spend money trying to save energy, but this is simple and the payback is quick."

Jay Zierden
Triple E Home builder

IN THE FIELD
Installing DWHR in Existing Homes

"DWHR units are relatively easy to install. You know they work right after you put them in. Turn on the shower and you can feel nice tempered water going to the hot water tank. They reduce wear and tear on the water heater and there are no moving parts, so they are virtually maintenance free. I feel they are a worthwhile investment."

Glen Nordquist, Plumber, Carlson Duluth Company

Click here to read the Building Up Newsletter on Drain Water Heat Recovery
Some Other References

Government of France:

Government of Canada:
http://oee.nrcan.gc.ca/residential/personal/retrofit-homes/drain.cfm?attr=4

Minnesota Power:
http://www.mnpower.com/powerofone/one_home/waterheating/dwhr/

U.S. DOE:
http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13040

Sears Canada
• http://www.sears.ca/stores/shop/search?
  langId=1&storeId=10051&catalogId=10001&N=0&Ntk=level1&Ntt=drain+water+heat
  +recovery&Nty=1&D=drain+water+heat+recovery&Ntx=mode+matchall&Dx=mode
  +matchall&initialquery=true&internalSearch=true

Home Depot Canada:
• http://www.homedepot.ca/catalog/drain-water-heat-recovery/173006
Top 10 Reasons: Why Builders Include and Like the Power-Pipe

• It is a **low-cost** technology for credits in energy efficiency labeling programs (e.g. LEED, ENERGYSTAR for New Homes)
• It is **cost-effective** for single homes and multi-residential buildings adding little to a mortgage while saving customers up to 30% or more (depending upon unit size) on water heating costs
• **Demonstrability:** It is one of the most obvious and visible energy saving technologies that a builder can showcase. People can even feel the heat pickup on the unit when hot water runs down the drain
• Positions them as innovative and environmentally aware
• Strengthens reputation as a leading builder
• Triples effective hot water capacity
• Reduces greenhouse gas emissions
• Maintenance free with no moving parts
• Will increase the life of the water heater
• Easy to install
Review and Summary

• DWHR advantages:
  - Practical and proven in many applications
  - Easy to specify and install
  - Cost effective

• Performance includes 2 factors:
  - Efficiency at nominal flow rate
  - Pressure loss at maximum flow rate

• DWHR should be:
  - considered a standard appliance
  - Incorporated wherever possible
Questions

There is now time for Product Specific Questions and Discussion

www.renewability.com