Case Study: The Early Adopter – Milton Hydro
Smart Meters and Time of Use

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President and CEO
Milton Hydro Distribution Inc.
Outline

- Smart Metering Installation
- Implementation of Time of Use
- Conservation and U of W Graduate Studies
- Summary
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Town of Milton Stats:
- ~ 370 km²
- Population ~ 84,000
- Fastest Growing Community in Ontario
Milton Hydro Customers

Total Customer ~27,271

- Rural Customers ~ 3,922
- Urban Customers ~23,349
Smart Metering System Implementation Program (SMSIP)

- Milton Hydro has participated in the CIS & AMI working groups since Oct 2006
- Milton Hydro has participated in the VEE Sub-committee since Jan 2007
- Milton Hydro has over 26,000 smart meters registered with the MDM/R
- Sending daily all meter data for all registered meters
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THEN

SocketGate

Meters

NOW

SecureMesh Pole-Mounted Collector

SecureMesh Socket-Mounted Collector

SecureMesh Powerline Repeater

SecureMesh Repeater

SecureMesh WAN Gateway (SkyPilot)

Demand Response Premise Devices

Software Modifications

Trillian 6 versions

MDM/R Technical Reports and Interface

>25 changes

Meters

Toronto 2010
Lessons Learned From Rollout

- Used Contracted help for the meter installs

- Meter base not secure to house

- Exposed wiring, conduit separation

You read the meter?
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First Field Deployment of Trilliant Smart Meters
Milton 2005 (294 meters)

25,495 Smart Meters Deployed by End of 2009
## Communications—Critical Component for Rural

### Milton Rural Deployment

**Equipment for LAN & WAN**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Estimated Apr-08</th>
<th>Revised Estimate Sept-09</th>
<th>Actual Current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qnty</td>
<td>Total</td>
<td>Qnty</td>
</tr>
<tr>
<td>External antenna kit and Misc</td>
<td></td>
<td>$24,831</td>
<td></td>
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<tr>
<td>Polegate</td>
<td>73</td>
<td></td>
<td>42</td>
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<tr>
<td>Repeater</td>
<td>219</td>
<td></td>
<td>115</td>
</tr>
<tr>
<td>Socketgate</td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Equipment cost/meter</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Toronto 2010
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Time of Use ----- Public Perception

- Toronto
  
  **Smart meter phase-in sparks cost fears**
  
  Tyler Hamilton, Toronto Star October 30, 2009

- Burlington
  
  **Post story spawns additional complaints of soaring hydro bills after device installed**
  
  Jason Misner, Burlington Post Staff Published on Oct 29, 2009

- Simcoe
  
  **Hydro bills set to skyrocket**
  
  Jim Wilson, MPP Simcoe-Grey January 26, 2010
Milton Hydro – Customer Information Plan

- Public
  - Newspaper
  - Mail Out
    - General Information
    - Letter indicating when they would be moved to TOU billing
  - Bill Messages
  - Information Sessions
  - On-line Access to Customer Information
Milton: Smart Meter Awareness

March

- Heard of Them: Yes 80%, No 20%
- Have One: Yes 60%, No 40%
- Paying TOU: Yes 40%, No 60%

Sept

- Heard of them: Yes 80%, No 20%
- Have one: Yes 60%, No 40%
- Paying TOU: Yes 40%, No 60%

Legend:
- Green: Yes
- Orange: No
- Yellow: Don't know
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View Account On-Line

See Daily Usage by hour

See Usage during TOU periods
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View Account On-Line

See Billing History

Compare bill to similar accounts in your area

24.61% - used approximately the same as you.
29.81% - used less than you.
45.54% - used more than you.
Perceptions of Bill Impact

Percentage of customers who believed that their bills would go up, down or stay the same as a result of the shift to TOU pricing.
## Time of Use vs Tiered Structure

### Residential

<table>
<thead>
<tr>
<th>Customer</th>
<th>Cost Impact</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>$1609.03</td>
</tr>
<tr>
<td>2</td>
<td>$537.38</td>
</tr>
<tr>
<td>3</td>
<td>$536.10</td>
</tr>
<tr>
<td>4</td>
<td>$448.39</td>
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<tr>
<td>222</td>
<td>$85.34</td>
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<tr>
<td>931</td>
<td>$20.00</td>
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<tr>
<td>3090</td>
<td>$2.01</td>
</tr>
<tr>
<td>4229</td>
<td>$0.00</td>
</tr>
<tr>
<td>5315</td>
<td>($2.00)</td>
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<tr>
<td>16567</td>
<td>($20.00)</td>
</tr>
<tr>
<td>21671</td>
<td>($123.30)</td>
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<tr>
<td>21672</td>
<td>($127.99)</td>
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<tr>
<td>21673</td>
<td>($139.38)</td>
</tr>
</tbody>
</table>

**Average** ($10.31)

### Non Residential*  
* Includes designated groups

<table>
<thead>
<tr>
<th>Customer</th>
<th>Cost Impact</th>
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<tbody>
<tr>
<td>1</td>
<td>$68,596.15</td>
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<tr>
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<td>$63,278.35</td>
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<tr>
<td>3</td>
<td>$25,738.76</td>
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<td>230</td>
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<td>322</td>
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<td>498</td>
<td>$20.40</td>
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<td>627</td>
<td>$0.00</td>
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<td>1010</td>
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<td>1255</td>
<td>($100.03)</td>
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<td>1429</td>
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<td>1540</td>
<td>($514.16)</td>
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<tr>
<td>1564</td>
<td>($1,646.20)</td>
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<tr>
<td>1565</td>
<td>($1,813.89)</td>
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</tbody>
</table>

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**Customer Cost Impact**

- **Average** ($10.31)
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Customer's Daily kWh Consumption from Smart Meter

Customer 1 consumed 1707 kWh
Customer 2 consumed 536 kWh

Date

Sep-01  Sep-02  Sep-03  Sep-04  Sep-05  Sep-06  Sep-07  Sep-08  Sep-09  Sep-10  Sep-11  Sep-12  Sep-13  Sep-14  Sep-15  Sep-16  Sep-17  Sep-18  Sep-19  Sep-20  Sep-21  Sep-22  Sep-23  Sep-24  Sep-25  Sep-26  Sep-27  Sep-28  Sep-29  Sep-30

Daily kWh's
Customer's Hourly kWh Consumption from Smart Meter

Customer 1 consumed 5.21 kWh
Customer 2 consumed 17.24 kWh
Conservation & Demand Management

MH continues its relationship with the University of Waterloo and the Ontario Centers of Excellence (OCE)

- Customer Feedback Impact Study
- Smart Home Energy Conservation System (web based) Impact Study
- Impact of TOU rates on Low Income & Vulnerable Customers study
- The Social Acceptance of School-based Solar Photovoltaic Projects
- Energy Hub Management System
- Keeping up with the Jones’s
Smart Home Conservation Project

- **Education**
  - Real-time information about energy usage
  - Shows impact of behavior on consumption

- **Tools for change**
  - Consumer friendly, convenient, easy to use
  - Ability to remotely adjust energy-consuming systems and appliances
  - Prompts to help change habits and reinforce positive behavior
  - Easy steps to keep energy costs down as prices rise

- **New knowledge to build a better future**
  - New innovation to give consumers more power to conserve
  - Better conservation outreach
  - More effective energy policies

*GIVE THE CONSUMER THE TOOLS TO MAKE INFORMED DECISIONS*
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- Participants with the Energy Conservation Solution experienced:
  - A larger consumption reduction than those without it
  - Improvements in both monthly and on-peak periods

- The impact is more pronounced during the on-peak vs. the total monthly consumption
Lower-income and Senior-headed households Study

Overall research question:
What are the behavioural responses to, and financial impacts of, TOU electricity rates on lower-income and senior-headed households? This leads to two sub-questions:
• Do lower-income and senior-headed households respond to TOU electricity rates? More specifically, do they reduce electricity consumption or shift the time electricity is consumed?
• In either the presence or absence of behavioural change, do lower-income and senior-headed households experience a change in the amount of their electricity bill upon the implementation of TOU rates?

• Key findings from analysis of electricity data:
  – A conservation effect was observed, though it is unclear if the conservation effect can be attributed solely to TOU rates (weather normalization of data was completed).
  – Little to no change in the proportion of electricity consumed during the on-, mid- and off-peak periods.
  – Electricity costs under a TOU regime as compared to costs under a conventional, ‘flat-rate’ regime: greater in summer; lower in winter.

Contact information: Sarah Simmons (sarah.ivy.s@gmail.com)
http://environment.uwaterloo.ca/research/greenpower/projects/response_systems.html
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• Keeping up with the Jones’s

• Latest study currently in progress -- to determine the whether personal groups can exert pressure on its members to conserve

• Having difficulty recruiting public to participate.

• Contact Marybeth Deline medeline@uwaterloo.ca
Future Developments ----- Powerline Carrier Pilot

Pole Mounted Collector and PLC

Distribution Transformer Meter
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Smart Meter Data & DTM Data Comparison
for Tx#4273 on Dec 27, 2008
Summary

- General Observations
  - For early adopters, the Vendors are also learning
  - Working in Partnership with the Regulator is beneficial
  - Staff are generally over optimistic
  - Public can be readily Spooked
  - Energy Conservation is not necessarily the highest priority for the average consumer
  - BE PREPARED FOR SURPRISES
For Project Success

✔ Have eager staff, who know your internal systems, leading the project

✔ Give the team the necessary time and resources

✔ Avoid multiple deadlines
  ❖ IFRS
  ❖ OEB requirements
  ❖ CIS
Yes, if we had to do it over again
Milton Hydro would be an early adopter

Thank You

Questions