BC HYDRO’S SMART METERING PROGRAM

Program Overview for Key Account Customers
CASE FOR REVITALIZATION

Case For Revitalization

- 20th century investments in our grid have not kept pace with today’s global economy. While technology continues to advance, our grid remains unchanged.

“Conservation” is the new watch word

- Manage supply and demand with less carbon impact and less environmental footprint
- Centralized generation evolving to distributed generation

Electricity distribution model evolving

- One-way flow of electricity to two-way flow

Customers influencing priorities

- Increasingly sensitive to power quality levels
- Continuing to demand uninterrupted service
- Expecting higher levels of service and interaction
- Anticipating tools and technologies to better manage their own electricity usage

BC hydro
REGENERATION
WHAT IS THE SMART METERING PROGRAM?

**METERING SYSTEM**
- Upgrade old meters to smart meters
- Implement metering telecommunication network
- Develop automated data collection system

**GRID MODERNIZATION**
- Adopt standards for clean energy transportation
- Support micro-grids & distributed generation
- Enable an intelligent, self-healing grid that can accommodate two-way flow of electricity

**IN-HOME FEEDBACK TOOLS**
- Introduce in-home display devices
- Launch new conservation website

**THEFT DETECTION SOLUTION**
- Install distribution system meters
- Develop theft analytics software
WHAT MAKES A SMART METER SMART?

<table>
<thead>
<tr>
<th>OLD METER</th>
<th>SMART METER</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Captures only electricity consumption</td>
<td>• Captures voltage, power quality measurements, interval (time-stamped) data information as well as electricity consumption</td>
</tr>
<tr>
<td>• No communication capability</td>
<td>• Integrated two-way communication between the meter and BC Hydro, and the meter and the premise</td>
</tr>
<tr>
<td>• No outage detection</td>
<td>• Automated outage detection and notification – “last gasp” and “first breath”</td>
</tr>
<tr>
<td>• No tamper detection</td>
<td>• Automated meter tamper alarms and support for theft detection and other analytics</td>
</tr>
</tbody>
</table>
| • Manual on-site meter reading  
• Manual meter connects and disconnects | • Automated and on-demand meter readings  
• Remote meter connect and disconnects  
• Disconnect policy remains the same |
| • Estimated cost and consumption feedback provided through bi-monthly bills only | • Customer cost and consumption feedback provided in near real-time via multiple choices |
A MODERN GRID

HERITAGE ASSETS - LARGE HYDRO

INDUSTRIAL CUSTOMERS WITH BIOMASS GENERATION

SMART HOME WITH EV

NET ZERO OFFICE BUILDING (PRODUCTION = CONSUMPTION)

ENERGY STORAGE BACKUP

RENEWABLE DISTRIBUTED GENERATION - WIND

RENEWABLE DISTRIBUTED GENERATION - SOLAR

RENEWABLE GENERATION - SMALL HYDRO

MULTI HOME - COMMUNITY

ENERGY STORAGE SYSTEM

OPERATIONS CENTRE

MICRO GRID - COMMUNITY

RENEWABLE GENERATION - WIND

INSTITUTION WITH SELF GENERATION (UNIVERSITY / HOSPITAL)
HOW DOES THE SMART METERING SYSTEM WORK?

1. SMART METERS STORE HOURLY CONSUMPTION INFORMATION

2. SMART METERS SEND DATA PERIODICALLY

3. DATA IS RELAYED BY A NETWORK TO THE COLLECTOR

4. THE COLLECTOR SENDS DATA TO BC HYDRO

5. BC HYDRO UTILIZES THE DATA TO OPTIMIZE THE ELECTRICITY SYSTEM
Throughout the day, the smart meter records your electricity consumption on an hourly basis, and securely stores it until it receives a request to send the data. Hourly consumption information is sent back to BC Hydro 4 to 6 times a day for less than one minute in total.

<table>
<thead>
<tr>
<th>TIME</th>
<th>ENERGY USED</th>
</tr>
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<tbody>
<tr>
<td>April 1, 2011, 6:00PM</td>
<td>3.14 kWh</td>
</tr>
<tr>
<td>April 1, 2011, 7:00PM</td>
<td>2.45 kWh</td>
</tr>
<tr>
<td>April 1, 2011, 8:00PM</td>
<td>2.04 kWh</td>
</tr>
</tbody>
</table>
Smart meters form a network where meters relay information between one another. This network ensures BC Hydro receives data in a reliable and cost effective way. For example, when there is a power outage at your home, your meter will send a signal to BC Hydro. If there is an interruption, such as a truck parked in front of a meter, the self-healing network automatically redirects the data through nearby meters ensuring the information is received by BC Hydro.
3. DATA IS RELAYED BY A NETWORK TO THE COLLECTOR

The data from the smart meter is securely routed from meter to meter until it is received by the collector. The collector sends aggregated data to BC Hydro. The collectors are mounted on existing BC Hydro poles 18 to 24 feet above the ground.
The fully protected data is relayed from the collector to BC Hydro using existing communication infrastructure, such as DSL landline, cellular or satellite. A Digital Subscriber Line (DSL) is a family of technologies that provides digital transmission over the wires of a local telephone network. This design ensures that data is sent in the most cost-effective way.
Providing substantially more measurement points throughout the electricity system will benefit customers by:

- Improving safety and reliability;
- Improving customer service;
- Reducing the waste of electricity and helping to create a sustainable energy future for BC by integrating new clean technologies.

To learn more about the many ways the smart metering system will benefit you, visit bchydro.com/smartmeters.
## WHAT ARE THE PROGRAM BENEFITS?

### IMPROVED OPERATIONAL EFFICIENCY
- Optimize voltage regulation to reduce electricity waste and improve power quality
- Enable long-term distribution system planning
- Automate meter reading

### GREATER CUSTOMER CHOICE & CONTROL
- Enable timely access to usage information
- Web & mobile applications
- Energy management devices
- Introduce new conservation programs
- Enable customer generation

### IMPROVE WORKER & PUBLIC SAFETY
- Pinpoint outages and restore power faster
- Discourage illegal tampering with electricity wires which cause fires and live wire dangers

### ENHANCE CUSTOMER SERVICE
- Better informed customer service
- Eliminate estimated billing
- Streamline moving procedures
- Faster outage restoration

### REDUCE ELECTRICITY THEFT
- Locate and reduce power diversions that cost ratepayers over $100 Million per year

### MODERNIZE BC’S ELECTRICITY SYSTEM
- Accommodate clean energy transportation
- Support micro-grids & distributed generation
- Enable an intelligent, self-healing grid that can accommodate two-way flow of electricity

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**BC Hydro Regeneration**

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WHAT ARE BENEFITS FOR COMMERCIAL CUSTOMERS?

- Voltage optimization will:
  - reduce electricity usage in incandescent lighting systems and electric motors
  - extend the life of lamps in lighting systems (particularly the types used in retail stores)
  - maximize the margin of safety for electrical equipment in the event of a voltage spike or dip in the electrical distribution feed

- Improved information for outage situations will enable better decisions and reduce down-time costs.

- On-demand meter reading will avoid adjusted billings between tenants, simplifying transactions.
HOW WILL THE PROGRAM PAY FOR ITSELF?*

<table>
<thead>
<tr>
<th>BC HYDRO OPERATIONAL EFFICIENCES</th>
<th>80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTOMER CONSERVATION</td>
<td>20%</td>
</tr>
</tbody>
</table>

**AVOIDED CAPITAL**
- Meter Reading Automation $222
- Meter Sampling $61
- Remote Re-connect Automation $47
- Distribution Asset Optimization $15
- Outage Management Efficiencies $10
- Continuous Optimization and Load Research $6
- Call Center & Billing ($2)
- Total (22%) $359

**ENERGY SAVINGS**
- Voltage Optimization – Commercial Customer Sites $108
- Voltage Optimization – Distribution System $100
- Total (13%) $208

**CAPACITY SAVINGS**
- Voluntary Time-of-use Rates $110
- Total (7%) $110

**REVENUE PROTECTION**
- Theft Detection $732
- Total (45%) $732

**TOTAL $1,629**
NPV $520

* All costs in $ Millions
BC HYDRO’S SUPPLIERS & VENDORS FOR THE PROGRAM

CORIX

- B.C.-based Corix will provide the meter deployment vendor services
- Corix is responsible for the installation of approximately 1.9 million customer meters

CAPGEMINI

- Capgemini will provide program management and control, implementation and technology integration services that will ensure the project successfully delivers planned operational benefits.
- Capgemini has worked with several utilities in North America to implement their smart metering programs.

ITRON

- Itron Inc. was chosen as BC Hydro’s metering system provider
- Itron will provide its OpenWay® Smart Meters, run over a multi-application communication network powered by CISCO. The Associated System Software and meter data management system are included in the agreement providing a cost effective, end-to-end solution.
METER GROUPS

There are 3 main groups of meters in the province:

- **SIMPLE METERS**
  - Approximately 1.8M meters

- **COMPLEX METERS**
  - Approximately 40,000 meters

- **TRANSMISSION METERS**
  - Not part of the Smart Metering Program meter exchange program
PROVINCIAL SMART METER DEPLOYMENT
SIMPLE METERS EXCHANGED BY CORIX

Meter deployment of 1.8M simple meters begins July 2011 and is scheduled to complete by December 2012

- Network deployment to start before meter deployment (aligned with meter deployment schedule)
- Province will be divided into 7 regions and 66 billing areas
- Planning based on meter reading routes and billing windows
- Some of these meters will experience an outage
- Outages are 60 seconds or less
- Customers will be able to schedule meter swap through 1-800#

<table>
<thead>
<tr>
<th>AREA</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Lower Mainland South – Fraser Valley</td>
<td>444,224</td>
</tr>
<tr>
<td>North Interior</td>
<td>104,362</td>
</tr>
<tr>
<td>North Coast</td>
<td>42,430</td>
</tr>
<tr>
<td>Vancouver Island</td>
<td>387,898</td>
</tr>
<tr>
<td>Lower Mainland Metro</td>
<td>623,627</td>
</tr>
<tr>
<td>South Interior</td>
<td>191,965</td>
</tr>
<tr>
<td>Kootenay</td>
<td>54,433</td>
</tr>
</tbody>
</table>
PROVINCIAL METER DEPLOYMENT
COMPLEX METERS EXCHANGED BY BC HYDRO

BC Hydro will install approximately 40,000 meters that have special requirements.

- Approx 32,000 of these 40,000 meters will not require an outage (transformer type meters do not require an outage).
- They will be installed by BC Hydro technicians.
- They will not follow the same schedule as the simple meter exchanges.
- Implementation schedule TBD.
- Customers will be able to schedule swap through 1-800#.

<table>
<thead>
<tr>
<th>Three phase transformer type including INSITU test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal &amp; Rewiring of Var Meters</td>
</tr>
<tr>
<td>Single Phase A Base self contained</td>
</tr>
<tr>
<td>Single Phase A Base transformer type including INSITU test</td>
</tr>
<tr>
<td>Methane gas areas</td>
</tr>
<tr>
<td>BCH Continuous Optimization program meters</td>
</tr>
<tr>
<td>Load Research Accounts</td>
</tr>
<tr>
<td>600 Volt Delta Socket Meters</td>
</tr>
<tr>
<td>Hyder Alaska (Tongass)</td>
</tr>
<tr>
<td>Remote Community Electrification accounts</td>
</tr>
<tr>
<td>E-Plus Decommissioned accounts</td>
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</table>
GENERAL CUSTOMER COMMUNICATIONS
COMMUNICATIONS FOR SMART METER DEPLOYMENT

COMMUNITY ENGAGEMENT
- Ongoing

BILL MESSAGES & INSERTS
- 8 weeks prior

COMMUNITY ADS
- 4 weeks prior

ON-GOING COMMUNICATIONS, FOR GENS NEWSLETTER, BCHYDRO.COM ETC.

METER INSTALL & DOOR HANGERS & BROCHURE
- At time of meter exchange

CUSTOMER LETTER
- 3-4 weeks prior
  - Residential
  - Commercial
  - Outage Information
KEY ACCOUNT CUSTOMER COMMUNICATIONS

Early July

Email letter with meter and outage details by site as well as clarification on how they will receive notification of meter Exchanges

4 weeks prior to meter exchange

A letter will be sent to the mailing address for each site. These letters will include a 1-800 number for you to call with questions and schedule meter exchange appointments
WHAT CUSTOMERS CAN EXPECT
INSTALLATION DAY

- Prior to starting the exchange, installers will make every effort to contact customers to let them know that meters are being exchanged. You can also call to schedule the exchange once you have received your 4 week advance notice letter by site.

- Installers will let customers who will experience an outage know that a 60 second out can be expected.

<table>
<thead>
<tr>
<th>60 SECOND OUTAGE REQUIRED</th>
<th>NO OUTAGE REQUIRED</th>
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<tbody>
<tr>
<td>Most Residential Meters</td>
<td>Transformer Type Meters</td>
</tr>
<tr>
<td>Multi-Dwelling Unit Meters</td>
<td></td>
</tr>
<tr>
<td>Commercial Self Contained</td>
<td></td>
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- Business customers on site contact can request that meter installer come back a time that works better for them.

- If the install is successful, installers will leave a brochure with onsite contact explaining the new smart meter, associated benefits, and commonly asked questions about the program.
RESOURCES
CUSTOMER

Smart Meter Call Centre

- Smart Metering Program general inquiries Scheduling/ unable to access
- General inquires meter exchange
- Complaints & Claims
- Escalated customer issues
- Claims
- Billing Exceptions

BCHYDRO.COM

- Deployment Facts and FAQs (residential & businesses)
- Overview of deployment schedule
- Online customer tools (e.g. video)
- Customer communications