Kwadacha Nation Energy Conservation Program: Community engagement and policy development report (Phase 3)

March 2014

Areef Abraham
areef@qpscanada.ca

#302 – 14640 64th Ave. Surrey BC V3S 1X7
Tel: 604 598 8428
www.qpscanada.ca

1. Summary of baseline data, interventions, forecasts and results

1. Summary of baseline data, interventions, forecasts and results

Background

BC Hydro's Remote Community Electrification (RCE) Program was established in 2005 to provide equitable and appropriate electric utility service to eligible remote communities that are not currently but would like to receive service from BC Hydro. The primary goal of the RCE program was to provide reliable, safe and cost effective electric utility service to all willing and eligible remote communities by 2017.

BC Hydro has been working with the Kwadacha Nation (home of the Tsek'ene people) to implement the RCE Program. Kwadacha is located at Fort Ware, approximately 570 km north of Prince George in British Columbia, Canada and is considered one of the most isolated communities in BC. The village lies at the confluence of the Fox, Kwadacha, and Finlay Rivers in the Rocky Mountain Trench. Access to Fort Ware is either by air from Prince George or by road with an eight to ten hour drive from Prince George, including nearly 280kms on a logging road from Mackenzie to Fort Ware. A freight company based in Prince George delivers food, goods and other materials to the community once a week.

The homes in this northerly community, where average winter temperatures can reach -23^0 Celsius, are heated by a combination of wood burning appliances and electricity. Water in most homes is heated by electricity.

Kwadacha has a population of 425 people, about 100 homes and a total annual electricity consumption of around 3,100 MWh (Nov 2010 to Oct 2011). Electricity is generated by a diesel generating plant located close to the community. The annual cost of diesel in Kwadacha is over $1.0m resulting in an electricity production cost of $0.35/kWh.

In February 2012 BC Hydro commissioned Quality Program Services (QPS), to undertake energy efficiency work in the community anticipating BC Hydro taking over the provision and supply of electricity there in early 2013. Kwadacha residents became BC Hydro customers in February 2013.

The Kwadacha Energy Efficiency Initiative has been funded by Kwadacha Nation, BC Hydro, Aboriginal Affairs & Northern Development Canada (AANDC) and BC Ministry of Energy, Mines and Petroleum Resources (EMPR).

Phase I of the initiative consisted of in-home energy related data gathering, ecoEnergy assessments, face-to-face resident energy education and basic upgrades. The upgrades included changing out incandescent lighting with compact florescent lamps, basic air sealing and hot water saving measures.

The estimated net present value of diesel savings was estimated at $95,000 and resulted in a benefit/cost ration of 1.71.

The Phase I assessments also identified significant additional opportunities for Kwadacha to reduce electrical consumption. While many of the savings opportunities were associated with the physical infrastructure of the homes - heating systems, controls and the building envelope - resident behaviour was found to be a major contributor to high electricity consumption.

Key recommendations from Phase I were:

- Install better and programmable room thermostats and heating equipment to enable residents to a) choose their primary heating source - wood or electricity, b) better control room temperatures, c) setback temperatures at night and when residents are not at home, and d) heat specific rooms in their homes rather than heat the whole house.
- Install digital thermostats to control temperatures in crawl spaces marginally above freezing to stop water pipes icing in the winter.
- Increase the air tightness of the homes by a) undertaking a concerted air sealing effort, b) replacing broken windows and ill-fitting doors, and c) repairing holes and gaps in the drywall.
- Install R60 attic insulation in the homes.
- With increased air tightness of the homes, install adequate mechanical ventilation in the homes to mitigate any risks associated with moisture buildup.
- Enable residents to use wood as their primary fuel source by ensuring that all wood burning appliances are functional and safe.
- Engage and support a community Energy Champion to ensure there is ongoing follow through and focus on supporting residents to manage their electricity usage and bills.
- Where possible engage and train Band maintenance staff during the upgrades to build capacity in the community in these upgrading skills.
- Encourage the Band store to only carry CFLs through a Memorandum of Understanding.

Eleven of the highest electricity consuming homes were selected by the band leadership to be included in a pilot which would action the recommendations.

Results

Preliminary results are shown in Tables 1 and 2 below.

Table 1: Comparison of forecast and actual savings based on preliminary data (kW/yr)

Client Ref. No.	Previous Consumption	Forecast Savings from DSM Interventions				Forecast Consumption	Current Consumption	Variance
		Forecast savings from heating system and controls upgrades	Forecast savings from improved air tightness	Forecast savings from improved attic insulation	Total savings from DSM Interventions			
1	51,985	14,495	7,220	647	22,362	29,623	28,095	1,528
2	50,820	6,721	1,613	1,888	10,222	40,598	28,169	12,429
3	47,232	7,232	2,433	947	10,612	36,620	53,752	(17,132)
4	40,329	12,527	4,822	158	17,508	22,821	25,981	(3,160)
5	35,125	6,521	2,245	1,090	9,856	25,269	13,802	11,467
6	37,506	7,924	2,327	126	10,378	27,128	21,295	5,833
8	34,918	8,946	2,356	1,006	12,308	22,610	18,004	4,606
9	33,901	9,355	2,470	831	12,656	21,245	15,137	6,108
10	32,418	8,679	2,824	771	12,275	20,143	34,250	(14,107)
11	32,356	8,353	2,715	891	11,959	20,397	16,714	3,683
13	29,957	5,038	1,116	726	6,880	23,077	15,407	7,670
Totals	**426,547**	**95,792**	**32,142**	**9,082**	**137,015**	**289,532**	**270,606**	**18,925**
%	**100%**	**22.5%**	**7.5%**	**2.1%**	**32.1%**	**67.9%**	**63.4%**	**4.4%**
					% Reductions	**32.1%**	**36.6%**	

Table 2: Comparison of previous and current electricity costs for clients and diesel costs for BC Hydro

	Client annual electricity costs at current BC Hydro Zone II rates			BC Hydro annual diesel costs (based on $0.35/kWh)		
Client Ref No	**Previous Consumption**	**Current Consumption**	**Annual Savings/ (Additional Costs)**	**Previous Consumption**	**Current Consumption**	**Annual Savings/ (Additional Costs)**
1	$6,314	$2,983	$3,331	$18,195	$9,833	$8,362
2	$6,149	$3,046	$3,103	$17,787	$9,859	$7,928
3	$5,640	$4,948	$692	$16,531	$18,813	$(2,282)
4	$4,659	$2,607	$2,052	$14,115	$9,093	$5,022
5	$3,920	$1,199	$2,721	$12,294	$4,831	$7,463
6	$4,258	$2,026	$2,232	$13,127	$7,453	$5,674
8	$3,891	$1,554	$2,337	$12,221	$6,301	$5,920
9	$3,747	$1,252	$2,495	$11,865	$5,298	$6,567
10	$3,536	$3,876	$340	$11,346	$11,988	$(641)
11	$3,527	$1,531	$1,996	$11,325	$5,850	$5,475
13	$3,186	$1,280	$1,906	$10,485	$5,392	$5,093
Totals	**$48,828**	**$26,302**	**$23,205**	**$149,291**	**$94,712**	**$54,579**

Notes: Tables 1 and 2

1. *Historically band members previously paid $0.05/kWh and the table illustrates the cost of electricity to band member based on previous consumption and current rates.*
2. *Previous consumptions are based on Band meter readings from Nov 2010 to Oct 2011. (Actual dates in the month of the meter readings are not available)*
3. *Current consumptions are based on billing information provided by BC Hydro in March 2014 and relate to consumption from Feb 19, 2013 to Feb 19, 2014*
4. *Client #3's consumption has been prorated to 365 days based on billing information for 353 days*
5. *The stepped rates have been applied to the previous consumption (and for Client 3) on an annual basis i.e. 18,000 kWh at the Step 1 rate and the balance at the Step*

2 rate.

6. *Electricity costs are based on electricity consumption and do not include taxes, the basic daily rate and other charges*
7. *Step 1 Rate $0.0827/kWh for the first 3,000 kWh/60 days and Step 2 Rate $0.145/kWh for consumption over 3,000 kWh/60 days.*

Discussion of the results

The preliminary results are based on meter readings taken on February 19, 2014. Many of the recommended upgrades were installed in late fall/winter 2013 and the attic insulation and some of the air sealing had not been completed at the time of the meter readings. Also the wood heating systems in a few of the pilot homes were inoperable and these residents relied on electric heat for all of their space heating needs.

The electrical consumption data therefore does not yet fully reflect the complete benefits of the planned and installed measures.

While not specifically quantified, the initiative anticipated that there would be substantial energy savings as a result of significant behaviour and lifestyle changes due to the engagement of residents by the Energy Champion, the education program, and the frequent feedback on electricity consumption and charges. There was good evidence of this in terms of the ongoing calls from community members to the Energy Champion asking for help in saving on their electricity bills.

Additionally, savings from a made-in-Kwadacha efficient lighting program have not been included in the analysis. An initial inventory of 200 CFLs supplied to the Band store in August 2013 had dropped to less than 40 lamps by March 2014.

Given that many of the measures were not installed for the full heating season, and not accounting for variations in outside temperatures, it is reasonable to conclude that residents had a significant impact on achieving the average 37% reduction in electricity consumption over the 12 month period through their energy use choices, lifestyle, and behaviour.

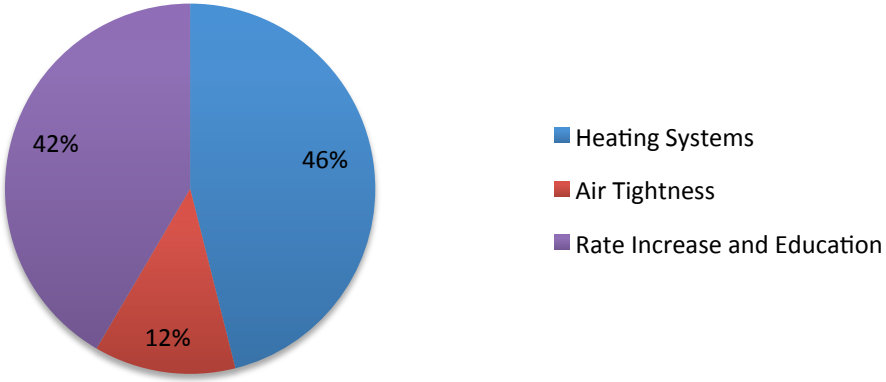
As the physical interventions have not been in effect for a full year and if we allocate 75% of the savings from the heating system upgrades, 60% of the savings from improved air tightness and no savings from insulation upgrades, we could attribute 15% (64,812 kWh) of the reduction in consumption to the actions of the residents.

Electricity rates went up significantly during the life of the project as residents moved from $0.05/kWh to BC Hydro's Zone II stepped rates and this has likely had a significant motivation for residents to reduce their consumption. However, without the education component of project residents would likely not have an effective way of channeling their motivation to reduce consumption and save money.

While further work is needed to more accurately quantify the impacts of residents' actions, observations as well as anecdotal evidence suggests that residents were motivated to make changes to save on their electricity bills and most importantly, thanks to the initiative had the knowledge, resources and tools to do it.

The image below is an example of the impact of energy efficiency education and demonstrates that residents armed with good and contextualized information are able to prioritize and make good decisions on their energy use.

Estimated Current Impact of DSM Measures on Electricity Savings



Discussion of the results

The preliminary results are based on meter readings taken on February 19, 2014. Many of the recommended upgrades were installed in late fall/winter 2013 and the attic insulation and some of the air sealing had not been completed at the time of the meter readings. Also the wood heating systems in a few of the pilot homes were inoperable and these residents relied on electric heat for all of their space heating needs.

The electrical consumption data therefore does not yet fully reflect the complete benefits of the planned and installed measures.

While not specifically quantified, the initiative anticipated that there would be substantial energy savings as a result of significant behaviour and lifestyle changes due to the engagement of residents by the Energy Champion, the education program, and the frequent feedback on electricity consumption and charges. There was good evidence of this in terms of the ongoing calls from community members to the Energy Champion asking for help in saving on their electricity bills.

Additionally, savings from a made-in-Kwadacha efficient lighting program have not been included in the analysis. An initial inventory of 200 CFLs supplied to the Band store in August 2013 had dropped to less than 40 lamps by March 2014.

Given that many of the measures were not installed for the full heating season, and not accounting for variations in outside temperatures, it is reasonable to conclude that residents had a significant impact on achieving the average 37% reduction in electricity consumption over the 12 month period through their energy use choices, lifestyle, and behaviour.

As the physical interventions have not been in effect for a full year and if we allocate 75% of the savings from the heating system upgrades, 60% of the savings from improved air tightness and no savings from insulation upgrades, we could attribute 15% (64,812 kWh) of the reduction in consumption to the actions of the residents.

While further work is needed to more accurately quantify the impacts of residents' actions, observations as well as anecdotal evidence suggests that residents were motivated to make changes to save on their electricity bills and most importantly, thanks to the initiative had the knowledge, resources and tools to do it.

The image below is an example of the impact of energy efficiency education and demonstrates that residents armed with good and contextualized information are able to prioritize and make good decisions on their energy use.


Do not use
heat must
make fire or
going to be paying
hydro bill !!!
Make Sure every
thing is unpluged
Thanks

2. Homeowner feedback

2. Homeowner feedback

- QPS designed a Green Team meeting with the goal of receiving feedback from the entire community on the status of their bills, the comfort of their homes, and to gather suggestions as to how we could further help the community reduce usage
- The goal of this meeting was to get the entire community involved to determine how we could spread the energy conservation message and work we'd done within the pilot homes to the community at large
- QPS posted the following posters in the community the week before the Green Team meeting:

We are looking for people to be part of the Kwadacha Green Team!

What is the Green Team?

The Green Team is a group of people who want to help the community save energy and lower their energy bills. If your bills are high and you want to find a way to lower them you are the perfect Green Team Member!

What will the Green Team do?

Work with the Kwadacha Energy Champion (Tracy Charlie), QPS, and BC Hydro to come up with ways that the community can lower their energy costs in their homes.

Who can join?

Anyone!

When?

Come to the first Green Team meeting at 4:00pm at the school on Tuesday March 4th to get your **free GREEN TEAM T-SHIRT**

For more information email Tracy at kwadachaenergychampion@gmail.com

Image by Mariah Seymour, age 11

- QPS purposely did not include a sign up sheet to encourage participation and attendance. A blank sign up sheet with no names listed would likely demotivate and not encourage community members to join.
- Teachers and administrators at the school encouraged interested students to also attend the Green Team meeting.
- The Green Team meeting was held after classes in the lobby of the school, a central place in the community where many people come and go at the end of the school day.
- A few adult community members and a group of students attended the Green Team meeting
- Results of the pilot homes were shared with the Green Team attendees, none of whom were part of the pilot project.
- Their reaction was very positive about savings achieved by pilot homes and they were surprised at the amount of money that could be saved by just sealing air leaks; however, their main concern was the cost of their current electricity bills compared to the bills that they were used to receiving before BC Hydro took over service. (The

current BC Hydro Zone II stepped rates are $0.0827/kWh for Step 1 (for the first 60 kWh in a 60-day billing cycle) and $0.142/kWh (Step 2) above the Step 1 rate. Previously residents were charged a flat $0.05/kWh).

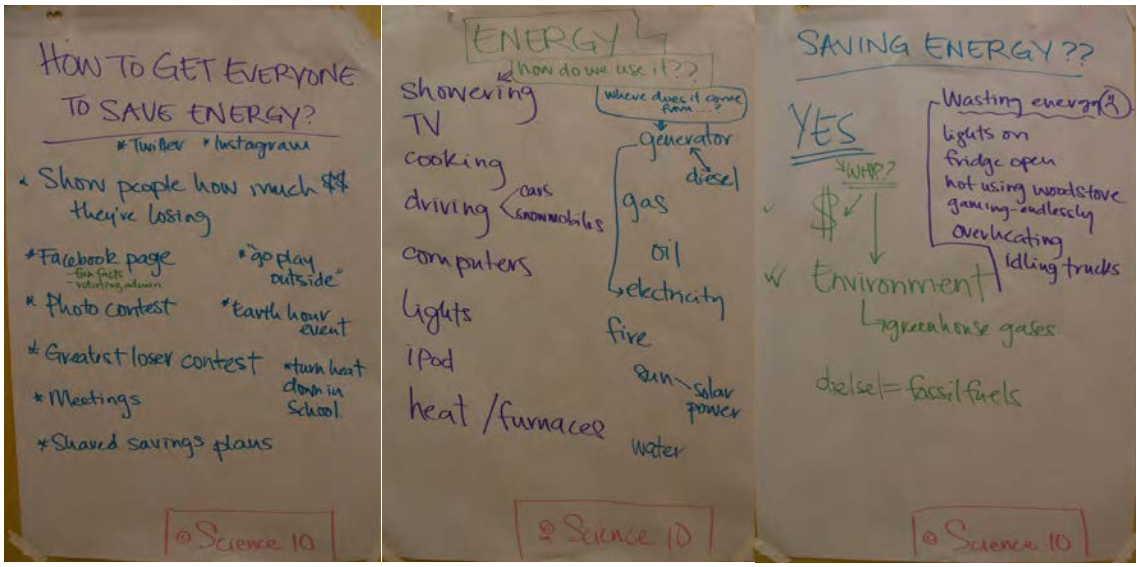
- Many community members we spoke to at the Green Team meeting and around the community expressed frustration that they were doing what they could to lower their electricity consumption but their BC Hydro bills have either decreased only slightly or have stayed the same.

School session:

- The school's principal Andreas Rohrbach organized a session during one of the High School's Grade 10 Science Classes.
- Around a dozen Grade 10 students were present during this discussion as well as 2 teachers who also participated and prompted answers from students.
- This session was structured as a discussion with the students to gage their interest and knowledge in energy and to generate ideas of how the community could save energy as a whole.
- The following five questions were used as a discussion structure with the students:

1. How have you used energy today?
2. Where did that energy come from
3. Is it important to save energy? Why or why not?
4. Can you think of any ways we waste energy?
5. What do you think are the best ways to get people not to waste energy?

Students were very interested in helping their community saving energy and many understood the technical aspects of how electricity works having covered this in their curriculum. Their enthusiasm extended beyond the cost of electricity (as they do not pay the bills) but rather on the importance on conserving resources that we have.



Discussion points and answers from the Science 10 Class

Photos from the green team events:

Robyn Spencer, Areef Abraham, and two younger members of the Green Team
(Casey Seymour and Therron Massettoe)

Setting up Green Team meeting at the school

Areef Abraham, Robyn Spencer, Chief Van Somer, and Dawn Bursey

Two young members of the Green Team
(Patricia Case and Jacob McCook)

Robyn Spencer and Verna Charlie

Shawna Case

Young members of the Green Team
(Shakira Seymour, William McCook, Casey Seymour and Therron Massettoe)

3. Interventions and Effectiveness

3. Interventions and Effectiveness

It is clear from the preliminary results for the 11 pilot homes that the average electricity consumption has decreased by 37%. While it is difficult to precisely allocate the effects of the a) interventions and b) education, the reduction in consumption is large enough to acknowledge that the actions have been successful.

There are 2 outlier homes in the data set: clients 3 and 10. Client 3's higher consumption is due to an inoperable wood furnace, reasons behind client 10's usage requires further investigation.

It was evident at a very early stage that for this initiative to be successful we needed to engage the community and residents and understand their perspectives. Earlier work had confirmed that residents were concerned with the potentially high Utility bills they were likely to face with BC Hydro's Zone II rates compared with the $0.05 kWh they were used to paying to the Band. In addition two other factors became evident:

a) Residents wanted to reduce their electricity consumption but didn't know how, and
b) Residents preferred to use wood as their primary fuel for space heating

Phase II was designed to harness these two factors.

The energy education delivered through the community Energy Champion focused on helping residents understand what appliances, equipment, and applications used the most electricity. All education focused on dollar costs, avoiding both percentages and kWh.

Very effective examples included, "Each of your large baseboard heaters left on at the highest setting for 8 hours everyday will cost you around $20 a week" Prior to receiving the education residents were unaware that space heating and hot water heating were the largest consumers of energy in their home. Many residents had been using energy efficient lighting (delivered through previous programs) but only saw a large impact on their electricity bills when they began to focus on space heating and hot water use.

Initial Heating System Set up

All pilot homes had both electric and wood heating appliances. In 7 of the 11 pilot homes space heat was delivered by a combination of a forced air wood furnace and a 14kW electric furnace mounted in series. We believe the intention of the combination was to use the electric furnace to initially heat the home while the wood furnace was being fueled up and fired, and to stop the home from freezing when the residents were not present for any length of time. Two separate thermostats controlled the furnaces: the electric furnace was to be set a few degrees below the desired room temperature while the wood furnace was set to the desired room temperature. This would result in the electric furnace switching off before the wood furnace, leaving the wood furnace alone to maintain the desired temperature.

Unfortunately there was no education provided to the residents (or to the maintenance department) on how the furnaces should be operated in tandem as described above. In addition the temperature control mechanisms for the wood furnaces became inoperable over the years. Without education on how to use the thermostats, residents began to use the thermostats as "on/off" switches and generally left the both thermostats at their maximum

settings and controlled what they thought was wood heat by opening windows. The result was that in the winter many electric furnaces were left running for most of the day resulting in the high electricity consumption.

The other 4 pilot homes had wood stoves and electric baseboard heaters. The baseboard heaters were not controlled with a wall mounted thermostat but relied on temperature knobs on the baseboards to regulate the heat output. Most of the baseboards were mounted in areas which were difficult to access and so typically the baseboards control knobs were set at a high point and the left on.

These 4 homes also had crawl spaces with baseboard heaters to stop the pipes freezing in the winter. These baseboard heaters also relied on relatively inaccessible knob controls to maintain the temperature, so typically they were set high and not turned off in the summer months. Many of the crawl spaces were above 21°C when the outside temperatures were well below freezing.

Heating System Intervention

The electric furnaces were replaced with baseboard heaters in each room and controlled by digital programmable thermostats. Digital programmable thermostats were also installed in the 4 homes with existing baseboards to allow residents to control the temperature in each room independently. The baseboards in the crawl spaces were fitted with a digital thermostat and set to just above freezing.

In addition to changes to the equipment each resident was provided with ongoing support on how and when to use the equipment by the Energy Champion.

The combination of the need to understand the heating systems plus the need for education helped frame the interventions for the initiative and its success.

Air Infiltration

Visual inspection and blower door tests showed that many of the pilot homes required air sealing. Key air leakage areas were:

- The attic/ceilings interface
- Broken windows and warped doors
- Window and door frames
- Plumbing and electric penetrations

Air Sealing Intervention

The broken windows and doors were replaced and all other areas of leakage were air sealed using a blower door to identify the leakage paths. New, properly sized, and quiet bathroom fans were installed to reduce the risk of moisture buildup in the tighter homes.

Residents were encouraged to ensure that holes and breakages in the building envelope were fixed in a timely manner. This was also an opportunity for the maintenance department to understand the importance of keeping buildings airtight and to ensure plumbing and electrical penetrations are plugged.

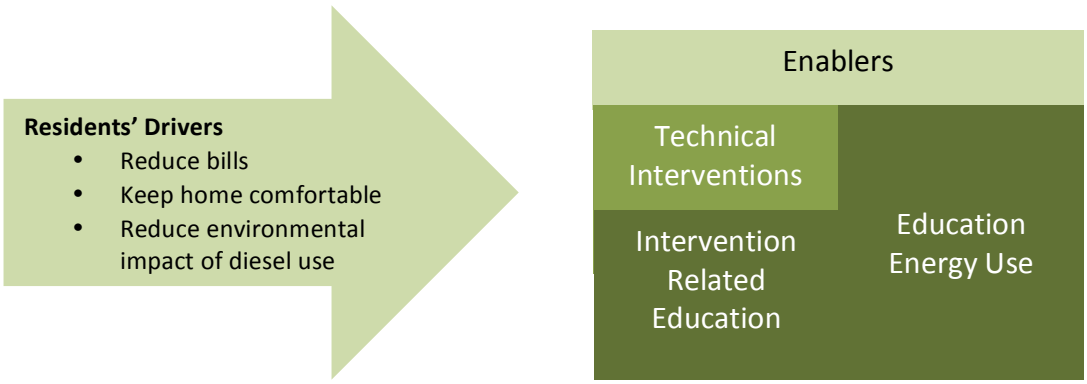
Attic Insulation

Most attics in the pilot homes had some attic insulation present and therefore the modeled improvement does not show large savings. However, the air sealing work in the attics meant that insulation in the attic spaces would be disturbed and compacted and it was therefore important to add insulation and minimize the heat loss from the attic space.

Attic Insulation Intervention

Add insulation to ensure that the insulation value is R60 or more.

Ranking the interventions in terms of effectiveness



For Kwadacha to have the largest benefit to cost ratio for all parties it is important to understand the interrelated nature of the interventions. For example a new heating system without education would not have achieved the desired results. Neither would a heating system without air sealing have been effective because much of the heat would have been lost through the leaky building envelope. Irrespective of the intervention, energy education for residents and the maintenance department needs to form the cornerstone of any future energy efficiency work in the community.

4. Assessments of remaining homes and criteria to prioritize houses for upgrades

4. Assessments of remaining homes and criteria to prioritize houses for upgrades

Now that the 11 homes have completed their deep retrofits and successfully proven that significant electricity savings can be achieved using the methods adopted for Phase II. Kwadacha can begin to determine the next set of homes to be included in these efforts. Based on the experience of upgrading the 11 homes, the following process should be considered when selecting homes.

Deciding which homes should receive upgrades next is not a straightforward technical exercise, since it not only requires consideration of the physical elements of homes but also the socio-economic realities in the community.

Physical Parameters

1. Conduct an assessment of all community homes and determine the following:
    a. Size and type of home –including presence of a basement or crawl space
    b. Type of electrical heating system (if any) and type of thermostat(s) employed
    c. Type of wood heating equipment and type of thermostat(s) employed
    d. Type of thermostat(s) for the anti-freezing baseboards in homes with crawl spaces
    e. Extent of holes and leaks in the building envelope including leaks through and around doors and windows
    f. Type and level of attic insulation
    g. Customer preference for the primary heating fuel – wood or electricity
    h. Other significant factors affecting livability of the home, electricity consumption, comfort, and safety
2. Establish the historical and current electricity consumption of the homes
3. Number of people living in the home
4. From the information gathered above develop electricity consumption intensity benchmarks for each home – kWh/year per sq. ft. and kWh/person

Socio-economic Parameters

1. Elders
2. Residents on social assistance
3. Overdue balance on BC Hydro bill
4. Residents who are interested in reducing electricity use and can be role models in the community

Having established the above parameters, the Band leadership can develop an equitable process to include both the socio-economic and the physical parameters for an initial selection of homes for the next phase. Once this initial selection has been created, a more detailed assessment of the selected homes can be made. The final selection of homes can then be created based on the availability of funding and the homes that provide a positive benefit/cost ratio.

Notes:

- Almost all of the homes in the pilot project had overdue bills with BC Hydro at the time the work was being completed. During this time however, Kwadacha residents were exempt from the standard procedures that apply to accounts with overdue balances (late payment charges and disconnection). These exemptions will not be available after April 18th, 2014. After this date, the consequences for non or late payment of BC Hydro bills will become more severe for residents.
- Residents who are engaged and motivated to reduce their energy usage are more likely to be able to reduce a larger proportion of their energy bill by changing their behavior.

5_Leadership Workshop

5_Leadership Workshop

The Kwadacha Leadership workshop was held on March 4 in Kwadacha. Present were Chief Donny Van Somer and Dawn Bursey, Executive Director from Kwadacha, Robyn Spencer from BC Hydro and Areef Abraham, Jeff Smith and Yasmin Abraham from QPS,.

The goal of the workshop was to review the work to date, review the preliminary electricity billing data from BC Hydro and work together to plan a strategy for developing a community energy efficiency policy which would lead to decreased electricity consumption beyond the pilot homes to the whole community.

The workshop presentation is attached at the end of the document.

Workshop Outcomes

Kwadacha Nation under Chief Van Somer's leadership has a vision to be a leader in energy conservation and sustainability. The Nation has been very active on energy efficiency initiatives, supporting a variety of programs from upgrades and infrastructure, to education, behaviour change and capacity building within staff. As a remote northern community, currently dependent on diesel fuel for energy, Kwadacha has significant incentives to conserve energy.

The main focus of the discussion was to determine ways individual homeowners can take responsibility and ways the community can integrate energy efficiency into the Nation's policies and operations.

There was agreement that there are two specific categories for policy development:

A. Operations and Maintenance Policies
B. Community Education and Empowerment Policies

Policies have to be realistic in terms of the community's financial and human capacities and have to show quantifiable short and long-term benefits to the Band members, the Band employees, and to the leadership. There is a danger for policy development work to take more heavily from the aspirations of funders and not focus on the immediate and short-term needs of the community. The policy development work therefore needs to proceed with a series of small policy pieces, which would then broaden out over time to a more comprehensive energy efficiency and housing policy. Each of the policy pieces needs to encompass.

a) The goals of the policies,

b) Any specific procedures to implement the policy,

c) Purchasing and inspection specifications to support the policy,

d) Training, education and capacity building requirements, as well as

e) An analysis of the benefits and costs of the policy development and implementation

This approach provides solid and implementable policy building blocks for the Nation, allows the approach to be used in other areas of the Band's operations, and provides organizational and institutional development at the same time.

The outcome of the workshop was the development of the following workplan .

Kwadacha Nation Energy Efficiency Policy Development Workplan

Purpose of this workplan:

To identify specific areas for policy development and the related areas of:

- Housing information and data collection and management
- Lifecycle costing analysis for equipment
- Purchasing specifications and policies
- Installation and maintenance policies
- Staff capacity building and training
- Managing adequate inventories of maintenance equipment and products
- Directing the design of new homes in the community to be more energy efficient

Policy goals:

- To ensure the running and maintenance of the homes is more affordable for the Band and the residents
- To ensure the homes are more comfortable and durable
- To ensure that funding is directed to areas which provide the best overall value to the Band and residents

Rationale for selecting proposed policy:

The Kwadacha Energy Efficiency Policy is being created from the "ground up". Kwadacha is a remote northern community with limited resources and has unique challenges with access and the climate. Therefore rather than begin with an aspirational plan, Kwadacha has chosen to focus its efforts on developing policies for specific areas based on the community's current needs. With limited resources and capacity it is important to begin policy development at the ground level and then, over time, integrate the resulting specific policies and procedures into an overall community energy policy.

This approach also provides the community with the opportunity to review the impacts of any energy efficiency related polices on other areas such as the development of a housing policy and the potential bio-mass facility being planned for the community.

The tables below list the activities and the potential areas of policy development identified by Kwadacha. Once the resources and funding for policy development are finalized, Kwadacha will develop project plans based on the activities listed below for the policy areas being undertaken.

Policy Development Activities
1. Develop and present this workplan and supporting materials (if needed) for Chief & Council's consideration, briefly describing the need for the proposed EE policy and the rational for further investigation.
2. Obtain Chief & Council's approval to proceed with the policy development process as detailed in the policy development areas section
3. Identify policy development team members and establish budgets and agreed upon policy development process.
4. Identify external funding to support the energy efficiency policy development work
5. Prioritize policy development areas based on need and availability of funding.
6. Review potential EE policy models or practices for each area identified from other communities/organizations and identify pros and cons of each model
7. Develop initial draft policies (and identify any possible limitations/exceptions)
8. Design policy implementation process (including compliance verification and enforcement strategies, if applicable)
9. Complete necessary studies (e.g. cost-benefit analysis to estimate potential energy savings, other benefits and costs, legal review, technical review, etc)
10. Hold community/stakeholder meetings and consultations on the proposed policy
11. Identify potential barriers to adopting proposed policy and potential solutions
12. Other steps, as necessary (e.g. awareness campaign, fundraising, etc.)
13. Finalize policy design
14. Prepare a report to Chief and Council for the proposed policy and seek approval to proceed.
15. Obtain Chief & Council approval to implement the policy

Kwadacha Nation Energy Efficiency Policy Development Areas – March 2014

A. Operations and Maintenance

1. Collecting and maintaining baseline information and data on the all community homes (including the pilot homes).
    a. Develop list of information and data to be collected
    b. Create procedures to collect the information and data
    c. Model the energy costs of operating the community housing stock and compare the results to Federal funding towards energy costs
    d. Model the energy costs of the CMHC homes based on the original house plans provided to the band by CMHC and understand the imbedded energy costs of operating theses homes.
    e. Based on the baseline information and data create a plan for upgrading the balance of homes in Kwadacha
2. Conduct lifecycle cost analysis on wood burning and other major appliances leading to specific purchasing policies
    a. Wood burning equipment
        i. Develop a life cycle business case to fund the replacement of 16 unsafe and inoperable wood furnaces and stoves with energy efficient and EPA compliant appliances.
        ii. Review impacts on:
            I. Electricity bills for residents (and the Band for SA clients)
            II. Green house gas emissions
            III. The air quality in the community in terms of particulate matter, which can negatively affect respiratory conditions such as asthma.
        iii. Use the analysis to create purchasing specifications for wood burning appliances
        iv. Build capacity for the O&M staff in terms of operating and maintaining the wood burning appliances.
        v. Create a spare parts list to be carried in the community for the equipment
    b. Other appliances
        i. Develop a purchasing policy to ensure that Energy Star appliances are installed
3. Create purchasing and maintaining policies for building envelope related items such as doors, windows, air sealing and insulation
    a. Develop a purchasing policy for energy efficient doors and windows
    b. Develop purchasing and installation policies for other building maintenance products such as caulking, weather-stripping, insulation etc.
4. Develop an inventory identification and management system of energy efficiency related equipment for the band store and maintenance department
    a. Create a list of EE related products that the band store should carry and products that O&M should carry
    b. Quantify and carry sufficient inventory of materials to manage regular maintenance requirements
5. Develop an electrical and wood burning appliance safety inspection program
    a. Conduct an inspection to ensure the wiring systems in the homes are safe.

6. O&M Staff Capacity Building
    a. Develop an intern program to assist with developing O&M and energy efficiency procedures in the community
    b. Train O&M staff to effectively identify and seal air leaks in the homes and other buildings.
7. Integrating the findings from the pilot project work with the selected builder to create specifications for new energy efficient homes
    a. Working with the Kwadacha selected builder create an energy efficiency policy for new homes, which includes life cycle costs and capacity building plans for the O&M staff to understand the construction and maintenance issues with future homes

B. Community Education and Empowerment

1. Develop a community based Green Energy Strategy
    a. Develop programs to encourage community members to:
        i. Adopt wood as the primary fuel for space heating
        ii. Set thermostats for electrical heating to a maximum of 21C
    b. Provide access to energy efficient light lamps and other appropriate energy related products for the residents through the band store
2. Develop energy conservation incentives and feedback for residents
    a. Launch and support the biggest (electricity consumption) looser contest in the community
    b. Build and support the Kwadacha Green Team
    c. Use Instagram and Facebook as the key messaging channels for the residents
3. Provide ongoing education and support for residents
    a. Maintain the Energy Champion position and provide on going mentoring to the individual
    b. Continue to provide energy efficiency education and tips to residents via the Energy Champion

KWADACHA NATION ENERGY CONSERVATION PROGRAM – PHASE 3

WORKING TOGETHER FOR GREENER COMMUNITIES

LEADERSHIP WORKSHOP – MARCH 2014

Quality PROGRAM SERVICES

302 – 14640 64th Avenue, Surrey, British Columbia V3S 1X7
604.598.8428 / info@qpscanada.ca / qualityprogramservices.ca

PURPOSE OF PHASE 3

- Phase 1 and 2 of the program laid important ground work with upgrades in 11 pilot homes
- Opportunity to analyze interventions and determine the highest value opportunities that should be promoted in a community-wide energy conservation effort
- The goal is to reduce Kwadacha's total energy consumption and costs

Plan for the 3 days

- –Leadership Workshop (Mon Mar 3)
- –Kwadacha Green Team Launch and Meeting (Tue Mar 4)
- –Kwadacha Energy Open House (Wed Mar 5)

Quality PROGRAM SERVICES

LEADERSHIP WORKSHOP AGENDA

1. Electricity usage in the community: an overview of usage, costs, and the effects of behavior and structure
2. Overview of the work done so far in the community at the 11 pilot homes
3. Overview of plan for Phase 3: Kwadacha Green Team, Open House, Energy Outwest Conference in San Diego, California
4. Discuss what we're presenting and roles for the Energy Outwest conference
5. Group discussion on current housing maintenance and procurement procedures that affect electricity usage.

Quality
PROGRAM SERVICES

PHASE 1 – FEBRUARY 2012

- Gather information and data
- Install basic energy energy measures to all accessible homes

Basic Air Sealing	Aerators
Compact Fluorescent Lamps	Shower Heads
Outlet Gaskets	Hot Water Pipes
Window Films	Nightlights

- Total savings 51,000 kWh/year or $7,100/year

Quality PROGRAM SERVICES

PHASE 2 – SEPTEMBER 2013

- Run a pilot with 11 homes
- Hire and train a community Champion Tracy Charlie to effect behaviour change among the residents of the pilot homes
- Upgrade the 11 homes focusing on
  - Air leakage
  - Poor heating controls
  - Attic insulation

Quality
PROGRAM SERVICES

PHASE 2 ACTUAL RESULTS

Total annual resident Savings - $20,590 per year

(Compared to 2010 usage with today's Zone II rates excluding taxes and other charges)

Client #	Annual Savings %	Annual Savings kWh	Annual Savings $
1	46%	23,890	$3,392
2	45%	22,651	$3,216
3	-14%	(6,520)	$(926)
4	36%	14,348	$2,037
5	61%	21,323	$2,432
6	43%	16,211	$2,302
8	48%	16,914	$2,402
9	55%	18,764	$2,258
10	(6%)	(1,832)	($260)
11	48%	15,642	$2,039
13	49%	14,550	$1,689
Total	***37%***	***155,941***	***$20,590***

Based on preliminary data

Quality PROGRAM SERVICES

KEEPING HOMES TOO HOT

Indoor temperature setting	Increased annual cost of electrical heating (base 21°C)
Turning the heat up to 22°C:	$252
Turning the heat up to 23°C:	$516
Turning the heat up to 24°C:	$788
Turning the heat up to 25°C:	$1,067
Turning the heat up to 26C:	$1,351
Turning the heat up to 27°C:	$1,639
Turning the heat up to 28°C:	$1,932

Quality
PROGRAM SERVICES

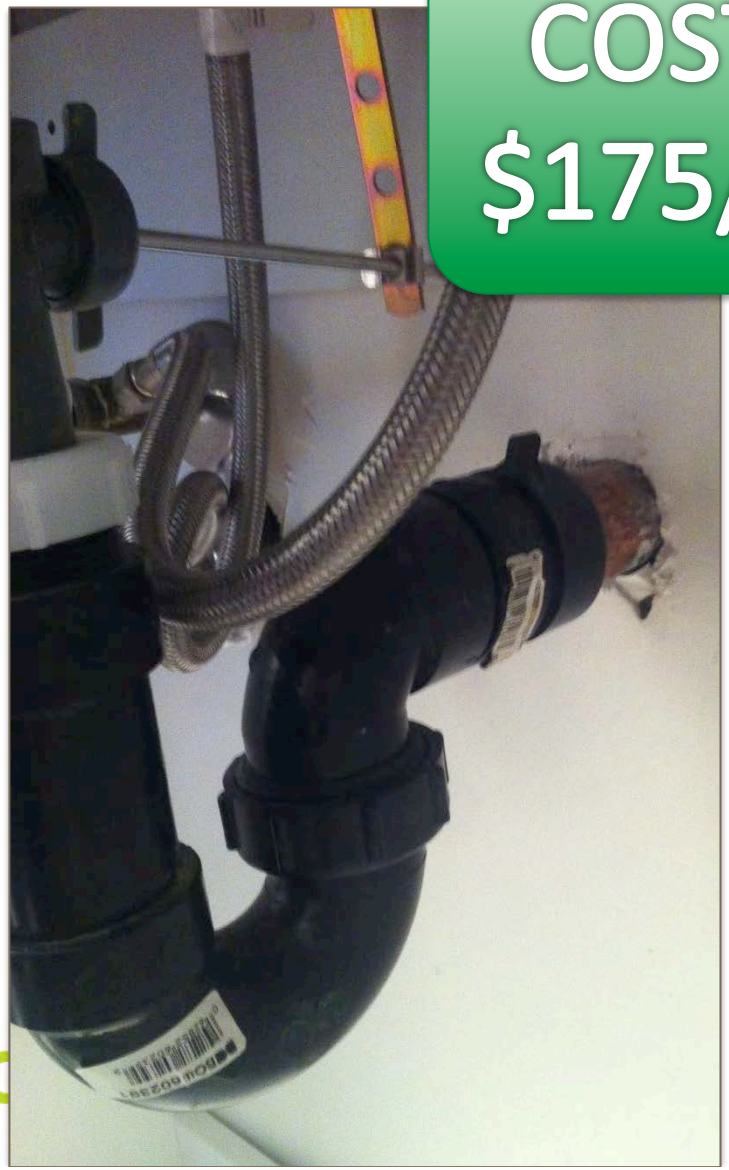
FANS, VENTS, AND DUCTS

COST:
$229/Yr

EXTERIOR DOORS

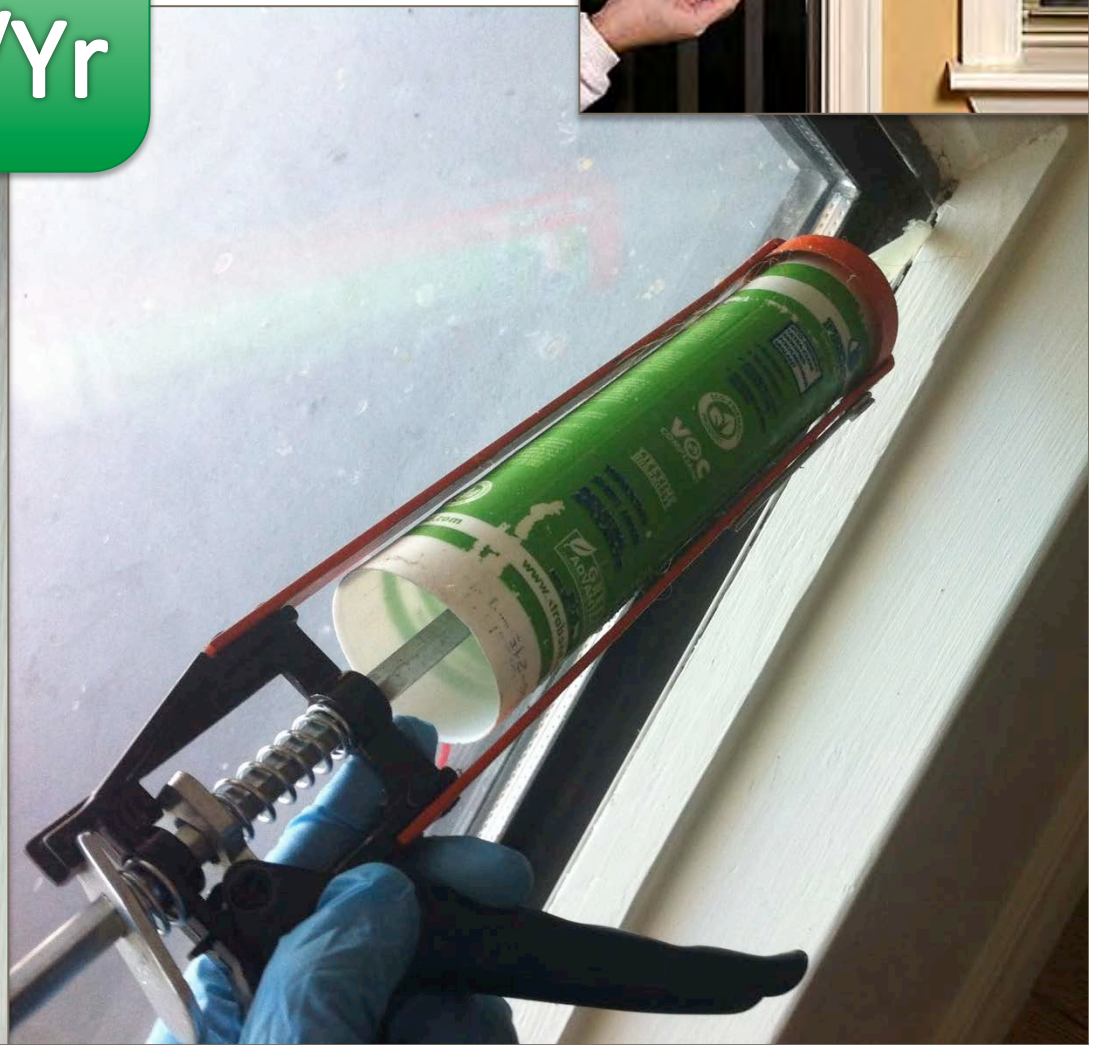
PLUMBING FIXTURES

COST:
$175/Yr



WINDOWS

COST:
$135/Yr



ELECTRICAL OUTLETS

COST:
$27/Yr

WALL, CEILING, AND FLOORS

COST:
$418/Yr

MOVING FORWARD WITH ALL HOMES

Behaviour – Champion and Green Team

1. Ensure the Energy Champion and support is available going forward
2. Use wood rather than electricity to heat the homes
3. Keep thermostats set at 21C or lower
4. Use setback feature to lower temperatures at night and when out of the house
5. Use CFL lamps and turn off when not required
6. Continue to provide energy efficiency education to residents

Quality
PROGRAM SERVICES

MOVING FORWARD FOR ALL HOMES

Upgrades

1. Ensure wood furnaces and stoves are functional and safe
2. Install programmable digital thermostats in all homes (existing and new)
3. Seal all air leaks – big and small
4. Check insulation levels in all homes and top up to R60
5. Create a set of records of heating systems, thermostats and other other items in each home
6. Develop a budget for energy efficiency upgrades and seek volunteers
7. Develop and energy efficiency workplans and polices

Quality
PROGRAM SERVICES

6. Poster development (final artwork to follow)

POSTER DEVELOPMENT

Quality
PROGRAM SERVICES

302 – 14640 64th Avenue, Surrey, British Columbia V3S 1X7
604.598.8428 / info@qpscanada.ca / qualityprogramservices.ca

KEEPING HOMES TOO HOT

Indoor temperature setting	Increased annual cost of electrical heating (base 21°C)
Turning the heat up to 22°C:	$252
Turning the heat up to 23°C:	$516
Turning the heat up to 24°C:	$788
Turning the heat up to 25°C:	$1,067
Turning the heat up to 26C:	$1,351
Turning the heat up to 27°C:	$1,639
Turning the heat up to 28°C:	$1,932

Quality
PROGRAM SERVICES

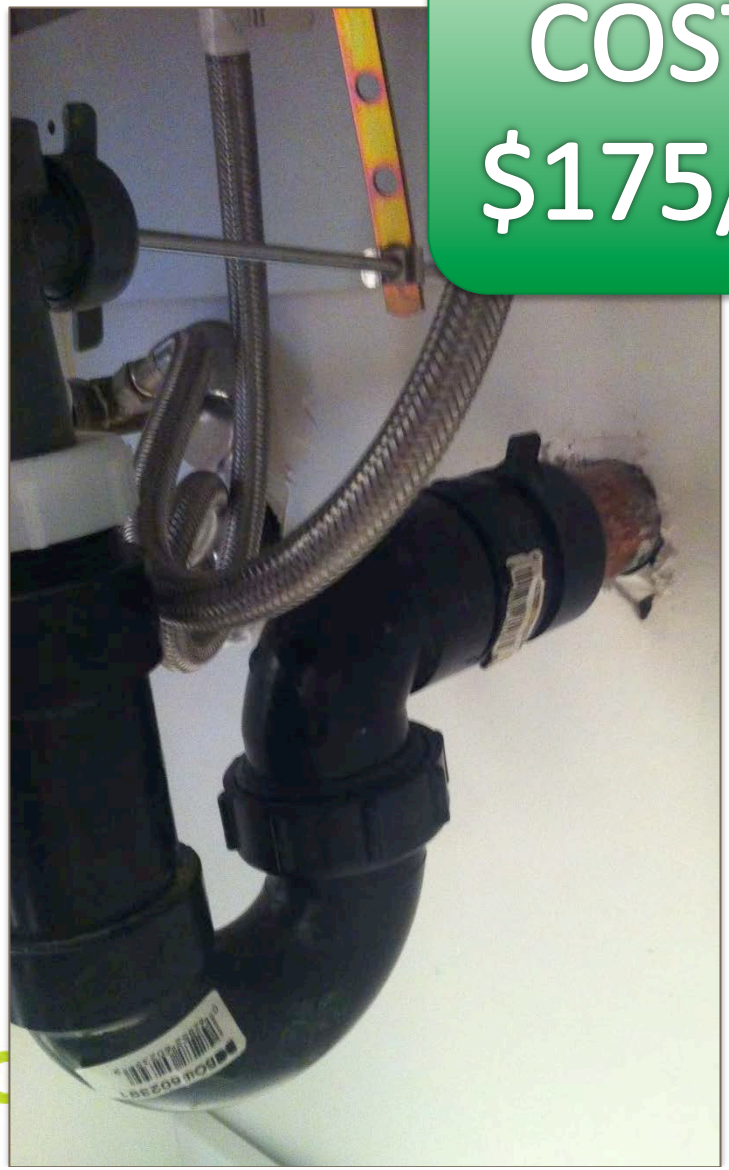
FANS, VENTS, AND DUCTS

COST:
$229/Yr

EXTERIOR DOORS

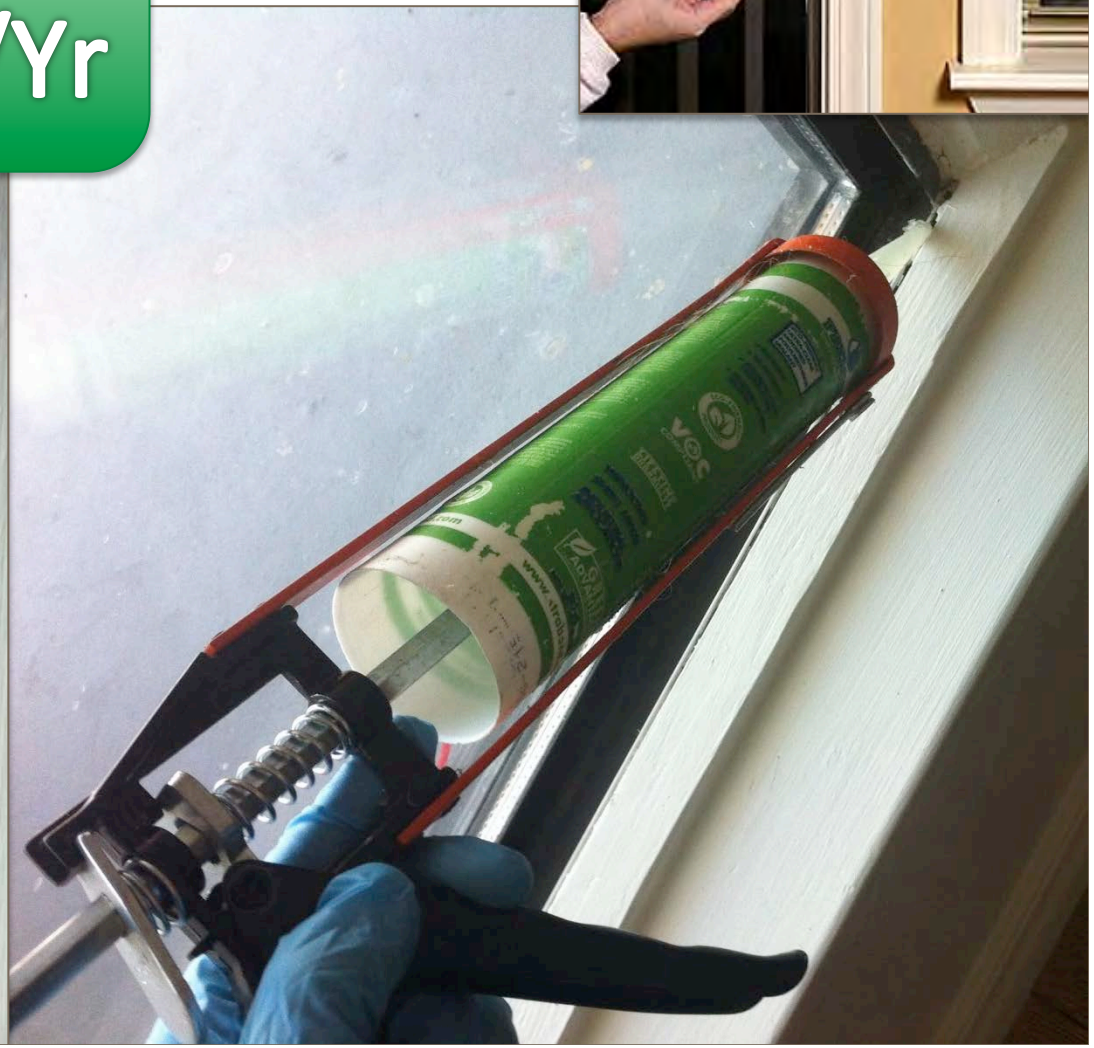
PLUMBING FIXTURES

COST:
$175/Yr



LEAKY WINDOWS

COST: $135/Yr



ELECTRICAL OUTLETS

COST:
$27/Yr

WALL, CEILING, AND FLOORS

COST:
$418/Yr

Kwadacha Green Team

What does it cost you to turn up your thermostat?

$1,932*

$16,139

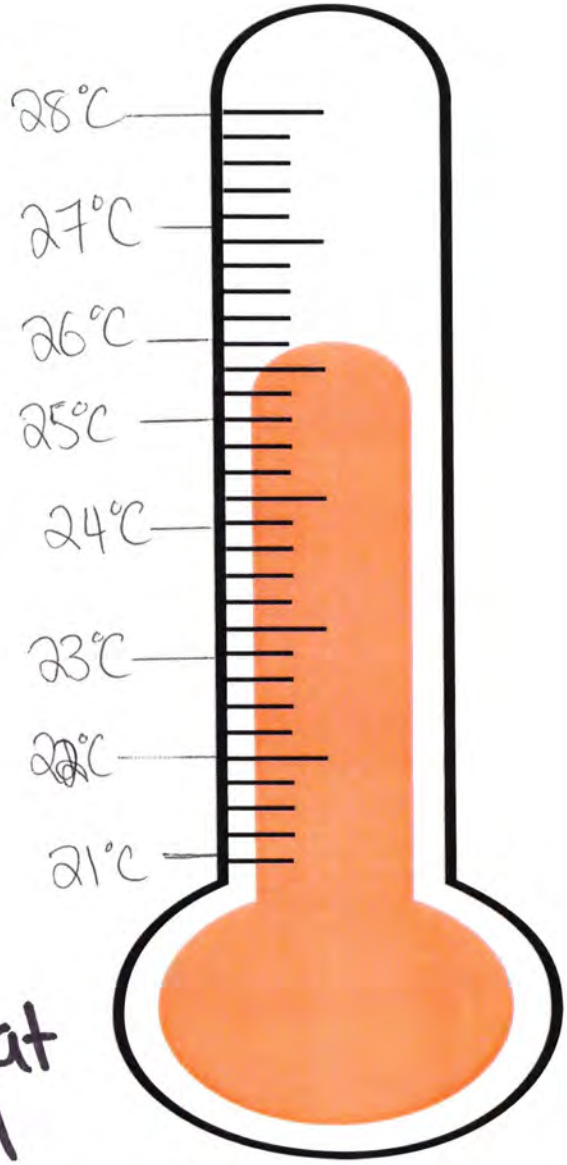
$1351

$1067

$788

$516

$252



Keep your thermostat low and use wood to heat your home

* increased annual cost of electrical heating over 21°C in Kwadacha

Kwadacha Green Team

What do air leaks in your home cost you?

Air leaks in these places cost you **$229** a year!

If you see holes or leaks in your home let the maintenance team know so they can seal them, or speak to Tracy Charlie (Energy Champion).

Nobody knows your home better than you, these air leaks cost **you** money on your BC Hydro bills, speak up to seal the leaks and lower your bills.

7. Community Open House Report

Community Open House Report

The community open house and dinner was held on Wednesday March 5th 2104 at the school. Rhonda McCook organized and cooked all the food for the dinner which included roast turkey, ribs, meatballs, casseroles, salads, and many different kinds of deserts. Many of the people who had shown interest during the week as part of the Green Team attended wearing their Green Team t-shirts to show support for the project. Elders, adults, and children all attended for a total of approximately 75 people.

Chief Van Somer introduced the QPS and BC Hydro team communicating that Band leadership is committed to a sustainable and greener future for the community as a whole beyond the 11 pilot homes. Robyn Spencer from BC Hydro and Yasmin Abraham from QPS then spent some time going through the results of the pilot as well as energy savings opportunities that the whole community should be aware of in their homes.

The main message to the community was they know their homes the best, if they see opportunities for energy saving they need to raise the flag and ask the maintenance department to fix it. Materials shown during the dinner included slides of leaks and holes around exhaust fans, cracks through the door, and holes in the drywall – each of these scenarios had a price tag attached to them to communicate the real cost to the resident when these items are not fixed.

These same messages were converted into the posters found in Appendix 1 to be used in Kwadacha and other communities.

Team members from QPS and BC Hydro circulated while people were eating to discuss the pilot, people's electricity bills, and any concerns they had. Many people admitted to not being aware that leaks in their homes cost them so much money while also being impressed with the savings achieved in the pilot homes. Some of the participants from the pilot homes were also there and shared with the groups at the table how warm and comfortable their home is now and how low their energy bill is.

The Open House concluded with door prizes given out to the community. These prizes included Canucks and Team Canada T-shirts, headphones, iTunes gift cards, and a remote controlled helicopter. Some of the photos from the open house are shown below:


MOVING FORWARD


Saving Kwadacha
Money and Energy


Save Money
Adam
go Green Team
Save energy


Saving Kwadaça
Saving Kwadaça


Kwadachi
Green Team

8. *Kwadacha Energy Outwest Presentation – Draft Outline*

8. Kwadacha Energy Outwest Presentation

San Diego, California at the Manchester Grand Hyatt from April 14 to 18.
Kwadacha Presentation: Wednesday, April 16th from 10 until 11:30 a.m.

Overview:

The presentation will recount the story of a Canadian First Nation, a Utility Corporation, and an Energy Efficiency Contractor coming together to empower residents of Fort Ware, BC, home of the Kwadacha First Nation and one of the province's most remote communities, to save energy. The story weaves together the experiences of key individuals involved in the project including Tracy Charlie, one of the first female Energy Champions in a Canadian First Nation, and Chief Donny Van Somer, whose leadership enabled the project to improve the homes of Kwadacha residents, while reducing the cost of energy for his whole community.

Presentation Structure:

1. **Background of the Kwadacha Nation**
   Speaker: Dawn Bursey (note: this was originally intended to be presented by Chief Donny Van Somer and Tracy Charlie. However, due to personal and scheduling constraints they were unable to attend and Dawn Bursey, Kwadacha's Executive Director will represent Kwadacha in their place).
   - An overview of the history of the Kwadacha Nation and the Tsek'ene people.
   - Where the community is now and what their goals are for sustainability in the community
   - Background of electricity source in the community

   Presentation will use photos of the community to portray life in Fort Ware

2. **BC Hydro's Role in the Kwadacha Project**
   Speaker: Robyn Spencer
   - BC Hydro's history with the Kwadacha Nation
   - Overview of the RCE Group and their mandate
   - Why BC Hydro made the decision to work with QPS for this project

3. **Overview of Project and Results**
   Speaker: Areef Abraham
   - Overview of the Kwadacha project and the upgrades since 2010
   - How and why Energy Champion Tracy Charlie was part of the project
   - Results and Data

4. **Question and Answer**

ENGAGEMENT: THE HUMAN FACTOR IN ENERGY EFFICIENCY

BC hydro
FOR GENERATIONS

Quality
PROGRAM SERVICES

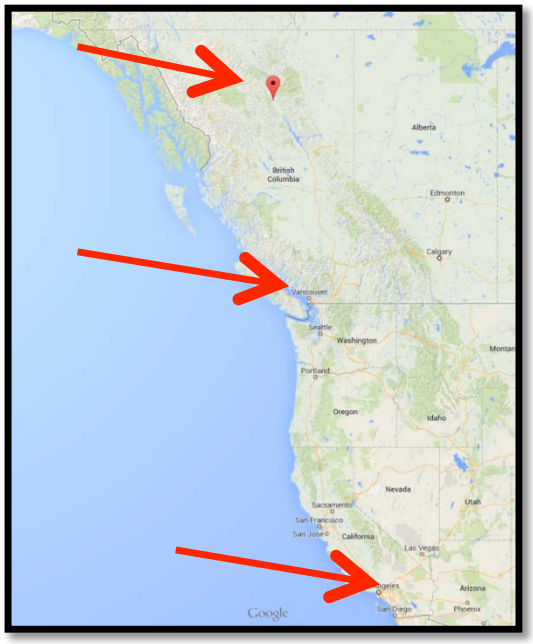
THE KWADACHA NATION

BC HYDRO (UTILITY)

QUALITY PROGRAM SERVICES (CONTRACTOR)

THE KWADACHA NATION

- **Fort Ware, home of the Kwadacha Nation Tsek'ene**
- **250 miles from the closest town Mackenzie, BC (population 4500);**
  - 1300 mi from Vancouver, BC
  - 2000 mi from San Diego, Ca
- **Accessible by small plane, or since 1992, by logging road (an 8 - 10 hour drive)**
- **<u>One of the most remote, isolated communities</u>**
- **Kwadacha Nation is one of five nations that make up the Kaska Dena, the traditional territory (92,000 sq miles)**



A BRIEF HISTORY OF KWADACHA

- Tsek'ene people gradually moved west into BC from the Rocky Mountains beginning 11-12,000 years ago as the glacial ice melted
- As migratory people, Tsek'ene people had no permanent settlements, lived in small mobile family groups which followed constantly-moving animals, had a cooperative but less formal social structure, and minimal material goods due to frequent travel by foot.
- 1793 for next 100 yrs, Tsek'ene people began trading with Hudson Bay Company
- 1930's first generation of children were sent to Lejac Residential School, over 600 km southwest of the emerging village of Fort Ware.
- Social, political, and economic changes that most Canadian First Nations experienced over two to three centuries were compressed into roughly 100 years for Kwadacha Tsek'ene peoples.
- The ultimate, irrevocable change occurred in the 1960's and early 70's when Tsek'ene lands, waterways, trails, trap lines, and hunting areas were flooded by the Williston Reservoir caused by the W.A.C. Bennett Dam built across the Peace River on the eastern side of the Rocky Mountains.








PEOPLE OF KWADACHA

- **400 people living in Fort Ware of which 380 are Kwadacha Nation members (also 145 off-reserve members living in nearby communities)**
- **Employment in Fort Ware consists of Band and Health Administration, Education, Public Works, and Forestry, Mining and Oil & Gas industries.**
- **10 to 12% of community members rely on Income Assistance and see on average about $540 monthly**
- **Community buildings include the school, Health and Administration Centre, and a general store and restaurant**
- **Aatse Davie School (K-Grade 12) has 92 students**
  - All students take Tsek'ene class (traditional language)
  - Also classes on stories, language, crafts, sewing, and other traditional activities.
- **Governed by an elected Chief and Council**

HOUSING AND ELECTRICITY IN KWADACHA

- Most homes on reserve owned by Kwadacha Nation and rented to residents
- Most homes are bank financed with a modest subsidy from the Federal Government
- Wood is predominant heat source

Housing Challenges:

- Balancing housing needs and rent collections
- 5.5 persons per dwelling (Provincial average is 2.75) - demand exceeds capacity by about 20 homes.
- 25 homes in need of major renovation and/or upgrades

KWADACHA AND BC HYDRO

Electricity:

- **Electricity came to the community 30 yrs ago through federally funded Diesel Generating Power Station**
- **2005 Kwadacha Nation contracted with BC Hydro to operate the plant; residential rates were 5.5 c/ kWh**
- **Although plant operations partially funded by the federal government, a huge deficit was created.**
- **2008 Kwadacha Nation and BC Hydro reached a settlement agreement as a result of the flooding of the territory in the 1960's by BC Hydro's WAC Bennet Dam**
- **2012, Kwadacha Nation Green Initiative by Chief Donny Van Somer to become a BC Hydro customer under RCE Program**

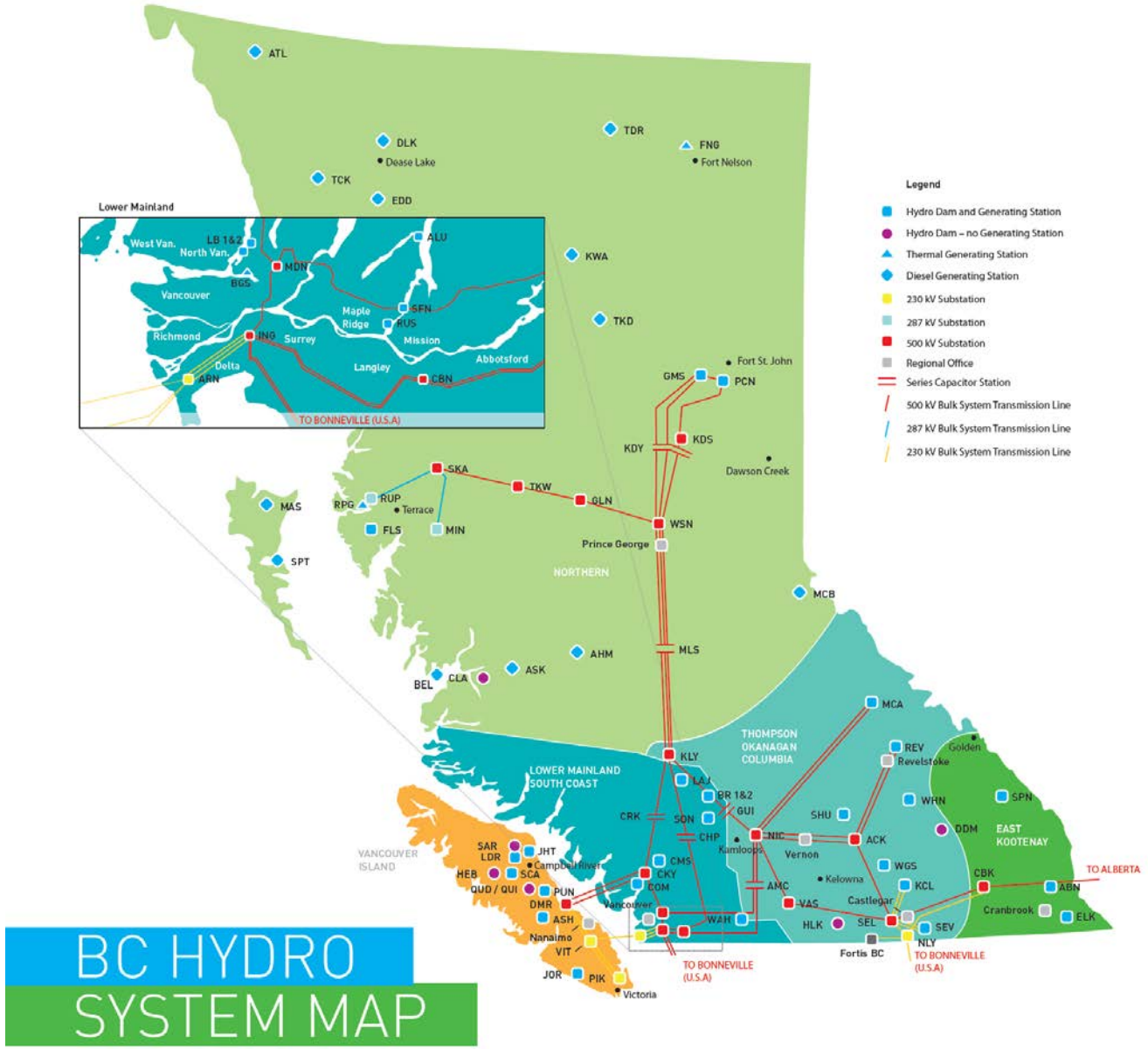
OVERVIEW: **BC HYDRO**

BC hydro
FOR GENERATIONS

- Crown corporation, established in 1961
- 3rd largest electric utility in Canada
- 31 hydroelectric facilities + 3 thermal generating plants = 12,000mw

ELECTRIFYING **REMOTE COMMUNITIES**

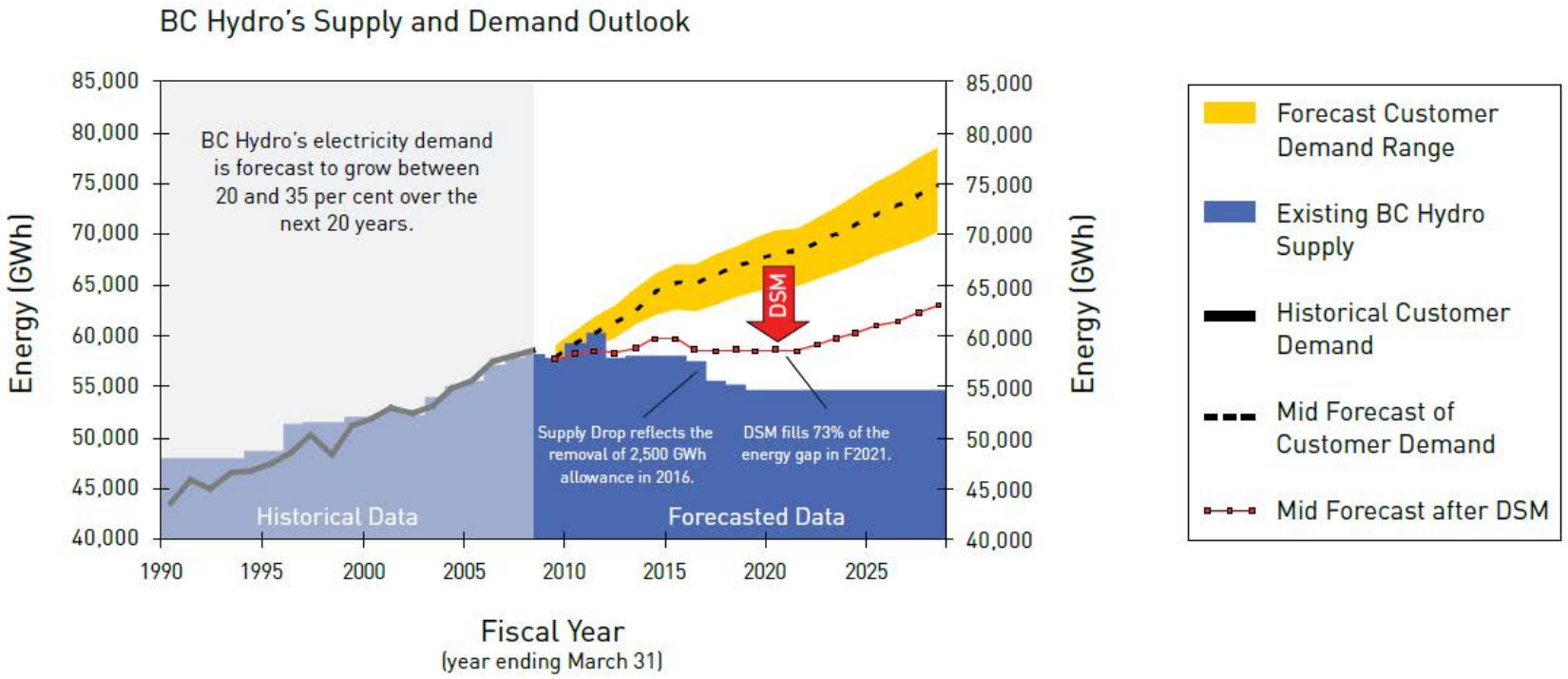
BC hydro
FOR GENERATIONS



BC HYDRO SYSTEM MAP

COMMITMENT TO **ENERGY EFFICIENCY**

BC hydro
FOR GENERATIONS



powersmart

Let's be smart with our power

See how much you could save on your electricity bill and enter to win 1 of 5 energy-efficient prize packages, courtesy of the Home Depot. Visit powersmart.ca

Residential

Be smart with your power. Take advantage of Power Smart rebates and programs designed for residential customers and low-income households

Business

Make your business more energy-efficient with programs and incentives for commercial and industrial customers

SAVE POWER. SAVE MONEY.

Use the online tool to see how much you could save on your electricity bill and you could win.

Learn more

Did you know?

Energy Saving Kits for

SUCCEEDING THROUGH **RELATIONSHIPS**

BC hydro
FOR GENERATIONS

- Duty to consult
- Historic grievance agreements
- Building long-term relationships

BC HYDRO & KWADACHA

BC hydro
FOR GENERATIONS

Pre-1960:
Kwadacha's long and rich history before the dam…

1962-1964:
BC Hydro builds WAC Bennett Dam. Marvel of engineering, failure of relationships.

Early 1990s-2008:
Many years of negotiations.

2008:
BC Hydro and Kwadacha Nation sign Final Agreement.

2005-2012:
RCE program. Install diesel generating station and local distribution.

2012-present:
Demand-side management and energy efficiency programs.

ENERGY CONSERVATION IN KWADACHA

BC hydro
FOR GENERATIONS

DIESEL GENERATION

+

$.35/ kwh

vs

~.09/ kwh

COST TO PRODUCE ENERGY

+

Account Number
12 3456 789
Please Pay
$145.88

HIGH BILLS

ENERGY CONSERVATION MAKES SENSE FOR EVERYONE!

WORKING TOGETHER FOR GREENER COMMUNITIES

QUALITY PROGRAM SERVICES

AREEF ABRAHAM

Quality PROGRAM SERVICES

302 – 14640 64th Avenue, Surrey, British Columbia V3S 1X7
604.598.8428 / info@qpscanada.ca / qualityprogramservices.ca

FINANCIAL AND CONSUMPTION INFO

- All electricity is diesel generated
- Residential consumption is 71% of generated power
- Avg. residential consumption 18,800 kWh/yr. = $2,740/yr
- 25% of homes consume over 25,000 kWh/yr. – average cost $4,800/yr.

Quality PROGRAM SERVICES

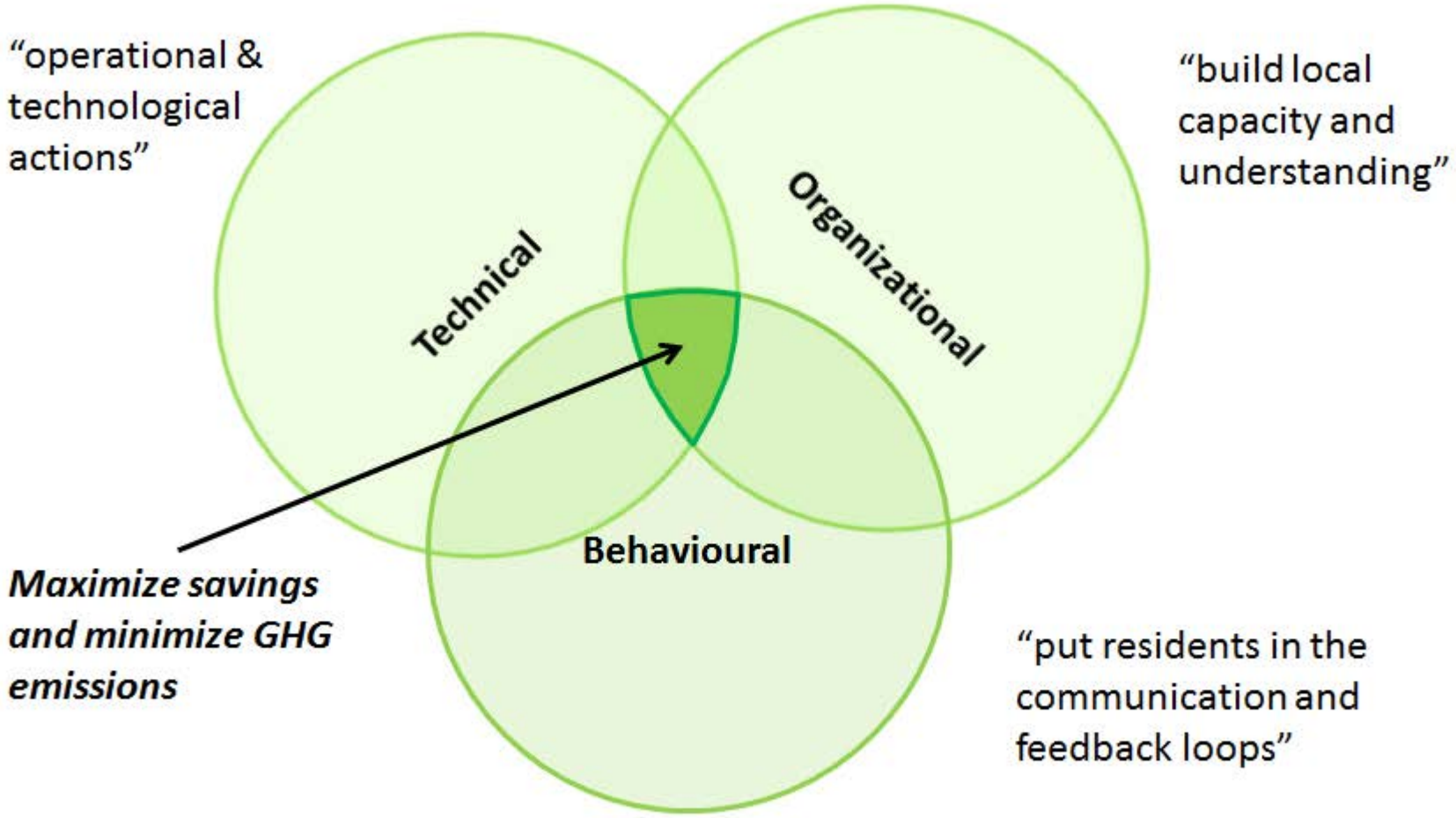
EFFECTIVELY CHANNELING MOTIVATIONS

Wood for space heating over electricity

1. Plentiful but requires harvesting
2. Sufficient financial motivations for residents, Band, and BC Hydro
3. Except individuals on Social Assistance (less incentive)
4. What about elders?

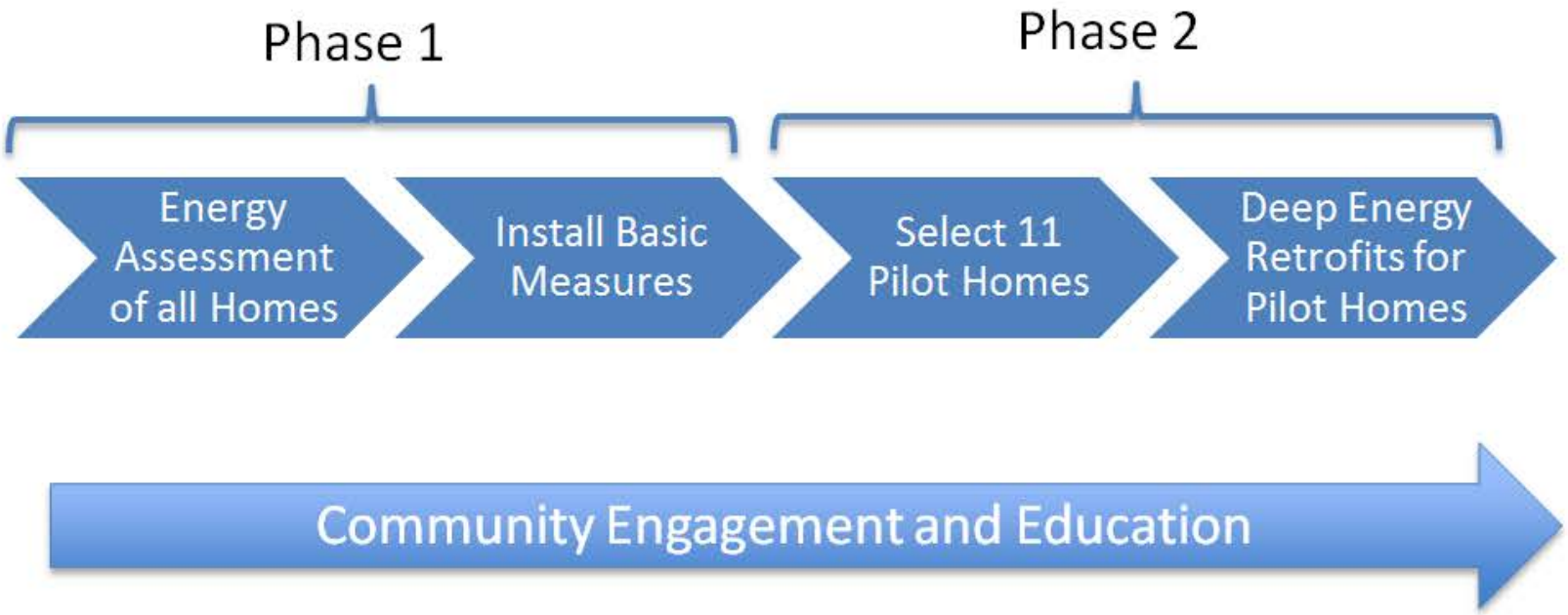
Quality PROGRAM SERVICES

OUR APPROACH



Quality PROGRAM SERVICES

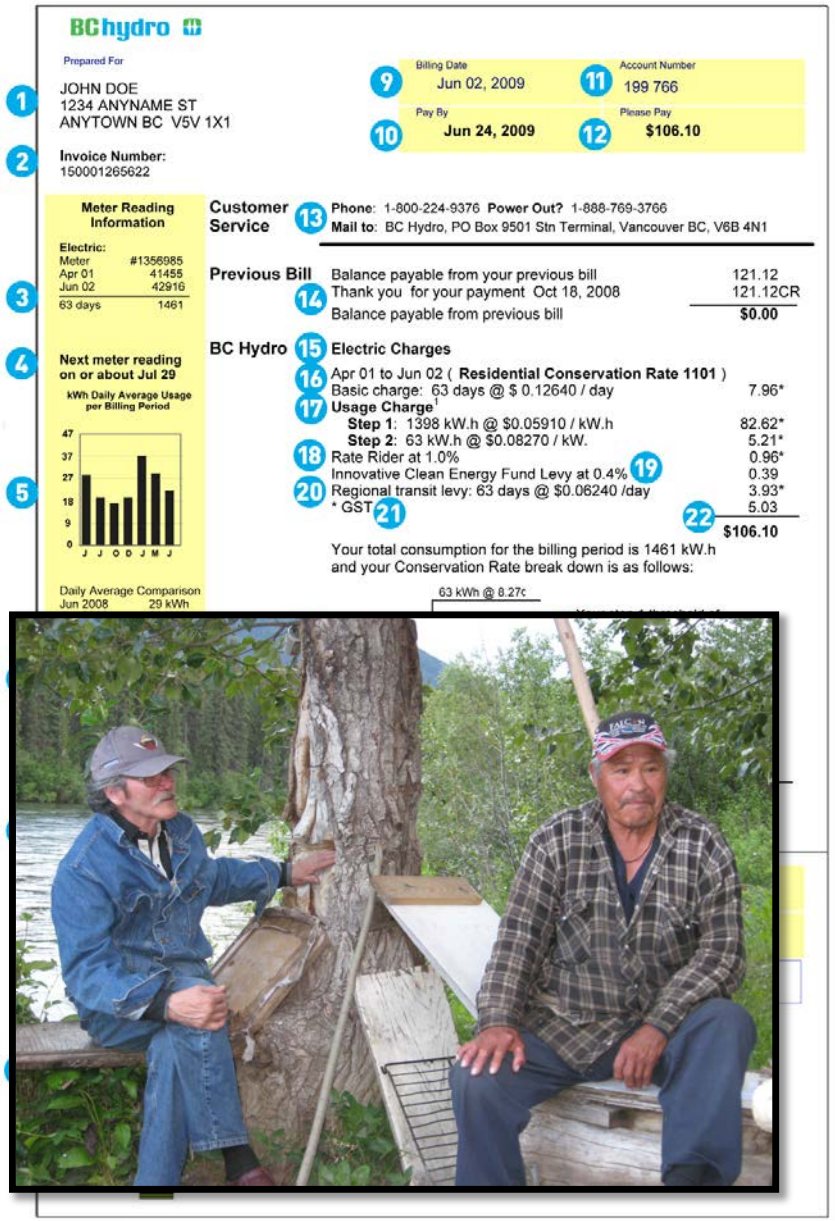
PROJECT TIMELINE 2010-2013



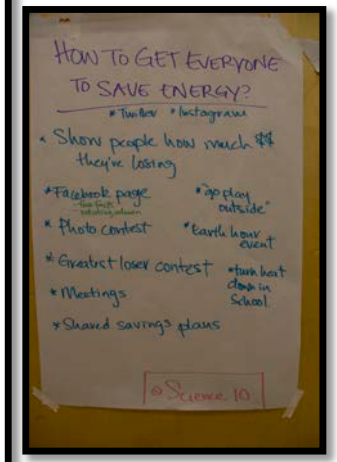
Quality PROGRAM SERVICES

COMMUNITY ENGAGEMENT & EDUCATION

- Community Dinners
- Community Energy Champion
- Community Green Team
- Engage and train operations and maintenance Staff
- Build capacity in the community store



ENGAGEMENT



Quality PROGRAM SERVICES

PHASE 1: BASIC MEASURES

- Basic Air Sealing
- Window film
- Outlet Gaskets
- Nightlights
- CFLs
- Aerators
- HW pipe wrap
- Showerheads

$55,457

Cost of Installation

Impacts

Annual Savings	$15,000 (42,900 kWh)
NPV of savings	$94,685
Benefit cost ratio	1.71

Quality PROGRAM SERVICES

DATA & INFO COLLECTED

- Collecting data to run HOT2000 energy modeling
  - Building envelope
  - Air leakage
- Detailed information on space heating systems and controls
- Resident concerns

Quality PROGRAM SERVICES

FINDINGS

Poor temperature control and lack of education on use

Quality PROGRAM SERVICES

FINDINGS CONT.

- Space heating – poor temperature control
  - Forced air wood/electric furnaces
  - Wood stoves and baseboard heaters
- Crawl spaces had baseboard heaters to stop pipes freezing – poor temperature controls
- Air infiltration levels – Average 6.0 ACH, Max 18 and Min 2 ACH.
- Attic insulation – Average R31, Max R41 and Min R18 (recommended for climate zone R52).

Quality PROGRAM SERVICES

ANALYSIS FROM PHASE 1

Eliminate Waste

- Resident choices and behaviours
- Building Envelope
- Heating controls

Optimize Heating Choices

- Make wood the primary fuel
- Ensure wood burning equipment is safe, functional and efficient
- Make electricity the standby heating fuel

Quality
PROGRAM SERVICES

PHASE 2: DEEP RETROFITS FOR 11 HOMES

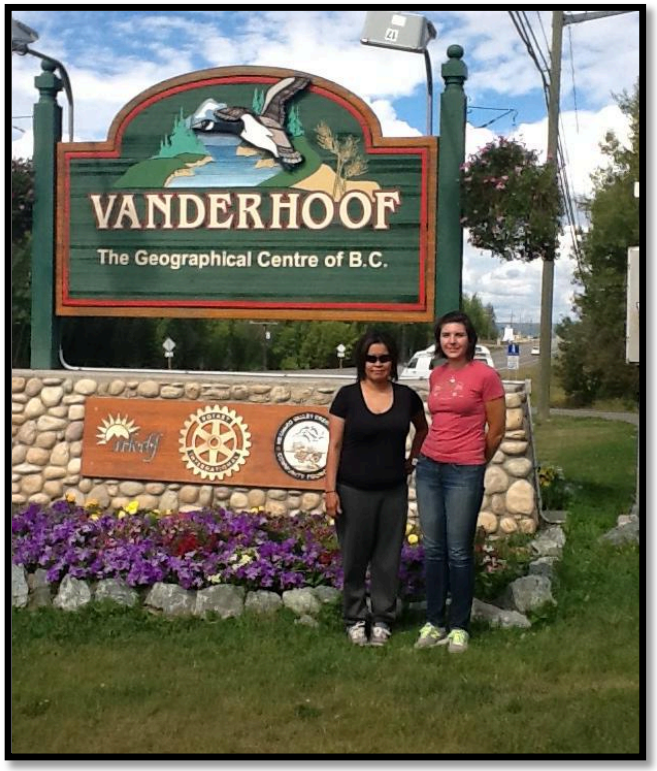
- Disconnected electric furnaces and provide individual room temperature control
  - baseboard heaters controlled by digital programmable thermostats.
- Replace existing crawl space thermostats with digital models (set and forget)
- Maintain, repair, or replace all wood burning appliances in the homes.
- Thorough air sealing including box end joists
- Attic R60 insulation

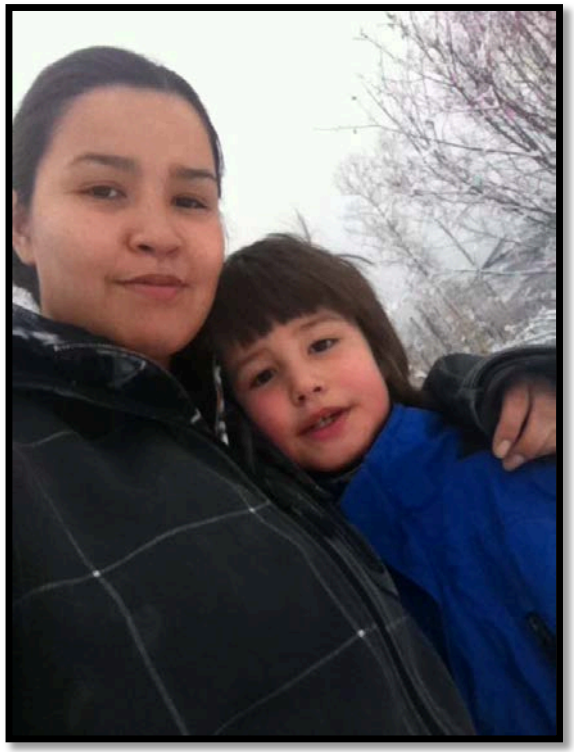
Quality PROGRAM SERVICES

HOME EDUCATION: TRACY CHARLIE

Mitigate financial risk of retrofits through education

Community Energy Champion: Tracy Charlie





Quality PROGRAM SERVICES

PRELIMINARY PHASE 2 RESULTS

Kwh/yr.	Total	Average	%
Previous Consumption	**426,547**	**38,777**	**100**
Forecast savings from heating system and controls upgrades	95,792	8,708	22.5
Forecast savings from improved air tightness	32,142	2,922	7.5
Forecast savings from improved attic insulation	9,082	826	2.1
Total savings from DSM Interventions	**137,015**	**12,456**	**32.1**
Forecast Consumption	**289,532**	**26,321**	**67.9**
Current Consumption	**270,606**	**24,601**	**63.4**
Variance	**18,925**	**1,720**	**4.4**

Quality
PROGRAM SERVICES

INDIVIDUAL HOMES

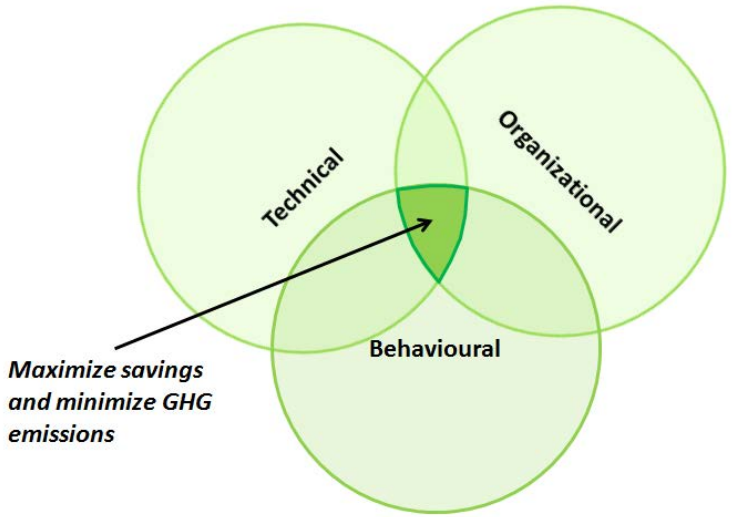
Home Ref #	Previous Consumption	Current Consumption	Reduction/ (Increase)	% Reduction/ (Increase)
1	51,985	28,095	23,890	46.0%
2	50,820	28,169	22,651	44.6%
3	47,232	53,752	(6,520)	(13.8%)
4	40,329	25,981	14,348	35.6%
5	35,125	13,802	21,323	60.7%
6	37,506	21,295	16,211	43.2%
8	34,918	18,004	16,914	48.4%
9	33,901	15,137	18,764	55.3%
10	32,418	34,250	(1,832)	(5.7%)
11	32,356	16,714	15,642	48.3%
13	29,957	15,407	23,890	48.6%

Quality
PROGRAM SERVICES

CONCLUSION: THE APPROACH WORKS!

Next Steps:

- Collect and maintain baseline information and data on all community homes.
- Create purchasing and maintenance policies for appliances, doors, windows, air sealing and insulation.
- Integrate findings to create specifications for new homes.
- Develop a community based Green Energy Strategy
- Develop energy conservation incentives and feedback for residents



Quality PROGRAM SERVICES

WORKING
TOGETHER
FOR GREENER
COMMUNITIES

Quality
PROGRAM SERVICES

302 – 14640 64th Avenue, Surrey, British Columbia V3S 1X7
604.598.8428 / info@qpscanada.ca / qualityprogramservices.ca