

Smart Metering Initiatives: Lessons in Public Engagement and Communication

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Abstract

This paper uses four case studies to explore the difficulties with public engagement and communication faced by utilities implementing smart metering initiatives, and the approaches taken to engage and communicate with the public. These case studies are then used to identify common areas of concern for public organizations looking to implement new policies or programs with characteristics similar to smart metering initiatives, and to offer up suggestions for improved public engagement and communications.

Keywords: Public Engagement; Communications; Energy Policy; Smart Meters; Utility Policy; Advanced Metering Initiatives

Dedication

This work is dedicated to those that believe that social theories matter. Politics is the final line in policy, and the more policy is developed outside of a box, with greater citizen engagement, the better outcomes will be.

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List of Acronyms

AMI	Advanced Metering Initiatives (Smart Metering)
BC	British Columbia (The Province of British Columbia)
BCUC	British Columbia Utilities Commission
CCC	Consumers Council of Canada
CEA	<i>Clean Energy Act</i> (2010) British Columbia
CEC	California Energy Commission
CPUC	California Public Utilities Commission
IPC	Office of the Information and Privacy Commission of Ontario
OIPC	BC Office of the Information and Privacy Commissioner
PGE	Portland General Electric
SFU	Simon Fraser University
TOU	Time of Use pricing
TURN	The Utility Reform Network, California
UCA	<i>Utilities Commission Act</i> (1996) British Columbia

Glossary

Bill Insert	Important notifications or information packaged with a customer's bill. Information is packaged with the bill with the implication that the customer will read the information as they must read their bill.
Demand Response Programs	Programs that aim to reduce total energy demand by inducing energy consumers to reduce their usage. It is a form of demand management, as opposed to supply management, where supply is limited.
Door Hanger	Informational brochure that hangs from a customer's outside door handle with the implication that the customer will read the information since they must remove the door hanger to enter their residence or place of business.
Dynamic Pricing Programs	Programs that incentivise consumers to use energy outside of peak times by making it either more expensive to use energy during peak, or by offering rewards, such as bill reductions, to use energy outside of the peak times.
Electromechanical electricity meter	Traditional electric meter that measures electricity use by utilizing a rotating disk and a mechanical read-out display. As electricity passes through the meter the metallic disk spins. The more electricity that passes through the meter, the faster the disk spins; the number of revolutions of the disk is proportional to the energy usage. Electromechanical meters can be equipped with a radio antenna to send a signal carrying usage information.
Focus Group	Gathering a (ideally) random sample of individuals from a target population (such as from a given jurisdiction) in order to test concepts, ideas, or media with the purpose of gathering participant's, feelings, impressions, opinions, criticisms, suggestions, etc.
Home Area Network (HAN)	A residential (building contained) local area network for the digital communication of devices within the residence or building. In the case of a smart meter or smart grid, HANs allow for 'smart devices' to communicate with the smart meter, and thus the electrical system.
Peak Demand	The highest potential electricity demand placed on the electrical system at any given time.
Peak Load Reduction programs	Programs aimed at inducing peak shifting or peak smoothing. A key example is demand response programs such as dynamic pricing.
Peak Shifting or Peak Smoothing	Using electricity outside of peak times so that the peak is lowered. Can be achieved by demand response programs such as dynamic pricing.

Semi-Structured Interview	An interview technique that does not strictly follow a list of scripted questions. Instead topic areas guide the interview and the interviewer has flexibility in questioning depending on participant response to previous questions.
Smart Grid	Integrated energy management system allowing two-way data communications between suppliers and consumers.
Smart Meter	Electricity metering devices that contain a radio antenna that enables the two-way communication of energy supply and demand data over wireless networks.
Solid State electricity meter	A design of electricity meter utilizing an LED or LCD display as opposed to the mechanical display of traditional meters. In addition to measuring energy used, solid state meters can also record other parameters of the load and supply such as instantaneous and maximum rate of usage demands, voltages, power factor and reactive power used. They can also support time-of-day billing.
Time of Use Pricing (TOU)	A dynamic pricing program that charges customers additional rates during a set “peak time” (i.e. 5-8 PM), or incentivizes them to meet their energy needs by offering them rebates for shifting use outside of peak time (i.e. 9-11 PM). The key aspect is that use rates are specified by time blocks.
Variable Electricity Sources	Variable sources are sources of electricity where supply dependence cannot be guaranteed. These sources include wind, which can only be tapped when the wind is blowing, and solar, which can only be tapped when the sun is shining. Variable sources are difficult to integrate into the electricity grid because careful management of supply to meet demand is required.
Voltage Optimization	The systematic controlled reduction in the voltages received by an energy consumer with the purpose of reducing energy use, power demand and reactive power demand.

Executive Summary

This study examines the role of public engagement as used by public utilities in the implementation of smart meters in various jurisdictions in North America. Smart metering represents a policy change that has the potential to provide many public benefits, but has been met with opposition or backlash in many jurisdictions. This paper uses four case studies to explore the difficulties with public engagement and communication faced by utilities implementing smart metering initiatives, and the approaches taken to engage and communicate with the public. These case studies are then used to identify common areas of concern for public organizations looking to implement new policies or programs with characteristics similar to smart metering initiatives, and to offer up suggestions for improved public engagement and communications with the goal of limiting public backlash and maintaining public trust and legitimacy.

The study examines the smart metering initiatives of British Columbia Hydro and Power Authority, the Province of Ontario, California's Pacific Gas and Electric, and Oregon's Portland General Electric. The cases were chosen for the attributes of their smart metering initiatives, and to offer a mix of successful and unsuccessful initiatives. The study employs a methodology of case study analysis, supplemented by elite interviews to explore the selected cases, and then a thematic analysis of cases to extract broad "lessons learned". An interview with BC Hydro was undertaken to help properly define the policy problem to be examined. Exploration of official government documents, media, and grey literature was then utilized to inform the cases. Interviews were solicited from the selected case utilities and government organizations to provide greater detail on the public engagement and communications plans and strategies utilized. Perhaps due to the sensitive nature of the issue, all interview requests were met with no response. This is a limitation to the robustness of the conclusions that can be drawn from this analysis.

The case analysis revealed many valuable lessons. Key among these was identifying policy characteristics that could be potential sources of public backlash. These characteristics include: new technologies with novel risks, such as health risks and security of information risks; complex applications that are difficult to understand

without a large degree of information intake; changes to programs or services that the public utilizes on a regular basis, and may feel a personal degree of ownership for the program or service; programs or services with high costs that may need to be passed onto the customer; and, changes to programs or services that will have an effect on other policies, programs, or services. These characteristics are not unique to smart metering initiatives, and can be potential sources of concern in many policy areas. Therefore, the lessons and recommendations from this analysis have broader application beyond smart meter policy.

The analysis also identified public engagement, communications, and program planning considerations that may help limit public backlash when policies or programs are implemented. These include:

- Developing customized tools that personally engage the individual to help understand benefits and policy impetus.
- Utilizing a 'Whole of Organization' approach when planning and implementing new policies.
- Personally contacting affected individuals for clearer communication of technical and complex policies.
- Training Front-line staff to be able to clearly and consistently communicate policy or program details, costs, and benefits, and to resolve public concerns.
- Utilizing external regulatory review, combined with an avenue for the public and stakeholders to participate in the process through hearings, in order to add legitimacy to policies and programs.
- Utilizing independent review bodies in order to add legitimacy to novel policies and programs (i.e. Scientific review of novel technologies).
- Undertaking program pilots to learn from real world usage scenarios and resolve issues and concerns before broader application. Pilots also allow time for the public to become familiar with policies or programs before broader implementation.
- Utilizing a staged implementation approach to allow time for issues to come to light before full implementation and to allow time to react to, and address public concerns as they arise.

From these 'lessons learned' this paper offers a process of policy risk characteristic evaluation, followed by recommended options of action given the presence, or lack-there-of, of policy risk characteristics. A suggested list of criteria and measures is provided to help guide decision making, and an example is presented to

illustrate how this evaluation process and applied options can lead to better outcomes in terms of reducing the risk of public backlash. As all public policies and issue areas are different, this study does not suggest that there is one specific superior approach, but that in the presence of policy risk characteristics much can, and should, be done to mitigate public backlash and avoid an erosion of legitimacy and trust.

1. Introduction: Public Engagement and Communication for Complex Policy Problems

This study examines the role of public engagement as used by public utilities in the implementation of smart meters in various jurisdictions in North America. Smart metering initiatives have notable issue characteristics that may be shared by other policy areas. These characteristics include: new technologies with novel risks, such as health risks and security of information risks; complex applications that are difficult to understand without a large degree of information intake; changes to programs or services that the public utilizes on a regular basis, and may feel a personal degree of ownership for the program or service; programs or services with high costs that may need to be passed onto the customer; and, changes to programs or services that will have an effect on other policies, programs, or services.

Smart metering represents a policy change that has the potential to provide many public benefits, but has been met with opposition or backlash in many jurisdictions. Smart meters reduce costs associated with meter reading, such as wages and fleet operation and maintenance; these cost savings can be passed on to the customer. Smart meters allow for measurement of time-sensitive aggregate energy demand, which allows for such benefits as more efficient integration of renewable energy sources, identification of electricity theft, and faster response to power outages. Continuous measurement also allows for the implementation of 'peak-shifting' demand side management programs such as dynamic pricing. Moving forward, smart meters are a prerequisite for sustainable electricity development and management. Population increase, a need to increase the proportion of renewable energy sources, and increasing demand for new electrical devices (more computerized systems, electrical cars, etc.) will require a smart grid to manage peak demand loads and electricity supply. Smart meters are an integral component of this smart grid.

Yet despite these benefits, the implementation of smart meters is frequently met with a lack of public acceptance. In many North American jurisdictions, smart metering initiatives have been met with public criticism and backlash. Key concerns have been the potential health risks from radio-wave transmissions produced by smart meters, as well as the potential risk of breach of the security of personal information contained in digital communications. Another concern has been the large costs of smart metering initiatives and how much of the cost will be passed on to the customer. This concern is often associated with a lack of understanding about how the benefits of smart metering compare to the cost. The functionality of new meters and how faulty meters may produce bill errors has also been a large concern. Other customers have falsely believed that since the current electrical meter is attached to their home, it is their property, and the utility does not have the right to make changes to “personal property.” All of these concerns share one thing in common: how information is communicated by the utility and perceived by the recipient.

Smart metering represents a new technology that operates in a complex system. There are many benefits, and communicating these benefits is also complex. There is a high potential for misinformation to gain traction with the public. This potential for misinformation is increased by the ability for vocal minorities to spread potentially false information and issues of concern. The bias of the media to give equal treatment to scientific and government information releases, and the concerns of vocal minorities, further increase the potential for misinformation. As a result, utilities face an increasing need to engage with the public and carefully manage communications when implementing programs in the public’s interest. The same concern applies to other public organizations wishing to implement policies and programs with similar characteristics.

As utilities typically have strong capacity and a large degree of experience with engagement and communication practices, it is not so much these organizations’ ability to engage and communicate that is problematic, but *how to identify which policies require a large degree of engagement and communication prior to, and during, implementation* that is the issue. Identifying potential issues of concern and matching

engagement strategies to those issues will be an ongoing important task for utilities, as well as for other public entities.¹

This paper uses four case studies and interviews to explore the difficulties with public engagement and communication faced by utilities implementing smart metering initiatives, and the approaches taken to engage and communicate with the public. A thematic analysis of these cases is then used to identify common areas of concern for public organizations looking to implement new policies or programs with characteristics similar to smart metering initiatives, and to offer up suggestions for improved public engagement and communications.

Here it should be noted that when I refer to communication and engagement I am referring to practices prior to, or during, policy *implementation*. Public engagement and communications also have an important role to play in policy *development*, but throughout this paper I will be speaking to policies or programs for which the evaluation of the public benefit of the policy or program is complete. This is not about engagement or deliberation informing the design of the policy, but of acceptance of the justifications of the chosen policy.

The original impetus for this paper was the experience of British Columbia Hydro (BC Hydro) in implementing their smart metering initiative, particularly the degree of public opposition that occurred during smart meter implementation. The first case therefore examines in detail the experience of BC Hydro's Smart Metering Program and the causes of public opposition to this initiative. This case will offer up an introduction to smart metering, reasons for public opposition to smart meters, and the challenges of communicating and engaging with the public when policies are complex, novel, and technical, and their benefits may not be immediately realized. Three other cases are then examined based on characteristics of their smart metering initiatives that are similar and different to BC Hydro.

¹ Of course, this capacity for engagement may not exist in all governments or public organizations, so an assessment of capacity is always required when considering options around engagement or communications.

1.1. Smart Meters

1.1.1. Smart Meter Basics

Until recently the electricity system was a one way flow from producer to consumer. At the point of reaching the consumer, a traditional, mechanical, electricity meter would measure the amount of energy flowing to the consumer. The supplier of electricity, or utility, would stop by monthly to read the meter and then bill the customer. If there was something wrong, such as suspected electricity theft, the supplier might make more frequent inspections. But in general, the supplier and consumer would only know how much energy the consumer used over the entire billing period. Suppliers would also not know of outages until, and unless, customers called to tell them the power was out (BC Hydro 2011a).

Smart meters update the traditional metering system by allowing for digital, two-way information flows between the consumer and the supplier. Utilizing a radio antenna embedded in the metering device, smart meters remotely send electricity supply and demand data through a digital or wireless signal to the supplier, eliminating the need for a meter-reader to be sent to the customer's home or place of business. Smart meters provide many benefits over traditional metering, including time-sensitive electricity demand measurement and monitoring for both the supplier and consumer, and instant knowledge of power outages (BC Hydro 2011a). These time-sensitive measurements allow for improved management of the electrical system, and extremely detailed usage and pricing information. The benefits that flow from time-sensitive measurement will be discussed below.

1.1.2. Benefits

Time-sensitive electricity measurement and monitoring provides many benefits to consumers and suppliers. With regards to suppliers, or utilities, knowing the current electrical demand greatly improves the ability to manage the electrical system. Most basically, digital signals communicating power usage eliminate the need for meter readers. This is an instant resource saving for utilities, both in terms of personnel and in maintaining and operating a fleet of vehicles to transport meter readers. This comes with

the attached public benefit of environmental protection, as fewer vehicles results in fewer carbon and air pollutant emissions. Additionally, utilities employing smart metering can instantly know about power outages when and where they happen, allowing them to quickly dispatch a service team to diagnose and repair the problem. Smart grid technologies can also help reduce electricity theft, commonly used to power illegal marijuana drug grow operations, reducing the rate impacts to legitimate customers (BC Hydro 2011a, Giordano, Vincenzo et al. European Commission Joint Research Center 2012).

Time-sensitive monitoring provided by smart meters also allows suppliers to manage energy to meet peak demand load and provide electricity regulation and voltage optimization support. A deeper understanding of peak demands allows for improved management of renewable energy integration, such as accommodating the integration of variable generation such as solar and wind power. Importantly, understanding and managing peak demands will also allow for better planning of the deferral of distribution investments (Singer 2009, Giordano, Vincenzo et al. European Commission Joint Research Center 2012). Voltage optimization means less electricity will be required to be transmitted to maintain expected power quality, making the distribution system more efficient (BC Hydro 2011a). These benefits can add up to large operational savings for utilities.

The benefits to the consumer fall under two categories: direct benefits at the point of electricity delivery; and societal benefits through improved management of the electricity system. At the point of delivery, the consumer benefits through an improved understanding of daily energy use, and potential savings on their electricity bill. Because customers can actually monitor their time-sensitive usage (provided they have a monitor device in home), they can understand how much energy they use in a day, and at what times of the day they use the most energy. In turn, deeper understanding of power use may enable increasing the scope and scale of demand response programs. Certain demand response programs reward customers by reducing their energy usage during times of peak demand, spreading total electricity grid use over time, and reducing required peak system capacity. Studies have suggested that providing transparent electricity prices to consumers, and combining that information with dynamic pricing, or demand reduction inducements, can lead to reductions in electricity consumption

ranging from five to fifteen per cent (Singer 2009, Neenan, Hemphill 2008). Such demand management will become increasingly important as new electrical devices, such as electrical cars, come on-line.

The customer also can benefit from the use of so-called “smart” electrical devices. These devices are possible from the two-way flow of electricity usage information provided by smart meters. “Smart appliances” can interact with a smart grid, or be pre-programmed, to cycle-down or turn off during times of peak demand (Ontario Independent Electricity System Operator (IESO) 2012). When coupled with a demand response program, smart devices can help spread the peak demand over the day, again reducing the peak capacity required by the electricity system. Customers enrolled in demand response programs can then easily save on power bills thanks to a home-electrical system that will be set up to manage itself most efficiently.

Smart meters and the associated smart grid can also create societal benefits. A key benefit will be the potential for reducing the peak capacity of the electrical system. Currently, electrical systems need to have capacity above and beyond the peak demand—the highest potential demand placed on the system at any given time. Because smart meters will enable the expansion of demand response programs and “smart” electrical devices, peak demand could be spread over the day, resulting in a lower peak. The current electrical capacity could be preserved well into the future under such a scenario, which means fewer generation sources being build. Since the cost of building new capacity is very high, both in terms of time, land, materials, labour, and potential environmental impacts, and costs are passed on to all rate-payers, reducing capacity requirements is very beneficial to society. When that capacity is increased through fossil-fuel burning generation, there is also the associated externality of carbon emissions into the atmosphere. Reducing these emissions has been established globally as a worthwhile goal.

Societal benefits are also generated by the ability to better integrate variable electricity sources, such as wind and solar into the electricity grid. Because wind and solar are only available when the wind is blowing and the sun is shining, it is difficult to match their variable output to system demand. Smart meters and the associated smart grid will enable better co-management of distribution and transmission systems, allowing

fast response to variable sources coming on and off the system, and delivering generation to load (Singer 2009). This will enable quicker uptake of renewable energy sources, addressing the externality problems associated with fossil-fuel electricity generation, and potentially saving customers money if externalities from fossil-fuel electricity generation are priced into generation (i.e. through a carbon tax) (Singer 2009).

Given the potential societal benefits, installing smart meters in preparation of a smart grid has the potential to address multiple policy objectives. Given these benefits, many jurisdictions around the world have implemented smart metering initiatives, or are in the process of developing smart metering initiatives.

1.1.3. Demand Response and Dynamic Pricing

Since smart meters and dynamic pricing are interrelated, and both are often topics of discussion in this paper, I will defined and explain dynamic pricing here.

Reducing the peak demand of the system will likely require a change in energy consumption behaviour. Typically, peaks in the system in Canada occur during winter months. These highest peaks occur in the evening between 5-9 PM when residential consumers return home from work or school and turn up their heat and turn on multiple appliances (Ontario Ministry of Energy 2012). In warmer, southern locations, such as California, the peak occurs during the summer days, from 12-6 PM, when air-conditioning units are running at maximum (Pacific Gas and Electric 2013b). Regardless of jurisdiction, the problem is the same: the total built system capacity (dams, power plants, solar/wind) is based solely on meeting that peak. If that peak could be spread out over the day, the total built and operational capacity could be reduced with great cost savings. But achieving this 'peak-smoothing' will require consumers to change their behaviour by using less power at peak times.

Smart meters enable this consumer behaviour change. By continuously monitoring energy use, smart meters allow for behaviour changing demand-response programs such as dynamic pricing programs (Singer 2009). The idea behind dynamic pricing is to incentivise consumers to use energy outside of peak times by making it either more expensive to use energy during peak, or by offering rewards, such as bill

reductions, to use energy outside of the peak times (Ontario Ministry of Energy 2012, Pacific Gas and Electric 2013b, Singer 2009). Economic theory suggests that individuals will respond to these price signals if the incentive is great enough (Levy, Herter et al. 2004). By charging mandatory higher rates in peak times, as they do in Ontario, utilities will incent some consumers to choose to shift their energy use outside of peak times or make more efficient appliance investments. This lowers the peak demand and utilities can therefor save on building new supply or operating high marginal-cost supply at peak. These costs savings can be passed on to consumers via lower rates.

1.2. The Problem: Identifying When to Engage the Public

Most utilities and governments who manage the electrical system for the public benefit likely have some tough policy decisions ahead. These decisions include eventually increasing consumer rates in order to pay for new capital electricity generating projects, and, as is the case with BC Hydro and the Government of BC, potentially initiating demand response programs that aim to change consumer behavior; mandatory dynamic pricing systems. These tough decisions come with the high possibility of public opposition. There is also a high possibility of public misunderstanding of the impetus for such programs. The technical nature of energy systems and the complex interaction of the economy and the environment can lead to confusion about the tradeoffs being faced by the public when policies are presented and considered.

Clearly communicating these policy program needs, the public benefits of energy conservation, and the drivers of any future policy will need to be a key objective of utilities and the governments who manage the electrical system. Effective public engagement and communication will be necessary to increase the likelihood of public acceptance of policies and programs in the public interest.

Most North American utilities already have a strong capacity for engagement and communication. In the case of the BC Hydro Smart Metering Program, public engagement processes are in place to inform decision-making and policy planning and implementation (Murphy, Interview, 2012). The policy problem identified in this paper is therefore not that there is a lack of public engagement capacity prior to the

implementation of smart metering initiatives, but that it is often difficult to determine the degree and type of public engagement and communications when planning and implementing new public programs. As a result, the opportunity for public opposition and backlash may unexpectedly present itself. This may lead to a waste of public resources trying to quell opposition and regain public trust.

Governments, public utilities, and other governmental organizations require public trust and buy-in in order to initiate progressive and beneficial policy programs. Lack of public trust or legitimacy may inhibit the possibility of beneficial policies and programs, undermine program implementation and potential realization of societal gains, or significantly delay achievement of benefits. Without the full achievement of public benefits, or benefits achieved with long delays, the costs of program implementation may outstrip the benefits. Given the potential for a lack of public trust and buy-in to complex, costly, policy programs that affect households or induce behavioural change, organizations need to be more aware of what can lead to public backlash and how to address it. Recognizing when to utilize public engagement and what kind of public engagement and communication instruments to employ will be important to utilities and governments moving forward with implementing new programs and carrying out evolving mandates. Analysis is therefore required to systematically identify characteristics that can lead to a lack of public trust and public backlash.

2. Smart Meters in British Columbia

In British Columbia (BC), the process of implementing any electrical power program or infrastructure is a public concern. Concerned parties are: the consumers of energy; the Government of British Columbia, who sets high level energy policy for the province; British Columbia Hydro and Power Authority (BC Hydro), the crown corporation that provides the majority of BC's power and manages transmission; and, the British Columbia Utilities Commission (BCUC), an independent, quasi-judicial administrative tribunal that regulates the province's electricity and natural gas sectors in the public interest.

In the case of BC's Smart Meter Program, smart meters were mandated by the BC Government through the 2010 *Clean Energy Act (CEA)*. BC Hydro was instructed to install smart meters across BC, manage the Smart Meter Program, and the corresponding smart grid. Under the *CEA*, the Smart Meter Program was exempt from the usual oversight and public hearing process provided by the BCUC. This set up an interesting environment where the Smart Meter Program was implemented under the *CEA* without the typical formal public oversight and the opportunity for public consultation through the BCUC hearings process. Beginning with the installation of smart meters in 2011, the Smart Meter Program was met with public confusion and even backlash, first by vocal minorities (citizens groups), and then municipalities, some of whom called for a halt in smart meter installation. Concerns cited were privacy, health, and program pricing and potential changes in electricity rates.

This portion of the study outlines the background of the BC Smart Meter Program and the public concern that resulted. The case of BC Hydro's Smart Meter Program provides an example of the difficulty in communicating complex policies and their benefits, and the public opposition that can occur to novel policies and programs as a result. It also demonstrates that additional resources may have to be expended after

policy implementation to clear up misinformation or confusion that could potentially have been avoided prior to implementation.

2.1. The Smart Meter Program in B.C.

On Dec 15, 2010, the Government of British Columbia legally mandated BC Hydro to install smart meters for each eligible premise within BC, as well as all related communications and security equipment and systems, by the end of the 2012 calendar year. This was achieved through the *Smart Meters and Smart Grid Regulation* under the *BC Clean Energy Act (CEA)*. The authority to make the Smart Meter Regulation stems from Section 17 of the *CEA*, and section 37, which grants power to the minister to make regulations, “for the purposes of section 17, respecting smart meters and smart-grids and their installation, including, without limitation:

- prescribing the types of smart meters to be installed, including the features or functions each meter must have or be able to perform;
- prescribing types of smart grids to be installed, including, without limitation, equipment to detect unauthorized use or consumption of electricity, equipment to facilitate distributed generation and associated telecommunication and back-up systems, and;
- prescribing the classes of users for whom smart meters must be installed, and, without limiting section 36 (1) (c), requiring the authority to install different types of smart meters for different classes of users. (Government of British Columbia 2010)

The *Smart Meters and Smart Grid Regulation* prescribes that smart meters to be capable of: measuring electricity supplied to an eligible premises; transmitting and receiving information in digital form; allowing the authority remotely to disconnect and reconnect the supply of electricity to an eligible premises; and, transmitting information to and receiving information from an in-home feedback device (Government of British Columbia 2010b). The regulation also mandates that BC Hydro must establish a Smart Grid system by the end of 2015.

BC Hydro will also have to acquire investigation devices and computer software to enable two-way, digital, and secure communication among system devices and equipment used by the authority for monitoring and controlling its electric system. The

final goal is to “facilitate the operation of the authority's electric system, and the integration, on a large scale, of distributed generation into the electric distribution system, and the provision of electricity service that allows for the large-scale use of electric vehicles by (BC Hydro) customers” (Government of British Columbia 2010b).

Additionally, Subsection 7(1) of the *CEA* exempts the Smart Meter Program from the requirements of complying with the Certificate of Public Convenience and Necessity (CPCN) requirements (sections 45 to 47) of the *Utilities Commission Act (UCA)*. As a result, the usual, formal public oversight process of BC Hydro operations conducted by the British Columbia Utilities Commission (BCUC) was bypassed and the BCUC was not involved in the planning phase or approval of the project (British Columbia Utilities Commission 2012).

Another notable of the BC Hydro Smart Meter Program is that dynamic pricing is not included in the Smart Meter Program. Any proposal for new rate structures will have to be reviewed and approved by the BCUC. The *CEA* excludes dynamic pricing in its demand-side measure objectives. This exclusion is important because it takes away a key benefit of smart metering, which is the potential peak smoothing possible through dynamic pricing and the associated savings by avoiding building and operating supply to meet peak energy demand.

In the *Smart Meter Initiative Business Case*, BC Hydro reported that cost savings would be realized in the following manner:

- Operating Efficiencies—more efficient use of distribution assets and streamlining of business processes, reducing operating and future capital expenses;
- Energy Savings—lower electricity use through improved system control, operational efficiencies and providing customers with new options to better manage their electricity consumption;
- Revenue Protection—includes both recovery of revenue (e.g. back-billing) and prevention of future potential revenue loss (e.g. reduced theft); and
- Capacity Savings—lower electricity use at certain key periods, which reduces peak demand and capacity constraints (BC Hydro 2011a pgs. 1-2).

BC Hydro noted that the Smart metering program would result in a net present value (NPV) of \$520 million through 2033. Interestingly, BC Hydro noted that 80% of this

benefit would be as a result of operational savings and 20% from increased customer conservation. The high NPV was largely a result of \$730 million out of \$1300 million in operational savings being due to electricity theft reduction. BC Hydro also noted “that if customers take advantage of the conservation tools to be implemented by the Smart Metering Program, the overall benefits increase significantly...The NPV remains positive even if all costs are incurred but only the BC Hydro operational efficiencies are realized. The NPV also remains positive if all benefits are achieved at the low end of the estimated benefit range” (BC Hydro 2011a pgs. 2 and 9). Other reports have suggested that the active role of customers participating in demand response and dynamic pricing programs is essential for capturing the full benefits of smart metering, although they suggest that there are many future operational cost savings that are difficult to quantify at this time (i.e. California Public Utilities Commission. 2005, Giordano, Vincenzo et al. European Commission Joint Research Center 2012).

It is easy to speculate that the exemption of the Smart Meter Program from BCUC oversight, and the exclusion of dynamic pricing from the program design would make it extremely difficult for BC Hydro to defend the justification of public benefits of smart meters and would open up the door to public backlash from citizens who would view the smart metering program as a top-down, heavy-handed government initiative. In this regard, BC Hydro was in a difficult position: they were tasked with implementing a program where a key justification for public benefits had been removed, and they were further not protected by the public safety valve of regulatory oversight.

2.2. Public Outcry to the Smart Meter Program

Beginning in July 2011, BC Hydro began upgrading homes and businesses across the province with new smart meters. The roll-out of the Smart Meter Program was very quickly met with public outcry from citizens, citizens groups, and then politicians and municipalities. Media scans of on-line newspapers and news databases available through the Simon Fraser University Library (Canadian Newstand) since the Smart Meter Program was announced reveal that the concerns centered around privacy

concerns, health concerns, and program cost and rate concerns.² Many citizens were concerned about the small amounts of electromagnetic radiation produced by smart meters as they communicate to the network via radio waves. Others were very concerned about privacy issues. One unfounded privacy concern was that BC Hydro would be able to tell via the smart meter what devices a household is using and the behaviour and habits of individuals within the household based on device usage. A more realistic privacy concern is that usage and pricing information could be tampered with and personal billing information could be retrieved from non-secure networks. A third key concern was that the smart meter program will cost an estimated \$930 million dollars, and it was not clear how this would be paid for or what the benefits would be. A fourth concern was that the smart meter would enable time of day pricing. Both these concerns were addressed in the “Smart Metering and Infrastructure Business Case” publication (BC Hydro 2011a), but this information was apparently not sufficiently disseminated to, understood, or read, by the concerned public.

Citizens groups, including the Coalition to Stop Smart Meters³, the StopSmartMeters citizens group⁴, and the Citizen’s for Safe Technology⁵ either formed to oppose the BC Smart Meter program, or placed the smart meter on their issue agenda. The StopSmartMeters group issued an online petition. As of Oct, 14, 2012 it had been signed by 5700 members. Citizen’s for Safe Technology also created an online “Action-Kit” available on their web-page, with a “notice” to send BC Hydro regarding apparent legal rights to deny the installation of the smart meter, and a “No Trespassing” poster targeted towards smart meter installers⁶. They also issued on-line and print versions of a petition to send to the Government of British Columbia with the intent that “a moratorium be placed on the wireless smart meter program until the major issues and problems identified regarding wireless smart meters are independently assessed with full public consultation, and until acceptable alternatives can be made

² For a selected listing of the BC Smart Meter Program media scan, see Appendix A

³ <http://www.stopsmartmetersbc.ca/html/>

⁴ www.StopSmartMeters.ca

⁵ <http://citizensforsafetechnology.com>

⁶ <http://citizensforsafetechnology.org/smart-meters-and-grids-in-communities-governments,25,0>

available to the consumer”⁷. The petition has been signed by 16487 individuals as of February 28, 2013.

Citizen’s for Safe Technology also launched a complaint and hearing request with the BCUC on April 14, 2012 (British Columbia Utilities Commission 2012c). When the BCUC denied the request, as they have no mandate to oversee smart meters, Citizen’s for Safe Technology took their complaint to the B.C. Court of Appeal, who refused to hear the complaint (Nagel 2012). The head of Citizens for Safe Technology, Una St. Clair, has also had a complaint accepted by the Human Rights Tribunal accusing B.C. Hydro of discrimination against those suffering from medical conditions claimed to be caused or exacerbated by smart meters (Cahute 2012).⁸

Widespread coverage in the media and vocal opposition from citizen’s groups led politicians and municipalities into the public smart meter discussion. This initially culminated on September 30, 2011, when the Union of B.C. Municipalities voted for a moratorium on mandatory installation of smart meters at their annual convention (Kimmitt 2011). At a conference meeting with BC Hydro representatives, municipal councillors reported that they had been inundated with emails and phone calls from constituents (Kimmitt 2011b). Despite the Union of B.C. Municipalities’ vote, Gary Murphy, chief project officer of BC Smart Meter Program, reiterated that, “there is no opt-out program. Every customer in the province is going to get a smart meter” (Kimmitt 2011b).

The BC Office of the Information and Privacy Commissioner (OIPC) reported receiving complaints and correspondence from approximately 600 individuals expressing privacy and security concerns. According to the OIPC, these individuals were concerned about whether BC Hydro will properly protect information about their electricity consumption and whether the organization will improperly share their consumption information with third parties (British Columbia. Office of the Information and Privacy Commissioner, B.C. Hydro 2011).

⁷ <https://cstorg.wufoo.com/reports/smart-meter-petition/>

⁸ The case has yet to go to tribunal as of March 22, 2013. It is currently not on the published 90 day hearing schedule as of March 25, 2013. The BC Human Rights Tribunal 90 Day Schedule is available at http://www.bchrt.bc.ca/hearing_schedule.pdf.

In response to this backlash and confusion surrounding the Smart Meter Program, BC Hydro and other government agencies attempted to fill the information gap and address customer concerns. Addressing customer concerns should be expected after any new policy or program implementation, especially one regarding advanced and novel technology. Regardless, the time and resources that have gone into addressing public concerns after the fact has been large. BC Hydro, the BCUC, and the BC Government have had to issue reports, statements, conduct additional research, and hold public hearings, all at the public's expense. Below are some details of the efforts to address public concerns after smart meters began to be installed.

In order to address privacy concerns, B.C.'s Information and Privacy Commissioner (OIPC) released a report in December 2011 regarding the Smart Metering Program's compliance with B.C.'s Freedom of Information and Protection of Privacy Act. The report focuses on BC Hydro's obligations under the *Freedom of Information and Protection of Privacy Act* and examines the privacy and security impacts of a smart meter's ability to collect information about British Columbians' household activities. The Commissioner found that "BC Hydro is complying with FIPPA regarding the collection, use, disclosure, protection, and retention of personal information and that BC Hydro has taken reasonable steps to put in place an effective privacy management framework." In order to avoid confusion, the Commissioner recommended "BC Hydro should develop more comprehensive web pages and paper notices for its customers regarding the purposes for collecting hourly consumption data, the legal authority for collection, and the contact information for the person within BC Hydro who can answer questions regarding collection" (British Columbia. Office of the Information and Privacy Commissioner, B.C. Hydro 2011).

In February 2012, BC Hydro posted two fact sheets on their webpage titled, "Smart Meter Basics" and, "Smart Meters: Frequently Asked Questions," as well as a video, "Smart Meters 101: The Power to Save" (BC Hydro 2012). These materials are aimed at addressing the various issues of concern voiced by the public. Information includes smart meter basics, benefits of the smart meter, installation information, smart meter safety such as fire hazard and radiation exposure, billing issues, potential for rate changes such as time-of-use pricing, security information such as security of customer's personal information, the detail of information the smart meter records (aggregate

electricity use, not individual device use nor customer habits or behaviour), prevention of electricity theft, and disposal of old meters.

Testing was also undertaken to back up previous statements that radio frequency signals from a single smart meter, or a bank of smart meters, were not harmful to human health. In January 2012, the BC Center for Disease Control conducted a test on a bank of ten BC Hydro Itron Smart Meters. The Itron smart meter bank produced radio frequency emissions at levels less than typical household items, such as microwaves, baby monitors, and mobile phones, and was deemed safe at a frequency exposure less than 0.001 % of Health Canada's Safety Code 6 limit (BC Center for Disease Control 2012). These tests provided support that health concerns surrounding smart meters are currently considered unfounded.

As noted above, The BCUC, who was not involved in the oversight of the Smart Meter Program, also received requests for hearings regarding the legality of the *Clean Energy Act* exempting BC Hydro from having to obtain a certificate of public convenience and necessity under section 45(1) of *the Utilities Commission Act*. As the intermediary between the public and BC utilities, the BCUC also received many complaints and concerns from customers regarding the Smart Meter Program. As a result, the BCUC also released a fact sheet on their web page addressing frequently asked questions about the legality and health and privacy concerns surrounding the Smart Meter (British Columbia Utilities Commission 2012).

While this information campaign has quelled some opposition to the smart meter, the smart meter program remains on the public and political radar. For example, on August 17, 2012, Vancouver City Council passed a motion asking BC Hydro to allow electricity users to opt out of having smart meters installed in their homes. After the motion, Cindy Verschoor, BC Hydro's communications manager for the Smart Meter Program stated that, "the [electricity] grid is actually provincial infrastructure under provincial jurisdiction. Our responsibility under several pieces of legislation is to deliver power responsibly, safely and reliably to our customers, and [the Smart Meter] program is necessary to that" (Lee 2012). In another incident, on October 2, 2012, residents of Campbell River, BC declared an "International Day of Action to Stop Smart Meters" and

protested in front of BC Hydro offices, demanding an immediate ban on continued smart meter installation across BC (Douglas 2012).

Due to this continued resistance, BC Hydro has had a difficult time completing their Smart Meter Program objectives on time. On December 27, 2012, BC Energy Minister Rich Coleman announced that the BC government would extend the smart meter installation deadline by a year, to Dec. 31, 2013, in order to accommodate public hold-outs. As of the end of December 2012, B.C. Hydro had installed 93 per cent of the proposed meters, or 1.73 million devices. Almost 140,000 meters had yet to be installed, mostly as the result of people asking that they not be installed. Cindy Verschoor stated that, "The bottom line is the province is extending the deadline for smart-meter installation to allow for more flexibility to address customer concerns" (Shaw 2012).

With the announced program extension, BC's smart meter saga continued into 2013. On January 30, 2013, BC Hydro announced that they would not install smart meters without the permission of residents. This exception would apply to most of the final 5% of required installations, representing the 85000 BC households that have refused to accept smart meters. BC Hydro reported they were able to convince 9,000 customers who originally objected to the new meters to have them installed after meeting with BC Hydro reps. Another 35,000 additional meters had yet to be installed because of other issues, such as construction delays (CBC News Online 2013). BC Hydro spokesman Greg Alexis stated, "We think it's important to take some extra time to work with customers who still have concerns with getting a new meter. In the meantime we will not install a new meter for these customers unless we have their permission" (CBC News Online 2013).

This announcement causes confusion over what is, and what is not obligatory with regards to smart meters. Previously, BC Hydro had stated that all customers would have to have smart meters installed because the system would not function if households choose to opt-out. The mixed and contradictory messages will surely hurt the credibility and legitimacy of the government and BC Hydro and will continue to undermine the rationale for the program. Indeed, the official opposition was quick to point out the confusion these statements were making with the public; the New Democratic Party energy critic John Horgan stated, "One week customers are receiving

threatening letters saying the meters will be installed no matter what. The next week the energy minister pens an opinion piece saying B.C. Hydro won't install a new meter without the homeowner's consent. Which is it? You can't have it both ways ... This is a government initiative, it's a BC Hydro initiative, and we haven't heard categorically and clearly just what the expectations are for people who don't want a smart meter today" (CBC News Online 2013)

2.3. Why the Public's Adverse Reaction is a Concern

As noted above, smart meters offer many potential benefits, especially future benefits and cost savings. Especially when paired with demand response dynamic pricing, smart meters have the potential to aid in the reduction of overall electricity use, reducing peak demand, and thus reducing the need for added system capacity. Smart meters, combined with a smart grid could enable future uptake of more renewable, variable energy sources, such as solar and wind. Smart meters and a smart grid will likely be necessary for large scale uptake of electric cars. These changes could result in reduced greenhouse gas emissions, depending on the electricity supply mix.

The presence of public opposition remains a concern. Considering the benefits of smart meters for future electrical system management, the degree of public mistrust surrounding smart meters bodes poorly for the future policy development in this area by the BC Government and BC Hydro. Given the broad public goals of BC's *Clean Energy Act*, and BC Hydro's goals of achieving cost saving through demand management, broad public trust and support will be necessary for future policy initiatives (BC Hydro 2012c).

The Smart Meter Program therefore provides a potentially important and instructive case study on public policy implementation. Learning from the policy development and implementation of the program will provide insight into how BC Hydro (and/or the BC government) can better manage policy development and implementation in order to generate broad public support. As many governments and utilities face similar problems of increased energy demand, aging infrastructure, and the likely necessity to

introduce dynamic pricing, lessons will hopefully be transferable to other government policy initiatives both in BC and beyond.

I could find little publicly available material regarding the decision making process surrounding the BC Hydro Smart Meter Program, or any proposed public engagement prior to launching the Smart Meter Program. A bill-insert and mail-out announcing the installation of smart meters and the fact sheet titled, “Straight Facts About BC’s Smart Metering Program” were sent out to all BC Hydro customers, and municipal mayors and councillors in June and July, 2011 (BC Hydro 2013). There was also mention in the *Smart Meter Initiative Business Case* that “customers have access—through the BC Hydro website, bill inserts, and community events—to information about the Smart Metering Program, the smart metering system that will be installed, how it works, and other topics of customer interest. Customers can share their feedback, concerns, and interest directly through calling, email, community events, and customer research” (BC Hydro 2011a pg. 2). Beyond BC Hydro press releases and mail-outs, I could find no record of the degree of public engagement or communications prior to the Smart Meter Program implementation. It was therefore the first task of this paper to learn what the degree of public engagement and communications was prior to implementation.

3. Project Methodology

In attempting to investigate how governmental organizations can enhance public participation and engagement processes prior to policy or program implementation, this study employs a methodology of case study analysis, supplemented by elite interviews. The elite interviews were used to firstly identify what was actually done in terms of public engagement prior to the implementation of the BC Smart Meter Program. This was necessary to help identify and finalize the particular policy problem. I used a thematic analysis of the cases to identify methods of public engagement used by other jurisdictions who have implemented smart metering programs. These cases provide a point of comparison and contrast to the BC case, help identify “lessons learned” and potentially provide “best practices” to improve public engagement. Interviews were requested in an attempt to supplement the findings from independent research and provide insight on opinions, approaches and specific practices that utilities and governments can consider.

3.1. Elite Interviews

A semi-structured interview format was used in order to keep the discussion broad and let participants share any information they felt relevant. Participants were free to discuss experiences, issues, lessons and successes, as well as share opinions on strategies for effective public engagement, and obstacles to ideal public engagement moving forward. Interviews were selected to provide information not available through analysis of written documents, such as impressions, attitudes and anecdotes.

An initial interview was conducted with the Chief Project Manager for the BC Hydro Smart Metering Program. This interview provided the primary data in order to fully identify the policy problem. The interview also provided considerations for selecting and evaluating appropriate case studies. Interviews can complement secondary sources of

information such as public documents and websites, where these sources are incomplete. In the case of the BC Smart Meter Program, there is not a large amount of publicly available information on the public engagement process; the interview provided the main source of information to identify public engagement issues.

Interviews were also sought with individuals involved in the utilities selected as case studies. These interviews were intended to provide information on those organizations' public engagement strategies surrounding their own smart meter programs. Unfortunately, all attempts to solicit interviews were met with no response. Follow ups and general department solicitations did not yield any response. One interview was conducted, but the individual later retracted their statements. I have no explanation as to why my requests were met with no response. I am only left to speculate that either the policy managers sought were too busy to respond to requests, or that the topic of smart meters in general is currently quite politically sensitive.

3.2. Interview Question Development

Questions for BC Hydro were developed based from a media scan of the issue, and public documents and media releases from BC Hydro, the Government of BC, and the BCUC. This scan was used to identify key areas of concern for the public, and what, if anything had been done beforehand to identify and address these areas of concern prior to program implementation. It was then possible to develop a set of broad discussion areas to guide the semi-structured interview process. The interview request was accompanied by an emailed or faxed copy of an interview guide in order to allow the participant time to gather information the participant felt important prior to the interview.

Questions for the case study utilities were designed to be very similar, and aimed to understand the public engagement strategies employed by these utilities. Questions were developed based from a media scan of the smart metering program in each jurisdiction, and public documents and media releases from the relevant utility. Again, a semi-structured interview guide was developed to allow for flexibility of questions in order to get a grasp on the unique aspects of each utility's approach. As stated above, requests for interviews with case study utilities were met with no response.

This project aims to understand the difficulties faced by the service provider or government agency with regards to public engagement. Therefore, no interviews were conducted with the public or stakeholders due to the time constraints of the project. The public, who are recipients and participants of engagement, would likely have some valuable information on how engagement could be improved to meet their needs, but this is beyond the scope of this particular paper.

3.3. Case Study Case Selection

The goal of the case study analysis is to identify public engagement approaches and strategies used by utilities in other jurisdictions prior to the implementation of their smart metering programs. I use a thematic analysis to examine the cases and draw out a summary of key lessons learned. Gathering information on similar variables for each utility studied allows for a thorough and structured analysis of how utilities can identify when to engage the public and what approaches to use. The following section provides the rationale for the case selection.

3.3.1. *Rationale for Case Selection*

There are a number of major factors that are important in the case of BC Hydro's Smart Metering Program. First, in the case of BC Hydro, the Smart Metering Program was legislated and mandated by the government. Secondly, BC Hydro did not introduce smart metering in conjunction with time-of-day or dynamic pricing programs. Third, there was opposition from a vocal minority who launched a counter-information campaign of largely misinformed or not credible facts.

I will therefore look for different mixes of the above factors when considering case studies. I will look at a case where the program was not directly mandated by the government, there was a concurrent time of day or dynamic pricing program, but there was still significant public backlash. I will look at a case where the program was not mandated, there was not a concurrent time of day or dynamic pricing program, and there was no public backlash. And I will look at a case where the program was mandated,

there was a concurrent time of day or dynamic pricing program, but there was no public backlash.

	Dynamic Pricing	No Dynamic Pricing
Government Mandate	Ontario (No Backlash)	BC (Backlash)
No Government Mandate	Pacific Gas & Electric (Backlash)	Portland General Electric (No Backlash)

Looking further into each case study aims to evaluate those approaches that worked and those that didn't, and to uncover variables that played into success or failure. As identified from the initial interview with BC Hydro, potential variables to be investigated across cases are:

- What engagement approaches were used prior to smart meter implementation?
- Was the program introduced with or without dynamic pricing?
- What is the role of the interaction between shareholder, government and utilities?
- What was the regulatory oversight of each of the projects?
- What role do vocal minorities play?
- What role does the media play with regards to publishing smart meter information?
- What is the perceived level of public trust with the utility? (Subjective)
- What other unique factors are present?

3.4. Limitations

As stated above, all requests for interviews with case study utilities were met with no response, with the exception of one participant who withdrew their statement. This limited my ability to fully understand the engagement and communication efforts undertaken by these utilities. Therefore, developing a list of lessons learned and best practices is also limited. I have done my best to uncover as much information as possible through exploration of public documents and other grey literature. Due to all case study utilities operating under the regulation of a utilities commission, there are

many publicly available documents regarding each utility's smart metering initiative. In the grey literature there were often interviews conducted for newspapers or magazines regarding each utilities smart metering initiative. These interviews can of course be biased by the media outlet or author, although reputable sources were sought. Sometimes, the smart metering initiative was the subject to a review, either solicited by government, or through a think tank.

One qualification to relying on these sources of information is that many did not directly discuss engagement or communication plans. A few referred directly to engagement and communications, and these provided valuable inputs to my analysis. I have done my best to extract the relevant information from the sources available. A second qualification is that relying on these information sources made it very difficult to explore the issues particular to each case study in a systematic way by utilizing similar variables to be explored across all cases. Despite these qualifications, I feel that there are useful information and lessons that can be extracted from the analysis of the cases.

4. Uncovering The Problem: BC Hydro's Public Engagement

To begin my investigations, an interview with the Chief Project Manager for the BC Hydro Smart Metering Program was conducted to help identify the policy problem and key issues. As the public backlash to BC Hydro's Smart Meter Program was the initial impetus for my research, it was a starting point to clarify whether a lack of public engagement was the main source of the backlash experienced, or if there were other factors at play. From this interview I was able to understand the problem from a public engagement and communications perspective, as held by the organization conducting said engagement.

BC Hydro has extensive public engagement capacity and strategy (Murphy, Interview, 2012). They have community liaison officers, conduct focus groups, and conduct public hearings and meetings as well as direct consultation with individuals. They have a communications branch that utilizes multiple mediums to communicate information to customers and stakeholders. While I do not have access to the budget information for the Smart Meter Program's public engagement strategy, BC Hydro has a large consultation and engagement capacity and I do not consider capacity as the major obstacle for ineffective public engagement and communications.⁹

⁹ For example, this can be evidenced in BC Hydro's handling of major infrastructure projects such as the Site C Dam project. The Regional and Local Government Liaison Committee (RLGC) provides a forum for BC Hydro and elected officials to share information and discuss community interests, issues and potential benefits related to the Site C project (BC Hydro 2012d). The RLGC holds meetings in communities potentially affected by the proposed Site C Dam. BC Hydro also has multiple public and stakeholder consultation programs in order to provide opportunities for direct consultation and input from the public, communities, Aboriginal groups, property owners and stakeholders (BC Hydro 2012e). All consultation documents and reports are available for public viewing on a specific BC Hydro webpage (BC Hydro 2012f). Every step along the way has been accompanied by an information bulletin and a media release (BC Hydro 2012g).

Public engagement prior to the Smart Metering Program included engagement through existing community liaison officers (Murphy, Interview, 2012). This engagement revealed that a very small portion of individuals were concerned about or opposed to the Smart Metering Program (less than 5% of customers). This small opposition was from a vocal minority with pre-held (and subsequently determined to be inaccurate) beliefs about the safety and security of smart meters. BC Hydro deemed that the opinions held by this vocal minority would not change with increased engagement or presentation of evidence otherwise (Murphy, Interview, 2012). It was also found that many customers were simply misinformed about smart meters and were happy to accept the Smart Metering Program once they had received new information.

Additionally, BC Hydro undertook discussions with many other jurisdictions that had experience with smart metering programs (Murphy, Interview, 2012). These discussions indicated other jurisdictions encountered few problems; installation of smart meters was met with general support or disinterest. One exception was the San Francisco based utility Pacific Gas and Electric (PG&E), who faced opposition from a vocal minorities concerned about the safety and security of Smart Meters, and who faced a unique issue of high bill complaints after the installation of smart meters. PG&E indicated to BC Hydro that they felt their situation was unique to the presence of vocal minority groups and a unique weather event, and that it should not be considered an obstacle to moving forward in BC (Murphy, Interview, 2012). BC Hydro further outlined the lessons learned from other jurisdictions in the BC Hydro *Smart Metering and Infrastructure Business Case* and demonstrated how they had attempted to resolve issues prior to program implementation. They address privacy and security of information concerns through privacy-by-design and security-by-design approaches but fail to address health concerns (BC Hydro 2011a).

An informational campaign with bill inserts, web content, TV spots and talk radio was then initiated. This was the usual communication plan for a major project roll-out by BC Hydro (Murphy, Interview, 2012). This information campaign was designed to communicate what smart meters are, when they were being exchanged with traditional meters, and what the benefits of the Smart Metering Program are.

Importantly, BC Hydro has the legal mandate to change over traditional meters to Smart Meters. They were tasked this by government legislation. Meters are property of BC Hydro, not the home-owner, and the Smart Metering Program was viewed as a legitimate task within BC Hydro's legal right and responsibility to undertake (Murphy, Interview, 2012).

So, given that the public engagement undertaken was typical for a project like the Smart Metering Program, why was there a significant public backlash to the program? BC Hydro indicated that they expected the opposition from the identified vocal minority, but they did not expect the degree of backlash received (Murphy, Interview, 2012). It was felt that the media offered a one-sided case, taking the sensationalist arguments of vocal minorities, and not publishing corrected information offered by BC Hydro. It was also felt that there was opportunistic political opposition from those that opposed the agenda of the current government and projected that opposition onto the Government's crown corporation, BC Hydro; attacking BC Hydro was a chance to ride a wave of public concern and attack the current government (Murphy, Interview, 2012). This use of BC Hydro for political debate is not unique to the Smart Meter Program, but in the context of the recent public opposition to the BC provincial Harmonized Sales Tax (HST)¹⁰, and the potential of an upcoming provincial election, the environment was ripe for populist political opposition.

The above discussion reveals that BC Hydro did take what they felt were appropriate public engagement measures given the project at hand. The problem remains that public backlash was significant and resulted in substantial resources being

¹⁰ The BC Harmonized Sales Tax (HST) was introduced by the leading BC Liberal Government in March, 2010. Under a BC law, the *Recall and Initiative Act*, that allows registered voters to propose new laws or changes to existing laws, a recall initiative was launched. B.C. Chief Electoral Officer Harry Neufeld approved the initiative application in February, giving the opponents of B.C.'s harmonized sales tax 90 days — starting April 6 — to collect signatures from 10 per cent of voters in each of the 85 electoral districts. Work by former populist BC premier Bill Vander Zalm was successful in gaining the required number of signatures, and the BC government called a referendum to keep or repeal the HST law. In August 2011, citizens voted 55% in favour of scraping the HST. The HST recall provided an example for other potential initiatives where opposition to government policy was present. This included the BC Smart Meter Program—the citizens group StopSmartMeters.ca attempted to launch an initiative under the *Recall and Initiative Act*. So far the group has failed to collect the sufficient number of signatures (Duggan 2012).

expended to quell this backlash and retain a positive public image for BC Hydro. BC Hydro's experience also suggests that while the experiences of other jurisdictions may be beneficial in planning and implementing new programs, there will always be social and political forces unique to the jurisdiction at hand. The degree of public engagement and the approach to public engagement may also need to be unique to each jurisdiction, and social and political forces will have to be carefully understood and evaluated.

In the case of BC Hydro's Smart Metering Program, BC Hydro was mandated their responsibilities by the government. The largest mistake that led to public backlash was likely made by the government in its mandate decision to exclude the Smart Meter Program from regulatory oversight. This is an example of paying attention to the social and political environment in which policy decision are made. Given that the BC public was already sensitive to unilateral provincial government decisions after the implementation and subsequent removal of the HST¹¹, removal of BCUC oversight left no independent or publicly 'credible' body that the public could turn to for reassurance or confirmation that smart metering was in the public benefit.

Regardless of the political environment, independent regulatory oversight is in place for the exact purpose of supplying the public an avenue to debate and challenge major capital projects from utilities. The regulatory oversight process provides the opportunity for identifying potential public concerns and addressing them prior to program implementation. It also offers an avenue for those that have concerns to vent to do so, rather than their only option to be public protests or dramatic media stories. Although vocal minority groups may always take the option of publicly demonstrating their opposition, they are less likely to do so given an official process to have their concerns heard. Independent oversight of the decision making and planning process through to implementation likely would have greatly alleviated many of the public's smart metering concerns. The BC government's blockage of this oversight may have been their biggest mistake, and definitely left BC Hydro in a challenging position to initiate a major policy in an environment of potentially charged opposition that would end up being directed at Hydro.

¹¹ See footnote 9, above.

With this in mind, the public policy problem is not that there was a complete lack of public engagement, but that there was a failure to recognize that a different approach to public engagement may have been necessary. With this problem defined, I will now move to examining additional case studies to inform possible solutions or best practices when identifying when to engage, and through what mechanisms.

5. Case Studies

The experience of BC Hydro points to a potential policy problem; how does a government or public organization know when to engage the public on new policy programs? Additionally, how much engagement and communication is required and what form should this engagement take? A government or public organization may choose to take substantial engagement action in order to mitigate future public backlash to their new policy. Or, they may choose to take little action and respond to any backlash, if, and when, it presents itself. But which approach is best? The thematic analysis of cases will explore the implementation of smart metering programs in an attempt to answer these questions. A systematic approach will attempt to draw out lessons learned and suggest best practices for governments and public organizations implementing potentially contentious new policies and programs.

The first case explored will be Pacific Gas and Electric (PG&E). PG&E was the first of my chosen utilities to implement a smart metering initiative, and like BC Hydro, they faced significant public backlash to their program. Portland General Electric will then offer a counter case where smart metering was deployed without dynamic pricing and was met with general public acceptance. Finally, Ontario's smart meter program will be examined. Ontario offers another example of a smart meter program that was successfully deployed in conjunction with a mandatory dynamic pricing policy. The cases highlight each jurisdiction's smart metering program and any public engagement and communications strategies prior to program implementation. Each case is based on publicly available information, so where a lot of information was available, as was the case with PG&E, I go into more detail than other cases. Each case has a short summary of lessons learned from that particular case. I do not go into great detail and analysis of each case within these case summaries, as I use the case study section to develop a thematic analysis and summary of combined key lessons learned.

5.1. Pacific Gas and Electric (PG&E)

PG&E was one of the first North American utilities to implement smart meter installations to their whole customer base. They had completed a large number of installations of smart meters before large-scale customer opposition began in 2009 (1.7 million gas and electric smart meters by Q4, 2008) (Pacific Gas and Electric 2009 pg. 13). The customer opposition to PG&E's smart meter program was significant enough that the California Public Utilities Commission (CPUC) initiated an independent analysis of the program in April 2010. This analysis, combined with a CPUC request that PG&E issue quarterly program updates, PG&E voluntarily releasing weekly updates, and subsequent programs being launched incorporating "lessons learned" from the PG&E smart meter program, provides a large amount of information on the PG&E smart meter experience. The backlash to PG&E's experience with smart meter deployment is very similar to BC Hydro's experience. As a result, I will look at the PG&E experience in great detail to inform my analysis.

5.1.1. *PG&E Organizational Structure*

PG&E is a private, investor-owned utility under regulatory supervision of the California Public Utilities Commission (CPUC). PG&E is a subsidiary of PG&E Corporation, an energy-based holding company headquartered in San Francisco. It is one of the largest utilities in North America, providing service to approximately 15 million people throughout a 70,000-square-mile service area in northern and central California (Pacific Gas and Electric 2013). In terms of electricity, PG&E has over 5.6 million customers (Kaneshiro, Bruce (California Public Utilities Commission) 2008 pg. 5).

California electricity policy and planning is developed by the California Energy Commission (CEC). Six basic responsibilities guide the Energy Commission as it sets state energy policy. With regards to electricity policy, these responsibilities include: forecasting future energy needs; promoting energy efficiency and conservation by setting the state's appliance and building efficiency standards; supporting public interest energy research that advances energy science and technology through research, development and demonstration programs; and developing renewable energy resources

and alternative renewable energy technologies for buildings, industry and transportation (California Energy Commission 2013).

5.1.2. The PG&E Smart Meter Program

The 2001 California energy crisis prompted increased interest in demand response as a method of reducing California's peak load demand. In 2000 and 2001, the California legislature allocated funds to the Energy Commission for peak load reduction programs. Beginning in the summer of 2002, the CEC, CPUC, and the California Power Authority began a joint proceeding to promote demand response to retail prices and tariffs. Two goals of this committee were to collect existing and new data needed to allow educated decisions on meter and tariff policy by early 2004, and to implement a smart metering and demand response pilot (Rosenfeld, Arthur H. (Commissioner, California Energy Commission) 2003). In California, smart metering initiatives were referred to as "advanced metering initiatives" (AMI).

In order to proceed with demand response initiatives, in 2002 the CEC opened up their Rulemaking procedures to further develop demand response and advanced metering policies. The purpose of the Rulemaking was to develop demand response as a flexible resource to improve electric system reliability, reduce power purchase/individual costs, and protect the environment. The CEC adopted voluntary price responsive programs and directed utilities to file advanced metering initiative project proposals along with cost/benefit analysis (California Energy Commission 2008 pg. 3). The CEC established minimum regulatory requirements for approval of the AMI project proposals. These included the requirement that AMI systems meet a minimum functional requirement criterion, AMI project proposals be cost-effective, and utilities provide a comprehensive plan for implementing their AMI projects (California Energy Commission 2008 pgs. 4-6).

The CEC and the CPUC's *Energy Action Plan II* also provided high-level policy and planning that incentivized investor-owned utilities to adopt AMI through the adoption of tariffs that allowed for AMI cost recovery, and tariffs for dynamic pricing (California Energy Commission 2005 pgs. 4-5). Investor-owned utilities were thus not directly mandated to adopt AMI, but they were incentivized through the CEC's high level

planning and rulemaking. Since the original business case for AMI was largely based on operational savings, investor-owned utilities were likely to adopt AMI voluntarily; the expansion of the cost effectiveness case by the CEC and the CPUC to include qualitative benefits for the public, and the consequent decision to allow for cost recovery and dynamic pricing tariffs, all but assured that California's utilities would adopt AMI (Levy, Herter et al. 2004, California Public Utilities Commission 2006).

In light of what PG&E saw as a strong cost effectiveness case, PG&E requested cost recovery of a full smart meter implementation across its area of coverage. The CEC and the CPUC approved PG&E's AMI proposal on July 20th 2006. The approval allowed PG&E to recover the actual AMI deployment cost without further reasonableness review if the actual cost was less than or equal to \$1.74 billion, and to recover additional reasonable amounts, if any, upon appropriate reasonableness review (California Public Utilities Commission 2006 pg. 3).

PG&E's AMI was under CPUC oversight, and thus had to undergo a public review process. Prior to approval of PG&E's AMI, there was a public hearing process and all stakeholders and the public were invited to bring forward arguments of support or opposition (California Public Utilities Commission 2006 pgs. 5-6). During this process, most concerns were focused on the cost effectiveness of the project. The Utility Reform Network (TURN) argued that the PG&E AMI project was not cost effective (California Public Utilities Commission 2006 pg. 8). There was also a territorial dispute over service area from other utilities, and as such they did not want PG&E installing meters until that dispute was resolved (California Public Utilities Commission 2006 pg. 9). Beyond these challenges, AMI was largely supported by stakeholder groups participating in the CUPC hearings.

After a six month testing period, PG&E slowly began smart meter installations at a rate of around 4000 per month starting in January 2007 (Pacific Gas and Electric 2007 pg. 3). From the PG&E monthly program updates made available to the public in 2010, customer interaction regarding smart meter installations appears limited. From what little is mentioned in the program updates about customer communication, installations were originally pre-announced with letters to the customer, but this policy was cancelled in May 2007. However, it was decided that door-hangers indicating that a smart meter

had been installed would be left after each installation (Pacific Gas and Electric 2007b pg. 11). Program updates also indicate that the first customer complaint was received in June 2007, when a customer complained he was unaware he was getting a smart meter installed, or why his existing meter was being changed (Pacific Gas and Electric 2008 pg. 12).

PG&E began their smart meter installations in earnest in late 2007, and activated their first smart meters in December 2007 (Pacific Gas and Electric 2011b). The first bills based on smart meter measurements were printed in December 2007 (Pacific Gas and Electric 2008 pg. 3). More customers may have been concerned with not being informed of smart meter installations, because PG&E returned to sending out notification letters prior to installation in order to “minimize incidents in the field” (Pacific Gas and Electric 2008 pg. 11). A report on what these incidents entailed was not provided.

An analysis of PG&E Smart Meter Program updates shows that throughout 2008 installations continued, but problems began to arise. Technical issues with a small number of meters, issues with the compatibility of meter reading software, and radiofrequency interference were reported in program updates from April-July (Pacific Gas and Electric 2008b, 2008c, 2008d, 2008e). In the September 2008 progress report it was noted that one particular meter vendor was providing meters that were failing at an unacceptable rate leading to billing errors and customer complaints. An inability of the IT Systems to handle the interval meter read volumes was also reported, resulting in billing errors (Pacific Gas and Electric 2008f pg.11). These early issues would become extremely problematic for PG&E in 2009.

5.1.3. Customer Backlash

By the end of the first quarter 2009, PG&E had rolled out over 2 million gas and electric smart meters. The issues reported above (issues with some meters, issues with the compatibility of meter reading software, and radiofrequency interference) continued to be persistent in program updates (Pacific Gas and Electric 2009b pg. 10). On top of these problems, PG&E had proposed a deployment of electromechanical electricity meters for the majority of its residential electric service customers in its original AMI Application. Since that time solid-state meter technology had advanced and PG&E felt

that the solid state meter would be more cost effective and would enable PG&E to provide a number of new capabilities including a Home Area Network (HAN) gateway device (enabling price signals, load control and near real time data for residential electric customers) (California Public Utilities Commission 2009 pg. 22).

PG&E then sought to upgrade 230,000 electromechanical electric meters already installed in Kern County with solid-state meters, and to deploy 288,000 upgraded meters with HAN capabilities (California Public Utilities Commission 2009 pgs. 40 and 50). PG&E requested \$32 million for the HAN upgrade but the CPUC felt this request was unreasonable and allowed rate recovery for \$5.5 million (California Public Utilities Commission 2009 pgs.40-49). PG&E requested \$37 million for the solid-state upgrade in Kern County, but the CPUC considered these costs stranded by PG&E and they would be absorbed in the original 2005 PG&E AMI request (California Public Utilities Commission 2009 pgs. 50-56). The result of this activity was that PG&E was seen to be wasting money in its rush to install smart meters, and this waste was being passed on to customers in rate hikes. These accusations were made by many groups in CPUC public hearings reviewing the proposal to upgrade electromechanical meters (California Public Utilities Commission 2009 pg.51).

Additionally, starting in 2009, PG&E had modified their tiered rate schedule. This meant that high power users (those above 130% of the established baseline) would see rates go up 6-9 cents per kilowatt/hour from 2008 rates (Wood, Lisa (Institute for Electric Efficiency) 2010 pg. 4). This rate increase came in conjunction with many customers' smart meter installations.

All of these issues came to a head in summer 2009. In July, the city of Bakersfield in Kern County, California experienced a month-long heat-wave. Bakersfield experienced 17 days with a temperature at or above 100 degrees, including two weeks of nearly sustained 100 degree plus weather. This compared to only 6 days at or above 100 degrees in July 2008 (Wood, Lisa (Institute for Electric Efficiency) 2010 pg. 3). In a post event analysis for the Institute for Electric Efficiency, Lisa Wood noted that the combination of extreme weather and tiered rates significantly influenced electricity bills. She noted that many Kern County residents utilizing air conditioners could have entered into the upper usage tier rates. With PG&E's tiered rate structure, increasing usage has

a non-linear impact on bills; this meant an average user could move from tier one and two average monthly rates of \$200 in the month of July, to an upper tier rate of \$900 (i.e., from \$0.115 per kWh to \$0.443 per kWh) (Wood, Lisa (Institute for Electric Efficiency) 2010 pgs. 5-6). With the heat wave, most residents in this area would have had significantly higher bills from 2008 to 2009.

The experience in Bakersfield set off a flurry of high-bill complaints to the CPUC and PG&E. This high bill concern is well documented, sometimes being cited in the utilities industry as "The Bakersfield Problem" (Cox 2010). As the high bill issues occurred in conjunction with smart meter installations, many customers blamed the smart meter for their high bills. The press coverage and the uptake of public concern by political entities prompted the CPUC to commission an independent analysis of the problem in order to determine if smart meters resulted in high bills (The Structure Group 2010).

By the fall of 2009, the CPUC had received over 600 Smart Meter consumer complaints about "unexpectedly high" bills and allegations that the new electric Smart Meters were not accurately recording electric usage, almost all of which were from PG&E's service area. The initial CPUC complaints were supplemented by complaints provided by California Senators Dean Florez (Shafter) and Roy Ashburn (Bakersfield), identified during town hall meetings in Bakersfield and Fresno (The Structure Group 2010 pg. 11). These town halls were hosted by the senators as a direct result of customer complaints filed to their offices (Kern County Board of Supervisors Chambers 2009).

As high bills coincided with smart meter installations, and PG&E's meter upgrades, many customers blamed the smart meters for high bills. During the Bakersfield open house hosted by Senator Florez, all eight public speakers called upon to express their concerns attributed their rate increases in some way to the installation of the smart meter (Kern County Board of Supervisors Chambers 2009 pgs. 4-17). Senator Florez also made a point of asking PG&E for an independent audit of "faulty meters" because he believed that the people of Kern County felt that faulty meters were to blame for high bills (Kern County Board of Supervisors Chambers 2009 pgs. 20-24). Senator Florez also pointed out on multiple occasions that customers had no way of actually

knowing that they were shifting from tier to tier in their electricity usage, so could not do anything to adjust their usage (i.e. they needed an in-home display device with their new smart meter) (Kern County Board of Supervisors Chambers 2009 pg. 37).

As would be the case in British Columbia, customer opposition to PG&E's smart metering program gained political support in many municipalities. For example, both the County of Santa Cruz, and the City and County of San Francisco, passed motions to petition the California Public Utility Commission to modify CPUC Decision 09-03-026 allowing for PG&E to initiate installation of smart meters, and to seek expedited treatment of this petition in order to temporarily suspend installation in their counties (Santa Cruz County 2010). California State Senate Majority Leader Dean Florez, the City of Cotati, California, and the Town of Fairfax, California also were identified as pushing the CPUC to protect customers from defective or inaccurate metering devices (City and County of San Francisco 2010).

The City and County of San Francisco petitioned the California Public Utilities Commission on June 17, 2010 to immediately suspend CPUC's authorization for PG&E to continue installing "so-called Smart Meters" until the CPUC concluded their investigation into whether the "problem-plagued meters" currently being deployed by the PG&E were deemed accurate (City and County of San Francisco 2010). The San Francisco Attorney's Office claimed that, "Mounting evidence points to disturbingly high error rates with the devices, which are supposed to measure power usage and wirelessly transmit the data to PG&E. But since the Smart Meter deployment program began last summer, increasing numbers of PG&E ratepayers have blamed the new devices for dramatic and inexplicable spikes in their utility bills, and PG&E has itself acknowledged problems with the meters" (City and County of San Francisco 2010). City attorney Dennis Herrera was quoted claiming,

Common sense should argue against installing millions of defective Smart Meters until their problems are fixed, and questions about their accuracy are fully resolved. Unfortunately, when a company lacks common sense, it means regulators need to do their job to protect the public interest. The CPUC is charged with policing utility services, and making sure that ratepayers can be confident that what they're charged for electricity service is just and reasonable. Until CPUC's investigation is concluded, prudence dictates that PG&E's ongoing

Smart Meter program be halted, so we can be confident that the problems are fixed (City and County of San Francisco 2010).

The County of Santa Cruz joined the petition, stating that they were “aware of the significant problems PG&E has been having with this technology.” As it was PG&E’s stated intent to begin deployment of the smart meters in the County of Santa Cruz prior to the conclusion of the investigation by the CPUC, the County of Santa Cruz wished to have installation suspended (Santa Cruz County 2010 pg. 4).

On December 16, 2010, the CPUC responded by denying the City and County of San Francisco request (and thus, the addition of the Santa Cruz request), saying the local governments failed to show that the meters were flawed. The commission claimed San Francisco authorities had failed to present new evidence to show that the smart meters are less accurate than current meters or that PG&E’s billing system is now generating fewer accurate bills (Energy Daily 2011).

Other politicized reactions included the Fairfax, California Town Council, and the Marin County, California county supervisors declaring temporary bans on smart meter installation. More than a dozen California cities and counties have passed such legislation. But, it is not within their legal jurisdiction to do so: CPUC director of energy Edward Randolph stated in an interview with PBS that the CPUC is the only agency that has jurisdiction over the devices and that the CPUC pushed the utilities to install smart meters (PBS News Hour Report 2012). Regardless, the motions demonstrate that small, but vocal minority groups can easily get political attention to their cause, making opposition appear larger than it may be¹².

Additionally, as would be the case in British Columbia, a small vocal minority of citizens groups formed to oppose presumed health and security of information risks of smart meter radio-frequency data transmission. These groups have largely coalesced on-line in order to promote activism against smart meters. The Electromagnetic Field

¹² According to Helen Burt, the chief customer officer for PG&E, after the 2012 PG&E smart meter opt-out program allowed individuals to opt-out of radio-frequency transmissions, essentially turning their smart meter into a traditional manual read meter, only around 30,000 of 5 million households elected to opt-out, or less than 1% (PBS News Hour Report 2012).

(EMF) Safety Network¹³ claims to offer, “education and science based precaution for EMF and RF technologies” such as smart meters. They offer advice on taking action against smart meters, such as organizing rallies, and provide form letters of complaint to send to utilities and the CPUC. They also offer flyers to hand out to neighbors and politicians to “educate” them on the dangers of smart meters.¹⁴ You can also donate to the EMF safety network so that they are able to offer mini-grants to “visionaries doing extraordinary work in the EMF awareness field.” You cannot request or apply for these funds however you can suggest a recipient.¹⁵ The EMF Safety Network’s webpage demonstrates that there is a proliferation of these on-line activist groups in California, offering links to partner groups such as: The Center for Electrosmog Prevention; Collaborative on Health and the Environment; Naperville Smart Meter Awareness; and, StopSmartMeters.org.¹⁶

While these groups are small and dispersed, they have been able to organize a vocal opposition that has led to political response. Direct lobbying from these groups was reported to have led to action from municipality councils (PBS News Hour Report 2012). Additionally, in response to these groups, the California State Assembly requested that the California Council on Science and Technology conduct a review of what is known about human exposure to wireless transmissions such as smart meter radio transmissions, and to determine the efficacy of California safety standards for these signals (California Council of Science and Technology 2011). As would be the case in BC, the key findings were that smart meters result in very low levels of radio-frequency exposure, much less than cell phones or microwaves. California safety standards were deemed adequate to protect against known thermally induced health impacts caused by wireless transmissions (California Council of Science and Technology 2011 pg. 1).

By August 2010 the number of complaints filed by customers to the CPUC had reached 4400, with 4169 coming from PG&E customers. This compared to 152 and 78

¹³ <http://emfsafetynetwork.org>

¹⁴ http://emfsafetynetwork.org/?page_id=649

¹⁵ http://emfsafetynetwork.org/?page_id=2127

¹⁶ Links to all these organizations’ web pages can be found at http://emfsafetynetwork.org/?page_id=2127

complaints respectively for California's other two utilities who had launched their own smart metering initiatives (Baker 2010).

5.1.4. The Structure Report

On April 1, 2010, the CPUC contracted The Structure Group to conduct an impartial analysis of the customer complaints against PG&E Smart Meter Program. Structure Consulting Group (Structure) is a global consulting firm focused exclusively on the energy and utility industry, providing services and technology solutions. Structure's task was to provide an independent report related to testing and validating meter and billing accuracy of PG&E's residential electric Smart Meters. The five-month evaluation was issued on September 2, 2010 (The Structure Group 2010).

Structure was asked to address the following questions:

- Does PG&E's Smart Meter system measure and bill electric usage accurately, both now and since PG&E's Smart Meter deployment began?
- What factors contributed to Smart Meter high bill complaints?
- How does PG&E's Smart Meter Program's past and current operational and deployment practices compare against the framework of industry best practices? (The Structure Group 2010 pgs. 13-15)

The assessment included meter testing, end-to-end system testing, an evaluation of high bill complaints, and an evaluation of PG&E's smart meter deployment as compared to industry best practices (The Structure Group 2010 pg. 11-12). For the analysis, PG&E provided a list of 2,915 Smart Meter electric and gas high bill-based complaints. Structure also attempted to contact over 100 of the high-bill complaint Customers, resulting in 20 high-bill complaint phone interviews. Structure reviewed the accounts of each of the interviews with PG&E's complaint resolution team for further analysis (The Structure Group 2010 pg. 17). Conclusions from the report are summarized below. For detailed conclusions from the Structure report, please see Appendix B.

Structure concluded that PG&E's smart meters were accurately recording electricity usage and there were no systematic issues with measurement or billing (The Structure Group 2010 pg. 13). Structure felt that most customer complaints were driven by meter deployment schedules and rate increases that coincided with increased energy

usage caused by a heat wave. Other customers had not taken into account recent additions to their homes such as expansions, or energy consuming additions like pools and new appliances. Limited Electromechanical meter degradation was also identified as part of Structure's field meter testing. Customer service was also identified as a large issue, as PG&E customer service agents were not well equipped to address concerns with new smart meter equipment, or failed to address concerns in a timely manner. Customers were also generally upset at the lack of notification prior to smart meter installation and that installers were not equipped with information to address customer concerns (The Structure Group 2010 pgs. 13-14). Structure also felt that in general, PG&E over-utilized bill cancellation and re-billing to resolve issues, resulting in irregular billing cycles that confused customers. This furthered customer perception that smart meters may not have been accurate (The Structure Group 2010 pgs. 14-15). Overall, Structure reported that:

[We] found that the AMI technology deployed by PG&E appears to be 1) consistent with industry standards, based upon the goals of the AMI implementation and upgrades approved by the CPUC, and 2) accurate from a metering and billing perspective. Structure identified gaps in Customer services and processes related to high bill complaints, and determined certain PG&E practices to be partially non-compliant relative to industry best practices. (The Structure Group 2010 pg.15)

5.1.5. PG&E and CPUC Reaction of Consumer Backlash

After the Structure Report, PG&E set about attempting to quell consumer discontent. In an external communication, Chief Customer Officer Helen Burt stated:

We have confidence in this technology and in our program. At the same time, we recognize that some customers question whether they can have faith in our Smart Meter program, and frankly in PG&E. Restoring this trust is absolutely critical to us. We also know that we've let some of our customers down with the quality of customer service they received. While 99 percent of our Smart Meter devices are installed and working properly, we recognize that even having less than 1 percent of meters with issues is still 50,000 customers, and that's too many. Today, we are renewing our commitment to our customers. We pledge to address customer service issues better than we have been, more quickly, and more aggressively. (Pacific Gas and Electric 2010)

In order to address customer service issues, PG&E stated they would:

- Expand their side-by-side meter testing program, doubling the number from 150 homes to 300 homes;
- Increase the number of customer answer centers so customers can have one-on-one service to address their questions and concerns;
- Use a dedicated smart meter customer call center to ensure specialized and expedited handling of customers' questions and concerns regarding smart meter devices;
- Add 165 additional customer service representatives to improve customer service and help customers with billing;
- Revamp customer communications around the installation of smart meter devices, including a series of communications timed to introduce customers to their newly installed meter and its benefits;
- Communicate with customers multiple times, and in multiple ways, about their new smart meter device and how it can empower them to control and reduce their energy use, and;
- Call all customers who receive an estimated bill for two billing cycles, to explain the reasons for the bill estimate and facilitate payment arrangements.

PG&E also pledged to provide weekly web updates on its smart metering program, including milestones or key developments as they happen, and to post the results of side-by-side meter testing data (Pacific Gas and Electric 2010).

At the state level, CPUC Commissioner Michael Peevey issued a directive to PG&E to develop a proposal that would allow some form of opt-out for PG&E customers who did not wish to have a smart meter with radio frequency (RF) transmission (California Public Utilities Commission 2011 pg. 3). PG&E proposed that the Smart Meter Program be modified to provide residential customers the choice to request that PG&E disable the radio inside their smart meter, eliminating radio frequency communications. PG&E also proposed that it be allowed to recover the associated costs from customers electing to opt out through an up-front fee, monthly charges, and an “exit” charge when a customer sells or leaves the property (California Public Utilities Commission 2011 pg. 3).

Public hearings and stakeholder workshops were conducted by the CPUC before their decision. Opposition groups present at the hearings opposed PG&E’s proposed option, contending that the radio-off option would not address the concerns raised by customers regarding the effect of Radio-Frequency emissions on health. These groups

believed that that even with the radio off, the smart meter would still emit radio-frequency emissions. These complaints were also heard at Commission meetings, and through letters to Commissioners (California Public Utilities Commission 2011pgs. 9-10). After the hearings, on November 22, 2011, the CPUC commissioner proposed a decision that PG&E was to offer an opt-out program to customers by turning off their radios, and allowed them to charge a one-time fee of \$90 and \$15 per month thereafter to cover the costs of servicing those customers manually. Income-qualified customers would pay no initial setup charge and \$5 a month (California Public Utilities Commission 2011 pg. 37).

In response to further customer opposition, PG&E requested to the CPUC in December 2011 that they be allowed to offer a traditional analogue meter instead of a radio-equipped meter. The February 1, 2012 final decision from the CPUC requires customers who opt-out of the program to pay a \$75 initial setup charge and a \$10 monthly charge. This will cover the costs of manual meter-reading and associated operational and billing issues. Income-qualified customers will pay a \$10 initial setup charge and \$5 a month (Pacific Gas and Electric 2012). It will also partially cover the cost of PG&E being forced to strengthen their wireless network to make up for the missing radios and enable their mesh networks to “bounce” signals from one remaining meter to another to increase coverage area (St. John 2011). This will allow for grid integration of existing meters.

5.1.6. *Lessons Learned?*

PG&E has taken many steps to improve customer engagement and communications since the backlash to their smart meter program. Since the roll-out of their Smart Meter Program, PG&E has also implemented time of use pricing (TOU), and a Home Area Network (HAN) program enabling smart-grid technologies. Because of the backlash to the PG&E smart meter program, the CPUC has made implementation and communication plans part of the regulatory oversight process. As a result, portions of these plans can be found on publicly available documents. Looking at the engagement and communication plans on current and future projects is instructive as to the “lessons learned” by PG&E from their smart meter program.

The first program implemented by PG&E after smart meter installation was a dynamic pricing regime. Currently, dynamic programs are in effect for PG&E's business customers. Unlike AMI, which was largely voluntary by California utilities, the CPUC mandated that PG&E must apply dynamic pricing to its small- and medium-sized business customers by November 2012 in order to align electricity prices with costs, improve reliability of the grid and manage environmental impacts associated with peak use (Carson 2012). Given the backlash PG&E experienced with smart meters, and given that TOU is directly related to smart meters, PG&E realized that they would need a strong engagement and communications approach. In an interview with *Intelligent Utility Magazine*, Jamie Chesler, manager for PG&E's business rates outreach, claimed that it would be "critical to go the extra mile for customer outreach," given their smart meter controversy, particularly with business customers facing mandatory changes (Carson 2012).

As part of TOU roll-out, the CPUC mandated one year's worth of interval meter data before mandatory TOU pricing kicked in (Carson 2012). This transition period was to give customers time to experience TOU and provide them with enough information to grasp the changes and adjust to them. With regards to the 200,000 small and medium-sized business customers on mandatory rates, PG&E found that "creating a benefit" around TOU pricing was difficult. Instead, the general customer perception was rates would increase. In order to help the customer understand the change of TOU, Carson reports that PG&E "created a rate comparison tool that could demonstrate the impact or lack thereof [of TOU pricing]. It sent custom rate comparisons by mail twice during the data-gathering year. [PG&E] made person-to-person contact with more than 60,000 customers, including the 23,000 likely to be most impacted. Meetings with influential community groups were arranged, including civic groups, government entities, and the media. And digital media was used to get the message across that rates would go to TOU starting in November 2012 on a staggered basis" (Carson 2012).

In the same interview Chester noted that, "[PG&E's] purpose was to lead customers to tools to empower them to understand the impacts of the new rates so they can act and manage their energy costs. It's about understanding options and taking advantage of various programs that can help in tough economic times." Tools offered to help with transition included energy audits, rebates on more efficient appliances and

equipment and rate analysis tools to determine strategies for managing energy use on TOU rates.

A similar customer engagement strategy was used in implementing PG&E's Smart Grid "Home Area Network" (HAN) program. HAN is a system of in-home devices, such as a power-use monitor, communicating with the customer's smart meter, allowing for instant or near-instant updates on electricity use (Pacific Gas and Electric 2011 pg. 1). It can also include so-called "smart-devices" which communicate with the smart meter to turn-off during peak hours under TOU pricing schemes. These devices might include air-conditioners and heaters, or household appliances. HAN is a way to help customers realize the benefits of smart metering in conjunction with TOU rates. As with mandatory TOU rates for business customers, the CPUC mandated a phased roll-out of HAN, with an initial test phase of 5000 residential customers who wished to be early adopters of the technology receiving HAN devices (Pacific Gas and Electric 2011 pg. 1).

PG&E proposed a three stage roll-out plan to implement HAN. The Initial Rollout Phase will use 500 HAN devices provided to 500 volunteer and employee customers. If assessment of the customer experience and third-party market developments indicates sufficient customer and vendor support, PG&E will roll out its Early Adopters Phase in early 2013, which will open up potential participation to up to 5,000 customers who purchase and register their own HAN devices. This will be a "lessons-learned" approach where lessons learned from initial rollout phase will be used to shape the early adopter phase experience. Again, customer feedback will be analyzed and if the experience is positive, Mass Market implementation will begin (Pacific Gas and Electric 2011 pgs. 4-5).

Features of this program are designed to be as friendly and helpful to the customer as possible, with the gathering of customer feedback a key priority. Features of the Initial Rollout Phase include: PG&E provided color touch screen devices; High-touch customer experience; fully enabled customer support; integrated knowledge capture/lessons learned; and Security-driven best practices. This includes the development of a specialized HAN customer support team to address any customer questions or issues. Customer engagement through surveys and problem analysis will be gathered throughout the program to provide a knowledge base to develop lessons learned for the larger rollout to early adopters in 2013. Customers will be asked to

commit to provide feedback in return for use of the device (Pacific Gas and Electric 2011 pgs. 7-8).

In their letter to the CPUC outlining their HAN Implementation Plan, PG&E indicated that customer outreach and engagement would be a key for success:

Prior to rolling out HAN network services to customers, PG&E will complete a customer outreach and education plan. This will ensure that customers who use HAN devices and connect those devices to PG&E's HAN network are fully aware of the attributes and benefits of the new technology as another tool to assist in understanding and managing energy use. PG&E's customer research and analysis, as well as its experience with SmartMeter technology, has demonstrated that this preliminary customer outreach and education is essential to a positive and beneficial customer experience with the new HAN technology (Pacific Gas and Electric 2011pg. 13).

PG&E is also working on new customer programs to utilize and build up their "Smart Grid." Now that they are extremely attuned to customer engagement from their smart meter experience, they are integrating customer engagement into every aspect of development, taking an approach of the smart grid being a "customer driven" initiative (Pacific Gas and Electric 2012b pg. 10). In their 2012 Annual report PG&E notes that:

PG&E believes that the customer must be placed at the center of its Smart Grid development plans to ensure that customer benefits, options and the role that customers will play are clearly communicated. Additionally, customers must have the tools and knowledge to personally benefit from the Smart Grid in the ways most impactful to them as businesses, individuals and families. PG&E efforts over the last 12 months have been focused on [these] goals.

This effort has included customer education about the tools currently available to them, which are designed to help PG&E's customers understand their energy use, engage with their usage in ways they prefer—whether online, in-home or through the mail—and offer more choice and options as it relates to rate plans and new technology. Additionally, PG&E's has sought to more broadly educate customers on longer-term benefits of Smart Grid technology beyond these immediate offerings, to provide context for future technologies and customer-facing benefits that will be available in the coming years. Central to this effort is PG&E's proposed Customer Outreach and Education Pilot, which includes research and message testing to better understand customers' interest in the Smart Grid benefits and services they most value. (Pacific Gas and Electric 2012b pg. 56)

PG&E has created a number of “Customer Engagement Projects.” An example pertaining to the smart grid is the “Smart Grid Customer Outreach and Education Pilot”:

PG&E Smart Grid Customer Outreach and Education pilot will test new messaging and customer outreach materials to determine how best to communicate the Smart Grid to customers in a way that meets the overall objectives of the Smart Grid deployment. The results of this pilot will be used to develop strategies to mitigate areas of potential customer concern or confusion prior implementing a larger, territory-wide outreach campaign. (Pacific Gas and Electric 2012b pg. 26)

5.1.7. Summary

The PG&E case demonstrates the importance of customer engagement and communication prior to behaviour changing policy implementation. PG&E’s failure to engage with customers to communicate their smart meter implementation plans led to great confusion and a large loss of customer trust and legitimacy. In a recent interview, Jim Meadows, Director of PG&E's SmartMeter Program, commented that, "Originally, people viewed the implementation of the smart grid and the deployment of smart meters as a purely technical change," but, in actuality, moving toward a smart grid is a very substantial transition that requires dialogue and education between utility and customer base (Mitchel 2012). Senior Director of PG&E's SmartMeter Program, Cliff Gleicher, also noted that what seemed like a “no-brainer” in terms of benefits to utilities was not so clear to the every-day consumer; PG&E quickly realized it had made a mistake in not involving its customers in the process, and not giving them a reason to believe in the technology. He added that customers "need communication. They need time. The meter is on their house. Until there are real tools for them, it doesn't seem like it is worth the risks" (Mitchel 2012). These statements from the program directors sum up nicely the lessons learned from PG&E, and demonstrate that PG&E, with hindsight, would have preferred to have enhanced customer engagement prior to program implementation to avoid reactive actions after the fact.

5.2. Portland General Electric (PGE)

The case of PGE’s smart metering initiative was chosen because like BC, PGE did not introduce dynamic pricing with their smart metering initiative. Yet unlike BC, PGE

encountered limited public concern or backlash. PGE's program is explored with the hopes of understanding how success was achieved in the absence of the direct customer benefits associated with dynamic pricing.

5.2.1. PGE's Organizational Structure

Portland General Electric (PGE) is a private, investor-owned utility under regulatory supervision of the Oregon Public Utility Commission (OPUC) (Oregon Public Utility Commission 2012). They have over 800,000 customers. PGE has a Metering Services division responsible for all metering operations.

5.2.2. PGE's Smart Metering Initiative

Since 1999, PGE has recognized the potential of smart metering systems and PGE Metering Services has conducted several smart metering pilot studies, deploying more than 6500 pilot meters in various test programs. In May 2008, the OPUC approved PGE's application for system-wide smart meter deployment and an accompanying 2.5 year tariff to fund the project. A six month system acceptance testing period of 16,000 meters was implemented in both urban and rural settings to test the system. Full roll-out was then initiated in January 2009. PGE's business case identified \$18 million in annual benefits starting in the first full year of implementation in 2011 (Metering.com 2008).

Portland General Electric realized early on that its Smart Meter Initiative was more than just an operational procedure of swapping out meters. They recognized that their smart metering program would touch every customer in their network and there needed to be a customer focus to the program. They also had the benefit of having other jurisdictions already lead initiatives and saw that smart meters garnered significant media attention and some opposition from a "vocal minority" (Energy Central 2011)¹⁷.

¹⁷ This section is largely informed by a publicly available webcast from *Intelligent Utility* magazine that took place on July 7, 2011. The webcast features a panel of utility managers speaking about customer engagement around smart metering programs. The panel includes the Customer Communications Supervisor for Portland General Electric. This webcast is publicly available, although you must sign up with Energy Central / Intelligent Utility to listen to the webcast. Sign up is free, but requires a valid e-mail address.

PGE viewed smart meters as new technology that was being forced into every customer's daily life, so it was important customers were comfortable with what was happening. PGE realized in their initial planning that a key aspect of any smart metering program was that there was a high level of customer unfamiliarity with smart meter technology; the utility knew far more about smart meters than the customer and in most cases customers knew nothing about smart meters. For PGE customers presented with initial information about smart metering, there were key questions such as, what is a smart meter and why install them now? There was also the related key question of, who benefits from smart meters? (Energy Central 2011).

In order to gain a better understanding about how to communicate their proposed smart metering initiative, PGE conducted six focus groups: three residential and three business. The idea behind the focus groups was to get an initial impression of existing awareness and attitudes towards smart meters. They also tested initial messaging around smart meters to see how focus group members would react, as well as tested different methods and channels of communication to determine how to best get information and messaging to customers. These focus groups revealed that some of the preferred messages and channels used by PGE were not the best approaches identified by the focus group members (Energy Central 2011).

The focus groups also identified that customers believed that the equipment that would be swapped out, the existing electric meter, was "their" property (Energy Central 2011). This was of course not true—electric meters belong to the utility. But, when many customers in the focus group referred to the meter at their residence as "my meter," PGE recognised that this notion of ownership changed the dynamic of the relationship between PGE and the customer in that, moving forward, PGE would need to respect this belief of ownership and work with it, not against it (Energy Central 2011). In an interview with *Intelligent Utility* magazine, Stan Sittser, Customer Communications Supervisor for PGE, noted that, "If we'd have gone in [to install meters] without talking to customers, we could have easily referred to the meter in a way that offended them. So it's important to talk to folks, because you find out things you never would have thought are a huge deal. Then, even subtly, you can have a positive engagement versus some sort of backlash" (Carson 2011b).

The residential customer focus groups revealed some important information—that there is an emotional factor at play when you are making a physical instrument change at their home involving new technology. Individuals were very interested, and/or concerned with how much data was being collected by the meter. They also wanted to know the reason for the sudden system change—for example, if there was something “wrong” with the old meters, and why these new meters were necessary. Business focus groups, on the other hand, were interested in how they would benefit from the smart meter and how meter change-over would affect their business. They were focused on the business bottom line. For PGE, different group concerns meant targeting information to different customers would be a good strategy (Energy Central 2011).

In terms of messaging and methods of messaging, customers were not really interested in the details of smart meter technology, how it worked, or the operational details of the utility. Many customers knew little or nothing about their power system, or even about how their old, mechanical electrical meter worked. They were not interested in “smart grid” technologies and how this would improve grid performance. Communications would therefore have to go beyond “operational” communications that simply highlighted the change in meters and how and when this change would be implemented. The communications would have to get into the benefits to the customer and succinctly explain what a smart meter will do (Energy Central 2011).

Simple and guided communications was deemed the best approach. In his *Intelligent Utility* interview, Stan Sittser notes that, “Sometimes I think [organizations] think we need to educate everybody on how everything works. But I don't think that's reasonable, generally, in a low-interest, low-involvement category. You work with what you have. We asked ourselves, 'How can we be successful without requiring everybody to pass a test on infrastructure?' You need to find a friendly, common denominator” (Carson 2011b).

Importantly, misinformation was identified as an important pitfall—if the void of information was not properly filled, and if the customer was not made sufficiently informed about the smart metering initiative, there could easily be confusion and misinformation would gain traction. This included “creatively inventing other facts to fit.” PGE notes that “even for a utility with high customer satisfaction, scepticism can run

high. An information vacuum can become a major problem” (Energy Central 2011). This meant that mail-outs, bill inserts, and door-hangers would not be sufficient—a broader communications strategy was deemed necessary.

During the initial system acceptance testing phase, PGE tested different customer notification communications for smart meter installation. Prior research into smart metering included learning how different utilities handled the task of customer notification. From these lessons, and those learned in the focus groups, PGE tested the concept of personally communicating with every customer on multiple occasions, in advance. This communication included a personalized letter explaining smart meter benefits, a “knock-and-talk” with the meter technician, and a series of five door hangers developed to handle various situations (Metering.com 2008). Through this approach, PGE sought to pre-empt any concerns about smart meters and to strengthen the relationship between the customer and PGE through the personal contact to address any concerns. As a control group during system acceptance testing, some customers did not receive the advance letter and survey research following the test was used to determine the satisfaction levels of each group for future communications programs (Metering.com 2008).

PG&E took an approach of "comprehensive, integrated communications" via a "coordinated campaign" (Carson 2011b) This meant utilizing as many formats and channels as possible, including emails, newsletters, videos, news releases, fact sheets, social media, direct-to-customer letters, door hangers, web-based presentations, call center scripts, brochures and posters.

PGE was a fairly early adopter of smart metering technologies and they wanted to install quickly to realize the operational savings for the utility. They did not have any dynamic pricing programs to offer to the customer. As such, prior to roll-out, PGE decided on a staged information campaign that would focus only on immediately available benefits. This was done to control customer expectations (Carson 2011b). PGE felt that due to the technical nature of smart meters, and the long-term nature of many of the benefits, it would be too much information for the public to swallow to release all the information at once. They felt that releasing the key information related to

each stage of the smart meter roll-out as it happened was important (Energy Central 2011).

PGE therefore initially focused on messaging around operational savings and how those savings would be passed on to the customer, as well as operational performance improvement (Energy Central 2011). PGE recognized smart meters are unique in that there needs to be a complete operational installation of meters before customer benefits can be realized. Therefore, in the initial installation phase they limited messages about what the smart meter does, and focused more on what they were installing. With regards to future benefits, messaging was kept to simple statements that smart meters would provide customer benefits down the road once installation was complete, but not explicitly detailing those benefits.

Communications that focused on service improvements that customers valued were deemed the most effective. Different messages spoke to different customers, so a variety of unique, but simple messages were developed in order to communicate the benefits of the smart metering program. This meant key messages about what customers cared about the most—cost saving, environmental benefits, and quicker, often instant, response to service outages. This strategy was aimed at giving every customer at least one reason to support the smart meter initiative (Energy Central 2011).

Information messaging was kept very simple, with more complex information being more favourably communicated by the one-on-one “knock-and-talk” with the meter technician, or with more detailed information on the web-page. An example of this simple information approach focusing on key elements is found in the “Meet the new, easy-to-read smart meter” mail-out pamphlet (Portland General Electric 2010). Here, details about how a smart meter works are limited to the following statement: “Our new smart meters may look similar to the old dial meters, but they provide two-way communication between your home and PGE. Your meter is read remotely through a secure, wireless network.” There is no information about what details are communicated and how often. This simple introduction is quickly followed by simple explanations of immediately realizable benefits, or, when not immediately realizable, contains a disclaimer saying they will be realizable “further down the road.” Additional details are limited to a description of the digital display. This description serves to familiarize the reader with the

smart meter in a way that makes it comparable to the traditional meter, including instructions on how to read the meter on a monthly basis just like a traditional meter. The two-way wireless communication function and the potential of that change are almost entirely glossed over.

5.2.3. Smart Meter Initiative Outcome: No Backlash

Portland General Electric appears to have experienced very little pushback from their smart metering initiative. Media scans using multiple search terms and utilizing Google's News search function, as well as media databases from Simon Fraser University's library, turned up little to no information on opposition to smart meters in PGE's service territory. While PGE provides an opt-out option that allows for the installation of a non-network based meter for a one-time cost of \$254 and a monthly charge of \$51, The OPUC reports only four customers have chosen to opt out as of October 2012 (Evans 2012, Carson 2012b). Additionally, in a recent JD Power and Associates survey, PGE received the highest customer satisfaction ratings out of all NA utilities to complete full smart meter roll-out (JD Power and Associates 2012). All of this suggests that PGE has been extremely successful in implementing smart meters with regards to public perceptions and concerns.

5.2.4. Summary

PGE successfully implemented their smart meter roll-out without public backlash. Like British Columbia, this smart meter roll-out was not accompanied by a dynamic pricing program. Regardless, consumers seemed happy with the justifications provided to them: that smart meters would create operational and environmental benefits. Simple messaging about why smart meters were being installed, without getting into technical details, and a focus on immediately realized benefits without much talk of a future smart grid or demand side management such as dynamic pricing appears to have given Oregon customers what they need. Having informed, front-line staff personally communicate with every customer was also considered a key factor in success, as this addressed any technical confusion or misinformation at the source. Being considerate of the fact that customers felt that the meter belonged to them was also considered a factor

of success. Clearly a lot of thought and planning went into communications *prior* to program implementation.

PGE has also begun putting their lessons to work by shifting customer focus to the benefits of a smart grid beginning with educational pilot demonstration projects. These projects include the “Smart Power” project in Salem, OR, featuring an 8,000-square-foot Salem Smart Power Center slated to open to the public for tours in late spring of 2013. This center will give visitors a behind-the-scenes tour of a working smart grid demonstration project. A second project is a 500 home smart grid pilot including remote-operated power-line switches, energy storage, demand response, dispatchable standby generation, and solar generation (Portland General Electric 2013). These projects are in line with PGE’s goal of having realizable benefits functional and packaged before implementation.

5.3. Ontario

The case of Ontario’s smart metering initiative was chosen due to its early roll-out, concurrent implementation of dynamic pricing, Canadian jurisdiction, and, importantly, for the general lack of public backlash. Like in BC, smart metering was mandated in Ontario, so exploring its program will hopefully offer insight into why it was successful.

5.3.1. Ontario’s Electricity System Structure

Ontario features a complex, privatized system of electricity distribution with government oversight. The Ontario Independent Electricity System Operator (IESO) oversees energy supply and demand. Each day, the IESO forecasts the demand for electricity and makes this information available to participants in the market. Generators and other energy suppliers then send in their offers to provide energy. The Ontario Ministry of Energy establishes energy policy for the province, working to ensure that Ontario’s electricity system functions at the highest level of reliability and productivity. The Ontario Energy Board (OEB) regulates all non-commodity electricity rates licences, the IESO, and all market participants. The IESO issues annual fee submissions for

review by the OEB, as well as quarterly updates on its fulfillment of licence requirements. The Ontario Power Authority (OPA) is responsible for medium and long-term planning and ensuring an adequate supply of electricity and demand response in Ontario. The IESO is responsible for preparing short-term forecasts and assessments and works in co-ordination with the OPA (Independent Electricity System Operator (IESO) 2012).

With regards to metering, a system of over 75 Local Distribution Companies (LDCs) acts as utilities, distributing electricity from transmission lines to consumer's homes. These LDCs own and operate the meters. These LDCs may be publicly owned (e.g. by a municipality), privately or investor owned, or a combination of both (Independent Electricity System Operator (IESO) 2012).

5.3.2. *Ontario's Smart Metering Initiative*

In 2004, the OEB issued a report on issues related to demand side management and demand response in Ontario's electricity sector. The report noted concerns that Ontario's demand would not be sufficient to cover future supply and that demand side management was recommended to address the problem. The report noted that "New supply and investment in transmission are part of the solution, but cannot be built fast enough to meet our needs," and recommended that "by reducing consumption and using electricity more efficiently, the province can reduce the rate at which demand is growing." The report aimed to set out ways that Ontario could create a "culture of conservation" (Ontario Energy Board 2004 pg. 1).

The report went on to recommend that three conditions were needed to make consumers change the amount or timing of their electricity consumption: a price that changes over time in response to demand and supply forces; the ability of consumers to see and respond to a price signal; and measurement of the response so that consumers get credit for their action (Ontario Energy Board 2004 pg. 23). This measurement of response condition would require smart metering. Importantly, the OEB noted at the time that smart metering in and of itself showed little public benefit without the corresponding price signal to motivate behavioural change (Ontario Energy Board 2004 pg. 25).

In response to this report, the OEB received a directive from the Minister of Energy on July 16, 2004 to consult with stakeholders to identify options and address issues with regard to the Ministry's proposed smart metering targets. The OEB was instructed to provide an implementation plan by February 15, 2005 (Ontario Energy Board 2009).

A period of stakeholder consultation preceded the implementation plan. The initial round of the stakeholder regulation involved licensed electricity retailers and distributors (LDCs). The OEB also released a staff discussion paper with their call for stakeholder feedback, detailing their plan to develop smart metering and time of use (TOU) pricing. In the discussion paper it was stated that, "The policy of the Government of Ontario is to install 800,000 smart meters by December 31, 2007 and for every Ontario consumer by December 31, 2010. The objective of the policy is to help consumers control their electricity bills through conservation and demand response" (Ontario Energy Board 2004b pg. 1). This consultation was mostly internal with industry participants and the content was mostly the technical aspects of how to initiate and implement smart meter installation in Ontario. That said, consumers groups, such as the Consumers Council of Canada (CCC), were also listed in the consultation process. The CCC responded that they were concerned with the lack of a cost-benefit analysis and felt costs and benefits needed to be evaluated and communicated to the consumer (Ontario Energy Board 2004c). Energy Probe Research Foundation and the Ontario Energy Association also called for a cost-benefit analysis (Ontario Energy Board 2004e) (Ontario Energy Board 2004d). The Canadian Energy Efficiency Alliance applauded the action and recommended that interval meters replace every traditional meter in Ontario and that demand response programs be initiated sooner rather than later (Ontario Energy Board 2004d).

The implementation plan was delivered on January 26, 2005. It incorporated the OEB proposed phased installation approach noted above. The idea behind the two-phase installation approach was to achieve a good start on smart meter implementation "while minimizing technology or implementation risks that could threaten the overall success of the initiative. The advantages of this approach range from better project planning and control to the opportunity to test economies of scale thresholds and to prove technologies." The initial stage would also provide "a diverse but controllable pilot

deployment from which the Board and other distributors can learn” (Ontario Energy Board 2005 pgs. ii-iii).

In terms of customer engagement, the OEB proposed that the Ministry of Energy should “develop and guide the communication process to ensure electricity consumers in the province have a clear understanding of the objectives of smart metering and the need to develop a conservation culture” (Ontario Energy Board 2005 pg. iii). This would include developing a detailed communication plan involving both “pro-active” and “reactive” communications (pg. 10). Individual LDCs would then be responsible for their own communication efforts (pg. 7). The OEB also proposed that customers have access to their energy usage on-line, over the telephone, or via an in-home customer display. Smart meters would also be implemented with time of use pricing schedules to motivate customers to shift usage off-peak, as well as the possibility for special critical peak pricing days (Ontario Energy Board 2005 pg. v).

Importantly, the OEB recognized that wide-scale implementation of novel technologies could present barriers. In addition to the phased implementation, five pilots with partnering LDCs were conducted to test both smart metering technologies and consumer response to various demand-side management programs (Garvin, Industry Canada 2009 pgs. 21-25, Ontario Energy Board 2008). This group tested 11 different technologies and implemented 5 different options during Phase One of the smart meter deployment (Information Technology Business 2008).

The OEB also noted that a “key factor” to success of the initiative was managing customer relationships, noting:

Customer co-operation and support are essential to achieve the goals. A careful and properly orchestrated communication and education plan that is consistent with messages at the local levels should be executed. Customers must be shown how using the new smart metering technology can save them money. (Ontario Energy Board 2005 pg. 22)

For Ontario’s electricity sector, this meant a great deal of inter-organizational cooperation, from the Ministry, the OEB, the LDCs, and the retailers who buy and sell

electricity services from the LDCs. The OEB recommended a mixture of the following approaches:

- Ministerial announcement
- Mass communications
- Bill stuffers
- Distributor targeted communications
- Installation schedule information
- Six month follow-up
- Education in conjunction with the Regulated Price Plan
- Large customers communications

To make communications a key aspect of the initiative the OEB recommended that all communication efforts be eligible for cost recovery (Ontario Energy Board 2005 pgs. 22-23).

5.3.3. Outcome: *Little Backlash*

The pilots, staged implementation, and long rollout schedule appear to have worked for Ontario. While there were some public concerns, public opposition was limited. The main stakeholder concerns focused around cost and benefits, as indicated in the initial consultation. The main public concerns were typical concerns associated with major policy directives involving new technology: concerns about how the new technology would affect customers, and concerns about problems with how the technology was operating once installed. These issues were mainly technical and/or operational. For example, time of use pricing meant that in some cases there would need to be a technical solution developed to enable individual billing for each unit in an apartment building, condominium complex, or non-profit housing complexes (Hassani 2007).

The main public concern in Ontario focused around increased billing. Many customers faced issues of higher billing once the smart meter was installed at their residence. Inaccurate billing was reported to have affected up to 150,000 customers (Robert Benzie, Rob Ferguson et al. 2010). This was enough to prompt a letter from

Measurement Canada directing the OEB and the IESO to bring metering devices into compliance (Vinet, Gilles P. (Measurement Canada) 2009).

The IESO responded that most bill increases were a result of changing over from a system of monthly, manual reading and average estimation, to a system of exact interval measurement. Terry Young, vice-president of corporate relations for the IESO claimed, "It's not like anyone's being overbilled vastly or under-billed vastly ... it's really around a few cents a month, up or down." The amounts could be as little as three to five cents, he added. "It has to do with the way meters were read previously and the way they're read now" (Robert Benzie, Rob Ferguson et al. 2010).

But the main culprit in customer billing complaints was a number of newly introduced policies increasing bills. TOU pricing was introduced at the same time as the Ontario HST, which added 8% to electricity bills (Bardessy 2011). Combined with changes in how electricity was measured, and how the rate structure worked, many bills increased, even though all the measurement systems were accurate. Some customers incorrectly attributed this increase to the installation of smart meters, but TOU pricing and the HST resulted in reported average annual utility bill increases of \$150 (Howlett 2010). This case of utility bill increases highlights the importance of being aware of other policy changes that may make the policy environment challenging; in some cases, timing is everything.

This concern gained some political traction in the Provincial Legislature. Tim Hudak, leader of the Progressive Conservative Party of Ontario, attacked the Liberal Government in the Legislative Assembly on May 4th, 2011 over utility bill increases due to TOU pricing. The debate centered on the fact that some individuals, such as seniors and working families, could not shift their power usage off-peak, and thus were receiving higher bills. Hudak argued constituents could not benefit from TOU off-peak discounts because they were not flexible enough (Assembly of Ontario 2011). The Liberal government of Dalton McGinty responded by extending off-peak hours by 10 hours a week to provide some relief to consumers (Assembly of Ontario 2011).

Beyond billing concerns, there were also minor privacy of customer information concerns, but the oversight of the project by multiple parties, including the OEB and the

Office of the Information and Privacy Commission of Ontario (IPC) appear to have sufficiently quelled these concerns. The IPC was aware of the issue of privacy of customer information from the start of the Ontario Smart Metering Initiative, and actively researched and reported on the issue of security to the public (PR Newswire 2012). The IPC did get some customer concerns around privacy and addressed these during Phase Two of the Ontario smart metering initiative through a F.A.Q. release in 2010 (Cavoukian, Ann (Information and Privacy Commissioner, Ontario) 2010). By this time multiple reports and discussion papers on smart meter privacy had been released by the IPC (Office of the Information & Privacy Commissioner of Ontario 2013).

Health concerns, so dominant in the criticisms of vocal minorities in BC and California (PG&E), did not seem to be a concern in Ontario. Media scans using the terms “Ontario Smart Metering Initiative”, and “Ontario Smart meter” and utilizing Google’s News search function, as well as media databases from Simon Fraser University’s library, revealed no reports on health concerns besides information briefings issued by the OEB and LDCs themselves. There was a citizens’ coalition set up against the Ontario Smart Metering Initiative, but the group, Ontario Citizens Against Smart Meters (OCASM), seems largely concerned with the costs and billing changes than with security of information or health risks. The group has an online petition, without a specific stated goal, which has only managed to raise 89 signatures.¹⁸

5.3.4. Key to Success: The Staged Approach

Overall, Ontario’s approach seems to have worked in terms of limiting public opposition and gaining general program acceptance. One stand-out aspect of the Ontario case is the long, gradual roll-out of novel technology. In an interview, Toronto Hydro’s Blair Peberdy, the company’s vice president of communications and public affairs, points to the success of this gradual approach, paired with potential immediate customer benefits through TOU pricing. With regards to TOU pricing, Peberdy states:

If you're trying to trigger consumer revolt, then you bring in a very aggressive time-of-use regime that will send price shocks to consumers.

¹⁸ <http://stopthesmartmeter.com/ontario-stop-smart-meter/>

But our feeling is that the more moderate approach the province is taking is the right way to go to get consumers to understand the concept, to be able to achieve some reduction on the bill should they start to make the behavioral changes. It also gives the company time to start to bring out new programs for customers to make conservation and load shifting more practical and more realistic. Then, over time, as the conditions may warrant, aggressive pricing signals could be set. I think for us the key thing now is to get the rates in, to get the billing systems stabilized, and to help consumers to understand and accept this pricing model. By trusting that the bills are accurate and that the rationale is sound, we can then provide them with the tools, over time, to be able to either manage it themselves or have the utility or someone else manage it for them. (Rowland 2010 pg. 18).

Toronto Hydro used a phased approach to introduce customers to the TOU pricing scheme accompanying the smart meter installation. This introduction was implemented with a lengthy advance notification and education program. This included a web-page where new TOU customers can track their consumption day to day, and make a comparison of what their rates will be under time-of-use rates versus the old rate structure. The page is interactive, so customers can "play" with their energy usage at certain times of day, to see how they can change their electric bill by shifting some of their normal on-peak load to off-peak times. After program implementation, calls to the call center have increased by only 10 percent. For those already on TOU pricing, Peberdy felt that the program had been well received: "The accuracy of the bills has not been a question. It's been more of a clarification around the rates" (Rowland 2010 pg. 19).

5.3.5. Summary

Ontario has, for the most part, successfully implemented their smart meter roll-out without public backlash. As stated above, this success appears to be in part on the long, phased implementation of smart meters and the associated dynamic pricing policy. This phased implementation allowed issues and concerns to come to light and be addressed before broad applications of policies. Communications and engagement strategic planning was included in the process from the initial planning stage. The IPC actively attempted to stay ahead of privacy concerns with multiple papers and reports on potential privacy issues. Multiple technologies were piloted and thoroughly tested before

mass-installations to eliminate bugs and demonstrate benefits. Interactive, web-based monitoring of energy use allowed individuals to understand TOU rates before the dynamic pricing program was initiated. These factors allowed for customers to be informed and prepared long before implementation so that when the time came for smart meter installation, the Ontario public appears to have been broadly accepting of smart meters.

6. Lessons Learned

This section offers up key “lessons learned” from the smart metering case studies. Smart metering initiatives were chosen for this analysis because they have a set of characteristics that many policy makers and decision makers may encounter in their own field. These characteristics include: new technologies with novel risks, such as health risks and security of information risks; complex applications that are difficult to understand without a large degree of information intake; changes to programs or services that the public utilizes on a regular basis, and may feel a personal degree of ownership for the program or service; programs or services with high costs that may need to be passed onto the customer; and, changes to programs or services that will have an effect on other policies, programs, or services. Examples of similar policies may be the introduction of electronic fare cards (or “Smart Cards”) for transit systems.¹⁹ Such cards are linked to accounts that contain personal information, collect data on user usage and movements, and are a novel technology change to a familiar service with which the public interacts with daily and may have taken a sense of personal ownership over (e.g. “My train” or “My bus-pass”). As such, lessons learned from smart metering initiatives can have greater application beyond utilities looking to implement their own smart meter program.

The following lessons learned are a combination of lessons from a thematic analysis of the four case studies. The first five lessons learned point to key factors that can be points for potential public backlash to new policies. These factors are what I would label “policy risk characteristics” or “risk factors”; that is, if they are present, the policy maker or decision maker needs to be aware that they are potential points for public backlash when the policy or program is implemented. If any of these policy risk characteristics are present, the policy maker or decision maker needs to think carefully

¹⁹ Electronic fare cards are utilized in London (Oyster Card), Brisbane (go Card), Hong Kong (Octopus Card), and are being introduced in Vancouver (Compass Card).

about how they will reduce the risk prior to program implementation, particularly through public engagement and communications.

Lessons six through twelve suggest approaches and strategies that can be useful in avoiding backlash. These are a list of what I would consider “best practices” in policy planning and public engagement and communications. These are not broad “policy options” to approach public engagement and communications to avoid public backlash, but elements that can be utilized in policy implementation to reduce the risk of public backlash to publicly beneficial policies. Depending on the policy to be implemented, and the number and type of risk factors present, policy planners and decision makers may decide to utilize some, or all, of these best practices. Again, these are best practices informed from a thematic analysis of four smart metering programs; there may be many more best practices in public engagement and communications out there. I wished to highlight these particular lessons as I feel they have a broad application to policies beyond smart metering.

When working through the lessons learned, the reader may find them “obvious.” I would agree. The problem is that organizations don’t always take these points into consideration. I have a certain amount of sympathy for these organizations, as in this paper I am talking about very complex problems and policies; it could be very easy to miss an important aspect of public communications and engagement prior to policy implementation that could lead to public backlash. PG&E is a clear example here, where smart metering was seen as a “purely technical” change to be handled in with a technical approach. Therefore, rather than critique, it is my goal to provide some advice on what risk factors to look for and, if identified, some approaches to take to reduce the risk of public backlash to policies established to be in the public benefit. I then undertake an analysis of broader policy approaches given the presence of certain risks in the next section.

6.1. Lessons from Smart Metering Initiatives

1. The communications environment that governments are operating in has changed.

While this might not be a novel concept, it is one worth noting. Information systems and social media are changing the way information is communicated in the press and amongst the public. Governments, and public entities, need to keep this in mind.

When policies and programs are novel, complex or technical there is a high potential for misinformation to gain traction with the public. This potential for misinformation is increased by the ability for vocal minorities to spread potentially false information and issues of concern, particularly over the internet. This information can spread quickly, and can spread from jurisdictions outside government's or utility's purview. This was the case in BC where vocal minorities were quickly able to adopt the arguments and strategies used by vocal minorities in California. The Internet also enables members of the public to participate in an isolated information community where they do not actively engage in dialogue with groups possessing other information or holding other opinions.

Additionally, the bias of the media to give equal treatment to government information releases and the concerns of vocal minorities, further increase the potential for misinformation.

2. People do not take easily to policies designed to change behavior.

In general, people don't like behavioral change forced upon them by governments. Typically though, governments adopt behavior-changing policies to provide public benefits. Therefore, benefits must be clearly communicated to give the public reason and motivation to adopt changes. This was clearly the case across all smart meter implementations when upfront costs were high, and benefits were complex to understand and communicate. Governments may also need to be adaptive in their approaches. The case of Ontario is instructive; Ontario's TOU rates were resulting in behavior change and not everyone appreciated doing their laundry late at night or only on weekends. Ontario responded by relaxing peak times to give households more

flexibility while maintaining the program, and providing credits to seniors who may not be able to adjust their energy use. Ontario's long, staged approach also helped households become prepared for the changes brought by smart meters and TOU pricing.

3. People can develop emotion connections to programs or services, including holding a sense ownership of a public or privately provided program or service.

PGE realized that while they owned the electrical meter, it was attached to the customer's home. Many customers mistakenly held the belief that it was "their meter." This was an experience shared by PG&E and BC Hydro as well; customers wanted to know why their meter was being changed. Other customers were protective of their meter, mistakenly claiming that the utility had no right to change it, even going so far as to physically stop the smart meter installer from completing his or her task.

Organizations need to take note when the service or program they are changing or eliminating is an everyday part of the public's life. They need to listen for ownership expressions like "my bus," or, "my park." From an example used above, switching to an electronic fair card for transit services, or other changes to the way the public utilize transit services, may be an area of concern. Transit is a service that a great many members of the public interact with daily, and if the same system has been in use for a long period of time, individuals will be resistant to change. Care needs to be taken in how the public is engaged, what is communicated to the public regarding the change, and how this information is communicated.

4. Money matters.

This is, again, not a new insight, but it is always worth keeping in mind. When the cost of existing services or programs will change, care needs to be taken to communicate when the change will take place and why it is taking place. The case of PG&E's high bill complaints is instructive. Organizations need to think through the effects of introducing new programs and how those changes will interact with other programs. A useful tool may be thinking how the change will affect different customers or users, from the customer or user's point of view. This thinking would have to be creative and a process of sensitivity analysis or situational analysis may be necessary.

This same concern holds for communicating benefits. If the cost of the program is upfront, but the benefits may be realized later, or may be difficult to understand, all that will be seen by a large portion of the public is the cost. Benefits must be carefully communicated. The experience of PGE and BC Hydro is instructive in this case. Both did not implement dynamic pricing at the same time as smart meters, so it was difficult for the customer to realize any electricity bill savings via their smart meter. While customers will eventually benefit from long-term utility operational savings being passed onto the customer, it can be a tough sell to gain the customer trust that cost reductions will be passed along. Here regulatory oversight is extremely helpful as it can send the message that cost savings will be passed on because *it is the law*. This was a major issue for BC Hydro. But it is extremely difficult to communicate long-run savings, especially when the up-front costs of policies are so high. PGE's staged information campaign that focused only on immediately available benefits appeared to be a successful approach. BC Hydro also attempted to keep messaging simple and focused on immediate benefits with its pamphlet, "Straight Facts About BC Hydro's Smart Metering Program" (BC Hydro 2011b).

5. The public's unfamiliarity with a novel technology or program is important.

This point overlaps many of the others, but it is again always an important consideration. People pay attention when there is something new. Smart meter installations should have been a simple operations swap out, potentially executed with limited notice to the customer. This appears to be the approach attempted by PG&E. But as noted above, we live in an environment where information and misinformation is readily, often instantly, available, and social media leads to issue awareness jumping from jurisdiction to jurisdiction. People will take note and share when they have taken note and what they have taken note of. The key issue here is that unfamiliarity leaves a gap of knowledge that can easily be filled with misinformation.

It is therefore very important that, when faced with unfamiliar territory, organizations think long and hard about how they will handle information communications. It is beyond the scope of this paper, and my expertise, to recommend communication campaigns, but the selected cases do offer some options. Pre-emptive

strategies such as independent third party reviews and endorsements, or endorsements by trusted public figures are some examples.

6. A ‘Whole of Organization’ approach can be important when planning and implementing new policies.

As the case studies demonstrate, utilities are familiar with capital projects where their engineering and technical teams do most of the work and lead the way. This was especially the case for PG&E, where smart meters were viewed as “a purely technical change.” With any technology project, the instinct would be to do the same; have the appropriate technical people lead the initiative. But the cases suggest that a ‘whole of organization’ approach is needed to look at all aspects of implementing the project. This involves bringing in a team of planners across the organization to discuss implementation issues so they can be incorporated into the program design and implementation plan.

7. Personalized contact, or customized tools that personally engage the individual, help in understanding benefits and policy impetus.

If policies or programs involve new technologies, technical elements, or interactions with other programs that make the policy or program benefits and impetus difficult to understand, the more personalized the communications, the better. PGE recognized that talking to each customer was important in mitigating concerns. Ontario realized that customers needed interactive tools to understand the effects of TOU pricing (i.e. online tools and display devices that interact with the smart meter). The fact the PG&E took great efforts to personally interact with affected customers when launching their mandatory TOU pricing policy demonstrates this was valuable lesson for them coming out of their smart metering initiative.

8. Front-line execution matters.

The public engages with the front-line staff of an organization; for example, the installer, service provider, call-center or help-desk attendant. These front-line staff can form the public’s perception of the organization depending on the interaction that occurs. As such, these front-line staff must to be trained and equipped with the proper messaging and

information to pass onto the customer/public. Front-line staff need to understand the reasoning behind the policy, the benefits, and have responses to predicted concerns the public might hold. The messaging needs to be consistent.

The Structure Report examining PG&E's high bill complaints clearly pointed to this issue, indicating that PG&E processes did not address the customer concerns associated with the new equipment and usage changes, and that customers had issues with the installation personnel when these personnel were ill-equipped to provide information on smart meter installations. The importance of customer contact points was also evident in PG&E's reaction, when they took multiple steps after the Structure report to beef-up customer relations.

9. Independent scientific review bodies can add legitimacy to policies utilizing new technologies.

It is important to demonstrate the safety and security of new technologies with public applications. Independent scientific review bodies have an important role to play in assisting policy planning and implementation. When asked what could be done to improve program implementation where novel technologies were being introduced, BC Hydro identified independent review bodies as an important source of legitimacy that could help to limit public opposition (Murphy, Interview, 2012).

10. External regulatory review, where applicable, combined with an avenue for the public and stakeholders to participate in the process through hearings, is recommended to add legitimacy to policies utilizing new technologies.

In BC, the decision of the provincial government to skip BCUC oversight did not add to the legitimacy of BC Hydro's smart meter project. While there are many competing claims to legitimacy, due process is typically important for legitimacy, even if it does not

change the final decision²⁰. In BC some members of the public felt that smart meters were illegitimate specifically for this reason.

At the same time, PG&E's smart meter program was under the oversight of the CPUC, and they experienced dramatic customer backlash. This reflects the fact that the experience of each utility in this matter is unique; PG&E's major problem was a confluence of factors leading to high bills that happened to coincide with smart meter installations. CPUC oversight may, or may not have caught this potential issue as it was a confluence of problems, not one, easily identifiable issue. But in general, the experience in BC and Ontario indicates that, where applicable, oversight will add legitimacy to the introduction of novel programs. This oversight could also come in the form of independent review bodies, as mentioned above, depending on the characteristics of the policy or program. Another example in this vein would be the independent privacy commission reviews of various smart metering programs.

11. When there are large program introductions or changes, consider a phased approach.

A phased approach allows time for issues to come to light before full implementation. A long time-frame will also allow the public to become familiar with the new program or technology. The example of Ontario is instructive. They researched the program, announced the program early, ran various pilots with multiple technologies, parties, and situations (residential, rural, agriculture), and then initiated a phased roll-out of smart meter installations.

12. Pilot programs help address complex policy changes and program introductions.

Here I am referring to implementation pilots of policies already deemed beneficial to the public. Pilots can also be used to test multiple potential policy options to help determine which policy can best address a particular public issue or problem. In this case, pilots

²⁰ For example, see Robert Baldwin, "Rules and Government" in Morgan and Yeung, *An Introduction to Law and Regulation*, Cambridge University Press, Cambridge (2007): pgs. 238-44

would be utilized to explore different paths of implementation. For example, Ontario partnered with ten LDCs to pilot different meter technologies and determine if their data systems were functioning properly prior to broader smart-meter roll-out and time-of-use billing.

While pilots may not always be feasible, conducting a pilot may reveal valuable information. As with the phased approach, when novel technologies are introduced, conducting a pilot can illuminate potential issues with that technology across various real-world scenarios. Again, the example of Ontario is instructive here. PG&E's new Smart Grid pilots also demonstrate that PG&E sees great value in pilots.

7. Engagement and Communications Recommendations

7.1. Criteria and Measures

Given that the objective of my analysis is to provide ways to avoid public backlash to new policies by improving the legitimacy and trust in governmental organizations through effective public engagements and communications, I will now set out some basic criteria that I use to assess policy options. A table fully describing these criteria and associated measure can be found in the appendix, Appendix D.

1. Effectiveness:

Approaches should be evaluated based on how effective they are in achieving the above stated objective. Policies should improve the legitimacy and trust of organizations and reduce backlash. Recognizing that legitimacy and trust are qualitative concepts, factors of effectiveness identified from the case study would be:

- Whether the public understands the initiative (costs, benefits, impetus)
- Limited false or misinformation in the public realm
- No legal challenges to the policy
- No request for audits from regulators or ombudsman
- Limited degree of public backlash
- Limited opposition from official political entities
- The policy doesn't interact negatively with other policies

2. Cost

Cost would include the full prior and post implementation costs allocated to public engagement and communication. This means proactive, upfront costs for any pilots, testing, reports, surveys, focus groups, community forums, media and information

campaigns etc. But it should also include any reactive costs of dealing with issues, such as additional engagement and communication to clear up confusion, audits, evaluations, legal action, program/policy change or reversal, implementation delays etc.

In the case of smart metering, it is important to note that within the category of costs there are cost to the utility and cost to the public. A portion of the costs to the utility *are* costs to the public as in the regulated rate environment that most utilities act under, costs to the utility are recovered through rates; a portion of extra costs are passed onto the consumer. In the case of crown corporations or public utilities, such as BC Hydro and many utilities in Ontario, all costs are public costs. Strictly public costs in the case of private utilities are the costs associated with the regulatory environment (legal and tribunal hearings, independent review bodies, privacy commissions, etc.).

7.2. The Engagement Dilemma

While each case study presents a different story, there were enough similarities across them to be instructive. Appendix C summarizes my case study analysis. Where things went wrong, as with BC Hydro and PG&E, in both cases there was a fairly unique confluence of factors that led to consumer backlash. But while it is difficult to plan for a heat wave, as in the case of PG&E, or the political environment, as in in BC, there should be some adaptive planning. While the cases make it difficult to point to any one thing that should be avoided, or any one thing that should be done to ensure success, there is enough information in the cases to warrant common themes.

There were a few notable similarities across the case. In terms of successful implementations with minimal public backlash, both the PGE and the Ontario smart metering programs were under regulatory oversight. Of course, PG&E was also under regulatory oversight. But the major public concern, bill increases due to a heat wave, had little to do with regulatory oversight. As I noted above, regulatory oversight with due process does add legitimacy to public policy. Secondly, both PGE and Ontario both took great efforts to prepare the right messaging prior to installation, and customers were well notified of each smart meter program and the installations schedule. Both deemed this approach a key to success.

In terms of unsuccessful implementations, both PG&E and BC Hydro faced the opposition of vocal minorities. This in itself is not entirely helpful to informing what kind of communication approach to utilize to minimize backlash, as the presence and actions of vocal minorities may be difficult to predict. But what these vocal minorities were able to do in terms of spreading misinformation, gaining media attention, and making local politicians take action is worth noting. If vocal minorities are identified in engagement exercises prior to program implementation, the risk of wider backlash likely increases. Proactive measures to identify potential points to backlash, and to address concerns beforehand, seem like factors for success; Ontario's IPC continuously investigating and publishing reports and press releases into privacy of information issues is instructive. Likewise, BC would have known about the health concerns that arose in California and could have potentially avoided some backlash with independent evaluations *prior* to smart meter implementation.

7.2.1. Policy Approaches

The problem of public backlash to policies or programs that have been established in the public benefit is not specific enough to recommend one "correct" solution. Approaches will be highly variable, depending on the policy or program being implemented, the jurisdiction, and the organization implementing the policy. Therefore instead of offering a single recommendation I offer a number of options and suggestions on how they can be utilized given the risk factors of public backlash present. These recommendations will hopefully act as a "map" to guide policy, program and decision makers.

Informed from the case studies, I envision three broad options that program managers face when engaging and communicating a new policy or program. These options build from least resource intensive, to most resource intensive, and as such track a path of implementation of policies or programs with minimal risk, through to implementation of policies or programs with the highest risk. This begins with a risk assessment, but follows with recommendations of actions.

When faced with policy or program implementation, organizations face three broad choices for action:

Option 1 (Low presence of risk): Expend minimal resources beforehand, and wait and see what happens. This approach requires reacting to unique and specific concerns and public backlash, if, and when they occur. It may also be the case that few from the public hold concerns and the program proceeds without issue. In this situation you have saved a lot of time and resources.

Option 2 (Some risks are present): Expend time and resources upfront on public engagement and communications with the expectation that these efforts will greatly limit the potential for any public backlash, reducing or eliminating the need to react after the fact.

Option 3 (Multiple risks are present): Implement programs slowly, in stages, potentially with pilot studies, or limited voluntary program participants. This allows for lessons learned to be integrated into future program expansion, and issues to be identified early so that plans can be made to mitigate them.

Option 1 could be a potential option if there are limited policy risk characteristics. This would be a policy that would clearly be widely accepted, such as an information campaign about washing one's hands before eating to reduce the spread of the flu, or switching out lighting in all public buildings to make them more efficient and save energy. There will be public money spent, but most would accept that these are reasonable expenses and the benefits from action are direct and clear to the public. A more complex example might be adding a particular drug to a publicly-funded health program's pharmaceutical formulary. In such a case, larger amounts of public money might be spent (funds that could be spent in other ways), but only those who require that drug are likely to even know about the program and they would be happy to benefit from such a policy. Most others would be indifferent or unaware, as adding drugs to a public formulary is common.

Unfortunately, there are few public policies that would fall under the category of Option 1. Most policies would have some policy risk characteristics. Flipping around the last example described above, if you wish to delist a drug from a public formulary, you could face significant backlash; certain members of the public are familiar with that drug, have been using that drug, and are now being asked to change behaviour by selecting another option or paying for the old drug themselves, and potential affecting their health in the process. They may have a perfectly acceptable alternative treatment, but there is at the least a perception that government is threatening their health. These individuals

could easily gain media attention and political support to maintain the status quo. In such an example, much more public engagement and communication is needed so that the public understands the impetus for the policy. In such a case, Option 2 would be highly recommended. Option 3 might also be recommended, such as a staged transition to allow those drug users time to properly transition to alternative treatments. In the next section I will look more in detail at how an organization can work through my recommendations to decide what actions to take when they wish to implement a new policy or program.

7.2.2. *Mapping out Risks and Recommended Actions*

The first step in the process of deciding a public engagement and communications strategy prior to program implementation is identification of policy risk characteristics that could lead to public backlash. I have suggested many throughout this paper, and explicitly summarized them in the lessons learned section. These include: new technologies with novel risks, such as health risks and security of information risks; complex applications that are difficult to understand without a large degree of information intake; changes to programs or services that the public utilizes on a regular basis, and may feel a personal degree of ownership for the program or service; programs or services with high costs that may need to be passed onto the customer; and, changes to programs or services that will have an effect on other policies, programs, or services. They also include characteristics unique to the jurisdiction, such as the political climate present in BC, or the state of BC Hydro as a crown corporation and thus subject to political intervention. Unique characteristics of the proposed policy should also be considered, such as experience with similar policies in other jurisdictions, and the information on the internet from those jurisdictions, such as vocal minority and special interest web-pages. Additionally, other risk factors that I have not identified may be present; each policy or program is unique, and the factors that make that policy unique may also mean unique risks are present. Novel technologies could especially present new risk factors. But the factors I have identified are definitely a good place to start.

If there are not very many risk factors identified, program managers may be content to proceed with Option 1. It may be the case that there is one glaring source of potential backlash. In this case, addressing that source and proceeding with little other

engagement and communication may be all that is required. For example, in BC, much of the backlash stemmed from vocal minorities with health and security of information concerns. This concern was originally restricted to less than 5% of British Columbians, but they were able to leverage media attention to capture broader public and political support. Placing the BC Hydro Smart Meter Program under the regulatory oversight of the BCUC may have been all that was needed to mitigate many of the concerns held by these vocal minorities. The media and broader public may then have been less likely to have an ongoing focus on the story as official oversight of the program would have already taken place and concerns addressed prior to program implementation.

Pursuing Option 1 is not without risk. Very careful consideration of risk of public backlash is needed to make sure any sources of potential backlash are identified and accounted for; pursuing the course of action described in Option 1 should only be taken if it is very clear there are no major risk factors present. I make this point largely due to the consideration of cost if things go wrong. Spending less up-front on engagement and communication may appear like the choice with the lowest cost. If one can get away with doing little and be met with public support, or at the worst, disinterest, then this approach seems attractive in terms of expending resources. But as the cases of BC Hydro and PG&E demonstrate, the cost of reacting when one is met with backlash can be substantial.

For example, PG&E spent \$86 million on Customer Communications and Outreach for the Smart Meter Program through June 30, 2011 (Pacific Gas and Electric 2011b pgs. 18 & 22). Up until the July 2009 “Bakersfield Problem,” budget allocations to communications and outreach were only \$7 million; after Bakersfield, this allocation had skyrocketed to \$27 million by the end of 2009.²¹ PG&E’s opt-out plan alone will reportedly cost up to \$85 million dollars in order to shut off the radios in the meters of the

²¹ The \$86 million value for the Customer Communications and Outreach for the Smart Meter Program through June 30, 2011 includes both proactive AND reactive costs. For comparison, through June, 2009, before the “Bakersfield Problem,” PG&E had only spent \$7 million on Customer Communications and Outreach. Spending per month in this program field doubled in June from \$720,000 to \$1.4 million in November, and then up to \$2.4 million in December. Final spending to date by the end of the 2009 on Customer Communications and Outreach had reached \$27 million. Change Management spending for the year that was budgeted to be \$46,000 ended with actual spending of \$1.7 million for the year.

predicted number of customers that will choose to opt-out (CBS News Local, San Francisco, 2011). This compares to the \$58 million allocated to PG&E for their Critical Peak Pricing Program Customer Marketing and Education Program.²² In Ontario, the LDC Toronto Hydro (709,000 customers located in the City of Toronto), budgeted \$10-15 million per year on Customer Relationships Management from 2006-2009 (a portion of which was for the Smart Metering Program) (Ontario Energy Board 2008b pgs. 55-57).²³

Importantly, PG&E's smart meter communications and outreach costs are only costs to the utility and do not include the public costs of CPUC hearings, Senate-hosted Open Houses, the CPUC commissioned Structure Report, and radio frequency safety tests. While one is still left to speculate exactly how much reactive customer relations cost PG&E, the above costs suggest the reactionary costs may easily outweigh the cost of significant efforts made prior to launching a new policy or program. When public costs are added, this is most certainly true.

More importantly, in terms of effectiveness, pursuing Option 1 without accounting for the presence of the risk of public backlash can result in significant losses in public trust and legitimacy. The cases of PG&E and BC Hydro demonstrate that significant losses in the trust and legitimacy of those organizations have occurred. For PG&E especially, it was assumed that smart meters were merely a technical infrastructure change, and no one would take much notice; this was clearly not the case. In both cases there was public confusion about the programs, high amounts of false information in the

²² The Customer Communications and Outreach Program proactively engages customers, educating them as to the benefits of the Smart Meter technology and supporting efficient deployment activities, including the timely resolution of customer inquiries.

²³ The Customer Relationships team includes the call centre, a customer concern escalation group, and the Key Accounts team. In addition to these main operating areas, Customer Services staff is engaged in a number of system development projects and activities. These include the following: Smart Meter Program; Metering Services; New Customer Information System; Mobile Workforce Project; Develop and Implement a New Customer Relationship Strategy; Develop and Implement a Flat Rate Water Heater Conversion Program. When submitting proposals for rate recovery, Toronto Hydro submitted that with the deployment of smart meters and the anticipated implementation of TOU rates, they would be experiencing increasing call volumes and an increased need to communicate with customers.

public realm, legal challenges, multiple independent reports, and political opposition. While PG&E were trailblazers in terms of smart meter implementation, and judging outcomes would have been difficult, BC Hydro had the knowledge of the PG&E case to guide them. Not taking significant proactive steps in the political climate of BC is risky, given all the points of potential backlash inherent in smart meter initiatives. Any similar policy implementation would do well to learn from these smart meter cases; where the policy risks I have outlined in the lessons learned section are present, Option 1 should likely not be pursued.

If it is identified that some policy risk factors are present, it is likely best to consider Options 2 or 3. Which one to consider will depend on the number of risk factors identified, the complexity of the policy implementation, the jurisdiction, and the organization. The approach taken may require a mix of elements from each option. In general, I recommend that the more risk factors are present, and the more serious the public backlash that could result from these risks, the more a combination of all the elements of each option is required. Depending on the policy or program, program managers who have decided to pursue Options 2 and 3 could then take the information gained from identifying risk factors and utilize the best practices outlined in the “Lessons Learned” section of this document to formulate a public engagement and communications strategy. This may mean only targeting the most blatant policy risk characteristics that have the potential to result in backlash, or using a very wide engagement and communications campaign to cover as many risks as possible. It may also mean only piloting certain aspects of the project, and then feeling confident to implement the complete program or policy.

With regards to Option 2, starting from the policy risk characteristics, proactive engagement and communications plans should be developed. These plans would vary depending on the policy and the characteristics present, but in general they would try to pre-empt concerns and misinformation that could spring from the policy characteristics. Surveys, focus groups, and dialogues should be used not only to understand potential public concerns, but also to understand the language and framing used by the public when considering an issue. Understanding issues faced by other jurisdictions and not treating them as unique is important. Where applicable, program design should incorporate independent regulatory oversight and review. Where applicable, consider

pre-emptive independent review and/or addressing health or security concerns. Finally, continual attention to the media is vital. The media can be a source of the problem due to biased reporting of arguments, but they can also be a helpful source of information and commentary. It is important to get out front of any misinformation by proactively engaging the press through as many mediums as possible (news, television, radio, internet, magazines, talk-shows, etc.). This work will help the policy designer and decision maker in preparing for potential public backlash and taking steps to mitigate it, all as an aspect of *program design*. This could greatly improve success of implementation.

If significant risk of public backlash is detected in the proactive work of Option 2, then an adaptive implementation approach, Option 3, is also recommend. Pilot studies and staged implementation can give complex concepts time to sink in with the public before large investments in complete roll-out are made. It also allows important 'real-world' information to be illuminated, such as technical issues with new technology, or public concerns that were not imagined by program managers and decision makers. These slow-and-steady approaches allow governments and organizations to better sense and respond to new issues, hopefully before they become large-scale concerns. It allows governments and organizations to gauge ongoing public acceptance of new policies, and adjust implementation to better gain acceptance and maintain legitimacy and trust.

Of course the combination of Options 2 and 3 is not without risk and cost. Vocal minorities may still voice opposition, potentially slowing down program implementation, or halting a program before expansion. It will be much easier for decision makers to significantly modify, delay, or cancel a program when little has been invested, rather than in the middle of a full roll-out, despite public benefits that are obvious from the program manager or policy analysts perspective. Additionally, it can cost a lot to run pilots and staged roll-outs, especially when the very point of many programs is that benefits are not fully realized until complete roll-out. In the case of smart metering, utilities and governments pushed hard to complete system-wide roll-outs and fought those that would oppose system-wide roll-outs for the very reason that benefits are only realized through close to complete system saturation. To stop halfway is worse than not having started at all, stranding potentially expensive capital and wasting previous

installation efforts. Also, technology change can happen quickly. PG&E's experience with electromechanical electric meters being made quickly redundant by solid-state meters is a good example. Therefore, the staged approach may not be applicable to all applications.

An additional note: It is often difficult to predict how the public will react and the sources of backlash. Sometimes there are purely exogenous events beyond the organizations control. The best an organization can hope for is to try to identify and predict sources of backlash from the policy risk characteristics present, and have plans to mitigate them. If an organization is unsure, it may be an appropriate option to pursue Option 1 but have a contingency plan ready in case particular forms or sources of public backlash arise. Organizations have to be ready to be reactive in such circumstances, and having established public trust and legitimacy to begin with will help them respond to difficult circumstances.

However, where one is unsure, the lessons learned from the case suggest that the Options 2 and 3 can lead to positive results. Most importantly, these approaches can help maintain the public's trust in, and perceived legitimacy of governments and governmental organizations. This is an extremely important point. While the cost may be high to utilize Options 2 and 3, these costs can pale in comparison to the costs associated with a loss of trust and legitimacy. PG&E is a prime example; now all PG&E's efforts are closely scrutinized by the public and implementing new policies requires an extraordinary amount of extra effort in terms of public engagement and oversight. BC Hydro is also another example; future growth of BC's electrical system could be avoided through demand side management utilizing dynamic pricing. But in the current environment, initiating a dynamic pricing policy will be extraordinarily challenging without a large investment in the sort of proactive prescriptions noted here. The point is, that there are not many 'easy' policies left to implement in our modern democracy; trust and legitimacy will be invaluable when attempting to initiate the 'hard' policies of the future. Work now to maintain and/or build trust and legitimacy will be worthwhile and priceless currency for the future.

7.2.3. *An Example of Recommendations in Action*

To help guide the suggested analysis to determine a particular policy or program engagement and communications strategy, I will go through a quick example of potential actions given a policy or program with many policy risk characteristics. I have included a table describing the criteria and potential measures with which to evaluate the effectiveness of approaches in Appendix D. I have also included a criteria matrix in Appendix E. This criteria matrix is an example of a summary analysis one could undertake given the presence of many policy risk characteristics.

I will work through a quick example to see how using these tools and my suggested process might work. For this example I will use a recent policy familiar to me: Metro Vancouver, BC's regional transportation authority's (TransLink) implementation of the aforementioned electronic fare card, the Compass Card (TransLink 2013). TransLink will introduce an electronic fare card in fall, 2013. The Compass Card is a plastic, reloadable, electronic fare card that will work everywhere on the Metro Vancouver transit system. It will replace all current passes and tickets. The card will be loaded with the fare product of a customer's choosing and will be reloadable at Compass Card vending machines, online, by phone, or at customer service centres. The card will need to be linked to an account to utilize some of these services (TransLink 2013)

One would begin with an analysis of the new policy or program. In this case, TransLink's electronic fare card program, Compass, introduces a novel technology (electronic fare card), changes how the public interacts with a familiar service, makes changes to a service customers may feel personal ownership of ("My bus," "My train," "My transit-pass"), can result in program costs being passed onto the consumer through increased fares (or can be perceived to be linked to increased fares), carries security and privacy of information concerns stemming from on-line customer accounts, carries the potential perception that the government is tracking individual's movements, and is introduced in a jurisdiction with low trust for government programs. Clearly this is a case of potential risk of public backlash, despite the benefits of an electronic fare card program, and the fact that such programs are in place in major city centers around the world.

As the Compass Card program demonstrates numerous risk factors, careful consideration to public engagement and communication strategies should be taken. In general, as numerous policy risk characteristics are present, a combination of Options 2 and 3 will increase the public understanding of the impetus for the policy, and the public benefits that can flow from the policy. Option 1 would be ruled out because the potential costs of public backlash to such an expensive, capital intensive project have the potential to outweigh proactive spending on public engagement and communications.

While an electronic fare card appears to be simply a technical change over to a more modern fare system, the case studies of smart metering suggest that the policy and program change is more nuanced than that. A broader conception of the policy is needed and an organization-wide approach will help to limit public backlash when the program is initiated. If you take my recommendations, this means training all front-line staff to be able to address common public questions and concerns. As TransLink has a highly public presence through transit security personnel, and platform-based user assistance personnel, these staff need to be prepared to answer all questions and concerns about the Compass Card. Planning needs to consider addressing security and privacy of information concerns through Privacy-by-design and Security-by-Design methods and external review. TransLink executive, board members, and/or spokespersons need to be out-front in the media prior to program implementation describing the program impetus, benefits, and addressing potential public concerns.

By communicating information by effective means prior to implementation, Option 2 reduces misinformation, and thus the public attention to, or support for, vocal minorities. Legal challenges, requests for independent review, and political opposition are all still possible, but by limiting misinformation and support for vocal minorities, the proactive approach limits the potential for opposition, and politicians will not want to expend precious political resources on issues that do not seem to be of broad public concern. There is a trade-off of cost, in that the Option 2 means spending larger sums of money upfront on public engagement and communication. But as the cases of PG&E and BC Hydro demonstrate, the costs of reacting to public backlash can greatly outweigh the costs of proactively attempting to limit backlash.

In my example of the Compass Card, the number of policy risk characteristics identified lead me in this case to further recommend combining Option 2 with Option 3. Through phased implementation, Option 3 can further limit public backlash, legal challenges, requests for independent review, and political opposition by recognizing issues early and addressing concerns before they reach the level where individuals or groups feel they need to take significant actions of opposition. Further, by recognizing issues and addressing them prior to further policy or program expansion, Option 3 can potentially recognize negative policy interactions early enough to prevent them, or at least act to mitigate their effects. Combining the approaches serves to limit public backlash and increases the likelihood of public acceptance of programs in the public interest.

In the example of the Compass Card, this would mean a staged implementation of the project. As they have done, TransLink would want to introduce transit users to the Compass Card well before implementation. Due to the technical nature and novel technologies employed in the project, a pilot project prior to program implementation would be a good idea. Transit staff or a limited group of citizens would want to thoroughly test the system before it goes completely on-line. This means testing all aspects under many different scenarios, such as the ability to replace cards quickly and easily if they stop functioning, making sure customer accounts are linking securely and consistently to all card features, and having a back-up if fare-gates and cards are not functioning properly (manual override or personnel who can allow transit users to access the platform) It also means testing the customer support staff so that they are prepared to answer all queries come program implementation. Someone more familiar with the system could likely think up other scenarios that could cause the public concern and would want to work those scenarios into a pilot. Finally, a staged implementation might be considered, perhaps activating stations on a staggered schedule to make sure technical systems can handle the massive data load of over 1.5 million transit trip per day on the system.

8. Conclusion

This study has utilized case studies of smart metering initiatives to highlight difficulties faced in public engagement and communications surrounding novel public policies and programs. While smart metering initiatives are a unique policy, they exhibit multiple characteristics that may be common to many public policies governments will wish to implement in the future. As such, they offer valuable lessons for public engagement and communications prior to policy implementation. An overarching lesson is that public engagement and communications done poorly can have dramatic effects on public trust and legitimacy of government organizations. As trust and legitimacy will be invaluable when attempting to initiate the 'hard' policies of the future, governments and public organizations will need to continuously monitor and improve their engagement and communications strategies. It is my hope that this paper has offered some useful advice to policy makers and decision makers, and that lessons here will enable the effective delivery of public benefits in the future.

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Appendices

Appendix A. BC Smart Meter Media Scan

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Appendix B. PG&E: Structure Report Detailed Conclusions

Structure concluded in answer to the question, “Does PG&E’s Smart Meter system measure and bill electric usage accurately, both now and since PG&E’s Smart Meter deployment began?” that:

PG&E’s Smart Meters are accurately recording electric usage within acceptable CPUC tolerances, and are being accurately utilized in Customer billing. Structure reviewed PG&E’s Smart Meter program documentation issue logs, incident reports, and analysis of historical customer complaints and did not identify systemic issues in the measuring and billing of electric usage within PG&E’s Smart Meter system for the deployment period prior to our Assessment beyond those that had already been previously reported to the CPUC. Identified exceptions related to meter and billing issues appeared to have been limited and did not appear to have been prevalent in the overall deployed Smart Meter population. (The Structure Group 2010 pg. 13)

Structure concluded in answer to the question, “What factors contributed to Smart Meter high bill complaints?” that (answer broken up into four key factor areas):

Customer Usage:

Meter deployment schedules coincided with increased energy usage caused by a heat wave.

Some Customers experienced load changes that were reflective of changes in personal circumstances. Examples included room additions, pool additions, and equipment malfunctions.

Electromechanical meter degradation that was also identified as part of Structure’s field meter testing.

Rates:

Rate increases compounded the financial impact of the additional weather-related usage, resulting in higher bills that occurred as Smart Meters were being installed.

Incorrectly applied rates that were based upon historical premise assumptions.

Rate-based inquires that increased as Customer bills escalated. Requests for new or renewed financial assistance through California Alternate Rates for Energy (CARE) were identified as potential reductions of financial impacts related to higher bills.

Customer Service:

PG&E processes did not address the Customer concerns associated with the new equipment and usage changes.

Customer skepticism regarding the new advanced meter technology was not effectively addressed by PG&E on a timely basis.

Customers interviewed during this assessment did not consider their complaint resolved, despite indications from PG&E and CPUC that the Customer agreed with the resolution

PG&E Customer complaint resolution did not provide of interval read information available with Smart Meters, which may have assisted Customers’ understanding of hourly usage patterns.

Process Issues:

Customers indicated that communications/notifications surrounding physical meter installation were lacking, or that the Customer had issues with the installation personnel.

PG&E utilized field meter readers for an average of 131 days after Smart Meters were installed, resulting in similar meter reading errors as electromechanical meters. The transition to automate the Smart Meter data for use in billing was not clearly addressed with Customers.

PG&E's system tolerances related to billing quality control were not stringent enough, resulting in multiple bill cancelations and re-billings, which were confusing to Customers. (The Structure Group 2010 pgs. 13-14)

Structure concluded in answer to the question, "How does PG&E's Smart Meter Program's past and current operational and deployment compare against the framework of industry best practices?" that:

Structure found PG&E to have been historically in compliance, or have recently come into compliance, with the majority of Best Practices Associated with Smart Meters...Lapses [in meter deployment and data management best practices] have created a situation where data required manual editing, causing cancel/re-bills and delayed processing of Customer data in a relatively small portion of the bills processed. The cancel/re-bills and delayed processing potentially increased the days within a billing cycle presented in Customer's bills, as reflected in a portion of the High Bill complaints, and furthered Customer perception that Smart Meters may not have been accurate. (The Structure Group 2010 pgs. 14-15)

Overall, Structure reported that:

Overall, Structure found that the AMI technology deployed by PG&E appears to be 1) consistent with industry standards, based upon the goals of the AMI implementation and upgrades approved by the CPUC, and 2) accurate from a metering and billing perspective. Structure identified gaps in Customer services and processes related to high bill complaints, and determined certain PG&E practices to be partially non-compliant relative to industry best practices. (The Structure Group 2010 pg.15)

Appendix C. Case Comparison Overview

	BC Hydro	PG&E	PGE	Ontario
Customer Backlash	Yes	Yes	Minor	Minor
Role of the interaction between shareholder, government and utilities	Government Mandated Smart Meter Program	Government encouraged program. Choice optional, but incentivized	No Government Mandate. Utility-driven Smart Meter Program	Government Mandated Smart Meter Program
Dynamic Pricing	No	Mandatory TOU pricing for some customers, Voluntary for residential. Residential customers face a tiered rate structure based on total monthly usage.	No	Mandatory TOU pricing for all customers.
Regulatory Oversight	No independent oversight body. Provincial Government oversight.	CPUC	OPUC	OEB
Vocal Minorities	Yes	Yes	Minor	Minor
Engagement Approaches	Community liaisons Analysis of other utilities' programs Bill Inserts Web Content	Pilot Projects Limited prior engagement	Multiple mediums of communication	Staged Implementation Multiple mediums of communication
Pre-notification of Installation	Yes	Limited	Yes	Yes
Unique Factors	BC Hydro a Crown Corp and subject to political attack HST and <i>Recall and Initiative Act</i> Security of information and Health concerns Local Governments politicizing bans	First mover High Bill Complaints Security of information and Health concerns Local Governments politicizing bans	High Bill Complaints	First mover High Bill Complaints

Appendix D. Criteria and Measures

Criteria	Components	Measure	Index	Sources
Effectiveness	Whether the public understands the initiative (costs, benefits, impetus)	Level of understanding around key policy components (costs, benefits, impetus, technical aspects)	Scale	Public surveys testing public understanding
	Limited false or misinformation in the public realm	Number of false information claims circulating in the press	Scale	Analysis of jurisdictional press and web-pages
	No legal challenges to the policy	Number of legal challenges in jurisdictional courts or tribunals	Yes/No Potential	Jurisdictional court and tribunal dockets
	No request for audits from regulators, ombudsman or independent review bodies and commissions (i.e. Privacy Commission)	Number of audits requested from regulators, ombudsman, or independent review bodies and commissions	Yes/No Potential	Regulator, ombudsman, or independent review bodies and commissions' agendas
	Limited opposition from official political entities	Degree of opposition from official political entities as indicated by debates in legislatures, political comment in the press, or motions passed at lower jurisdictional level (i.e. municipalities or counties)	Scale	Political reports in the press, and commentary or opinion pieces authored by opposition politicians. Official records of legislative debates and motions
	The policy doesn't interact negatively with other policies	If the policy interacted with existing or concurrent policies to negatively impact the public	Scale	Press, reports from ministries, regulators, review bodies
	Limited degree of public backlash	Existence, capacity, and influence of public opposition or interest groups	Scale	Press. Oppositional and interest group web-pages

Criteria	Components	Measure	Index	Sources
	Proactive, upfront costs to the organization for any pilots, testing, reports, surveys, focus groups, community forums, media and information campaigns etc.	Dollars	Scale	Program or policy budget reports. Organizational Annual Reports
Cost	Reactive, post implementation costs to the organization such as additional engagement and communication to clear up confusion, audits, evaluations, legal action, program/policy change or reversal, implementation delays etc.	Dollars (some cost would be expected in all policies, so a baseline would need to be established for costs to be evaluated against)	Scale	Program or policy budget reports. Organizational Annual Reports

Appendix E. Example Criteria Matrix for Compass Card

		Option 1	Option 2	Options 2 and 3
Effectiveness	Public Understands Policy/Program	Low	High	High
	False Information	High	Med	Low
	Legal Challenges	Potentially	Potentially	Potentially
	Requests for Review	Yes	Potentially	Potentially
	Political Opposition	High	Med	Med
	Negative Policy Interaction	High/Med	Med	Low
	Public Backlash	High	Med	Low
Cost	Proactive Cost	Low	Med/High	Med/High
	Reactive Cost	High	Low	Low