

ONTARIO'S SMART METER PROGRAM
COST IMPACT
ON
RESIDENTIAL CONSUMERS

Prepared for

Clean Affordable Energy Alliance

Prepared by

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Executive Summary

While there is no doubt that Ontario should pursue an aggressive energy conservation program, the proposed “Smart Meter” program will have a minimal impact on Ontario’s overall electricity demand. If it is implemented, it will have major financial and lifestyle impacts on those with below average electricity demand and those least able to pay. These people will take the brunt of the pain while subsidizing those more able to pay. This additional burden will be on top of the anticipated 60% increase in electricity prices coming over the next few years.

The proposed Time of Use pricing structure does not take into account the highly diverse consumption profiles of different consumers.

The cost of this program is approximately 50% more than the cost of refurbishing a nuclear reactor equivalent to the capacity of the “hoped for” demand reduction.

The demand reduction target for the smart meter program can be achieved without this costly and uncertain program.

There will always be peak demand periods which are forecast to grow at 1.9%/yr. Reducing base load through energy conservation and providing sufficient generation capacity to comfortably manage peak demand should be the target, not relying on seniors to do without to “save the day”.

It is hard to believe the government would implement such a non-critical program that would place an inordinate burden on its seniors and low-income families. One can only conclude that this issue has not been brought to the government’s attention until this time.

Introduction

The Clean Affordable Energy Alliance made a presentation to the Standing Committee on Justice Policy at Simcoe on February 7, 2006 concerning Bill 21, An Act to enact Energy Conservation Leadership Act, 2005. Listening to the submissions presented at the hearing it became apparent that there are some serious issues with the Government's planned Smart Meter program. This report investigates the economic impact the Smart Meter Program will have on different segments of the residential consumers.

The following analysis is based on the Navigant report, 2005 "Overview of the Portfolio Screening Model" used by the OEB in the OEB Regulated Price Plan Manual for its treatment of the proposed Time of Use (TOU) pricing structure.

Demand Profiles

A major flaw in the Navigant Report is the fact that the analysis was based on **estimates of the average** residential demand profiles and the assumption that all consumers will be able to make changes to their demand profile. Page 26 of the report states, "In some instances because of the unavailability of profiles multiple end uses or segments were applied to the same profile." Page 31 of the Report states, "No Net System Load Shape (NSLS) for the entire province is readily available... To obtain a province wide NSLS, Navigant used a weighted aggregate". However the "average" profile is made up of many different profiles, some being significantly different from others, e.g. the working versus the non-working, pensioners versus large families, those with gas fired space heating versus those with electric heating. The Navigant report does not attempt to analyze the impact of TOU pricing on these different groups.

This analysis looks at the demand profiles for different groups of consumers. These profiles were quite easily developed by simply considering the daily routines for each group and applying the amount of electrical use by device throughout the day in a spreadsheet format.

The main focus of the analysis will be the winter season, since this now has the highest peak demand and is more complicated by electrical space heating demand. The starting point for this analysis is the reported Average Annual Residential Demand of 830KWh/month. The average winter residential demand is estimated to be 30Kwhr/day or 912Kwhr/month. The average residential daily profile consumption is shown In Fig 1. This electricity consumption profile was determined by prorating the average 30Kw/day against the profile average shown in the Navigant Report.

Comparing Fig 1.with the profiles shown in Fig 2, Fig 3 and Fig 4. clearly shows a problem with only considering an average profile. It is clear that basing a price structure on a usage pattern is going to impact some residences far more than others, as shown below.

Fig 1

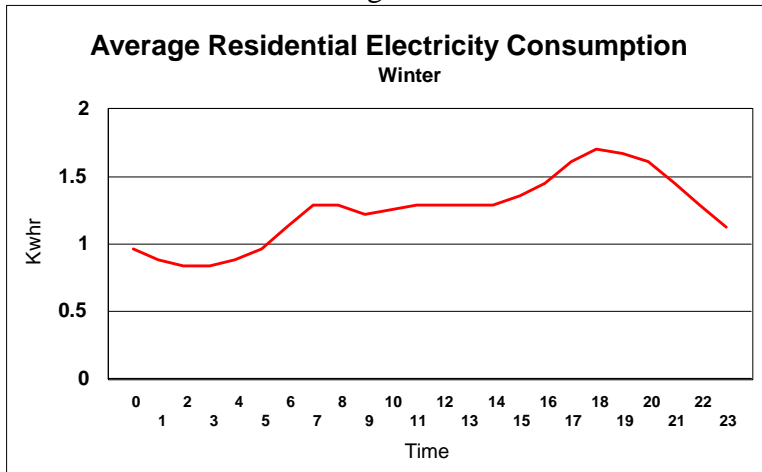


Fig 2

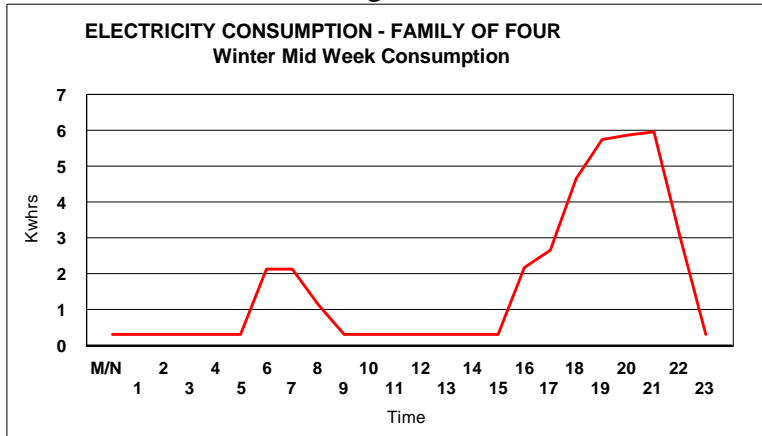


Fig 3

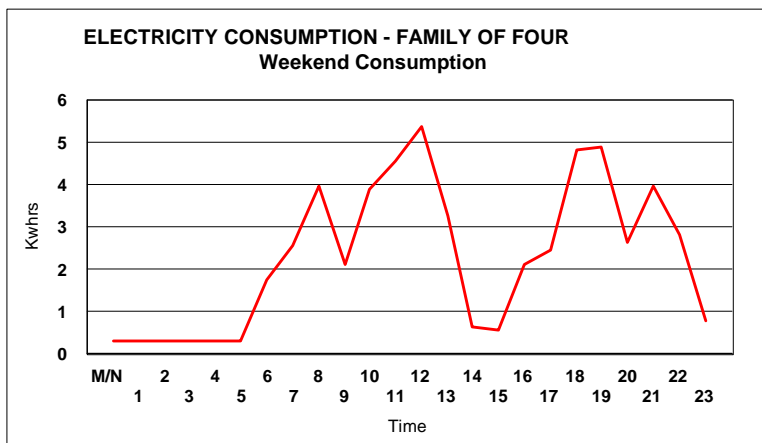
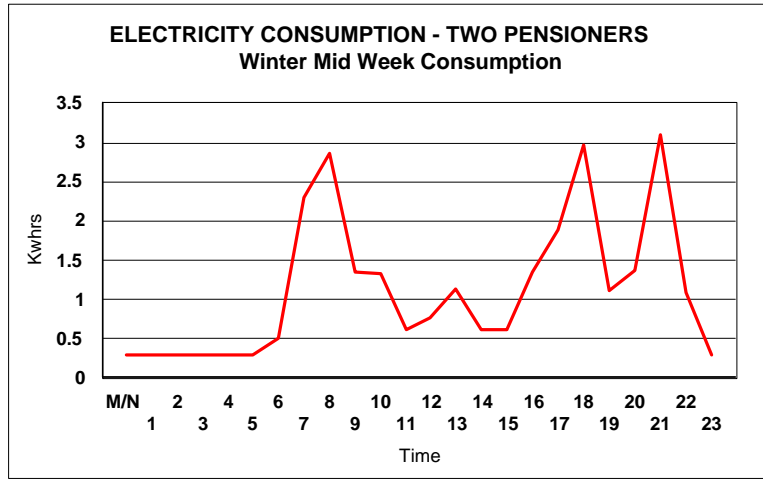


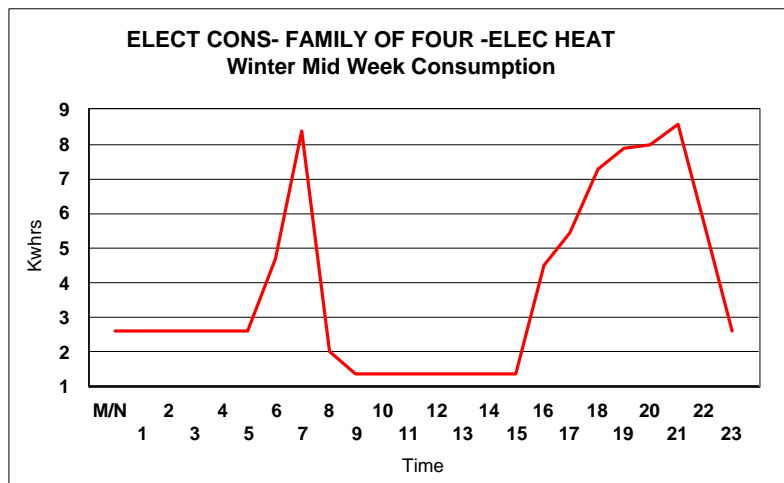
Fig 4



(Note weekend consumption for two pensioners the same as weekday)

Figures 2, 3 and 4 are based on families using natural gas for space and water heating and electricity for cooking and laundry. These cases clearly show a very low consumption during the night and the two week day peaks, in the early morning and evening. This compares with a much higher “base load” during the night and dampening of the peaks in Fig 1. This can be explained in part by the use of electric space heating in some residences during the night (Fig 5) and the fact that it is unlikely that all of the demand in the evening peak is not consumed at exactly the same time during the one-hour periods used in the calculation model. While the peak consumptions may be overstated, the costs associated with these peaks are not, since the price is the same whenever the electricity is consumed within the one-hour period.

Fig.5



The profiles above were determined using a spreadsheet that included all of the possible different electrical usages and their kwhr consumptions for each hour of the day. Scenarios considered were :

1. A working family of two adults and two teenagers (high consumption), gas fired space and water heating.
2. A family of two retirees (lower consumption), gas fired space and water heating
3. An unemployed single person with electric space and water heating. (lower consumption)
4. A working family of two adults and two teenagers (high consumption), electric space and water heating.

In all of the above cases there is little room for load shifting without major changes in life styles.

In the case of the family of four, there is a small peak as they get ready for work and school and the next larger peak starts when the teenagers arrive home from school and switch on their computers (homework and chat lines), lighting and the kettle. Shortly after the parents come home switch on more lighting, TV and make supper. After supper TV continues, teenagers do “their own thing” and one parent does some work in the office. The only way to reduce the evening peak is to not prepare supper until after 8 pm, sit in the cold with the lights off and not allow the teenagers to use their computers.

In the case of the two pensioners, their overall consumption is less, but the morning peak is greater as they take longer for breakfast and turn on TV. They also have a mid day demand to prepare lunch. They then face the same issue (smaller magnitude) as the family of four. They could possibly eat their supper in the middle of the afternoon or after 8 pm and then sit in the dark or read a book by flashlight until bedtime.

In the case of the unemployed person with electric heat, they would have to switch off the heat at peak periods due to the high load for heating and the high cost.

In summary, the government is planning to pass legislation that is going to impose draconian demands on our lifestyle for a mere (hoped for) 5% reduction in residential electricity demand. Approximately 1.5% of the overall demand.

Pricing

Whatever pricing mechanism is used the overall dollars paid by the consumers must pay for the electricity. So assuming the average residential winter consumption of 912 Kwhr and the 2005 winter rate of 5cents/kw, the average cost would be \$45.50/month. (before transmission costs, taxes and other charges). According to the OEB, the TOU price mechanism would apply to three different periods, off-peak, mid-peak and on-peak, in a ratio of 1, 2 and 3. (i.e. the on-peak rate would be three times that of the off-peak rate).

The winter off-peak times will be from midnight to 7 am, 10 pm to midnight on week days and all day on the weekends. Mid-peak times will be from 11 am to 5 pm and 8 pm to 10 pm. On-peak times will be from 7 am to 11 am and 5 pm to 8 pm.

Using the average consumption profile and the different TOU periods, the rates for each period were back calculated so the average cost would equal the \$45.50/month as above. These rates were:

Off-peak = 2.87c/kwh
Mid peak = 5.74c/kwh
On-peak = 8.61c/kwh.

These rates were then applied to the cases under consideration and compared against the existing rate structure with the following results.

Family of four. Two working adults and two teenagers. Gas space and water heating
Winter consumption 1361 Month/month

Existing rate structure 1,000 kwhr @ 5.0 c/kwhr = \$50.00
361 kwhr @ 5.8 c/kwhr = \$20.94
Total = \$70.94

TOU (smart meter) structure Total = \$70.13 (no change)

In this case the TOU case costs marginally less. This is because of the high usage on the weekend at the off-peak rate. In other words there is no incentive for this family to change their demand profile.

Two Retiree Family, Gas space and water heating
Winter consumption 822 Month/month

Existing rate structure 822 kwhr @ 5.0 c/kwhr = \$41.00

TOU (smart meter) structure Total = \$46.70 (14% increase)

In this case while the family has a lower overall consumption they pay more in the TOU case since their demand profile is more even through the week. (No high usage at cheap rates during the weekend)

Single unemployed person. Electric space and water heating.
Winter consumption 903 month/month

Existing rate structure 903 kwhr @ 5.0 c/kwhr = \$45.15

TOU (smart meter) structure Total = \$49.01 (9 % increase)

Family of four. Two working adults, two teenagers. Electric space and water heating
 Winter consumption 2817kwh

Existing rate structure 1,000 kwhr @ 5.0 c/kwhr = \$50.00
 1,817 kwhr @ 5.8 c/kwhr = \$105.38
 Total = \$155.38

TOU (smart meter) structure Total = \$136.83 (12% decrease)

Conclusion

The results of this analysis show that by changing from a volume based pricing schedule to a time of use schedule (smart meters), the low volume consumers (those least able to pay or shift load) will be subsidizing the high volume consumers, who will have no incentive to change their demand profile. To add insult to injury, the low income/volume consumers will be forced to buy the meters to enable this inequity.

This major inequity is clearly unacceptable!!

The inequity arises due to the significantly different load profiles of different consumers as shown in the table below.

Residential Consumption Distribution

	2 Pensioners <u>Gas Space Heat</u>	Family of 4 <u>Electric Heat</u>
Off Peak	38%	55%
Mid Peak	25%	21%
On Peak	<u>36%</u>	<u>24%</u>
	100%	100%

The low volume consumer uses 61% of their electricity at the mid and on-peak rates compared to only 45% for the high volume consumer.

Additional Concerns

The primary purpose of the “smart meter program” is to reduce peak demand. Hence the time of use (TOU) pricing mechanism. In the winter months this is for two periods during in the day totaling 7 hrs out of the 24. During other periods in the day it is expected to make a contribution to the overall conservation program.

According to the Navigant Report it is estimated that perhaps a 400 MW reduction in demand could be achieved by 2016. While the government has not revealed the cost of the smart meter program, the opposition parties have suggested that it may cost in excess of a Billion Dollars and will require a new Bureaucracy to manage it. Therefore this

hoped for electricity “savings” will cost \$2,500/Kw **if** the full benefit can be achieved, 10 years down the road. **This is 50% more than the government’s estimate to refurbish a nuclear reactor!**

The Navigant Report states “ Households exhibit a wide range of responses to time of use pricing. A study of focus groups found that approximately half of all households make very little change in electricity consumption in response to price changes while the other half respond actively by taking aggressive load reduction action when prices go up. This same study also looked at how price elasticities vary as a function of income and found that consumers with lower income levels are more responsive to price increases.” In other words, **there is considerable uncertainty that the savings will be achieved and that the lower income consumers will bear the brunt of the higher electricity prices.**

The residential load is 14% to 20% of the total winter demand depending upon the time of day and the hoped for 400MW reduction is only 1.5% of the total peak demand. While there can be no question about us all making a contribution to conservation, the low volume residential consumer will be expected to take an inordinate burden in attempting to achieve the smart meter program goal. It doesn’t matter how much the smart meter program achieves, their will always be peak loads during the day, unless 50% of the population goes on to permanent night shift. Slight changes to other large industrial and commercial consumers profiles will have a far greater chance of achieving the 400MW reduction. Reducing the base load by 400MW will also have the same impact.

Since the 400MW reduction target, required for only seven hours per day, has so much uncertainty, coming at a high cost, and placing an inordinate burden on those with lower consumption, it would seem to be a better strategy to spend the money to provide a similar amount of guaranteed new generation capacity that will be available 24 hrs/day. This could actually be done at no cost, by keeping two of the cleanest Coal Fired generating units in North America in operation at Lambton Generating Station.

Looked at another way, the 400MW divided by the 800,000 households that are going to be forced to buy the smart meters is 500W per household, equivalent to switching off 5 light bulbs or reducing the power consumption of 10 light bulbs by 50% (low energy bulbs). It would only cost the government \$32 million (\$4 per bulb) to give us 10 low energy light bulbs per household and there would be an instant reduction of 400MW, rather than spending \$1 Billion to maybe achieve the same result in 2016! For the price of a smart meter we could all buy a lot more light bulbs.

The economics of the smart meter program simply hasn’t been thought through!

This study has been based on the winter scenario because of the significantly different demand profiles for those using gas fired space heating versus those using electric space heating. The government obviously recognizes this as an issue of concern by having a higher threshold for the higher tier price during the winter season. Changing to TOU pricing will create an even greater issue than one currently being “managed”. In the summer, the electricity demand profiles become more similar for all, since peak demand

is due to high air conditioning usage. We all know there is a lot of wastage from air-conditioning, running the thermostat too low, leaving doors open, shopping malls and offices with “freezing temperatures” etc. This wastage results in higher demand by those doing the wasting. This could be solved by using the existing volume based system and perhaps adding a third really high priced tier for “abusers”. The average lower tier should be kept at a reasonable amount (rather than reducing it as planned for 2006), therefore allowing low income/low consumers to use a reasonable amount of air conditioning at a reasonable price and then the burden would be on the consumers with the large demands and those who waste electricity i.e. those who can afford to pay without causing undue hardship. Going to TOU pricing will make even small amounts of air-conditioning unaffordable for many consumers. Vigorous promotion of the existing energy conservation/education programs will have far more impact and be more equitable than the proposed TOU pricing.

Summary

The smart meter program will have a minimal impact on Ontario’s overall electricity demand but will have a major financial and lifestyle impact on those with below average electricity demand and those least able to pay. These people will take the brunt of the pain while subsidizing those more able to pay. This additional burden will be on top of the anticipated 60% increase in electricity prices over the next few years.

The demand reduction target for the smart meter program can be achieved without this costly and uncertain program. There are better less costly ways to meet our energy conservation goals.

There will always be peak demand periods and are forecast to grow at 1.9%/yr. Reducing base load through energy conservation and providing sufficient generation capacity to comfortably manage peak demand should be the target, not relying on seniors to do without to “save the day”.

It is hard to believe the government would implement such a non-critical program that would place an inordinate burden on its seniors and low-income families. One can only conclude that this problem has not been brought to the government’s attention until this time.