Submission to the B.C. Utilities Commission

on

the plan by B.C.Hydro

to

construct the Site C dam on the Peace River

by

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“This Earth, this planet, is ours to pass on to future generations in good shape. And it is this notion that should guide us in all of our choices and all of our decisions.”

Hon Julie Payette, Governor General of Canada

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1 address
2 e-mail
This is a more detailed version of the oral presentation I made on October 4, 2017

2 inaugural speech October 2, 2017.
Overview:

There are many reasons why the proposed Site C dam on the Peace River should not be built. They can be summarized by the quote from our new Governor General on the front page. I will only present evidence for three:

1) The Peace River is a canoeing river
2) The dam is not consistent with our responsibility to First Nations
3) There are better alternatives.

1) The Peace River is a canoeing river.

Please read and include here the submission I presented, cosigned by the Dogwood Canoe Club, to the BCUC at the previous Site C hearing in November 1981. For your convenience I include it here as Appendix A;

I have found the best holidays to be those spent on a wilderness canoe trip. All the troubles and stresses of ‘civilized’ living are forgotten. There are not many such trips available and the Peace River is one of them. If you would like to read an account of such a trip I recommend ‘Down the Wild River North’ by Constance Helmericks in which Constance and her two daughters ages 12 and 14 canoed the Peace, Slave and Mackenzie Rivers to the Arctic.

Losing this part of the Peace River would be a ‘cost’ which must be considered if the Site C dam is built.

2) Treaty 8

“Maps and Dreams” by Hugh Brody⁴ is one of the most memorable books I have read, and that was several decades ago. This a professional sociologist’s account of the life of First Nations peoples in Treaty 8 country. In particular one learns how the natives have been treated by the white people, continually being pushed out of their traditional lands. I hope you have all read it. If you have not, please do so.

It is abundantly clear that the treaty natives had no understanding of what they signed. They had no concept of ownership of land. The treaty states that the Queen takes all of their land except for small parcels known as reserves, and can even take reserve land if she wishes. No judge reading this treaty could regard it as a fair contract. It should be declared void. There is a long history of attempts to determine the natives understanding of the treaty, of which a useful account is provided by Dennis Madill⁵ It is clear that the natives and white people had completely different understandings of what the treaty meant, and for that reason also it should be declared void.

The construction of Site C is a cost, a significant cost to the natives, and which must be considered.

We have heard much about reconciliation recently. The best definition I have heard of the word is that we have their backs and they have ours. Cancelling Site C would show that we actually mean it.

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3) An alternative

As you all know, almost all the electrical energy we use ends up heating the environment, it is wasted. Avoiding this is sometimes referred to colloquially as energy efficiency or conservation. Please read and include here my submission to the BCUC Site C hearing in November 1981 on this topic; for your convenience I have attached it as Appendix B.

I offer you also my letter to the BCUC of May 29, 1982, Exhibit 288, Hearing No.74. This discusses the potential for large reductions in energy use by TMP refiners in pulp mills. The cover and first page are attached as Appendix C (I do not seem to have he rest, but you do).

I offer here another example of the potential. A neighbour of mine recently told me her electricity bill was over $1,500. I was shocked because mine for the same period was $50. Her bill was 30 times more than mine. How can that be? Both houses were built about 60 years ago. My neighbour’s house is larger, having had an extra floor added, and it has three residents compared to one. This does not account for the difference. The culprit is electric heating combined with poor insulation. The numbers are dramatic:

for the past 12 months

<table>
<thead>
<tr>
<th></th>
<th>Electricity use</th>
<th>Electricity cost</th>
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<tbody>
<tr>
<td>my house</td>
<td>1,800 kwh</td>
<td>$ 150</td>
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<tr>
<td>neighbour’s house</td>
<td>34,000 kwh</td>
<td>$ 3,940</td>
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Documentation of these figures is the BC Hydro bills shown in Appendix D.

Supposing the neighbour’s house were to be insulated properly, would it make sense and be relevant to Site C? Let us imagine the electricity use could be reduced substantially, to about double my use, to about 4,000 kwh/year. The demand on BC Hydro would be reduced by 30,000 kwh/year.

The figures for Site C are 4,600 GWh/y at a cost of about 9 G$. At this ratio, the cost for 30,000 kwh/y is about $59,000.

If BC Hydro can insulate my neighbour’s house for under $59,000, which seems very likely, it would be more effective to do this than to construct Site C. Better still, it would be even more cost effective to share the cost with my neighbour by providing her with an incentive.

This is only one example of what is possible in the way of ‘efficiency’ and which should be explored before construction of Site C.


7 The numbers are approximate, and do not include maintenance and transmission costs. There is also the risk of cost overruns.
PEACE RIVER

The B.C. Hydro Site "C" proposal

A submission to the B.C. Utilities Commission

by

D. J. Huntley*

and cosigned by

the Dogwood Canoe Club

November 1981

*980 Thermal, Coquitlam, B.C. V3J 6S1
The rivers of British Columbia are great natural assets. They are savoured and enjoyed by many, in many ways. There are those who travel them, there are those who fish them, and there are those who quietly watch the water moving. A river dammed has almost no such appeal. It is dead.

The Peace River is one of the great rivers of the Province; the latter include in addition the Columbia, Fraser, Liard, Skeena and Stikine. None of these are protected by legislation. Surely a society such as ours can preserve some of its great rivers for future generations to enjoy. We urge the Commission to request the Provincial Government to do so.

Each river has its own character and attractions. The Peace River downstream from Hudson's Hope is a quiet one of moderate speed. It offers high quality canoeing, without requiring extreme skill, and is very accessible. It is well suited to trips of one or two days or longer. The trip from Hudson's Hope to Taylor must be rated as one of the most popular in the Province, and as many as 20-30 canoes per day pass a given point on some weekends (R.Wright and R.Wright, 'Canoe Routes of B.C.', Antonson Pub. Co., Surrey, 1977). Reasons for this are

i) only moderate canoeing skills are required (I have even taught beginners on the Peace),

ii) the scenery is attractive (it was featured recently on a Vancouver telephone directory),

iii) there are several historic trading post sites by the river, including the first non-native settlement in the B.C. mainland,

iv) wildlife, and

v) good camping areas.

The Peace River also offers the rare opportunity for family river canoeing holidays of a week or longer. Such holidays must be regarded as being of the highest quality, offering everything that a holiday should. They also happen
to be economical and make a very small drain on our natural resources. Rivers which provide such holidays in an attractive surrounding are rare. In B.C. only the Peace, the upper Fraser, the lower Stikine and the Dease Rivers can provide such holidays.

Hudson's Hope is also the starting point for a canoe trip to Inuvik, one that is of great historic interest and includes large parts of Alexander Mackenzie's two great journeys of exploration. The trip is a long and interesting one. An account of a trip taken by two teenage girls and their mother, 'Down the Wild River North' by Constance Helmericks, is fascinating reading. I would like someday to make this trip and I would like my children and their children to have the opportunity also. Removal of any portion of the river would lessen the experience. The part from Hudson's Hope to Taylor contains some of the most beautiful scenery of this trip.

The Site C dam would have a significant impact on the canoeing in B.C., one that we would not like to occur.

Regulation: One of the present features of canoeing the Peace is that one is in danger of having one's campsite swept away by the river rising unnaturally. One cannot now use any of the most pleasant spots on the bars for camping because of this danger. With two (or more) dams and sufficient generating capacity this unnatural hazard can be eliminated. We request the Commission order B.C.Hydro to regulate its discharge so that the river level at a specified place does not rise more than a specified height in any given 24 hour period or portion thereof, and that the height selected by the Commission to be of a value comparable to that which might occur under usual natural conditions.
THE CHAIRMAN: Do we have copies of the second brief?

A No. I apologize for not having it printed and circulated beforehand.

THE CHAIRMAN: That's fine, if you read it into the record, it will be printed tonight.

A Okay, having opposed the Site C dam, because of my interest in canoeing the river, an interest on behalf of other people who wish to do the same thing, I feel it obligatory on me to tell you what
I think the alternative is.

Okay, now I should state that what my instinct when faced with a room full of people is to lecture to them, that's my natural occupation. I'm going to try not to do so. If any semblance of that appears here, please excuse me. There's no intention to do that.

I've stated earlier that a river cannot be compared to a lake. You have read the environmental consultant's report. This fact is recognized in that report in passing perhaps, but the consultant simply didn't know what to do with that observation. Nothing they could do adequately with it and so they didn't discuss it very much.

For those of you who do not understand the difference between a river and a lake, I'm going to try an analogy which I think is quite reasonable.

The differences between a lion seen in the African wild and the same lion stuffed and mounted over a fireplace, I think that will convey to you hopefully my understanding or something of my feelings of the difference between the two.

In Africa the people have seen the wisdom of preserving lions. In B.C. we have not yet seen the wisdom of preserving any of our rivers. I think we can do that.
I would like to present my views on how this will be accomplished as a professional physicist. Some of what I'm going to say may sound a little bit far out, but I'm hoping you will see it as something which represents the limits of what we can do, not necessarily with our present technology. But limits as our present understanding of physics is concerned.

When I look around me, at home and outside, I see energy coming in in the form of electrical energy and other.

I also see where that energy ends up. Most of it ends up in the form of heat at the temperature of the environment. In that sense it's being wasted; almost all of the energy that we use, perhaps almost all is a little bit too extreme, but certainly most of the energy that we make use of is wasted in that respect.

There are a few exceptions. Perhaps the most notable exception to this is in the refining of aluminum ore where you have to separate aluminum from aluminum oxide that requires a certain amount of energy. Chemists will tell you exactly how much
and there's nothing you can do about that, if you're going to refine aluminum you need that energy.

That consideration does not apply to most of the other uses of energy. If you walk around the house you will see examples of the kind of thing I mean. If you look around industrial processes, you'll see the same kind of thing.

The B.C. Hydro has produced some reports on -- in discussing the possibilities for energy conservation. I've looked through these. I don't think they in any way tell you what the limits of what can be achieved are. They tell you the limits subject to certain boundary conditions. I don't know what those boundary conditions are, because I don't think they were stated very clearly.

I'm not going to talk about the kind of energy conservation that you find in those reports. There are lots of examples you will find around you in every day life. Well, maybe I will tell you about a couple of examples. I was sitting out in town before Christmas, eating my lunch beside the skating rink, and I looked around me, and I saw a large number of lights on. These were not Christmas lights, they were just ordinary lights, and as far as I could see, they served no useful purpose except decoration.

Now, if we -- I'm not
objecting to using lights for decorations as long as
the, as I will state later, the pricing is done
appropriately.

My own institution
recently installed a new lighting system, an emergency
lighting system in the science laboratories. As far as
I know, no one in our laboratories was asked if we wanted
it. We certainly weren't consulted on how to put it in.
The net result of the way it was put in is that there
are several kilowatts of lights which are on continuously.
There are no switches to turn them off. The only time
those lights go off is when there's a general power
failure. They're off for about ten seconds, and then
the emergency generator comes on and the lights go back
on.

Now, that's the kind --
that's a straight-forward kind of inefficiency which is
unnecessary, and it's the kind of thing that the B.C.
Hydro report discusses.

That's not the kind of
thing I want to talk about. What I want to talk about
are things like industrial processes where the B.C.
Hydro report discusses the possibility of improved
efficiency of electric motors, and they tell you what
the possibilities are.

That report discusses
very little, if anything, in the way of what those
electric motors are used for. Now, if you ask how much
energy is required to take a piece of wood and turn it
into some pulp, you can do some calculations based on the
chemical bond energies of the material involved, and you
can calculate a figure. You can ask also what kind of
electric power is used actually in the process of doing
this, and you will get a different figure.

I suspect that in most
cases these figures will differ by orders of magnitude, or
at least one order of magnitude. I can only give you one
example from a former graduate student of mine who looked
into this in one particular industrial process, and he
found that this particular process was using five
megawatts. He didn't think anything like that much was
necessary, and he devised a method of doing the same thing
for one tenth of the amount of power. He still didn't
know whether that was the limit.

If you look around the
house, you'll see the same kind of thing. The straight-
forward thing, if you look at a piece of -- if you look
at your toaster and ask how much electrical energy is
actually needed to turn a piece of bread into toast,
I think you'll find it a very small fraction of the
energy you actually use.

You can go further than
that. If you look at the heating system, the hot water heating system, the B.C. Hydro report discussing that talks about the limits and saturation point. They do not discuss the possibility that you can heat your hot water using a heat pump, and you'll find that that makes an enormous difference. I'm not sure, I haven't calculated the factor, but I think it will be at least a factor of five less energy required than is actually used.

I'm sure that some people are going to say I'm talking about pie in the sky, the technology is not with us, they'll be right, but that's the kind of thing that can be done, and the technology will come. Certainly technology will not come unless the incentives are there.
When I look at other things in the house, I look at a freezer. No energy is required to keep the food cold in my freezer, yet I use a lot of energy. No energy is required to keep my house warm, yet I use a lot. It's a matter of the technology.

Okay, what I'm saying here is that I don't think that the energy conservation reports that B.C. Hydro has, go anywhere near into the possibility, into the limits of the possibilities. I believe the potential much larger.

Because of it, I have a vision of how our society might be in the future. I think the Directors of B. C. Hydro have a totally different vision. From their scheduled projects for the future, it appears as though their vision is to dam all of the major rivers in British Columbia and produce a lot of electrical energy. That's something that's easy to do and I suspect that the reason they do it is because it's easy. It's just a matter of engineering. It can be done, they know it can be done and everyone else knows it can be done. No one is going to argue that it can't be done.

I have a different kind of vision of the future. It's a vision in which our society operates with a much smaller amount of energy,
much of which is produced locally on a small scale. Some of it possibly in individual residences, it will depend on the circumstances. I believe that can be done. We don't have the technology for doing it, but I believe we can.

One example of this kind of thing is the new town of Tumbler Ridge. As I understand it from one of the intervenors' papers, the plan for that town is to have it serviced by B.C. Hydro with electrical heating in the houses. I don't understand that.

Here we have a large supply of coal, right on site. I would have thought that B.C. Hydro would have, if it was serious about the Hat Creek Project, it would have taken this as an opportunity for a demonstration showpiece that it can build a coal fired generating plant which is acceptable to the public. They claim they can do it for Hat Creek, then they should be able to do it at Tumbler Ridge and one of the intervenors has pointed out that in fact it will be a lot cheaper.

The kind of society which I envisage, as I said has a lot more local production of electricity and much less consumption, because of the efficiencies that one has, or one can have. The surroundings will be cleaner, they will be quieter and
in fact less work will be required to keep everyone
fed and housed, with all the amenities we have now.
I'm not asking anyone to suffer at all. I think in
fact we'll be better off.

A society like that will be
much less susceptible to disruption. Right now it would
be very easy either through some unusual natural cause
or through some kind of insurgence to disrupt our
present society, simply by severing some of the main
transmission lines or putting some of the generators
or dams out of commission.

A society where there's a
lot more local independence would not be nearly so
susceptible in that respect, and I think we'd be
better off for it.

I'd like to look at this
subject from a completely point of view as well.
There's a scenario called, by Garrett Harding, "The
Tragedy of the Commons". Some of you may know it,
some of you may not. For the benefit of those who
don't, I will outline it very briefly.

There's a common land where
a number of herdsmen graze their cattle. This system
works fine for awhile. Some of these herdsmen will
find that they think they're better off if they graze
more cattle on the land,
and they will find that they are better off by grazing
even more cattle on the land, and this will go on and
the first one will become better off. Everything will
be fine until the land starts becoming overgrazed. What
happens then?

Well, if you consider one
of these herdsmen, with the land being overgrazed, and
he asks himself, am I better off if I graze one more cattle
on this land, and the answer will, to start off with be
yes, he's better off because he's got one more cow. He's
not as well off because the land is being a little bit
more overgrazed by that extra cow, but on net he's better
off.

This carries on, with all
of the herdsmen thinking of the same thing, and the
ultimate result, of course, is ruin for them all when
the land is so overgrazed that no cattle can be grazed
at all.

There are many many
examples of this phenomenon in our society, and you all
know a number of different ways in which the ruinous
conclusion is avoided.

There are two examples
of this in the Site C application. There are a number
of people who would like to use the Peace River Valley
for a number of different purposes, but up until now
there has been, as far as I know, no conflicts between them. Up until now this common, namely the valley, was not being overgrazed. We now have an application for one herdsman who actually represents in a way of course a very large number of people. That particular herdsman wishes to overgraze it. That is why we have the Utilities Commission.

The second application of this tragedy phenomenon is a little bit more direct. In this application, the commons is the electricity that is generated in this province, and the herdsman are the people, the businesses and the industries:

B.C. Hydro sees over-grazing ahead. That is, going on their projections, they envisage in the future not enough electricity being generated to meet the demand. The Utilities Commission can avoid this by introducing appropriate regulations, in just the same way that a Grazing Commission can prevent overgrazing on the common land. That is one possible solution.

B.C. Hydro sees a different solution. They see the solution as to enlarge the commons, in this case, to build another dam. Okay now, in the case of the herdsman on a common land, if one herdsman wants to graze more cattle than the others, but that would cause overgrazing, what would be the
obvious solution? Well, you either don't allow him, or
you give him the option of increasing the size of the
common land, but you expect him to pay for it.

I think that the same
thing should apply in the present case. If myself, and
lots of other people like me decide that we want to
buy a widget, I don't care what a widget is, let's just
call it a widget, and this widget uses, say, one kilowatt
of continuous electrical energy, electrical power, sorry,
at present it would cost me, I understand, 3.7 cents per
kilowatt hour. But what is the real cost? That's not
the way the herdsman would see it. The way the herdsman
would see it is that I should go out and, you know,
be financially responsible for the extra grazing land,
but that's not what's happening.

The price that I should
be paying for this widget should be the price of the
new grazing land, namely the price of new electricity.
I made some efforts to find out what that is, and I've
not been successful. I gather there is no agreement on
the price per kilowatt hour for electricity from the
proposed Site C Dam. The only figure I've seen quoted
is in one of the intervenors' briefs, and I think that
was about 19 cents per kilowatt hour.
I've tried to make some rational estimates of my own and all I can tell you is that I'm reasonably confident it's over 10 cents per kilowatt hour.

It's certainly several factors higher than the currently charged rate for electricity if I want to buy myself a new widget. I'm not sure if the factor is three or four or five. If you consider bulk users who pay less than the residential one, the factor is going to be even larger, okay? It may even be as large as a factor of 10.

The rate structure is here extremely important and this is what I'm driving at. I would like to see the rate structure set according to the principle that I've just outlined, namely people like myself, if I want to use a lot more electricity, I should at least pay for the cost of it.

This in no way, you know, if people are willing to pay for it, then we can also consider the other losses, the environmental losses and so forth, associated with the dam. This has nothing to do with that at all. It is simply a matter of straight economics as I see it, okay? I'm sure there will be people who disagree with me.

Supposing we take a figure which I'm sure people will argue with, of somewhere
around 10 to 15 cents per kilowatt hour for electricity
from the proposed Site C dam, we should ask ourselves the
question, are people in fact willing to pay for it? At
present we don't know. The Commissioners asked B.C. Hydro
for some estimates on the elasticity of the price; the
response, I think, indicated a certain amount of uncertainty
and I'll have to confess the numbers given were not well
enough explained, so that I don't know what they meant.

I don't think that's
important because I suspect that those numbers did not
apply to changes in electrical prices in factors of five
or ten, which I think is what is being envisaged here.

I would like the Commissioners
to ask those intervenors who want 100 or 200 megawatts,
whether in fact they are willing to pay 10 or 15 cents
per kilowatt hour for that electricity.

Okay, I realize here, I think
that the answer will be no. I think most people will not
be willing to pay that. Now there will be some who will
and I think the Commissioners are much more able than I
to evaluate how many people will and how many people won't.

But I think if you find that
people are paying -- if the rate structure is set so that
if I used more electricity, I pay 10 or 15 cents per
kilowatt hour, and if I used less electricity, I pay that
much less, then you will see a very large change in the
kind of incentive to, you would call it energy conservation; I would call it less energy wastage than we have at present. And I would like to see the rate structure set in that kind of way. You may argue that one should not use the price from Site C as that price that I'm quoting you. It may be that the price from Revelstoke would be a more sensible one to use. The argument remains the same.

I looked to see if B.C. Hydro had taken this consideration into their application. In other words I looked to see if I could see that B.C. Hydro had considered this kind of price structure and what effect it would have on the demand, okay, I could not find this anywhere, okay. It may be there, but if it's there, I apologize, but I couldn't find it. And I'll be glad to be corrected.

Okay, to summarize my statement then, I would like to say three things. The first is, as I stated many times before, the river is a totally different thing from a lake
and I don't believe the consultants, environmental consultants report has stated this adequately.

The second thing is that the possibilities for energy use reduction are in fact very much larger than stated in the B. C. Hydro reports. Perhaps I should give the numbers of those reports if this is going to be printed.

Okay, the numbers are 7833, 7853 and 7854. They were ones that the Commission made available.

The third point I wish to make is that as far as I can see, the impact of a proper rate structure has not been considered by B.C. Hydro. My personal estimation is if these three things are put together, you will find that the Site C Dam is not needed, but it will require the Commission to introduce an appropriate rate structure, or it may require the Commission to introduce an appropriate rate structure. Thank you.

THE CHAIRMAN: Thank you very much. Now have we people who would like to ask questions of this witness? If not, nobody from the floor? The Applicant?

COMM. LITTLE: Q Mr. Huntley, you were implying the rates should increase and that you feel the general public will probably pay for this.
What about a person that has electric heat and all of a sudden he has a big jump. He has no way of counteracting that, does he?

A I'm sorry, you misunderstood and I knew someone would misunderstand what I was saying. I'm not proposing in this that the actual amount is -- the actual amount paid by a typical person would change. All I'm suggesting is that the structure be changed, so that you pay less for less electricity and more for more. Okay, and if my electric bill is still $50, you know, is $50 for the last two months, it will be still $50 for the next two months, but if I use more electricity then it will cost me somewhere around 10 or 15 cents a kilowatt hour more, and if I use less, I will save 10 or 15 cents a kilowatt hour. Okay, so in other words the rate at which electricity is charged increases for the amount of use.

COMM. LITTLE: Well, what about in the industrial part?

A Yes, the same thing.

COMM. LITTLE: The same thing, in other words if they get more production they would be penalized?

A I recognize there is a difficult problem there and in asking you to introduce
this, you are going to have a difficult problem in
determining exactly how to do it. Okay, but I
maintain that you can do it, it won't be perfect,
but it will be better than the present situation.

COMM. LITTLE: Thank you.

THE CHAIRMAN: Mr. Ryan.

COMM. RYAN: Apropos of
the last statement, what effect would this have on
the demand for the building of Site C? Are you
suggesting that Site C would be out the window because
electricity would become too expensive?

A: What I'm suggesting is
that people would find it economically more attractive
to pay for, if you like, energy efficient devices than
to pay for the dam, and you can ask yourself the
question in a totally different way. Given the price
of the dam, I've forgotten what it is, about 2.6
billion, could you spend that same money in a way
so that people have the same amenities, same everything
they have now, but you know, using only the electricity
that they have now, instead of the extra that would be
produced by the dam, and I think the answer is that it
could be done. I'm sorry, did I make myself clear
or not?

COMM. RYAN: No, not to me

you don't.
A No, okay. Let's supposing everyone has a widget, okay. It uses one kilowatt of energy continuously. Supposing you could, supposing -- okay, but everyone wouldn't need that widget if you spent $1 billion, but on the other hand in order for people to keep those widgets, you have to spend $2.6 billion, which way would you go, okay. You would spend the $1 billion, so that people didn't need the widgets any more.
Okay now, what I'm suggesting is that the rate structure would have that effect, the rate structure that I'm suggesting.

COMM. KILPATRICK: Professor Huntley, are you recommending a rate structure which will charge more for increased usage, or are you recommending a marginal cost pricing approach to life which -- or both?

A Okay, I have not used the phrase "marginal cost pricing", because I'm sure it has a precise meaning, and I don't know what that is. It may be that's what I'm referring to.

COMM. KILPATRICK: Well then I won't get into that can of worms anyway. Thank you very much.

THE CHAIRMAN: Earlier in your second presentation, the one we're talking about now, you referred to a friend of yours who had developed a device that cut the need in an industrial situation from five kilowatts to about one-tenth of that. I find that fascinating, can you tell me more about it?

A I wish I could. I will be glad to give you his name and address and phone number, but I have tried previously, you know, I have asked him if it would be possible to make this public, and he said no, it was information which is
privy to the company, and it couldn't be made public.

But I shall be glad to try and get that --

THE CHAIRMAN: No, I don't care to try and pry it out of your friend.

A Okay.

THE CHAIRMAN: The -- I would make an observation or two concerning your presentation. You talked about the toaster using perhaps four or five times as much heat as it needs to turn a piece of bread into toast. If you do that in your kitchen you don't lose much energy, do you?

A You're saying that that energy is going to heat my kitchen? If I wanted to heat my kitchen I will do it in a totally different way, much more economically.

THE CHAIRMAN: Thank you very much. Is there anything further? Then I think that we now can excuse you, and carry on with the next intervenor.
Mr. K. Henry, Chairman,
Site C Hearings,
B.C. Utilities Commission,
1177 West Hastings,
Vancouver.

Dear Mr. Henry:

In my testimony at the Site C hearings I mentioned a 5MW machine performing an operation for which very much less power was actually required. In response to a question from you I indicated an unwillingness to make public more details. I can now do this and at the same time would like to correct what may have been an erroneous statement of mine.

The process is the production of pulp. A copy of a report describing the details, "TMP refiners" by C.W.E. Walker, is enclosed. The report was given to a colleague of mine for evaluation and is thus now in the public domain.

The essential messages are:

1) The energy actually needed for the process is less than 1% of the energy used (page 1).

2) A newly designed type of plate in the refiner is expected to result in a power saving of 75% (p. 87).

3) A test experiment on a laboratory refiner showed a power saving of 33% (p. 88).

As I understand it the company (MacMillan Bloedel Ltd) has shown no inclination to pursue this possibility of large power savings.

This matter has demonstrated to me that very large reductions in energy consumption are quite feasible but that financial incentives are necessary to cause them. I believe that a marginal rate structure should be the first financial incentive.

Yours sincerely,

D.J. Huntley (Intervenor)
A. Experimental Data - Fall, 1977

When this investigation started in the Fall of 1977 there was a considerable body of experimental data on the operation of TMP refiners, obtained both from laboratory and from regular production machines but this data left a somewhat confused picture, with many contradictions.

The salient fact of the TMP operation was an energy consumption of about 100 horse power days per ton of dry pulp produced, coupled with the creation of dirty low pressure steam whose sensible and latent heats accounted for almost all of the energy consumed. Estimates of the work actually needed to break down whole wood into separated and fibrillated fibres could account for less than 1% of the energy consumed. Of the large amount of steam produced between the rotating plates of the refiner, about half appeared to move outward and leave with the outgoing pulp and about half appeared to move inward against the wood and pulp flow and so act to preheat it.

Important measurements had been made of the steam temperatures and pressures at a series of points, spaced radially through the refining zone, and this had been done in several different TMP refiners. These measurements, in addition to providing the steam pressure profile through the refining zone, gave the force due to steam pressure which is acting to hold
Power smart
..for your convenience.

BC Hydro's account services are available online for your convenience. Create a MyHydro Profile and link your account at bchydro.com/myhydro.

Switch to online billing before December 15 and get a $5 e-gift card. Get more details at bchydro.com/paperlessoffer.

Electric Charges

Previous Bill
Balance payable from your previous bill
Thank you for your payment Sep 13, 2016

Balance from your previous bill

BC Hydro

Electric Charges

Oct 25 to Dec 22 (Residential Conservation Rate 1101)
Basic Charge: 59 days @ $0.18350 /day
Usage Charge:
  Step 1: 1309 kWh @ $0.08290 /kWh
  Step 2: 5749 kWh @ $0.12430 /kWh
Rate Rider at 5.0%
Regional Transit levy: 59 days @ $0.06240 /day
  * GST

Your total consumption for the billing period is 7058 kWh and your Conservation Rate breakdown is as follows:

1309 kWh @ 8.29¢
Your Step 1 threshold of 1309 kWh is prorated based on 59 days

1376 kWh @ 8.29¢

Next meter reading on or about Feb 22

Take action to save electricity and money.
Call 604 431 9463 or visit bchydro.com/powersmart

Other questions? Call the

Prepared For

BC Hydro
Power smart

Invoice Number:
109009367136

Meter Reading Information
Electric:
Meters #: 4673510
Oct 25 18708
Dec 22 26766
59 days 7058

Next meter reading on or about Feb 22

Daily Average Comparison
Dec 2015 163 kWh
Dec 2016 120 kWh

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Visit our website at bchydro.com/energysavings.

Other questions? Call the

Prepared For

BC Hydro
Power smart

Invoice Number:
101003925991

Meter Reading Information
Electric:
Meters #: 4673510
Aug 24 166056
Oct 24 19208
62 days 3303

Next meter reading on or about Dec 21

Daily Average Comparison
Oct 2015 303 kWh
Oct 2016 533 kWh

Take action to save electricity and money.
Call 604 431 9463 or visit bchydro.com/powersmart

Other questions? Call the
BC Hydro
Power smart
Prepared For

Invoice Number:
111009454234

Billing Date
Feb 27, 2017
Pay by
Mar 21, 2017

Balance payable from your previous bill
923.30
Thank you for your payment Jan 06, 2017
923.30CR

Balance from your previous bill
$0.00

Next meter reading on or about Apr 25

Meter Reading Information
Electric:
Meter # 4673510
Dec 23 26766
Feb 23 38610
63 days 11844

BC Hydro
Electric Charges
Dec 23 to Feb 23 (Residential Conservation Rate 1101)
Basic Charge: 63 days @ $0.18350 /day
11.56*

Usage Charge¹
Step 1: 1398 kWh @ $0.08290 /kWh
115.89*
Step 2: 10446 kWh @ $0.12430 /kWh
1298.44*
Rate Rider at 5.0%
71.29*
Regional transit levy: 63 days @ $0.06240 /day
3.93*

Total Electric Charges
$1,576.17

You total consumption for the billing period is 11844 kWh and your Conservation Rate breakdown is as follows:

Take action to save electricity and money.

Your Step 1 threshold of
1398 kWh is prorated based on 63 days

Next meter reading on or about Jun 22

Invoice Number:
109008822326

Meter Reading Information
Electric:
Meter # 4673510
Feb 24 39610
Mar 31 42495
36 days 3865

Meter # 4673510
Apr 01 42495
Apr 26 45201
26 days 2806

Previous Bill
Balance payable from your previous bill
1,576.17
Thank you for your payment Mar 14, 2017
1,576.17CR

Balance from your previous bill
$0.00

Next meter reading on or about Jun 22

Meter Reading Information
Electric:
Meter # 4673510
Feb 24 4673510
Mar 31 42495
36 days 3865

Meter # 4673510
Apr 01 42495
Apr 26 45201
26 days 2806

Next meter reading on or about Jun 22

BC Hydro
Electric Charges
Feb 24 to Mar 31 (Residential Conservation Rate 1101)
Basic Charge: 36 days @ $0.18350 /day
6.61*

Usage Charge¹
Step 1: 799 kWh @ $0.08290 /kWh
66.24*
Step 2: 3086 kWh @ $0.12430 /kWh
383.59*
Feb 24 to Apr 26 (Residential Conservation Rate 1101)
Rate Rider at 5.0%
39.89*
Regional transit levy: 62 days @ $0.06240 /day
3.67*
Apr 01 to Apr 26 (Residential Conservation Rate 1101)
Basic Charge: 26 days @ $0.18990 /day
4.94*
Usage Charge¹
Step 1: 577 kWh @ $0.08580 /kWh
49.51*
Step 2: 2229 kWh @ $0.12870 /kWh
286.87*

Total Electric Charges
$883.60

For more information on the Conservation Rates, visit bchydro.com/conserve.
Cl) BCHydro

Prepared For

Invoice Number:
109009750514

Meter Reading Information
Electric:
Meter # 4673510
Apr 27 45301
Jun 23 47686
58 days 2387

Next meter reading on or about Aug 23

kWh Daily Average Usage per Billing Period

Previous Bill Balance payable from your previous bill
Thank you for your payment May 05, 2017

Balance from your previous bill

BC Hydro Electric Charges

Apr 27 to Jun 23 (Residential Conservation Rate 1101)
Basic Charge: 58 days @ $0.18990/day

Usage Charge:
Step 1: 1287 kWh @ $0.08580/kWh
Step 2: 1100 kWh @ $0.12870/kWh

Rate Rider at 5.0%
Regional transit levy: 58 days @ $0.06240/day

* GST

Your total consumption for the billing period is 2387 kWh and your Conservation Rate breakdown is as follows:
1287 kWh @ 8.58¢
1376 kWh @ 12.87¢

Your Step 1 threshold of 1287 kWh is prorated based on 58 days

$293.76

Thank you for your payment May 05, 2017

Balance from your previous bill

BC Hydro Electric Charges

Jun 24 to Aug 24 (Residential Conservation Rate 1101)
Basic Charge: 62 days @ $0.18990/day

Usage Charge:
Step 1: 1376 kWh @ $0.09580/kWh
Step 2: 1502 kWh @ $0.12870/kWh

Rate Rider at 5.0%
Regional transit levy: 62 days @ $0.06240/day

* GST

Your total consumption for the billing period is 2878 kWh and your Conservation Rate breakdown is as follows:
1502 kWh @ 12.87¢
1376 kWh @ 8.58¢

Your Step 1 threshold of 1376 kWh is prorated based on 62 days

$360.33

Thank you for your payment Jul 12, 2017

Balance from your previous bill
Switch to online billing before December 15 and get a $5 e-gift card. Get more details at bchydro.com/paperlessoffer.

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## BC Hydro

### Power smart

**Prepared For**

DAVID HUNTLEY

**Invoice Number:**

108009634649

**Customer Service**

Phone: (604) 224-9376 Power Out? 1-888-769-3766

Mail to: BC Hydro, PO Box 9501 Stn Terminal, Vancouver BC, V6B 4N1

<table>
<thead>
<tr>
<th>Billing Date</th>
<th>Account Number</th>
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<tr>
<td>Pre-authorized Payment Date</td>
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</tr>
<tr>
<td>May 19, 2017</td>
<td>$44.81</td>
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Please do not pay this pre-authorized payment bill.

**Previous Bill**

Balance payable from your previous bill 53.07

Thank you for your payment Mar 20, 2017 53.07 CR

Balance from your previous bill $0.00

**BC Hydro Electric Charges**

Feb 24 to Mar 31 (Residential Conservation Rate 1101)

Basic Charge: 36 days @ $0.18350 /day 6.61*

Usage Charge1

- Step 1: 175 kWh @ $0.08290 /kWh 14.51*
- Step 2: 0 kWh @ $0.12430 /kWh 0.00

Feb 24 to Apr 26 (Residential Conservation Rate 1101)

Rate Rider at 5.0%

Regional transit levy: 62 days @ $0.06240 /day 3.87*

Apr 01 to Apr 26 (Residential Conservation Rate 1101)

Basic Charge: 26 days @ $0.18990 /day 4.94*

Usage Charge1

- Step 1: 127 kWh @ $0.08580 /kWh 10.90*
- Step 2: 0 kWh @ $0.12870 /kWh 0.00

* GST 2.13

$44.81

---

**Billing Date:**

Feb 27, 2017

**Account Number:**

**Pre-authorized Payment Date:**

Mar 20, 2017

**Pre-authorized Payment Amount:**

$53.07

Please do not pay this pre-authorized payment bill.

**Previous Bill**

Balance payable from your previous bill 49.62

Thank you for your payment Jan 18, 2017 49.62 CR

Balance from your previous bill $0.00

**BC Hydro Electric Charges**

Dec 23 to Feb 23 (Residential Conservation Rate 1101)

Basic Charge: 63 days @ $0.18350 /day 11.56*

Usage Charge1

- Step 1: 396 kWh @ $0.08290 /kWh 32.83*
- Step 2: 0 kWh @ $0.12430 /kWh 0.00

Rate Rider at 5.0%

Regional transit levy: 63 days @ $0.06240 /day 3.93*

* GST 2.53

$53.07
Please do not pay this pre-authorized payment bill.

Previous Bill
Balance payable from your previous bill 44.81
Thank you for your payment May 19, 2017 44.81CR
Balance from your previous bill $0.00

BC Hydro

Electric Charges
Apr 27 to Jun 23 (Residential Conservation Rate 1101)
Basic Charge: 58 days @ $0.18990 /day 11.01*
Usage Charge:
Step 1: 227 kWh @ $0.08580 /kWh 19.48*
Step 2: 0 kWh @ $0.12670 /kWh 0.00
Rate Rider at 5.0% 1.52*
Regional transit levy: 58 days @ $0.06240 /day 3.62*
* GST 1.78

$37.41

Please do not pay this pre-authorized payment bill.

Previous Bill
Balance payable from your previous bill 37.41
Thank you for your payment Jul 18, 2017 37.41CR
Balance from your previous bill $0.00

BC Hydro

Electric Charges
Jun 24 to Aug 24 (Residential Conservation Rate 1101)
Basic Charge: 62 days @ $0.18990 /day 11.77*
Usage Charge:
Step 1: 251 kWh @ $0.08560 /kWh 21.54*
Step 2: 0 kWh @ $0.12670 /kWh 0.00
Rate Rider at 5.0% 1.67*
Regional transit levy: 62 days @ $0.06240 /day 3.87*
* GST 1.94

$40.79

Your total consumption for the billing period is 251 kWh and your Conservation Rate breakdown is as follows:

0 kWh @ 12.87¢
Your Step 1 threshold of 1376 kWh is prorated based on 62 days