

From: José Luis Deras <jlderas@semarnat.gob.mx>
To: "Info CEC" <info@ccemtl.org>
Date: Fri, Dec 7, 2001 3:38 PM
Subject: Re: Solicitud de comentarios sobre electricidad y medio ambiente

BUEN DÌA, LA INFORMACIÒN QUE SE REQUIERE SON LOS COSTOS AMBIENTALES, ES DECIR, EL MONTO TOTAL O PARCIAL QUE SE HA GASTADO O INVERTIDO -MONTOS ECONÓMICOS- PARA LA CONSERVACIÒN DEL MEDIO AMBIENTE Y LOS RECURSOS NATURALES EN MÈXICO Y OTRO PAISES.

SEGURAMENTE USTEDES TIENEN UN COSTO APROXIMADO DE CUANTO SE GASTAN ANUALMENTE, POR MES, POR SEMANA O POR DÌA, EN RECUPERACIÒN Y PROTECCIÒN DE ALGUNA ESPECIE EN PELIGRO DE EXTINCIÒN, O RECUPERACIÒN DE FLORA Y FAUNA, POR EJEMPLO.

ESTA INFORMACIÒN ES DE MAYOR UTILIDAD PARA NOSOTROS, ES POR ELLO QUE SE LA ESTAMOS SOLICITANDO.

SIN MAS POR EL MOMENTO, Y ESPERANDO UNA RESPUESTA POSITIVA, LES MANDO UN CORDIAL Y AFECTUOSO SALUDO.

GRACIAS.....

----- Original Message -----

From: "Info CEC" <info@ccemtl.org>
To: "CCANovedades" <CCANovedades@lists.cec.org>
Sent: Thursday, November 29, 2001 11:40 AM
Subject: Solicitud de comentarios sobre electricidad y medio ambiente

- > Convocatoria de comentarios sobre el documento de discusi3n de la
- > Iniciativa sobre Electricidad y Medio Ambiente
- >
- > Montreal, a 29 de noviembre de 2001. El Secretariado de la Comisi3n para
- > la Cooperaci3n Ambiental de Am3rica del Norte (CCA) busca comentarios
- > sobre su iniciativa para estudiar los aspectos ambientales en un mercado
- > integrado de electricidad de Am3rica del Norte.
- >
- > El Secretariado de la CCA prepar3 un documento de discusi3n, Retos y
- > oportunidades ambientales del dinámico mercado de electricidad de
- > Am3rica del Norte, con objeto de propiciar un diálogo sobre los
- > principales aspectos ambientales relacionados con el incipiente mercado
- > de electricidad de Am3rica del Norte.
- >
- > Esta semana la CCA, junto con el Instituto de las Am3ricas, auspicia un
- > simposio sobre estos asuntos. Los resultados del simposio --que incluirá
- > recomendaciones de un comité consultivo independiente de expertos en
- > energía y medio ambiente y el Comité Consultivo Público Conjunto de la
- > CCA-- y los comentarios recibidos de la ciudadanía se usarán para
- > elaborar un informe final que se entregará a los gobiernos de Canadá,
- > Estados Unidos y Méjico.
- >
- > Los comentarios escritos se deben presentar, por medios electr3nicos o
- > en versi3n impresa, antes del 10 de enero de 2002 a trav3s del contacto
- > cuya informaci3n se incluye al calce. Todos los comentarios recibidos
- > estarán disponibles en la página en Internet de la CCA en su idioma
- > original.
- >

- > El documento de discusión, así como otros materiales de apoyo, se pueden
- > consultar en línea en:
- >
- > <[http://www.cec.org/programs_projects/other_initiatives/electricity/docs.cfm](http://www.cec.org/programs_projects/other_initiatives/electricity/docs.cfm?varlan=espanol)
- > <<http://www.cec.org/electricidad>>.
- >
- > Información adicional sobre la iniciativa y el simposio de los días 29 y
- > 30 de noviembre se encuentra en: <<http://www.cec.org/electricidad>>.
- >
- > Comisión para la Cooperación Ambiental
- > 393, rue St-Jacques ouest
- > Bureau 200
- > Montreal (Quebec) H2Y1N9 Canadá
- > (514) 350-4300
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- >
- > Contacto: Yolanda Clegg: yolanda@ccemtl.org
- >
- >
- >

BORDER ENERGY: DEVELOPING A REGIONAL CONSENSUS

**By Soll Sussman
Coordinator, Border Resources
Texas General Land Office**

As the Commission for Environmental Cooperation proceeds with its initiative studying environmental issues in an integrated North American electricity market, it is important that ongoing, existing efforts be recognized and supported.

Since 1994, the Texas General Land Office (a Texas state government agency) has worked with a wide variety of partner agencies in the United States and Mexico to organize the annual Border Energy Forum, a conference designed to improve the exchange of information regarding energy and its relationship to the environment throughout the border region. Electricity has been a major issue for conference since the start, with a concentration on how deregulation and opening of markets could affect the region as well as offer new opportunities for cross-border electric trade.

The Forum was founded because of the recognition that almost every economic and environmental issue that the United States and Mexico confront is affected, influenced, shaped or driven by energy, and that there is too much at stake for any of these aspects to be taken for granted.

Nearly nine years later, in the wake of rising natural gas prices, California's post-deregulation electricity crunch, and heightened interest in the potential of cross-border energy trade, it is appropriate to reflect on the motives for starting the Border Energy Forum. For the most part, the public operates with offices and tend to our transportation needs, and for the most part assume that the energy we need will be there when we need it. But energy use – at whatever level of economic activity, from the smallest wood-burning stove to a huge power plant – involves choices, and those choices affect for good or ill the world in which we live. Those choices become vastly more complicated in northern Mexico and the southwestern United States, where common interests, shared history, and similar characteristics transcend the international boundary.

The original idea for the Border Energy Forum was to bring together 50 people each from the United States and Mexico to exchange information on an annual basis about the best practices to produce and consume energy in the fast-growing region, to forge new partnerships, and ultimately to work together regionally on the twin goals of economic development and environmental protection. The Forum has achieved and exceeded that goal, bringing together each year a total of about 200 representatives of the U.S. and Mexican federal governments, state and local officials from both sides of the border, the private sector – energy producers as well as energy consumers, university professors and researchers, and environmental organizations.

The challenge is to meet energy needs and changes in the region by using more sustainable energy fuels, technologies, and consumption patterns. From the start, the decision was made that the participation of all stakeholders would be needed to find the U.S.-Mexico border consensus that ending the border regional war is being in taking any ways for border states separate than simply a border frontier. Our own emphasis that decisions on natural gas, timber, and Monterey funds will not develop in isolation with the border and Mexico City for those living in the states on both sides of the U.S.-Mexican border.

energy production and consumption in Dallas and Chihuahua as much as in Laredo and Ciudad Juárez would need to be taken into account if we were to produce a meaningful dialogue. Sensitivities regarding sovereignty also had to be respected, with voices and positions from both sides of the border presented equally with no effort to impose solutions.

It also is important to place the Forum's start back in the context of a period when there was generally little cross-border exchange of information about energy.

In addition to bringing together energy experts from both sides of the border, a priority of the Border Energy Forum has also been to initiate a dialogue between those who are interested in energy as a business and those who see protection of the environment as their charge. The Forum has evolved into a think tank for energy and environmental issues. It provides an opportunity for breaking through the confines of any particular area of expertise by sharing information among an unusual array of professions, including immunologists, natural gas producers, wastewater treatment engineers, windpower entrepreneurs and government regulators.

The questions this think tank addresses are profound and far-reaching. What, for example, are the current and future energy needs of northern Mexico and the southwestern United States? How will energy consumption affect the region? What parallels can be drawn between deregulation in the United States and the opening of energy markets in Mexico? What projects for the current year as well as for 10 years in the future will meet the energy needs of the region? What decisions must we make today that will be good for the economy and still protect the environment well into the coming decades?

Over the years, the Forum has explored how to expand energy markets and how to finance worthwhile energy projects. There has been a steady stream of reports on ambitious projects in progress. Working with the Forum has also provided a vantage point for observing the opening of markets and deregulation, to varying degrees, on both sides of the border. In the early years, the Border Energy Forum was originally called the Texas-Mexico Border Energy Forum and met the first two years in El Paso, Texas, concentrating on Texas and its four Mexican border states. During the United States-Mexico Border Energy Forum III in 1996, which took place in Monterrey, capital of the northern Mexico border state of Nuevo León, the name was changed because of the expressed interest from representatives from New Mexico and other states farther west. Thus the 1997 forum was held in Las Cruces, New Mexico, followed by Forum V in Chihuahua, Chihuahua, in 1998; Forum VI in San Antonio, Texas, in 1999; Forum VII in Ciudad Juárez, Chihuahua, in 2000; and Forum VIII in Tucson, Arizona, in October 2001. Plans are being made now for Border Energy Forum IX in Saltillo, Coahuila, in the fall of 2002.

Information is available on the Web site of the Texas General Land Office, www.glo.state.tx.us/energy/border, or by calling 512/463-5039.

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Comments on Environmental Challenges and Opportunities of the Evolving North American Electricity Market, CEC, November 5, 2001

It would be a great mistake to promote increased cross border trade in electricity without incentives that favor electricity produced with fuels or with generation plant designs that minimize or eliminate carbon dioxide emissions - as well as the emissions of other toxins like mercury, dioxins, sulfur dioxide and, nitrogen oxides.

There is a need to address the following considerations in any program aimed at electric power trade:

- 1) Curtailment of Fuel Waste Should Be Incentivized: As Thomas Casten of the Trigen Energy Corporation has illustrated in detail, conventional power plants that are located remotely from the consumers of the electric power, waste 67 percent of their fuel heat, and convert only 33 percent of their fuel into electricity. That is because the waste heat cannot be used for other purposes, and is discharged into the environment. In comparison, a combined heat and power plant (CHP), that is located near to the customer, allows the generator to use the waste heat for electricity, steam, and chilled water. Only 10 percent of fuel is wasted where the waste heat can be used.

The percentage of waste heat discharged from fossil fuel electric power plants is proportionate to the pollutants that are discharged from these same plants. These pollutants will cross country boundaries, and complicate and increase the expense to taxpayers of achievement of cross boundary agreements to control mercury, dioxin, acid rain, greenhouse gases and other pollutants. In short, business as usual involves a substantial incentive for energy waste. To counter this, there is a pressing need for a directed incentive program to favor cross boundary electricity trade from electric plants that use their waste heat, rather than discharging it into the environment. (Casten, Thomas, *Turning Off the Heat: Why America Must Double Energy Efficiency to Save Money and Reduce Global Warming*, Prometheus Books, 1998)

- 2) Green Power Should Be Incentivized: Regions of all three nations, such as the Great Plains of the United States, have excellent wind, solar and bio-resource fuel resources. States with such resources have expressed the wish to have extended power grids to distribute their green power. There is a need for a directed incentive program to favor electricity generated from these fuels, compared to fossil fuel sources, so as to recognize the reduced health and environmental costs to NAFTA nations downwind. Taxpayers should not have to pick up the costs of fossil fuel emissions.
- 3) Natural Gas Shortages Need To Be Addressed: The coal fired power plants being built in the United States, such as in Wisconsin, are deleterious to the environmental and human health of Canada. It would be beneficial if these were constructed to burn natural gas instead. However, North America is in the midst

of a terminal cycle of depletion of both petroleum and natural gas. Christopher Ellinghaus of the Williams Capital Group recently predicted that one third of the new power plants planned in the United States will not be completed because of a shortage of natural gas. The reserves do not exist to solve this problem. (Haryan S. Byrne, Too much power? Barrons, Aug. 6, 2001) Others have commented on the same issue. Simmons and Pursell point out that newer gas wells in the Gulf of Mexico are now showing 45 percent depletion in the first year. (Simmons, MR and DA Pursell, Depletion: The forgotten factor in supply and demand – some areas now hitting 15-20%, Offshore, Feb. 1999) Even Canada's reserves are beginning to show the strain of supplying the wasteful energy markets of the United States and Canada.

- 4) Address of Global Warming Also Requires Reduction of Electricity Waste: The governors of the New England states and the premiers of the eastern Canadian provinces in August 2001, agreed to reduce greenhouse gas emissions to 1990 levels by the year 2010, by 10 percent below that by 2020, and within several decades, to cut emissions 75 to 85 percent below current levels. These states and providence have also pledged to substantially reduce mercury emissions.

Generation of increased long distance cross boundary trade in electricity without consideration of plant design and fuel type, and the incentives needed to reduce emissions as discussed, would undermine this multi-state and province greenhouse gas cross-boundary compact, as well as deleteriously affect other US-Canadian agreements and treaties to reduce mercury, dioxin, and acid rain cross-boundary problems.

As the discussion paper notes, an environmental impact assessment by the US Federal Energy Regulatory Commission (FERC) prior to the introduction of competition in the US wholesale electricity market underestimated the effect on the use of coal. This type of electricity competition favors coal, rather than green power or distributed power. Furthermore, it has become standard practice at least in the United States to locate new plants next to the existing remotely located power plants because of the reduced regulatory impediments. But, these remote plants have no use for their waste heat.

And so, we can reasonably expect cross-boundary electricity trading, without countervailing incentives to reduce energy waste and promote green fuels, to aggravate the pollution problems and market instability that has become a hallmark of recent electric power generation. Cooperation, coordination and compatibility are not sufficiently robust approaches to this issue.

There is a need for specific negotiated cross-boundary agreements that provide for robust countervailing incentives, such as a tax on exported electricity in proportion to fuel waste or pollution loadings, the returns of which can be rebated to green fuels electric generation, CHP plants, or other similar facilities. Ample precedent exists for such programs, including the rebate of oil overcharges to energy efficiency programs in the United States. In summary, there is a need to specifically recognize the scale of present

taxpayer subsidies of energy waste and fossil fuel pollution in all three NAFTA nations, so as to promote energy efficiency, green fuel substitution, and reduced pollution flow across borders.

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COMENTARIOS AL DOCUMENTO DE DISCUSIÓN Y AL DOCUMENTO DE TRABAJO " RETOS Y OPORTUNIDADES AMBIENTALES EN EL DINAMICO MERCADO DE ELECTRICIDAD DE AMÉRICA DEL NORTE.

Quizá es un poco tarde para emitir estos comentarios pero sólo hasta después de leer el materia que nos fue entregado en la Jolla, es que puedo tener una idea más clara de la propuesta del ACAAN. Me limitare a un comentario general a fin de no ocupar mucho de su tiempo.

1.-Si bien la propuesta del ACAAN me parece excelente en términos de rigurosidad y análisis, considero que ésta se hace en función de la problemática estadounidense (crisis energética) y de manera importante con la finalidad de resolver el problema de su sector eléctrico, especialmente en California. En los documentos se señalan las implicaciones que tendrán las ordenes 888, 889 y 2000 de la FERC y las del TLCAN pero, una vez más, el impacto diferido hacia Canadá y México es claro que viene de los Estados Unidos. El problema es que me parece que no se consideran suficientemente las diferencias en términos de: políticas energéticas, dotación de recursos energéticos, aspectos sociales, conformación del parque de combustibles para la generación eléctrica, abismales diferencias en emisiones y, tampoco se señalan con toda la claridad los movimientos de comercio transfronterizo.

¿Cuál podría ser el problema de esto? Desde mi punto de vista, el que nos uniformemos de una manera que podría llevar a que las propuestas no sean suficientemente realistas para cada uno de los países. Ejemplo de esto es la opción de alentar la generación a partir de los renovables. Si bien en el caso de los Estados Unidos se explora la posibilidad de un desarrollo importante de estos recursos, en buena medida por razones de seguridad energética, en México creo que puede haber políticas con mayor impacto como es la del ahorro energético. Si bien se pueden aprovechar los renovables creo que difícilmente será de una manera masiva y estará bien considerarla como una alternativa para comunidades rurales que carecen de electricidad.

Como comenté en el seminario, me parece que la sociedad mexicana no estará en la mejor disposición de comprar energía verde si esto implica mayores precios. Hay estratos económicos que están al nivel de la sobrevivencia diaria. Si bien como uds. Sugieren en el documento de trabajo, hay industriales dispuestos a pagar energía verde, habrá que ver quienes son, con que preguntas se realizó esta encuesta y, cómo se transferirá este costo a los consumidores.

2.- Otros elementos que habrá que considerar son los diferentes momentos por los que atraviesa la reforma eléctrica en cada uno de los tres países y las implicaciones que esto puede tener tanto para el flujo de inversiones como para el comercio transfronterizo.

En el caso de México, la reforma no sólo es materia de controversia, sino que hay ahora varias propuestas de cómo desregular el sector. Si bien en términos políticos es sana la discusión de las propuestas y los debates entre el Ejecutivo y Congreso, no es claro el resultado ni el momento en que se concluirá la reforma.

En el caso de los Estados Unidos también me parece que habrá que seguir el devenir de sectores eléctricos como el de California así como de los varios Estados que han pospuesto su desregulación. Lo anterior es importante debido a 3 factores:

- a) Cuestiona la propuesta teórica de la reforma de este sector que plantea que los precios bajarán como resultado de la libre competencia.
- b) México está analizando muy de cerca la experiencia californiana, así como la de otros países para tomar medidas en su propio sector. Los apagones, la incertidumbre en los suministros, la especulación de las empresas generadoras y el hecho de que el precio de la electricidad californiana se multiplicara por 9, son elementos que se han incorporado en los debates del Congreso y de muchos en la sociedad mexicana.
- c) Los problemas no resueltos de el sector eléctrico Californiano impactarán muy de cerca a México. Es claro que el papel asignado a éste último será el de maquilador de electricidad que se producirá en territorio mexicano y se exportará a los Estados Unidos. En varios párrafos, en diferentes partes del documento de trabajo, se sugieren las ventajas comparativas resultantes de regulaciones ambientales menos estrictas o de regulaciones menos rigurosas, a las que se tienen que afrontar en los Estados Unidos. En otras se señalan otros factores como la cercanía del mercado y se minimiza el aspecto regulatorio. Sin embargo, creo que en la frontera mexicana se volverá muy importante para el sector y la integración de mercados. Podría suceder que ya que gran parte de las plantas de generación que se construirán para el 2007 se construirán en California y en Nueva York, estas podrían ubicarse del lado mexicano aprovechando las ventajas regulatorias de México *vis a vis* las de California. Este, es un aspecto medular del documento. Donde creo que habría que poner más énfasis es en las repercusiones ambientales de la región habida cuenta de que el problema en México no son las regulaciones y las normas sino su aplicación.
- d) También creo que tampoco están suficientemente ponderadas las implicaciones ambientales de las carboeléctricas que se construirán en Alberta y que, al parecer, van a generar electricidad para exportar. Un aspecto medular de la integración del mercado eléctrico serán las fronteras norte y sur de los Estados Unidos.
- e) Otro aspecto que quizá faltaría concretar es cuántas plantas de generación van a ser construidas en territorio estadounidense, sino también cuanto espera que le exporten sus vecinos y cuántas plantas debería construir para ello. Por ejemplo, el cuadro 1 del documento de discusión debería incluir las importaciones que harán los Estados Unidos de sus vecinos.

3.-Sobre las emisiones tóxicas. Es muy clara la diferencia en cantidad de emisiones en términos absolutos entre los tres países. Lo que no queda claro es si hay una propuesta para reducirlas y cómo. Así también me parece que el Documento de discusión debería complementarse con información de la capacidad de generación eléctrica actual y futura ya que ello da una idea más clara de lo que se puede esperar por país en términos de contaminantes y el tipo de contaminación. Ej. La electricidad estadounidense es generada en un 52% con carbón, mientras que México está sentando su generación futura con base en gas a través de los ciclos combinados.

Un aspecto más es si los países estarían dispuestos estarían dispuestos a no poner en marcha proyecto en camino a fin de reducir las emisiones y cooperar con la región ?. Ejemplo de ello son las plantas mexicanas (una en Petacalco) que están a punto de entrar en operación.

4. Propongo ponderar más las diferencias de los sectores energéticos a fin de dar mayor realidad a la propuesta de la Comisión. En este caso me refiero al aspecto jurídico y, en específico al TLCAN en lo que se refiere a su capítulo energético. Liberalizar el comercio de electricidad para México a partir de suscribir las mismas cláusulas que ha comprometido Canadá para el efecto podría comprometer otros bienes energéticos como el petróleo que veo difícil aceptar por parte del Congreso mexicano. Es decir, al suscribir cláusulas como las de seguro de abasto, se comprometerían otros bienes energéticos, dentro de los cuales está, precisamente, el petróleo que constituye el principal comercio energético del país.

En conclusión, como señalé al principio, considero que la integración del mercado eléctrico se hace en función de la problemática y los requerimientos de los Estados Unidos y no se ponderan suficientemente las diferencias en recursos, estructuras del sector y sociedades, lo cual permitiría destacar complementariedades entre los tres países. Un alineamiento que no destaque todas estas diferencias me parece que puede restar realismo y efectividad a la propuesta de la Comisión.

Agradezco el honor de permitirme `participar en ACAAN y deseo el mayor éxito para la Propuesta del mercado eléctrico para América del Norte.

Atentamente,

Rosío Vargas.



American Gas Cooling Center

400 N. Capitol St., N.W.
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Mark E. Krebs Education Committee Chairman

Tuesday, January 08, 2002

[Yolanda Clegg](#)

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Subject: Comments regarding: [Environmental Challenges and Opportunities of the Evolving North American Electricity Market](#)

The American Gas Cooling Center (AGCC) is a trade association for utilities and manufacturers whose common goal is to develop viable markets for highly energy efficient space conditioning alternatives that are not powered by electricity. Technologies we represent include recovering heat from distributed generation (DG) and utilizing it directly for space heating, domestic and process water heating and to power absorption refrigeration and desiccant dehumidification systems.

We commend the CEC for its insightful series of electric utility issue analyses. The following comments are intended to offer additional detail regarding what we consider to be highly important but often-misunderstood concepts that were mentioned in specific sentences within the subject document. In order of their occurrence, these are:

Sentence: *“Building a more supportive North American policy framework for energy efficiency and renewables represents a significant opportunity for achieving “win-win” outcomes.”*

Discussion: We suggest that the sentence be restructured to read as follows:

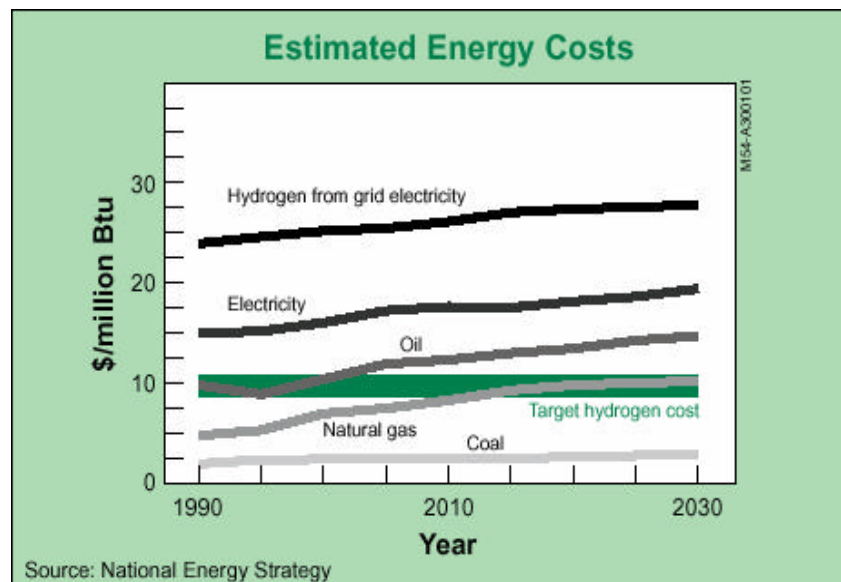
“Building a more supportive North American policy framework for energy efficiency and renewables can represent a significant opportunity for achieving “win-win” outcomes” if structured appropriately.

The reason for these changes are due to the fact that ostensible “energy efficiency” policies, usually gauge efficiency on the overly simplistic basis of BTU per square foot rather than considering total fuel-cycles. Consequently, such policies do little more than promote increased electrical consumption in a manner that is tantamount to advocating that energy is somehow created within utility meters. Such policies erode consumer choice and the environment.

Sentence: “Over time, whether and where “cleaner” electricity generation fuels can compete favorably with “dirtier” ones (considering their full lifecycle) will help answer many of the questions being asked today. A longer time frame would consider the still more uncertain pace of technological change and the advent of “breakthrough” technologies, such as hydrogen fuel cells.”

Discussion: Developing the proper analytical tools to transparently and robustly evaluate such tradeoffs over their complete fuel-cycles and life-cycles is something that is sorely needed as a basis of more rational policymaking and should therefore be fast tracked. Furthermore, alternatives to electricity (i.e., the direct use of natural gas, fuel cells, etc.) must be considered simultaneously. Otherwise, society will continue down the path towards an electric energy monoculture.

Often myopic approaches to solving problems create different (and sometimes far worse) problems. Classical cases-in-point of unintended consequences include the catalytic converter¹ and MTBE. Likewise, the ostensible environmental superiority of fuel cells may not pan out given that the cheapest source of hydrogen may be coal gasification. . The graph shown below is from a forecast that illustrates this conclusion:



In short, if fuel cells end up predominately coal-fueled, emissions at the point-of-use might be minimal, but total fuel-cycle emissions might be immense. Therefore, risk analyses should be another major feature of proper energy policy development tools.

Sentence: “In addition to promoting energy security through a more distributed and diverse energy portfolio, greater attention to these areas could help cushion the region from the impacts of more conventional electricity sources.”

Discussion: Such a portfolio should also consider end-use alternatives to electricity, especially if such alternatives are less costly (on a societal basis) and less environmentally degrading.

¹ Catalytic Converter Is Growing Cause of Global Warming <http://www.junkscience.com/news2/catalyt.htm>

Sentence: *“Finally, there are a number of opportunities to enhance public access to environmental information as well as to improve mechanisms for transboundary integrated resource planning and assessment. A more informed and active citizenry can help ensure that the integration of the North American electricity market benefits our shared economic and environment goals.”*

Discussion: If integrated resource planning (IRP) only considers electricity production and consumption, it is, in reality, segregated resource planning; regardless of whether or not the complete electric fuel-cycle is analyzed. Such “segregated resource planning” will underachieve (at best) its societal objectives through counterproductive “rebate wars” (whose victor should be obvious) and similar aberrations of ostensibly well-intended policies.

We hope to shed further light upon IRP and fuel-cycle analysis issues to improve the CEC’s knowledge of them. To begin, the following tables show that, for each Btu extracted from the ground, converted to electricity in a combined-cycle power plant and delivered to an electric water heater, only 0.36 Btu ends up as usable hot water. Conversely, for a gas water heater, 0.54 Btu is delivered as hot water because the direct use of natural gas avoids the losses of indirect use as a fuel to make centrally generated electricity, even at “state of the art” efficiency.

Electric hot water overall efficiency (energy derived from combined-cycle turbine)

gas wellhead to power plant	90%
power plant thermal efficiency	50%
power plant to end-use meter	90%
electric resistance water heater efficiency	90%
cumulative efficiency	36%

Gas water heater overall efficiency

gas wellhead to end-use meter	90%
gas water heater efficiency	60%
cumulative efficiency	54%

These calculations indicate that the direct use of natural gas for water heating is already far superior to supposed “best available control technology” (BACT) that many believe to be state-of-the-art combined-cycle turbines (CCT)-when fuel-cycle efficiency is properly considered. Distributed generation with heat recovery (a.k.a., CHP or BCHP) only improves such inherent advantages. Moreover, these calculations are lenient towards CCTs, given that ideal “ISO” efficiency ratings are used (59 deg. F and sea level) and given that numerous real-world variables that substantially detract from CCT fuel-cycle efficiency are being omitted in this example for simplicity. Such factors include but are not limited to the following:

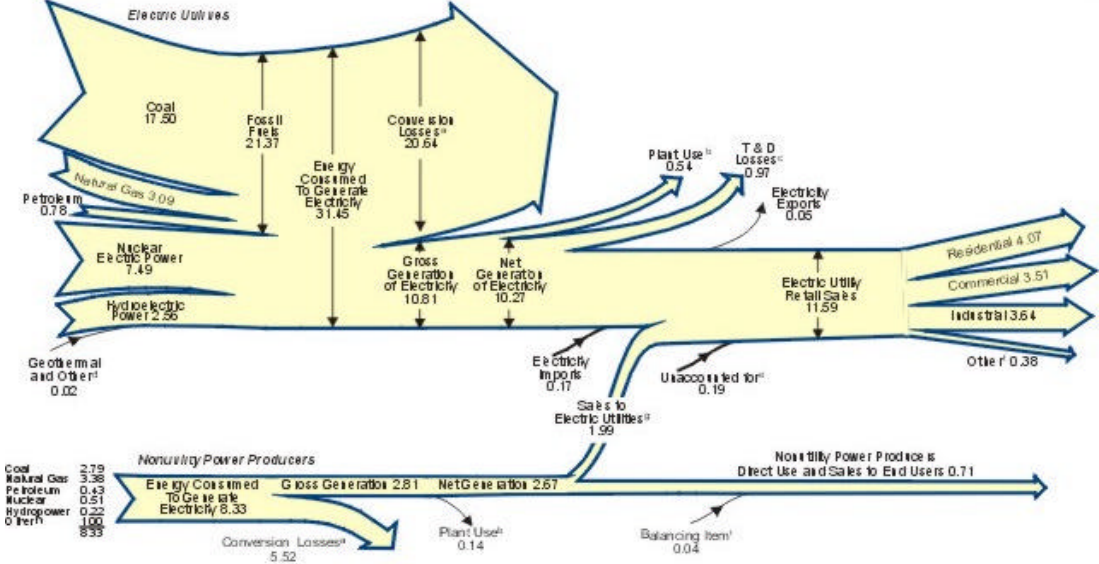
- Efficiency and emissions (other than SCR controlled NO_x) from CCTs vary significantly as a function of inlet air temperature.
- When temperatures are highest, turbine capacity and efficiency are lowest.
- When temperatures are highest, electric demand, hence T&D loss is highest.
- Turbine vanes (and thus efficiency) can deteriorate significantly over time.

While issues such as these may not have been what Alfred Einstein was most concerned with at the time, he nevertheless elegantly stated the rationale behind fuel-cycle analysis in the following quotes:

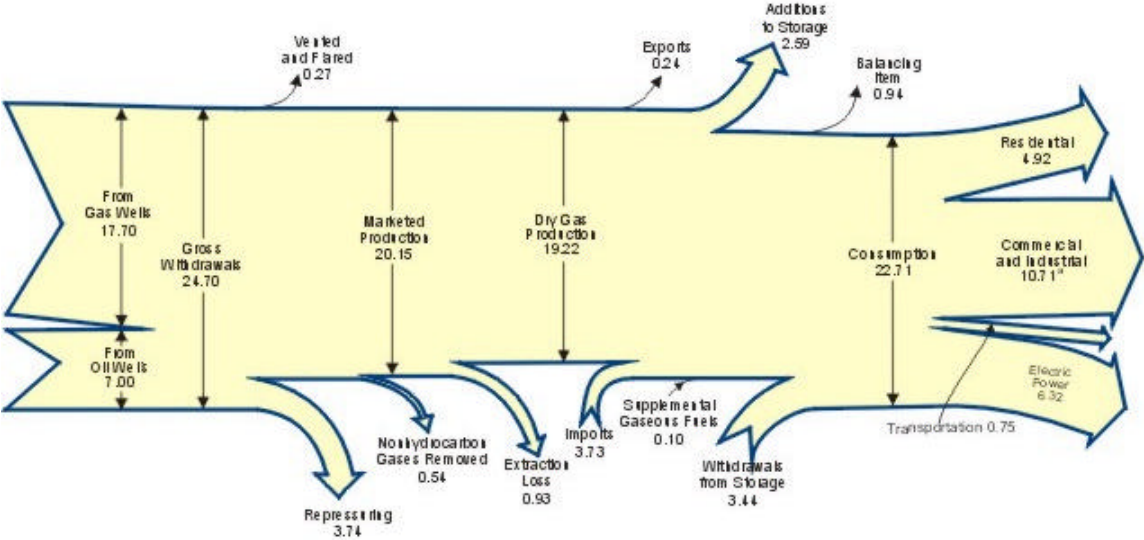
- “Problems can never be solved by thinking on the same level that created the m.”
- “Solutions to problems should be as simple as possible – **but no simpler.**”

The basic theory and importance of fuel-cycle analyses is further reviewed by the next two graphics and the discussion thereof:

Source to Site Electricity Flow 2000 (Quadrillion Btu) ²



Source to Site Natural Gas Flow 2000 (Trillion Cubic Feet) ³



² <http://www.eia.doe.gov/emeu/aer/diagrams/diagram5.html>

³ <http://www.eia.doe.gov/emeu/aer/diagrams/diagram3.html>

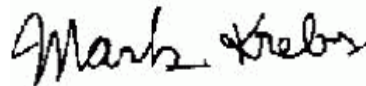
One Quadrillion Btu (1 Quad) and a trillion cubic feet (TCF) of natural gas contain essentially equivalent amounts of energy. Therefore, comparing the previous Energy Information Administration (EIA) graphs the following relationships can be determined:

1. Natural gas delivers twice the amount of energy to consumers relative to electricity
 2. Natural gas delivery is accomplished at least 2 ½ times the efficiency of electricity production and delivery (37% overall electricity vs. 91% natural gas efficiency).⁴
- Further comparing the natural gas and electric statistics contained within the EIA's Annual Energy Review⁵, it is evident that natural gas performs these services with far less environmental degradation and at less than ¼ of consumer cost relative to electricity (\$47 billion yearly revenue for the natural gas industry versus \$218 billion for the electric industry). Despite these features, contemporary American energy policies over the past two Administrations have focused primarily upon the increased importance of natural gas as a fuel for producing electricity.

Conclusions: The success of a market economy is based upon educated consumers with viable choices. Unfortunately, most consumers (as well as most regulators and legislators) are either kept unaware of or are purposefully ignoring important physical differences between total resource efficiency and efficiency at the point of end-use, as well as the resulting overall emissions differences. We also contend that the ongoing “rush to gas” for fueling CCT's adversely impacts consumer choice and needlessly wastes finite energy resources of natural gas. As of September 11th, the national security implications of this rapidly emerging energy monoculture should also be thoroughly reconsidered.

As these comments have hopefully reinforced, a comprehensive utilization of IRP and fuel-cycle analysis techniques should be the cornerstones of energy and environmental planning. In the event that the CEC would like additional information concerning these matters, AGCC offers its support. I can be contacted at (314) 342-0714 or via the following e-mail address: mekrebs@i1.net

Sincerely,



⁴ EIA's electricity flow graph does not include production and delivery losses for the primary fuels, so it is not truly “source to site”. For example, the losses associated with natural gas transmission or coal transportation to the power plant are not included. Also, note that the nuclear input is not uranium, or even enriched uranium, but nuclear electric power (which has a resource efficiency of approximately 16% when enrichment and power plant losses are taken into account. Conversely, EIA's natural gas flow graph does start from the wellhead. Also note that Hydro and Nuclear enter the electricity graph at 100% efficiency. Nuclear is only ~20% efficient, as is hydro (delivered electricity/potential hydraulic energy. That makes the 37% closer to 27% and the ratio closer to 3.5:1. CCTs are only ~40% (0.9*0.5*0.9).

⁵ <http://www.eia.doe.gov/emeu/aer/contents.html>

Comments on the CEC's Working Paper (and related papers)

Written by Jean-Étienne Klimpt, Yves Guérard and Érik Arsénault

Environmental Challenges and Opportunities of the Evolving North American Electricity Market

January 10, 2002.

1. Major comments

- CEC's Working Paper fails to address its very natural purpose : Did NAFTA affect environmental protection (negatively or positively) concerning the development of the continental electricity market (and how will it affect it in the future) ? And then, how can measures compatible with NAFTA support sustainable development ? Will a freer trade and a larger market tend to favor or impair DSM potential and IRP possibilities ? Will it encourage or discourage badly needed investments in the transmission grid ? In its present format, the Working Paper essentially states that strong demand growth will boost the growth of the electricity generation sector – implying that a freer trade will add to that growth – and that in turn, this could lead to stronger environmental disruptions. But it often fails to support its assertions with convincing references. Even more often, the Paper makes gratuitous or false assertions (see section 3 of this brief). As such, it should be sent back to the drawing board so that much better work can be done to explore key questions such as those mentioned above.
- More specifically. When we joined the *CEC Electricity and Environment Advisory Board*, we had understood that the primary goal of NAFTA was to set up a framework in which trade disputes could be solved and trade barriers alleviated. It would then have been natural for the CEC's Working Paper to focus its attention on areas where trade barriers and disputes were specifically hampering a sustainable development of the electricity sector. We were particularly disappointed to see that the Working Paper didn't stress the fact that *Renewable Portfolio Standards* are true protectionist measures that explicitly discriminate against large-scale hydroelectricity. Unfortunately, the Working Paper falls instead victim to the ill-founded belief "*small is beautiful*", especially when it comes to hydroelectric and distributed generation (see sections 3 and 4 of this brief). The general tone of the Paper practically supports protectionist RPS under the guise of pseudo-ecological preferences. This could actually increase air pollution and reduce the development of renewables. In sharp contradiction with the ill-founded analysis of the Working paper, the Background Paper entitled *NAFTA Provisions and the Electricity Sector* is clear-sighted on this possible discrimination against large-scale

hydroelectricity, on other illegitimate non tariff barriers and on the potential trade disputes thus created. For now, CEC should stick to its Background Paper's analysis (see section 2 of this brief).

- In our view, NAFTA will not impair the sustainable development of the electricity sector if the governments that signed the Agreement succeed in channeling the forces of liberalization towards :
 - Better market conditions for all renewable energies (without discrimination among them).
 - Better Environmental Impact Assessments (EIA), systematically taking into consideration the cumulative effects of all types of generation units and the level of service they provide (in order to compare options fairly).
 - A framework for DSM upstream measures (i.e.: market transformations at the levels of manufacturing and marketing of efficient appliances, materials, electric motors, etc.).
- On the Environmental Impact Assessment (EIA) topic, let's remind of the basic necessity of comparing energy options on the basis of similar production and level of service. The Working paper often does the opposite, especially when it fails to see the cumulative effects of small-scale production units and (precisely because of this smallness) their capacity to avoid full EIA procedures. Another important area of concern pertaining to EIA procedures is the current inequity in the level of studies and analysis required for the different generation options; an inequity that, according to us, is slowing the development of renewable options at the benefit of fossil-fueled ones. The Working Paper instead tends to legitimize this inequity (see sections 3 and 5 of this brief).
- On DSM, we have to point out that the opportunities presented in section 6 of the Working Paper may already have been taken into account in demand projections of section 3 and that future efficiency gains will prove harder than what the Paper says. We also challenge the assertion found in section 6 when it indiscriminately opposes DSM to any kind of additional capacity. Québec's experience proves that false : added renewable generation capacity can lead to major gains in energy efficiency (see section 6 of this brief).
- We must remind again the fact that large-scale hydroelectricity is indisputably renewable – if words must keep any meaning. Accordingly, its frequent exclusion from the *Renewables Portfolio Standards* (RPS) is irrational and it severely limits the potential contribution of renewables in the continental market instead of increasing it. Moreover, it violates NAFTA's principles. The Working Paper should at least have explored possible compromise solutions on this very contentious issue (see sections 3 and 7 of this brief).

- Finally, as Canadians and Québécois, we object strongly and feel offended by the insinuations, contained in the last five paragraphs of the Working Paper (pages 60-61), insinuations to the effect that we could be deriving a "*comparative advantage in the production of toxic intensive industries*" from our "*lax environmental regulations*" and "*lower ... environmental standards for the operation of large-scale reservoirs*" (see section 8 of this brief).

2. The Background Paper *NAFTA Provisions and the Electricity Sector* is clear-sighted on a possible discrimination against large-scale hydroelectricity

The Background Paper is remarkably clear-sighted when it exposes how, where and why there is *de facto* discrimination against large-scale hydroelectricity in various regulations and standards among some North-American jurisdictions. The analysis is especially striking when it exposes some biased and tailor-made definitions of what is *renewable* in the *Renewables Portfolio Standards*.

Unfortunately, it appears to us that the Working Paper *Environmental Challenges and Opportunities of the Evolving North American Electricity Market* falls victim to the ill-founded beliefs in the *small is beautiful* philosophy :

"Nevertheless, as a rule of thumb, the World Bank and others note that environmental impacts are proportionate to the scale of the project: large-scale, reservoir hydro-projects have profound immediate and secondary environmental and biodiversity impacts (p. 17) (...) However, to reiterate conclusions of the World Commission on Dams, the World Bank and the International Energy Agency – size matters : the magnitude of environmental damages from future hydropower will largely be a function of the size of those projects." (p. 28)

Such an approach does not consider impact per unit of energy; it is a serious methodological flaw (see sections 3, 4 and 5). Non-tariff barriers and arbitrary regulatory discrimination against the most profitable, effective and abundant renewable option could jeopardize the very fundamental calling of the CEC regarding the sustainable development of the continental electricity market : a freer trade and circulation of electricity made from renewable sources.

NAFTA is an international agreement; its members are sovereign countries representing the general interest of their respective populations; they have all signed and ratified the UN Framework Convention on Climate Change. The imperatives of both a UN Convention and of NAFTA should supersede preferences of some interest groups and local protectionism. There is no international agreement on the disqualification of certain categories of renewable resources, be they small or large-scale, with or without reservoir. Large-scale hydropower is indisputably renewable, it emits very low levels of GHG, and there is no basis for complacency on the part of NAFTA regarding trade-barriers based on ill-founded preferences.

On this whole issue of *small-scale versus large-scale hydro*, the clear-sightedness of the Background Paper ¹ must prevail on the biased and confusing approach of the Working Paper.

¹ The Background Paper nevertheless pays some lip service to the ecological prejudice against large-scale hydroelectricity. For example, on page 15 : *"Obviously, large-scale hydropower projects affect upstream watersheds and fisheries. Moreover,*

3. The Working Paper contains many false or ill-founded statements

Table 1: false or ill-founded statements found in CEC's Working Paper *Environmental Challenges and Opportunities of the Evolving North American Electricity Market* with our comments and corrections

Working Paper's false or ill-founded statements	Our comments or corrections
<p>"The construction of large-scale, reservoir hydropower plants has been definitively linked to the endangerment of freshwater fish and other species, the destruction of habitats, as well as emissions of mercury and methylmercury." (p. 4)</p>	<p>Not a single fish <i>species</i> in Quebec has been endangered by hydro plants. Expanded freshwater ecosystems, increased productivity of the milieu^{2, 3, 4}, and sustained water quality⁵ show that hydro-power developments can lead to gains in aquatic ecosystems. As environmental follow-up studies on hydropower have shown, the survival of species and biological diversity are assured by abundant populations of flora and fauna^{6, 7, 8, 9, 10, 11}.</p>
<p>"The generation of electricity through large-scale hydropower is a leading cause of extinction or endangerment of freshwater fish species. Large-scale hydropower projects also have significant and – according to the World Commission on Dams – largely detrimental impacts of habitats and fragile ecosystems." (p.13)</p>	<p>As for mercury, hydroelectric reservoirs are not a source of emissions. On the contrary, the sources of man-made mercury emissions come from the combustion of fossil fuels (like coal) and from smelters. These atmospheric emissions are then deposited on the land, where the flooding of reservoirs mobilizes it. It gets concentrated in the food chain of the reservoir in its methylmercury form. In Québec-Labrador, the data collected in reservoirs of different ages located in the Canadian shield demonstrate that between 20 and 30 years after impounding,</p>
<p>"The WCD has concluded that the construction of dams is "one of the major causes of freshwater species extinctions. Dams block or inhibit spawning grounds, change predatory relations of species, and change nutrient levels. Assessments have concluded that juveniles are especially at risk from dams." (p.18)</p>	

hydropower has significant impacts on transboundary air pollution. Although clearly air pollution problems will differ from fossil-fuel burning electric power generation, air pollution can include both mercury and carbon dioxide". Let's just state that everything in this statement can be proven false or ill-founded. Except in some cases where migrating fish species may travel a long way upstream, projects won't affect upstream watersheds and fisheries. And the transboundary effects on air pollution by large-scale hydro will be essentially very positive (by avoiding emissions from coal-fired generation), especially for mercury and carbon dioxide. On these pollution matters : IEA (2000), *Hydropower and the Environment: Present Context and Guidelines for Future Action*, Volume II, Main report, IEA Technical Report, IEA Hydropower Agreement.

² Gouvernement du Québec (1992), *État de l'environnement*, Ministère de l'environnement. Éd. Guérin, Montréal, 560 p.

³ Sarma, N.K. (1990), *Environmental impacts of water resources projects : The Indian experience*, P.239-248 in : United Nations (1990), *The impact of large water projects on the environment*, Proceedings of an International Symposium, October 21-31, 1986, Unesco, Paris, 570 p.

⁴ Dixon, J.A., L.M. Talbot et G.J. M. LeMoigne (1989), *Dams and the environment, Considerations in World Bank projects*, World Bank, Washington, 64 p.

⁵ Schetagne, R. (1992), *Suivi de la qualité de l'eau, du phytoplancton, du zooplancton et du benthos au complexe La Grande, Territoire de la Baie James*, p. 13-25 in : Hydro-Québec (1992), *Les enseignements de la phase I du complexe La Grande*, Actes du colloque tenu les 22 et 23 mai 1991, 219 p.

⁶ Hydro-Québec (1996), *La Grande Hydroelectric Complex; Water Quality, Plankton and Benthos*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 6.

⁷ Hydro-Québec (1996), *La Grande Hydroelectric Complex; Greenhouse Gas Emissions*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 4.

⁸ Hydro-Québec (1996), *La Grande Hydroelectric Complex; Fish Communities*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 8.

⁹ Hydro-Québec (1996), *La Grande Hydroelectric Complex; Waterfowl*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 9.

¹⁰ Hydro-Québec (1996), *La Grande Hydroelectric Complex; The Drowning of 9,604 caribou*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 5.

¹¹ Hydro-Québec (1993), *Complexe hydroélectrique La Grande, Rapport d'avant-projet*, Groupe Équipement, CDRom.

¹² Hydro-Québec (1994), *La Grande Hydroelectric Complex; Mercury and Hydroelectric Development*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 7.

¹³ Natural Resources Canada (2000), *Sensitivities to Climate Change in Canada*, Global Climate Change, <http://sts.gsc.nrcan.gc.ca/adaptation/main.htm>, p.13.

¹⁴ Atlantic Salmon Journal, Autumn 2001, Vol. 50, No.3, <http://www.asf.ca/Journal/2001/fa01/acid.html> and <http://www.asf.ca/acidrainns/index.html>.

<p>"(...) a recent assessment conclude that dams are the main reason why 75 percent of all native Pacific Salmon stocks are now classified as being at moderate to high risk of extinction". (p. 18)</p>	<p>mercury levels in lake whitefish and northern pike return to average levels encountered in natural environments¹². In short, reservoirs are at the receiving end of mercury pollution and are not responsible for it. Nevertheless, hydroelectric projects in Québec have incorporated mitigative measures to reduce the health risks for native populations during that 20-30 year period..</p> <p>Hydroelectric plants have on-site effects on natural habitats that are manageable with proper planning and mitigative measures. Fossil fueled alternatives are poisoning those habitats and fragile ecosystems and they are changing their most basic life-support system: their climate; furthermore, they make no difference between protected and non-protected areas.</p> <p>According to Natural Resources Canada, "(...) the climate change associated with a doubled atmospheric concentration of CO₂ may virtually eliminate salmon habitat from the Pacific Ocean"¹³. Hydro dams are part of the solution to global warming.</p> <p>Furthermore, on the East Coast, it is considered that the main threat against the Atlantic Salmon is acid rain¹⁴. Hydro dams, again, are an important part of the solution to acid rain in the North-Eastern parts of North-America where Hydro-Québec sells.</p>
<p>"Nevertheless, as a rule of thumb, the World Bank and others note that environmental impacts are proportionate to the scale of the project: large-scale, reservoir hydro-projects have profound immediate and secondary environmental and biodiversity impacts." (p. 17)</p> <p>"An intense debate has continued around assessing the comparable impacts of different sized dams – namely large-scale versus small-scale dams. The IEA notes that the trend is "away from reservoirs which inundate relatively large areas of valuable land, major settlements, areas occupied by indigenous people and areas with unique habitats. Generally, there is a tendency towards smaller sized reservoirs." (p.18)</p> <p>"An example of low impact hydro projects is the Canadian Hydro Developers Inc.: their portfolio for hydropower ranges from 6.6 MW – in Ragged Chute, Ontario – to as little as 1.3 MW, in Moose Rapids, also in Ontario." (footnote, p. 28)</p> <p>"In fact, the International Energy Agency has recently noted that any large-scale energy project is likely to be at odds with the goal of sustainable development." (p. 43)</p> <p>"Free trade in electricity opens new markets that otherwise would not have been served by a domestic utility. <u>Free trade not only brings with it new markets, but larger markets, which in turn can have important impacts on the size of generating facilities.</u>" (p.59)</p>	<p>See sections 4 and 5 of the present brief for a discussion and refutation of that bias against large-scale projects (for all options) pervading the whole analysis of the Working Paper.</p> <p>The same report by the IEA also states that comparisons of electricity generation options must always take into account the reliability and flexibility of the energy services provided. For example, "Windpower (...) needs a backup system with immediate response, generally hydropower with reservoir"¹⁵. Everything else being equal, small run-of-river projects will not provide the year-round amount of electricity services that large-scale multi-annual reservoirs do provide (both <u>energy</u> and <u>power</u> when needed).</p> <p>It would take more than 4 000 of these 1.3 MW plants to equal the capacity of the single Robert-Bourassa dam in Québec. To meet demand profile or to serve as back-up for wind power, there would also be a need for 4000 small reservoirs and/or diesel back-up plants.</p> <p>This unconditional preference for the small scale is no more rational in the fossil-fueled options area than it is for the renewables. Again, rational thinking tells us that 4 000 1.3-MW microturbines won't be more sustainable than 5 one-thousand-MW gas-fired-turbines plants. Microturbines are in fact much less efficient than large combined-cycle-turbines plants (see table 3 in section 4.3).</p> <p>This assertion is gratuitous. A freer continental trade, accompanied by unbundling of formerly vertically integrated monopolies should in principle be as much favorable to the emergence of small power producers. The more so since larger markets means more competition, which leads to short term profitability : this should create a favorable environment for the implementation of smaller</p>

¹⁵ IEA (2000), Hydropower and the Environment, Present Context and Guidelines for Future Action, Volume II, Main Report, IEA Hydropower Agreement, p. 55.

	production units. In anyway, it is the cumulative effect that matters from an continental environmental perspective (a perspective that goes with NAFTA's status). It doesn't really matter if the production units are small and numerous or large and few.
<p>"Such large-scale projects also have significant impacts on local and indigenous communities. For example, the Grand Council of the Crees recently noted their concern over the environmental challenges posed by large-scale river diversion, and the problem of methylmercury resulting from reservoir construction, and the broad ecological and social consequences of the creation of large reservoirs on the Canadian Shield." (p.18)</p>	<p>For the Crees or any other native people, it is simply normal to be "concerned" by projects. Hydro-Quebec's obligatory condition for any new hydro project is that it has to be "well received by local communities" ¹⁶. Accordingly, current hydro-projects on Quebec's North Shore or at James Bay are implemented in partnership with the local indigenous people. As for mitigative, health and compensation measures for mercury in reservoirs, there are specific provisions in a Convention signed with the Crees in 1986 ¹⁷. Apart from economic development, The James Bay Convention and its subsequent additions have conferred some exclusive hunting and fishing rights to the native peoples and even substantial financial support for the practice of the traditional activities of hunting, fishing and trapping ¹⁸.</p>
<p>"The construction of high tension transmission lines can result in habitat loss as land may have to be cleared to allow for the construction of transmission lines. It is not only the loss of habitat which can cause environmental impacts, but transmission lines can also fragment habitats." (p.8)</p>	<p>The exact opposite has been shown for northern transmission lines' right-of-ways in Québec where biodiversity for vascular plants and small mammals is higher than what is found in the natural surrounding habitats ¹⁹. This relatively high biodiversity is attributable to what is called the "edge effect". On the second part of the statement, negative effects ensuing from the fragmentation of habitats may have been shown for highways and roads. Nothing of the sort has been shown for transmission lines, which constitute much quieter and nature-friendly milieux than roads. This statement of the Working Paper is not supported by any reference.</p>
<p>"While somewhat controversial, there is also evidence that transmission lines can have harmful effects on people who live in close proximity to them from electromagnetic radiation they emit." (p. 8)</p>	<p>Again, this statement is not supported by any reference and it has the tone of ear-say. The World Health Organization goes beyond ear-say and bases its opinion on the whole body of knowledge available: "<u>Despite many studies, the evidence for any effect remains highly controversial. However, it is clear that if EMF does have an effect on cancer, then any increase in risk will be small. The available evidence contains many inconsistencies, but no large increases in risk have been found for any cancer in children or adults. It is possible that exposure to EMF in the home may slightly increase the risk of childhood leukaemia and exposure at work could slightly increase the risks of leukaemia and brain tumors in adults. Other explanations for these findings are possible. Large-scale studies are currently underway in several countries to help resolve these issues</u>" ²⁰. EMF measurements conducted in Québec show that outside high voltage line right-of-way, the public is never exposed beyond the limits recommended by the International</p>

¹⁶ Hydro-Québec (2001), Strategic Plan 2002-2006.

¹⁷ Hydro-Québec (1994), *La Grande Hydroelectric Complex; Mercury and Hydroelectric Development*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 7.

¹⁸ Hydro-Québec (1996), *La Grande Hydroelectric Complex; The James Bay and Northern Québec Agreement and Subsequent Agreements*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 3.

¹⁹ FORAMEC (2000), *Caractérisation de la biodiversité dans les emprises de lignes de transport d'énergie électrique situées en forêt boréale*, Rapport d'ensemble 1998-2000, présenté à TransÉnergie, Direction Expertise et Support technique de Transport, Lignes et Câbles et Environnement.

²⁰ World health Organization (1999), *Electromagnetic Fields*, Public Health, No.32.

²¹ Hydro-Québec (1995), *Electric and Magnetic Fields and Human Health*. This document was produced as part of Hydro-Québec's Action Plan on the biological effects of electric and magnetic fields.

	<p>Commission on Non-Ionizing Radiation protection (ICNIRP)^{21, 22, 23, 24}. Standards based on the precautionary principle are considered for home appliances and wiring and for some occupational situations. There remains no reasonable grounds for scaring people about ill-effects related to properly planned transmission lines. Furthermore, there is no exposure to EMF for the large lines going from Northern projects to cities (because of the very low population densities there); and in urban areas, population exposure from defective home wiring and appliances would be the same no matter the generation option.</p>
<p>"Unfortunately, despite these efforts, LCA [Life-Cycle Assessment] has not been used to examine upstream, downstream, operational or secondary effects of large-scale dams themselves.(...) Given the difficulty in making these comparisons [with fossil fueled options], a recent report from the World Commission on Dams noted that, taken together, the impacts of dams on ecosystems are profound, complex, varied, multiple and mostly negative." (p. 19)</p> <p>"The extent of that emission and environmental impact displacement is difficult to forecast. However, based on an analysis of current levels of exports from Canada to the US – that is approximately 9 percent of total generation – further broken down by provinces, fuel sources and emission factors, a back of the envelope estimate suggests that emissions in 1999 related to total Canadian exports were the equivalent of 3.6 million tonnes of CO2 emissions, 28.3 thousand tonnes of SO2 and 9.7 thousand tonnes of NOx". (p. 60)</p>	<p>Hydro-Québec routinely does thorough LCAs²⁵ and cumulative impact studies to compare and assess its generation options. All aspects (social, economic, ecological, hydrological, etc.) at all levels (upstream, downstream, operational, secondary effects) of its projects have been done in a <i>state of the art</i> way in for the past 30 years²⁶. To conclude against dams in the most pessimistic way "given the difficulty in making these comparisons" is not a reasonable argument and demonstrates nothing but prejudice.</p> <p>This statement is false. It is based on the untenable assumption that the electricity exported creates its own additional demand and replaces no U.S. domestic power production. To these gross, back of the envelope estimates, we can oppose net, precise and independently audited results. In 1998, Hydro-Québec's net exports to the US allowed the avoidance of 14,4 million tonnes of CO2, 60,4 thousand tonnes of SO2 and 23,5 thousand tonnes of NOx by U.S.-based power producers^{27, 28}.</p>
<p>"In October, Hydro Quebec announced plans to build a natural gas plant south of Montreal, with a generation capacity of approximately 800 MW. A portion of this generating capacity will be destined to the US market." (p.50)</p> <p>"It is worth noting once again that trade in electricity in North America began in the mid-1970s, when US buyers turned away from imported oil to cheaper Canadian hydropower. This opening of new export potential in turn prompted several large Canadian utilities – notably Hydro Quebec, the continent's largest exporter – to expand hydropower generation to meet increased foreign</p>	<p>Construction of hydroelectric plants can anticipate demand, export residual volumes of electricity and then progressively repatriate those exports as domestic demand grows²⁹. But Hydro-Québec has never built plants that were dedicated solely for export. In contradiction with the gratuitous assertions of the Working Paper, Hydro-Québec's <u>net</u> exports of electricity are expected to shrink to about nothing in the coming years due to the fact that all Québec's generation capacity will go to meet the power needs of Québec's own domestic market³⁰.</p> <p>The natural gas plant in question is the best available technology in</p>

²² MSSS (2000), Consensus sur l'évaluation et la gestion des risques associés à l'exposition aux CÉM provenant des lignes électriques, 34 p., mai 2000.

²³ Mandeville, R. et al (2000), Bioelectromagnetics, 21 : 84-93, 2000.

²⁴ Mandeville, R. et al (2000), Bioelectromagnetics, 21 : 432-438, 2000.

²⁵ Hydro-Québec (2000), *Comparing Environmental Impacts of Power Generation Options : Land Requirements; Energy Payback; Biodiversity; Acid Precipitation; Greenhouse Gas Emissions*. These information sheets are available on the Internet Site of H-Q.

²⁶ Hydro-Québec (2001), Justification environnementale des choix énergétiques pour le Québec, Septembre 2001. Hydro-Québec (1998), *La Grande Hydroelectric Complex; Environmental Studies in the James Bay Region Since 1971*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 15. Benson, N.G. (1992), *James Bay: An Unprecedented Environmental Assessment Program*, Forces, No. 97 (Spring 1992): 84-85. Carpentier, J.M. (1992), *The Environment at James Bay: A Comprehensive Ecological Approach*, Forces, No. 97 (Spring 1992): 73-75. Hydro-Québec (2001), *Synthèse des connaissances environnementales acquises en milieu nordique de 1970 à 2000*.

²⁷ Comparison between average emissions of Hydro-Québec and those of the producers in its export markets were audited and certified by: Deloitte & Touche, LLP, Chartered Accountants (2001), *Auditor's report on energy supply sources and air emissions from Hydro-Québec*, 1 Place Ville-Marie, Suite 3000, Montréal, H3B 4T9, Fax.: (514) 390-4109.

²⁸ Hydro-Québec (2001), *L'environnement: Plus qu'un engagement*, Rapport de performance environnementale 2000.

²⁹ Electricity from large-scale hydro plants reaches the market in too big chunks to be immediately absorbed entirely by a relatively small market such as Québec's. It's only rational management to export residual volumes while waiting for the local market to progressively absorb it.

³⁰ Hydro-Québec (2001), Strategic Plan 2002-2006.

demand." (p. 59)

the natural-gas-fired-combined-cycle plants option. It is being planned and can be assessed, authorized and commissioned readily as an insurance policy to absolutely avoid any possibility of a California-type energy crisis in Québec. If the recourse to gas turbines has become necessary, it is because the commissioning of new hydro projects has been hampered by strong political and administrative deadlock, by up to three to eight years of studies and authorizations gathering, all that added to the unavoidable 6 to 8 years of construction. On the other hand, most fossil-fueled generation projects do not need to be permitted under the Canadian Fisheries Act, often do not trigger the Canadian Environmental Assessment Act and can be rapidly built. They therefore can come on line in less than 4 years (studies and authorizations included).

4. The Working Paper falls victim to the unfounded belief in the *small is beautiful* philosophy

4.1. The *small is beautiful* philosophy, as applied to hydropower, is an inconsistent preference and it has no ecological foundation :

- First, some ecologists prove themselves very inconsistent in their support for the small-scale. Small-scale run-of-river hydro projects, which often qualify for *Renewables Portfolio Standards*, have traditionally been considered environment-friendly by ecologists, as opposed to the large-scale ones :

"We must add to these numbers [the energy savings potential of 5 000 mgw] the potential of small and medium scale hydroelectric plants, which is estimated at a production capacity of almost 15 000 mgw. This sector could be developed jointly with the private sector, thus enlarging the sphere of our competencies and creating jobs in an area where the world market is considerable. "

Greenpeace Québec (1993)³¹

But when Québec's government recently launched a program to allow the development, by the private sector, of the best small-scale run-of-river hydropower sites in the province, a strong opposition movement, led by major environmental groups, immediately manifested itself³². The small-scale hydro projects have suddenly become absolutely unacceptable for these same groups, especially since they are subsidized and they don't have reservoirs to meet demand. These opponents now even suggest that Hydro-Québec should instead build a couple of large-scale projects :

*"If sold in Québec, the electricity of the small dams will be more expensive than that produced by Hydro-Québec. (...) But the state-owned utility [Hydro-Québec which will buy and sell that small-scale production] asserts that it will make it profitable by selling it on external markets, profitable only during summer because the Americans use a lot of air conditioning. So, without reservoirs, those small run-of-river plants won't be able to store the energy to sell it when it is profitable. (...) **If Hydro-Québec really needs those additional megawatts, let it build itself one or two large-scale projects instead of the small-scale ones.** (...) All Quebecers should have their say in the management of our natural resources. But the PQ politics offers the choice to the local communities. This is*

³¹ Greenpeace (1993), *Moins de béton, plus d'imagination*, Mémoire de Greenpeace Québec Présenté par François Tanguay, responsable du dossier Énergie, Commission parlementaire pour l'évaluation de Plan de développement 1993 d'Hydro-Québec.

³² The 25 opposing groups included Greenpeace-Québec, Eau Secours, Aventure Éco-tourisme and the Québec Union for the Conservation of Nature. Sources : June 2001, *Formation d'un vaste regroupement québécois d'organismes opposés au nouveau*

parceling of interests. Quebecers should decide collectively if we need these plants and, if so, where we should build them."

Jean-François Blain, spoke-person for the *Eau Secours* coalition³³

Small-scale has traditionally been the preferred option of these interest groups until the authorities became serious and practical about it. All this proves very inconsistent.

- Second, the *small is beautiful* preference has no theoretical foundation. A very simple geometrical model suffice to show that there is no inherent ecological virtue in the small scale. On the contrary, there are environmental economies of scale to get from large-scale hydro. Figure 1 illustrates this principle³⁴.

This model is of course very theoretical. But so is also the belief in the superiority of small-scale sites and plants. Furthermore, this geometric theoretical rule is supported by statistical analysis. Table 2 below shows that the average reservoir area per MW of existing hydro capacity may increase up to 8 times for small projects :

Table 2 : Average Size of Hydro Reservoir per Unit of Capacity³⁵

Size of plants (MW)	Number of plants in category	Average size of reservoir per unit of power (hectare / MW)
3 000 to 18 200	19	32
2 000 to 2 999	16	40
1 000 to 1 999	36	36
500 to 999	25	80
250 to 499	37	69
100 to 249	33	96
2 to 99	33	249

The main virtue of small-scale hydro is political and institutional : it is easier to license and easier to accept for local communities; and it can be built more rapidly. The truth is that there are good sites for small-scale hydroelectric plants and good sites for large-scale ones. There are also bad sites and bad projects for either. The practice of sound environmental impact assessment (EIA) should guide our

programme de centrales hydroélectriques privées: <http://www.canot-kayak.qc.ca/>. Le Devoir, 14 décembre 2001, *Des rivières mises en adoption*, page A-2.

³³ Métro, 10 octobre 2001, *Pour quelques poignées de mégawatts*, pages 10-11.

³⁴ The model and figure 1 come from : Drapeau, J.-P. and Y. Guérard (1993), *Rehabilitating Hydroelectricity and Refuting the Lies*, Brief presented to the parliamentary committee responsible for studying Hydro-Québec's proposed 1993 Development Plan, GRAME.

³⁵ Source of data : Goodland, Robert (1995), *How to Distinguish Better Hydros from Worse : the Environmental Sustainability Challenge for the Hydro Industry*, The World Bank.

decisions on a case by case basis³⁶: it is their fundamental purpose. The *small versus large-scale* debate is simply not relevant to the goal of sustainable development.

4.2. The *small is beautiful* philosophy, as applied to hydropower, has also become a pretext used as a non-tariff barrier raised against large-scale hydropower projects

This aspect was discussed in section 2 above. The Background Paper *NAFTA Provisions and the Electricity Sector* makes it very clear and its interpretation should prevail and be maintained.

If the exclusion of large-scale hydro is simply the result of an ill-founded belief in an inherent superiority of the small scale, a belief that is then used as a pretext for protectionism, we refer the reader to the demonstration of section 4.1.

If, rather, the exclusion of existing large-scale hydro from Renewables Portfolio Standards ensues from a fear of seeing the RPS quotas flooded by existing hydro capacity, then a rational and efficient compromise solution may be designed. We then refer the reader to the suggestion contained in section 7 of the present brief.

4.3. The belief in the *small is beautiful* philosophy is no more valid in the distributed generation area than it is for hydropower.

Unfortunately, the Working Paper seems to fall victim to the illusion in that area as well : "*Other factors that could influence the environmental outcomes in future years include technological advances in clean energy, including hydrogen based fuel cells and the extent to which distributed generation develops on the continent*"³⁷.

- First, numbers show that distributed generation with micro-turbines or fuel cells is no more efficient – or is much less efficient, especially with the micro-turbines –, regarding GHG emissions, than combined cycle [natural] gas turbine plants. Table 3 shows these numbers³⁸.
- Second , the efficiency of distributed generation in lowering greenhouse gas (GHG) emissions, as compared to GHG emissions of a coal-fired power plant, lies essentially on its use of natural gas. If powered with petroleum instead of natural gas – which is a very likely scenario, particularly in an off-

³⁶ On a case by case basis but, of course, without forgetting the study of the possible cumulative effects.

³⁷ CEC (2001), Working Paper, Footnote # 59.

³⁸ Greene, N. and R. Hammerschlag (2000), *Small and Clean is Beautiful : Exploring the Emissions from Distributed Generation and Pollution Prevention Policies*, The Electricity Journal, June 2000.

grid context ³⁹ –, the fuel cell loses its advantage even if compared with conventional coal fired power plants : that is because the proportion of hydrogen to carbon atoms, which is about 4 / 1 in natural gas which is essentially composed of methane (CH₄), falls to about only 2 / 1 with fuels such as gasoline, diesel or heating oil ^{40, 41} .

- Greenpeace and other proponents of fuel cells and hydrogen [as seen as a green energy] deny these fundamental contradictions by implying that the hydrogen will be cleanly produced with wind and solar farms. So-called *green* fuel cells are nothing but batteries for solar and wind power and should be advertised as such. Fuel cells are only a conversion process and should not be recognized as a source of *green* energy. It must be noted here that hydroelectric reservoirs can store solar and wind energy for a much lower price – and with greater efficiency – than hydrogen production can do (and for large areas in the context of an open continental market).

In short, instead of being a way out of the *key question* mentioned on page 29 of the Working paper , distributed resources are themselves facing that very same key question: "*The key question from an environmental perspective is : will planned expansion (or switch in Mexico) to natural gas take place, or will increases over time in natural gas prices pull investments away from gas, and towards other fuel sources*". Distributed generation can be an interesting environment-friendly alternative to coal fired power plants if, and only if, they can rely on cheap and abundant natural gas supplies. It then remains a simple question of the superior quality of natural gas as compared with that of coal regarding intrinsic GHG emissions potential. It goes for distributed generation units as it goes for gas-fired-turbines plants : natural gas pollutes less than coal . If however, as was shown above, distributed generation units were running on oil, their greenhouse gas emissions would then present little or no gain as compared to those of coal-fired power plants. Smallness and decentralization of the electricity generation units are a simple esthetic preference that presents no obvious environmental benefit. It could in theory reduce the need for new transmission and distribution lines if it offered the level of reliability that centralized generation do provide; but it would also require added capacity for the transport and distribution of natural gas. As shown above, the preference for distributed generation could become counter-productive if gas prices

³⁹ Barlow, Russ (1999), *Residential Fuell Cells : Hope or Hype ?*, Home Power No. 72, August/September 1999, pp. 20-29.

⁴⁰ Source: Institute of Information & Computing Sciences (2001), Subject : Gasoline FAQ, <http://www.cs.ruu.nl/wais/html/na-dir/autos/gasoline-faq/part1.html> . Final EA 6A- 1 Volume 2 Appendix 6A Composition of Crude Oil and Refined Products Crude oils can vary greatly in composition, viscosity, density, and flammability: <http://www.epa.gov/Region06/6en/xp/lppapp6a.pdf> .

⁴¹ If powered with coal, fuel cells would emit at least twice the amount of CO₂ compared to as if with natural gas. Source: Fulkerson, W., R. Judkins and M. Sangvi (1990), *L'énergie des combustibles fossiles*, Pour la science, No 157, nov. 1990, pages 98 à 106.

went up and induced a shift towards oil supplies. On the whole, there is no environmental reason for smallness and decentralization to be promoted or favored by the NAFTA environmental body (the CEC).

5. EIA must become serious with the cumulative effects and with the level of service provided for all generation options

Concerning Environmental Impact Assessment (EIA) harmonization, we insist on the fact that these studies are a product of science and that their conclusions, corrective prescriptions and forecasts can be monitored and verified. These assessments are sophisticated and based on expertise. They contradict ideologically biased and simplistic assumptions such as the ones found in sections 4 and 6 (pages 28 and 43): "*... size matters : the magnitude of environmental damages from future hydropower will largely be a function of the size of those projects. (...) any large-scale energy project is likely to be at odds with the goal of sustainable development.*" These simplistic statements ignore the first lesson of the most basic *cumulative effects* study in an EIA : that you can't compare the impact of a large-scale 400 MW electricity plant (be it coal-fired, gas-fired or hydraulic) with the impact of a small-scale 2 MW unit (be it a gas-fired micro-turbine or a hydroelectric plant). Logic compels one to compare options or projects on the basis of a similar energy production and level of service. Because it neglects this basic knowledge, the Paper is misleading concerning the small versus large-scale debate as well as the Cumulative effects issue in section 7. This is the more troubling since the small-scale projects often avoid a formal EIA and its cumulative effects study. The sub-section *Long-range and cross boundary impacts and their assessment* in section 7 does raise the issue of projects that avoid formal EIA and their related public consultations but it fails to link this issue to the small-scale projects : the installation of a micro-turbine will never be examined in the context of a formal EIA. The Working Paper should have stressed the necessity of generic EIA, including thorough examination of cumulative effects, for small-scale and decentralized units.

Also, the Working Paper appears very weak in another aspect of option comparisons, always opposing dams with reservoirs to dams with small or no reservoirs. This is a major inconsistency since a report by the IEA, often cited in the Working Paper, states clearly that comparisons of electricity generation options must always take into account the reliability and flexibility of the energy services provided. For example, "*Windpower (...) Needs a backup system with immediate response, generally hydropower with reservoir*"⁴². Everything else being equal, smaller reservoirs will provide smaller electric services. Smaller reservoirs means that more thermal plants are required to meet peak demand and fluctuations in demand.

⁴² IEA (2000), *Hydropower and the Environment, Present Context and Guidelines for Future Action, Volume II, Main Report*, IEA Hydropower Agreement, p. 55.

Another area of concern is the current inequity in EIA and authorizations gathering among the generation options. In Québec, the recent recourse to gas turbines has become necessary because new hydro projects have been hampered by strong political and administrative deadlock, by up to three to eight years of studies and authorizations gathering, all this added to the unavoidable 5 to 8 years of the construction period. On the other hand, most of the time, fossil-fueled generation projects do not need to be permitted under the Canadian Fisheries Act and often do not even trigger the Canadian Environmental Assessment Act. The same kind of inequity is found in the US. If the EIA procedures in Canada and the U.S. were as severe for fossil-fuel-fired options than they are for hydroelectricity – if, for example, they had to assess the environmental impact of the cumulative effects of their greenhouse gas emissions – their studies and authorization processes would last for decades. This inequity in EIA requirements could be considered, at the continental scale, as a non tariff barrier penalizing a category of producers and consumers and hampering the development of renewables. CEC's Working Paper should have addressed that very real EIA issue and should have proposed ways of solutions.

6. Demand-Side Management : further gains in efficiency may be more difficult than expected. Hydroelectricity may help in that respect

In the second paragraph of section 6, the Working Paper states that "*the environmental projections* [for the demand in electricity during the next ten years] *noted in Section Three above reflect a supply-intensive vision of energy needs*". This statement may not be exact. For example, Hydro-Québec forecasts that, from 2002 to 2011, *carryover effects* – natural savings ensuing from clients' initiatives, from new standards for appliances and materials, from technological innovations but also from retrofit and replacement of old buildings by newer, more efficient ones – will progressively and spontaneously make it possible to save 2,6 TWh a year in avoided electricity demand. The *carryover effects* do not need any particular effort on the part of Hydro-Québec but the projections for demand take full and explicit account of these natural savings. Hydro-Québec nonetheless forecasts an 11 % growth in total demand for electricity over the period (2002-2011) ⁴³. We suspect that similar forecasting methods apply to the projections noted in section 3 of the Working Paper. The *Demand Side Energy Efficiency Opportunities* exposed in section 6 are part of these natural savings – like already existing eco-labeling or more stringent standards for lighting and appliances – and may already have been taken into account, at least in part, in demand projections of section 3. If we are right on this, additional gains in energy efficiency may be much more difficult to achieve than what is implied in section 6 of the Working Paper. This is due to the law of diminishing returns : further gains are harder and more expensive to achieve than former ones because, unless there is an improbable technological breakthrough, you already have tapped the potential of the cheapest and easiest technologies.

The *carryover effects* of natural savings, as compared to DSM programs implemented by electricity distributors, will have a substantial impact on future electricity demand. For example, from 1990 to the year 2000, Hydro-Québec invested half a billion Canadian dollars (300 million US \$) in a full-fledged DSM program that made it possible to save 2.5 TWh of energy per year ⁴⁴. But, as stated in the paragraph above, Hydro-Québec also forecasts that, from 2002 to 2011, the *carryover effects* will save another 2,6 TWh a year in avoided electricity demand and that will happen at no cost for the utility or its clients. So the two approaches will have the same impact but at very different costs. These results should be taken into account when one looks for the most effective approaches to the goal of demand side management. It can

⁴³ Hydro-Québec (2001), *Strategic Plan 2002-2006*. Hydro-Québec Distribution (2001), *Demande d'approbation du plan d'approvisionnement 2002-2011 du distributeur*, Présenté à la Régie de l'énergie du Québec, R-3470-2001, HQD-2, Document 1, pages 16-18.

⁴⁴ Hydro-Québec (2001), *Strategic Plan 2002-2006*.

be suspected that the carryover effects show results that are much more robust than those of DSM programs initiated by public utilities. Moreover, more stringent efficiency standards have other comparative advantages :

- They avoid the time-consuming negotiations and discussions on *state of the art* DSM procedures. They avoid the need for complex mechanisms such as Shared Savings Mechanisms (SSM) and Lost Revenue Adjustment Mechanisms (LRAM) which aim at encouraging the distributors to implement DSM programs.
- They avoid the problem of sub-optimal subsidies to the participating customers and the problem of free-riders.
- They are insensitive to the problems of deregulation and restructuring of the electric industry which have plagued DSM initiatives and Integrated Resource Planning logic during the last decade.
- They can be acted upon on a large scale (national, international) by the imposition of standards on manufacturing, emissions or processes.

They are also more likely than classic DSM programs to be successfully transferred towards Mexico which do need energy efficiency but not necessarily all the problems encountered by utility-led DSM initiatives in a regulated / deregulated context. However, the accounting and real performance of the *carryover effects* is difficult to judge correctly : one can blow up its apparent impact simply by over-estimating the demand growth in the base case scenario. Strongly increased efforts in R&D and the promulgation of ever-higher performance standards, upstream and at a supranational level, may prove more resilient than scattered DSM initiatives at the public utilities level, notably for Mexico. To produce real incremental results however, such upstream strategy would need some monitoring and measuring standards as well as some institution to do it. It would also need stowing with the possible recourse to some economic instrument (subsidy for R&D, technology transfer, explicit price signal). NAFTA could play here a positive environmental function. The Working Paper should be more explicit on this.

On the pessimistic side again, if the opening of the continental market has a tendency to lower the prices of electricity, they will have an equal tendency to lower the potential savings of DSM. Because conservation potential is higher when prices are high. We would have hoped that the Working Paper document seriously this aspect and propose ways out of the current difficulties.

The first paragraph of section 6 of the Working Paper may contain some wishful thinking and counter-productive prejudice :

"One of the clear lessons of energy efficiency after more than a quarter century of performance is a simple one : it is cheaper to save energy through efficiency gains than it is to build and operate new plants."

First, this statement is simplistic : if adding new capacity is relatively cheap and implementing energy conservation measures is relatively expensive, the statement is false. Which is often the case. Of course, if environmental costs were fully internalized in electricity tariffs, the statement would become more truthful. This is less often the case. And the Working Paper does not indicate where, how and to what extent NAFTA could contribute to the internalization of environmental costs.

Second, the statement ignores the intrinsic energy efficiency gains that come from adding electric capacity from renewable sources. Québec's historical case can illustrate our point. From 1979 to 1999, while the total number of households was increasing by 47 %, total energy consumption of the housing sector decreased by 12,5 %⁴⁵. The major part of this impressive result was achieved essentially by switching from oil – which had an end-use efficiency of about 60-65 % in home-heating⁴⁶ – to hydroelectricity – which has an end-use efficiency of 100 %. And this switch was possible because Hydro-Québec more than doubled its installed hydroelectric production capacity. In short, hydroelectric development does constitute, in itself, a powerful end-use efficiency measure. The more *economically feasible* hydroelectricity will be important in NAFTA countries' energy mix, the more their energy end-use and energy supply side efficiencies will improve. Section 6 of the Working Paper completely ignores this very fundamental fact and chooses instead to indiscriminately oppose DSM to any kind of additional capacity.

Section 5, page 36 of the Working Paper, notes the possibility of a rebound effect ensuing from subsidies to renewables and conservation: *"a price depressing effect on markets, which in turn lead to an increase in total CO₂ emissions"*. This could also contribute to a more pessimistic prognosis of the potential of DSM. There may be a way out of this catch. The way out is based on two major facts : First, as is demonstrated in the above paragraph, *additional hydroelectric capacity dedicated to the replacement of fossil fuels* improves the overall efficiency of the energy systems (from generation to end-uses). Second, it does not benefit from any subsidy at all; hydro projects are even often used as a way to help regional development and to assist economic sectors such as agriculture and water supply management : this is the exact opposite of being subsidized. Accordingly, it would then not be subject to the rebound effect. No subsidies are needed; the removal of non-tariff barriers such as discriminatory RPS

⁴⁵ Ministère des Ressources naturelles (2001), L'Énergie au Québec, pages 14-16.

and the alleviation of political and administrative deadlocks would suffice. In this way, a combination of added renewables capacity and electrification of some end-uses could help DSM to live-up to its expectations. This way out of a classic catch could be explored at the continental level. The Working Paper chooses instead to ponder on the relative merits of large and small scales of electricity generating units.

7. Large-scale Hydro is indisputably renewable and should be part of RPS; solutions satisfying for all are possible

Section 6 of the Working Paper completely neglects the superior efficiency of hydroelectricity from generation to end uses.

What is even more worrying is that the sub-section on renewable energy, while it fairly stresses the question of the definition of what is *renewable*, it fails to follow the issue to its limit : that the so-called Renewables Portfolio Standards, if they do exclude large hydro, will in fact severely limit the potential of renewables instead of increasing it. NAFTA is not an interest group and should not even accept to discuss the renewability of large-scale hydroelectricity: it is indisputably renewable (if words must keep their meaning) ⁴⁷. Its frequent exclusion from the so-called *Renewables Portfolio Standards* is rationally indefensible. It severely limits the potential contribution of renewables in the continental market instead of increasing it. Finally, it violates NAFTA's principles. As it is clearly shown in the Background Paper, this current approach to choose and pick renewables according to local interests has produced a set of State portfolios that are all different. An approach where all renewables are included fairly would reduce such disparities.

There may be possible compromise solutions on this very contentious issue. For example, if the RPS is to encourage the development of more renewable energy, such an RPS could include only those hydro projects that were built after 1999. With this approach, existing hydro would not be competing with new windpower. The competition would be between new windpower and new hydro (which is much more expensive than existing hydro). This would widen the opportunities for renewable development, increasing the efficiency of the RPS ⁴⁸. Hydro-Québec had already made that same suggestion in an earlier paper

⁴⁶ Essentially, heat losses occur through the chimney.

⁴⁷ Gagnon, L. and C. Bélanger (1998), *Windpower : More Renewable than Hydropower ?* Hydro Review, August 1998.

⁴⁸ Adopting a separate RPS for existing renewable facilities would also be justified to ensure that existing renewables continue to avoid air pollution in a given region, at a reasonable cost. In this case, hydro can provide large reductions in air emissions, because of its large capacity and low costs.

presented to the Commission for Environmental Cooperation⁴⁹. We were disappointed that this proposition was not even mentioned nor discussed in any of the working or background papers prepared for the present consultation.

However, the recognition of hydropower facilities of any size as sources of renewable energy should not be perceived as preventing the development of any type of renewable technology. For instance, a local government may choose to help windpower technology with R&D subsidies or other programs collected through a public charge whereas mature hydro technologies would not necessarily need such a support. There is often a confusion between the purposes of subsidies, public charges or Trust Funds on one hand, and the purpose of an RPS on the other hand. This confusion may explain the exclusive and protective approaches adopted up to now. The RPS purpose is to encourage the development of renewable facilities whereas the trust fund should focus on supporting technological development of emerging technologies. If these respective purposes would be made clear, including the lowest cost renewables in RPS would not be considered an unfair competition relative to more expensive ones such as windpower. On the contrary, the RPS could then serve to enlarge the total share of renewables in the market, facilitating the emergence of new technologies while helping the more mature renewable technologies in their competition with fossil-fueled options. The R&D of a specified renewable energy option could then be financed by a Trust Fund.

8. Québec and Canada are not pollution havens

As Canadians and Québécois, we object strongly and feel offended by the insinuations, contained in the last five paragraphs of the Working Paper (pages 60-61), insinuations to the effect that we could be deriving a "*comparative advantage in the production of toxic intensive industries*" from our "*lax environmental regulations*" and "*lower ... environmental standards for the operation of large-scale reservoirs*" (see section 8 of this brief). Basically, it implies that Canada is a pollution haven :

"However, there is evidence that some companies may use environmental regulatory differences strategically, to lower operating costs. Although the pollution haven argument in general has not found robust empirical backing, there are instances (...) similarly (...) Alberta or Québec (...)"

⁴⁹ Hydro-Québec, External Regulatory Affairs, (2000), *Environment and Electricity Restructuring in North America*, Paper presented to the North American Commission for Environmental Cooperation, June 2000, pp. 22-23.

The Canadian and Québécois environmental regulations are as serious and thorough as those found in neighboring jurisdictions – as is the overall performance in the field and in toxic pollutants emissions numbers.

For hydroelectric projects at James bay and in Northern Québec (a territory representing two-thirds of Québec's province area), the promoter has to cope with 3 to 5 evaluating committees all of them including an important representation of native populations (for both the planning of the environmental assessments and then to examine their final results), 2 levels of governments and their many agencies and own laws. These EIA have cost millions of dollars, as have mitigative, monitoring and compensation measures.

For example, the EIA for the Great-Whale hydroelectric project has cost 80 million dollars and lasted 15 years. The total cost of EIA and engineering studies – these engineering studies do search for the optimal environmental and economic design – for the Great-Whale project amounted to an impressive total of 500 million dollars. No other project in North-America has ever put such efforts, time and expenses to minimize its environmental impact.

All aspects (social, economic, ecological, hydrological, etc.) at all levels (upstream, downstream, operational, secondary effects) of these projects have been studied in a *state of the art* way for the past 30 years⁵⁰ (see section 3 of this brief). With the monitoring and mitigative measures for mercury, our environmental practices are even internalizing here costs that are avoided by neighboring jurisdictions.

Each project has to pass the stringent requirement of "*no net loss of fish habitat productive capacity*" of the Canadian Fisheries Act.

The unfounded and frivolous assertions of the CEC Working Paper must be removed.

⁵⁰ Hydro-Québec (2001), Justification environnementale des choix énergétiques pour le Québec, Septembre 2001. Hydro-Québec (1998), *La Grande Hydroelectric Complex; Environmental Studies in the James Bay Region Since 1971*, Information sheets produced by Hydraulique et Environnement, Groupe Production, Sheet # 15. Benson, N.G. (1992), *James Bay: An Unprecedented Environmental Assessment Program*, Forces, No. 97 (Spring 1992): 84-85. Carpentier, J.M. (1992), *The Environment at James Bay: A Comprehensive Ecological Approach*, Forces, No. 97 (Spring 1992): 73-75. Hydro-Québec (2001), *Synthèse des connaissances environnementales acquises en milieu nordique de 1970 à 2000*.

**Comments of the
Union of Concerned Scientists**

to the

Commission for Environmental Cooperation

**In response to its “NAFTA Provisions and the Electricity
Sector” Background Paper to its**

October 22, 2001, Working Paper Entitled

**"Environmental Challenges and Opportunities
of the Evolving North American Electricity Market"**

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The Union of Concerned Scientists is a nonprofit partnership of scientists and citizens combining rigorous scientific analysis, innovative policy development, and effective citizen advocacy to achieve practical environmental solutions.

UCS has testified on Renewable Portfolio Standards before the U.S. Senate Energy & Natural Resources Committee and a number of state legislative committees and regulatory commissions. UCS has published a number of reports on Renewable Portfolios, including *Powerful Opportunity*, *Powerful Solutions*, *Powering Ahead*, and *Clean Energy Blueprint*. For these reports, and additional information on renewable energy and Renewable Portfolio Standards, see <http://www.ucsusa.org/energy/>

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Introduction

Conserving the world's exhaustible resources while maintaining and increasing the quality of life has long challenged the world's policy makers. A recently developed policy, the "renewables portfolio standard" ("RPS"), seeks to promote this goal in a manner that relies on competitive markets. The RPS, briefly put, is an obligation on each retail seller of electricity to include in its resource portfolio a certain amount of electricity from a defined group of renewable energy resources. The policy often enables retailers to "trade" their obligation; that is, instead of maintaining renewable energy in their own energy portfolios, retailers are allowed to purchase tradable credits that demonstrate that someone else has generated the required amount of renewable energy.

U.S. state RPS laws have adapted effectively the prior practice of regulating utility resource acquisitions to the competitive electricity market (see, e.g., Maine PUC, 1998; NARUC, 2001). Because the historical practice, known as Integrated Resource Planning ("IRP"), was often considered incompatible with greater competition, the RPS enables the achievement of IRP goals in a market context.

Over the last five years, seven states in the United States have enacted statewide RPS statutes with a tradable feature and five other states have similar renewable energy standards. RPS proposals are pending in many other states and in Congress as well.

On October 22, 2001, the North American Commission for Environmental Cooperation (CEC) issued a Working Paper entitled "Environmental Challenges and Opportunities of the Evolving North American Electricity Market." The Working Paper discussed, among other things, concerns that U.S. state RPS laws might violate the North American Free Trade Agreement ("NAFTA"). As partial support for these concerns, the Working Paper cited a legal analysis it had commissioned (Horlick, 2001) ("hereinafter cited as the "Horlick paper").

The present paper responds to these concerns.

Part I describes the values of emphasizing renewable energy resources, and how those values are consistent with NAFTA.

Part II responds to specific concerns that RPS statutes might violate NAFTA.

Part III explains why one proposed resolution of the NAFTA concerns -- the imposition of an identical definition of RPS-eligible renewables throughout North America, would render RPS statutes ineffective.

I. RPS Statutes Promote Values Long Recognized in International Trade Law

A. Values of emphasizing renewable sources

Renewable energy resources benefit consumers and society. These values are cited in the preambles to a variety of state RPS statutes.¹ Prominent among these values are four:²

Environment: Renewable energy resources are recognized to have relatively low impacts on the environment. Compared with fossil fuel and nuclear plants, most renewable energy resources have modest environmental impacts in many or all of the following areas: air pollution, climate change, degradation of land and water, water use, wildlife impacts, and radioactive wastes. (See, e.g., CEC, 1999; Serchuck, 2000).

Conservation of exhaustible resources: The increased use of renewable resources necessarily reduces dependence on exhaustible resources. In the case of renewable energy resources, these exhaustible resources include finite stocks of fossil fuels, the finite ability of the Earth's atmosphere to absorb carbon dioxide (CO₂) emissions while maintaining a stable climate, and finite clean air resources.

Resource diversity benefits: Conserving exhaustible resources by increasing the use of renewable energy resources increases the diversity of energy supplies. This diversity increases price stability, improves electrical system reliability, and promotes competition:

- X Renewables contribute to price stability because of the tempering effect of fixed-cost resources in an electric system that relies heavily on variable-cost fuels.

¹ See, e.g., Maine, Public Law 1999, ch. 398, sec. 3210 ("to ensure an adequate and reliable supply of electricity for Maine residents ... to diversify electricity production on which residents of this State rely"); New Jersey, Subchapter 8, N.J.A.C. 14:4-8 ("encourage the development of renewable sources of electricity and new, cleaner generation technology; minimize the environmental impact of emissions from electric generation; reduce possible transport of emissions and minimize any adverse environmental impact from deregulation of energy generation"); Texas, Substantive Rule Section 25.173 ("reduce air pollution in Texas that is associated with the generation of electricity using fossil fuels; ... respond to customer preferences that place a high value on environmental quality and reflect a willingness to pay a higher price for "clean" energy acquired from renewable resources"); California, Senate Bill 532 (2001, pending) ("Improves the resource diversity in the electricity market that serves the state, and increases the reliability of the state's electricity system.").

² This section draws from NARUC, 2001. See that report for further discussion on these points.

- X Renewables improve system reliability by reducing the number of power plants that a single adverse event will affect similarly.
- X Renewables promote competition among different types of fuels³, and among retailers that utilize different types of fuels. For example, if some retailers have a significant fraction of renewable energy under contract at fixed prices, it will add competitive pressure on retailers who rely on gas and coal, and their fuel suppliers, to keep their prices down.

Technology advancement benefits: Promoting renewable resources simultaneously advances the associated technologies, lowering their costs and increasing their energy-conversion efficiencies. Technology advancement will, in the long run, allow society cost-effective access to new sources of energy on a large scale, and displace traditional resources and their associated environmental and economic risks.

B. Consistency of these values with international trade law

Both NAFTA and the General Agreement on Tariffs and Trade (GATT) establish the principle that nations should protect the environment and conserve resources. For example:

- GATT 1994, Article XX, allows exceptions to other GATT requirements for measures "necessary to protect human, animal or plant life or health" (Article XX(b)); and for nondiscriminatory measures "relating to the conservation of exhaustible natural resources" (Article XX(g)).
- NAFTA Article 104 emphasizes the importance of pre-existing environmental agreements. NAFTA Articles 904:1 and 904:2 emphasize the importance of "protection of human, animal or plant life or health, the environment or consumers."

RPS statutes further these goals. As discussed in Part II below, existing international trade law precedent, as applied to RPS statutes, does not support the conclusion that in the area of RPS statutes, these principles must give way to exporters seeking to increase use of exhaustible resources.

³ A U.S. Energy Information Administration analysis found that "Lower use of natural gas in the electricity sector when a 20-percent RPS is assumed is projected to cause average wellhead prices for natural gas to be 7 percent lower in 2010 and 17 percent lower in 2020." (EIA, 2001)

II. International Trade Law Precedent Does not Support a Conclusion that RPS Statutes Violate NAFTA

Arguments have arisen that RPS statutes violate NAFTA. These arguments fall under three categories:

1. the "national treatment" requirement;
2. the unavailability of an exception to the "national treatment" requirement; and
3. standard-related measures.

In each of these three categories, existing precedents do not support a conclusion that the RPS statutes are invalid.

A. The "National Treatment" Requirement

1. Introduction

Article 301:1 of NAFTA imposes on the NAFTA signatories an obligation of "national treatment" as established by the General Agreement on Tariffs and Trade.⁴

This principle requires, as explained in NAFTA Article 301:2, that "with respect to a state or province, treatment no less favorable than the most favorable treatment accorded by such state or province to any like, directly competitive or substitutable goods, as the case may be, of the Party of which it forms a part."

Furthermore, Article III:1 of GATT (1994) provides:

1. The contracting parties recognize that internal taxes and other internal charges, and laws, regulations and requirements affecting the internal sale, offering for sale, purchase, transportation, distribution or use of products, and internal quantitative regulations requiring the mixture, processing or use of

⁴ Article 301: National Treatment

1. Each Party shall accord national treatment to the goods of another Party in accordance with Article III of the General Agreement on Tariffs and Trade (GATT), including its interpretative notes, and to this end Article III of the GATT and its interpretative notes, or any equivalent provision of a successor agreement to which all Parties are party, are incorporated into and made part of this Agreement.

products in specified amounts or proportions, should not be applied to imported or domestic products so as to afford protection to domestic production.

And Article III:4 of GATT (1994) provides:

4. The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use. The provisions of this paragraph shall not prevent the application of differential internal transportation charges which are based exclusively on the economic operation of the means of transport and not on the nationality of the product.

Finally Article 606 of NAFTA applies the "national treatment" principle to "energy regulatory measures."

This section addresses three arguments that RPS statutes violate this national treatment requirement.

2. The "like product" analysis and its relationship to "processes and production methods"

a. Overview

Some have argued that the RPS concept is a "processes and production methods" (PPM) trade measure and therefore vulnerable under NAFTA. The argument, as we understand it, goes as follows:

1. There are two types of PPM: "product-related PPM," in which the product harms the environment through its consumption or use; and "non-product-related PPM," in which the product harms the environment through its production but not through its consumption or use.
2. The RPS is a non-product-related PPM because it restricts use based on the manner in which the electricity is produced.
3. The RPS is a non-product-related PPM because "the fact that renewable resources were used in the process ... is not a perceptible characteristic of the resulting end product" (Horlick paper at 9); and because all electricity, when consumed, has the same effect whether it originates from renewable or non-renewable sources.

4. Referring to the required treatment for "like ... goods" (Article 301(2) of NAFTA) and "like products" (Article III:4 of GATT (1994)), because electricity from renewable and nonrenewable sources have the same effect, "imported electricity generated with a renewable resource not included in a State's renewable resources portfolio is 'like' electricity produced by a domestic producer within the renewables definition of the State....Domestic and imported electricity from renewable resources therefore need to be given the same treatment under Article 301 and 606 of NAFTA and Article III:4 of the GATT 1994." (Horlick paper at 9).

There are several problems with this reasoning, as discussed next.

b. The PPM Analysis incorrectly characterizes electricity as a commodity, focusing only on environmental damage and not on other RPS benefits

Underlying the foregoing reasoning is an unstated premise: all electricity is a commodity. As a commodity, there is a no difference to the customer, or to the RPS states, whether the product comes from renewable or non-renewable sources.

This premise is incorrect. In the minds of policy makers and consumers, renewable power is different from nonrenewable power, at the point of consumption, for at least the following reasons:

Fuel diversity as a means to reduce price volatility: Procuring electricity from different sources applies a "risk portfolio" approach to fuels price management, to avoid the volatility in the price of any one fuel source.

Fuel diversity as a means to increase reliability: A balanced mix of fuel sources reduces the risk that a single event, such as a fuel supply shortage, will affect a large portion of the portfolio serving customers.

Customer preference: There is clear evidence that some customers view renewable energy as a product distinct from nonrenewable energy. This evidence includes the branding by some electric suppliers of their power as renewable, and the willingness of some consumers to pay more for that product. (See, e.g., Farhar, 1999; Swezey and Bird, 2001; Wisner, Bolinger and Holt, 2000.) Customers are willing to pay more because they perceive renewably produced electricity to have positive economic, diversity, and environmental attributes.⁵

⁵ Recognizing that marketing the environmental benefits of electricity is a powerful advertising theme, the (U.S.) National Association of Attorneys General adopted environmental marketing guidelines for electricity (NAAG, 1999).

Because some customers view the products as nonsubstitutable, they should not be considered "like" for purposes of GATT.

These facts shield the RPS from the argument that electricity coming from renewable and nonrenewable sources "share[s] the same physical qualities." For example, the Horlick paper (at 9) states: "If an imported and domestic product share the same physical qualities, i.e., are 'like', the importing country cannot restrict or condition the internal offering for sale, purchase, transportation, distribution or use of imported products arguing that they must fulfill specific environmental standards."⁶ The public's demand for renewables, as evidenced by the interest in diversity and the willingness to pay more for the product, demonstrates that the purchase decision has more dimensions than merely "physical" ones.

In short, the underlying error made by those applying the PPM analysis is to treat electric service as merely electric current. Doing so strips this product of all but its physical component, thereby channeling the "likeness" analysis into that one physical dimension. To the contrary: when customers buy electric service they do not think of themselves as buying electric current; they think of themselves as heating their showers and refrigerating their food at a stable, predictable price at a reasonable cost to the environment. This characteristic of electric service is evident among consumers but missed in a "physical-only" analysis.

Moreover, it appears that the emphasis on "physical qualities" is not consistent with the case law. The Asbestos decision cited above states as follows (emphasis added, footnotes omitted):

101. We turn to consideration of how a treaty interpreter should proceed in determining whether products are "like" under Article III:4 [of GATT 1994]. As in Article III:2, in this determination, "[n]o one approach will be appropriate for all cases." Rather, an assessment utilizing "an unavoidable element of individual, discretionary judgement" has to be made on a case-by-case basis. The Report of the Working Party on Border Tax Adjustments outlined an approach for analyzing "likeness" that has been followed and developed since by several panels and the Appellate Body. This approach has, in the main, consisted of employing four general criteria in analyzing "likeness": (i) the properties, nature and quality of the products; (ii) the end-uses of the products; (iii) consumers' tastes and habits - more comprehensively termed consumers' perceptions and behaviour - in respect of the products; and (iv) the tariff classification of the products. ⁷⁴ We note that these four criteria comprise four categories of "characteristics" that the products involved might share: (i) the physical properties of the products; (ii) the extent to which the products are

⁶ Horlick at 9, citing European Communities -- Measures Affecting Asbestos and Asbestos-Containing Products ("Asbestos"), WT/DS135/AB/R (adopted April 5, 2001)).

capable of serving the same or similar end-uses; (iii) the extent to which consumers perceive and treat the products as alternative means of performing particular functions in order to satisfy a particular want or demand; and (iv) the international classification of the products for tariff purposes.

This passage makes clear that the "physical properties" of the products at issue is only one dimension of the "likeness" analysis. The passage also emphasizes that customer perception and treatment is of equal importance with physical features. If a customer perceives renewable energy as "performing particular functions" that nonrenewable energy does not perform, then this third member of the likeness quartet is not satisfied.⁷ As explained in Part I.A above, customers and policymakers view renewable energy as playing a role distinct from nonrenewable energy in the areas of reliability and protection from price volatility. For example, a state ought to be able to prohibit its utilities from purchasing nuclear power, on the grounds that the future prices of such power is too uncertain. Otherwise a state could not protect its citizens, or itself, from high prices. The RPS plays a similar role, by reducing the volatility in the price of electric service coming to the state.

c. Where an RPS does not discriminate based on location, there is no vulnerability from the "like product" analysis under NAFTA or GATT.

While RPS statutes necessary distinguish among types of fuel used by the generator, they only rarely discriminate based on location of the generator.⁸ The "national treatment" principle is concerned with the latter, not the former.

Thus the Asbestos case holds (emphasis added, footnotes omitted):

97. We have previously described the "general principle" articulated in Article III:1 [of GATT 1994] as follows:

The broad and fundamental purpose of Article III is to avoid protectionism in the application of internal tax and regulatory measures. More specifically, the purpose of Article III "is to ensure that internal

⁷ The Horlick paper (at 9 n.28) states that the Asbestos opinion focused on the physical difference between the allowed and the banned products; e.g., the banned chrysotile asbestos fibers presented a health risk. That this particular case turned on physical difference does not eliminate the remaining three dimensions from the analysis.

⁸ Some state RPS laws explicitly exclude renewable energy generated from out-of-state or non-U.S. sources. Such laws would likely violate the Commerce Clause of the U.S. Constitution, as well as NAFTA. This paper therefore addresses RPS laws that do not have this feature.

measures 'not be applied to imported and domestic products so as to afford protection to domestic production'. Toward this end, Article III obliges Members of the WTO to provide equality of competitive conditions for imported products in relation to domestic products. Article III protects expectations not of any particular trade volume but rather of the equal competitive relationship between imported and domestic products. (quoting Appellate Body Report, Japan - Alcoholic Beverages (1996) at 109 and 110) (emphasis added).

98. As we have said, although this "general principle" is not explicitly invoked in Article III:4, nevertheless, it "informs" that provision. Therefore, the term "like product" in Article III:4 must be interpreted to give proper scope and meaning to this principle. In short, there must be consonance between the objective pursued by Article III, as enunciated in the "general principle" articulated in Article III:1, and the interpretation of the specific expression of this principle in the text of Article III:4. This interpretation must, therefore, reflect that, in endeavouring to ensure "equality of competitive conditions", the "general principle" in Article III seeks to prevent Members from applying internal taxes and regulations in a manner which affects the competitive relationship, in the marketplace, between the domestic and imported products involved, "so as to afford protection to domestic production."

99. As products that are in a competitive relationship in the marketplace could be affected through treatment of imports "less favourable" than the treatment accorded to domestic products, it follows that the word "like" in Article III:4 is to be interpreted to apply to products that are in such a competitive relationship.
 ..."

Thus the relevant comparison, in the "like" analysis, is not between renewable and nonrenewable products, but between domestic and imported products. There is no question that in the RPS concept, the distinctions among fuel types are just that: distinctions among fuel types, not distinctions between imported and domestic products. Excluded from the definition of renewables is U.S. coal along with Canadian and Mexican coal; U.S. nuclear along with Canadian and Mexican nuclear, U.S. large hydroelectric along with Canadian and Mexican large hydroelectricity, and so on. Consequently, under the Asbestos case there appears to be no GATT vulnerability:

100. ... [A] Member may draw distinctions between products which have been found to be "like", without, for this reason alone, according to the group of "like" imported products "less favourable treatment" than that accorded to the group of "like" domestic products."

3. "De facto discrimination"

Some have argued that when a facially neutral statute falls differentially on different nations, the result is "de facto discrimination" which is inconsistent with the "national treatment" requirement of NAFTA and GATT (1994). Beginning with this legal premise, the argument then points to the RPS statutes' frequent exclusion of large hydroelectric plants, along with the large investment in such plants in Canada, and suggests that the RPS statutes violate NAFTA. The argument seems to be based on the following syllogism:

1. RPS statutes exclude large hydro.
2. Canada owns a lot of large hydro.
3. Therefore the RPS statutes discriminate against Canada.

This reasoning does not have a clear basis in law. [In fact, the Horlick paper's discussion of this point (from p.10 through the second paragraph on p.11) lacks any citation to any international trade legal authority.]

That a large percentage of Canadian hydro is excluded does not translate into de facto discrimination against Canada. It is hard to see how statutes that exclude coal, gas and nuclear power, which together make up over 80 percent of the United States' generation base, constitutes de facto discrimination against any other nation.⁹ The purpose of GATT 1994 is not to protect expectations of particular trade volumes. Thus the correct question is whether the law discriminates against imports, not whether it has a differential effect on trade:

[I]t is conceivable that a tax consistent with the national treatment principle (for instance, a high but non-discriminatory excise tax) has a more severe impact on the exports of other contracting parties than a tax that violates that principle (for instance a very low but discriminatory tax). The case before the panel illustrates this point: the United States could bring the tax on petroleum in conformity with Article III:2, first sentence, by raising the tax on domestic products, by lowering the tax on imported products or by fixing a new common tax rate for both imported and domestic products. Each of these solutions would have different trade results, and it is therefore logically not possible to determine the difference in trade impact between the present tax and one consistent with Article III:2, first sentence, and hence to determine the trade impact resulting from the non-observance of that provision.

⁹ Thus the statement in the Horlick paper at p.12 n.37, apparently describing RPS statutes as a scheme in which "the large majority of products discriminated against are foreign," lacks factual support.

United States - Taxes on Petroleum and Certain Imported Substances, BISD 34S/136, para. 5.1.9.

Assuming it were valid at all to base a national treatment discrimination argument on how the chips fall from a neutral statute, the appropriate approach would not be to single out a specific generating resource important to the complaining nation. The appropriate approach would be to determine, for both the enacting nation and the complaining nation, the ratio of excluded resources to total resources. If there was a serious difference in ratios, and that difference did not have its roots in a neutral and legitimate national policy, there would be a starting point for concern. Given the U.S.'s dependence on excluded sources, singling out large hydroelectricity is convenient, but it is not logical. Conversely, if the ratio of included resources to total resources for the complaining nation exceeds the similar ratio for the enacting jurisdiction, it would seem that a discrimination argument would have to fall short. The "resources" should include not only existing resources but also the technical potential to develop future resources economically.¹⁰

The "de facto" discrimination analysis thus heads down a slippery slope. Almost every statute or regulation will have a differential effect on different nations. To hold each nation's enactments to such a standard of neutral effect would lead to a permanent state of trade litigation, where every nation sought adjustments in the laws of other nations to wipe out the differential effect. Certainly one could imagine a statute that defines permitted products and excluded products so precisely, so strategically, as to constitute "arbitrary or unjustifiable discrimination" or "disguised restriction" forbidden by Article XX of GATT 1994. But U.S. statutes that exclude over 80 percent of the U.S.'s generation base hardly fit this mold.

A separate argument has been that excluding hydroelectric resources based on size will discourage U.S. electricity brokers from importing Canadian hydro because the brokers will "need to gather and administer information on the capacity of a plant." (Horlick paper at 11). These brokers will have to gather information on the size of U.S. plants as well. This U.S. information is readily available from the FERC Form Ones and other sources. There is no evidence that the information is not equally readily available in other countries. If other nations have chosen to keep generation size information secret, that fact is not reason to invalidate U.S. laws. Nor is there any evidence that, assuming there is a difference in fact-gathering costs, that such difference is competitively significant.

4. Licensing requirements

¹⁰Canada, for example, has excellent wind energy resources (wind is generally considered to be the least-cost of the non-hydro renewables). The technical potential for wind generation in Canada has been estimated at 37,000 TWh per year, more than 70 times its 1999 electricity consumption and more than double the US wind potential. Indeed, Quebec alone has about the same wind potential as the entire US, assuming moderate US siting restrictions. (Grubb and Meyer, 1993.)

Connecticut Law H.5005 requires that a hydro source, to qualify for the RPS, must have a license from FERC unless exempted, or must have been found by the Canadian Environmental Assessment Agency to be in compliance with that Agency's resource objectives. The Horlick paper (at 12) complains that such a state requirement could amount to de facto discrimination because "circumstances ... may include that there are a limited number of large-scale hydropower producers in the State so that it would be certain that a Canadian producer intending to export would be mostly or exclusively subject to the licensing requirement."

Requiring a seller to demonstrate compliance with its governing laws is not discriminatory; it fulfills a common need: to protect the state's consumers from the risk of becoming dependent on a generating source which must shut down for lack of compliance.

Moreover, the suggestion that the requirement would somehow fall on Canadian sources only is not well-founded. Hydro projects in the U.S. generally need licenses from FERC.¹¹ If the Canadian licensing regime is somehow more extensive than the United States', that is cause to seek change in the Canadian regime, not eliminate Connecticut's scheme. The happenstance that there might be a limited number of licensed large-scale hydro sources in the state does not mean the state is discriminating against Canadian producers.

B. General Exceptions to the National Treatment Requirement

1. Introduction

¹¹ Generally, all non-federal hydro projects (i.e., private hydro projects as well as those owned or operated by states or municipalities) located within the United States must be licensed by the Federal Energy Regulatory Commission pursuant to Section 23(b) of the Federal Power Act, 16 U.S.C. sec. 817. Certain projects, i.e., small conduit hydro facilities smaller than 15 MW and small hydro projects smaller than 5 MW which otherwise must be licensed under Section 23(b) may apply for an exemption from FERC's licensing requirements under 16 U.S.C. 823a of the FPA and 18 C.F.R. sec. 4.90 (exemption of small conduit hydro facilities) and 18 C.F.R. sec. 4.103 (exemption of small hydro facilities). However, even those projects that qualify for an exemption remain subject to FERC's enforcement powers pursuant to Section 31 of the FPA, 16 U.S.C. sec. 823b.

In addition, there are a few categories of hydro projects to which the Section 23(b) FERC licensing requirements do not apply at all. For example, hydro projects constructed prior to 1935 and located on non-navigable waters do not need a FERC license; however, FERC's definition of navigability is so broad that as a practical matter only a handful of projects fall within this category. Moreover, as a practical matter these projects still remain subject to regulation by state and local environmental agencies. And Section 23(b) does not apply to federally owned hydro projects that do not require FERC licenses.

NAFTA Article 2101 provides that, with respect to trade in goods, Article XX of GATT applies. Article XX, General Exceptions, and subsection (g) thereof provide:

"Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:

...

"(g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption;"

By requiring electricity sellers to substitute renewable for exhaustible resources, RPS laws "relat[e] to the conservation of exhaustible natural resources." This substitution of renewable for nonrenewable resources satisfies Article XX(g) for another reason: it conserves clean air, itself an "exhaustible natural resource." See United States - Standards for Reformulated and Conventional Gasoline WT/DS2/9 (20 May 1996) (adopting panel decision). Para. 6.37 of the panel decision states that "a policy to reduce the depletion of clean air was a policy to conserve a natural resource within the meaning of Article XX(g)."

The differentiation between renewable and nonrenewable resources, when applied evenhandedly without regard to the geographic origin of the resources, is neither "arbitrary or unjustifiable discrimination" nor a "disguised limitation on international trade." Where the same rules apply whether the producer is located inside or outside the state, it is "made effective in conjunction with restrictions on domestic production or consumption." Nonetheless, arguments have been made that should RPS violate the "national treatment" requirement (discussed in Part II.A above), the Article XX(g) exception would not be available. These arguments fall short.

2. Jurisdictional limitation

Some have argued that RPS states are acting extra-jurisdictionally, forcing citizens of other nations to alter their behavior when that behavior has no effect on the enacting states. There are two clear reasons why RPS laws do not violate a jurisdictional limit, if such a limit exists.

First, damage to air and water resources from the use of energy resources affects the RPS state. Air and water are exhaustible resources, and they are resources shared among nations. An RPS statute reduces reliance on energy products or processes that diminish

exhaustible air and water resources. Even where those energy products or process are located outside the state, a reduction in their use contributes to the improvement of air and water resources within the state.¹² As the Horlick paper points out (at 15), this reasoning has support in the Shrimp-Turtle decision. There the Appellate Body found that sea turtles are "highly migratory animals, passing in and out of waters subject to the rights of jurisdiction of various coastal states and the high seas." United States - Import Prohibition of Certain Shrimp and Shrimp Products, WT/DS58/AB/R, AB-1998-4, Para. 133. Furthermore, they "are known to occur in waters over which the United States exercises jurisdiction." Id. In "these specific circumstances," there was "sufficient nexus between the migratory and endangered marine populations involved and the United States for purposes of Article XX(g)." Id.

Second, to assert that limits on in-state use of exhaustible resources violates some jurisdictional limit misses the point of conservation, and the RPS' role therein. State RPS laws recognize the in-state effect from overuse of exhaustible resources. Few if any states are blessed with all the power resources they need within their states. Every state depends on resources produced elsewhere; and thus every state faces the risk that those out-of-state resources will be exhausted prematurely. RPS laws are aimed at conservation of resources; i.e., the saving of resources for a later date. The present depletion of resources located outside the state, which resources otherwise were expected to be available later within the state, is a direct concern of the state. The state, in addition, is not acting on out-of-state actors only; the state also is reducing the amount of exhaustible resources that its citizens may use.

Thus the argument that granting a GATT Article XX exception would permit one nation to force another nation's producers to change their practices within their own territory,

¹² Substantial cross-border environmental impacts are associated with the generation of electricity. These impacts are related to emissions of sulfur oxides (SO_x), nitrogen oxides (NO_x), mercury and carbon dioxide (CO₂). Electricity generation represents more than 30 percent of North American CO₂ emissions, and its contribution is growing. (CEC, 1999)

Though hydropower facilities have some environmental benefits relative to fossil and nuclear resources -- namely, they do not produce some of the air emissions or wastes associated with other conventional power plants, states may exclude these facilities from benefiting from their RPS statutes because they have many complex and profound negative impacts on the environment. These impacts often extend beyond the immediate site, and often extend across borders. They include: altered downstream flows affecting aquatic ecosystems and biodiversity; alteration of the natural flood cycle on downstream floodplains; upstream and downstream impacts on fisheries; and cumulative impacts from a series of dams on a river system. (WCD, 2000; CEC, 1999.) In addition, all large dams and natural lakes in both Northern and tropical regions that have been measured emit greenhouse gases (carbon dioxide, methane, or sometimes both) (WCD, 2000). Greenhouse gas values range from one-tenth those of thermal options to emissions greater than thermal options. (WCD, 2000.)

"when the impact of these practices is limited to their national territory" (Horlick Paper at 15), does not connect well with the facts. The loss of clean air breathed by citizens of the enacting state, and the reduction in exhaustible resources on which such citizens depend, shows the in-state impact necessary to establish jurisdiction.

Since the argument acknowledges the theoretical possibility of in-state damage, the argument seems to boil down to a demand for proof, on an importer-by-importer basis. But in Shrimp-Turtle, it was not necessary to prove that the specific turtles dying at the hands of non-U.S. fishers necessarily would have made it to U.S. waters, in order to show that the turtles were an "exhaustible resource" for purposes of Article XX(g). It was enough to show a common water area, including U.S.-jurisdictional areas, in which the turtles moved. (However, the Appellate Body explicitly did not reach the larger question of "whether there is an implied jurisdictional limitation in Article XX(g), and if so, the nature or extent of that limitation.") Id. at para. 133.

3. Differences among the state policies

The Horlick paper (at 16) suggests that differences among RPS policies would make the Article XX(g) exception unavailable. Such differences, the argument goes, could produce "arbitrary or unjustifiable discrimination between countries where the same conditions prevail," forbidden by the "chapeau" in Article XX.

The reasoning appears to be as follows:

1. Assume that State A excludes from its "renewables" definition certain renewable fuel types, whereas State B does not exclude any renewable fuels.
2. A producer from a complaining nation would face, in its own nation, the "same conditions" as those which prevail in State B.
3. Since these "same conditions" prevail in part of the United States, we must impute these "same conditions" to the entire United States because the entire nation is a party to NAFTA and GATT.
4. But because the complaining nation faces exclusion of certain exports from State B, it therefore faces discrimination within the nation as a whole, on the grounds that differences within a nation, even if originating in different states, are imputed to the nation as a whole.
5. This discrimination is "arbitrary," in violation of the Article XX chapeau, because there is no rationale, other than differences in state policies, for the difference in treatment.

6. To avoid this status as "arbitrary," the differing states would have show that the "same conditions [did not] prevail," between the enacting states and the complaining nation, by taking into account not merely differences in commercial conditions but also ecological or environmental conditions, including "the state of diverse ecosystems, topographical factors, biodiversity, past and present pollution damages, changes in forest cover, changes in forest quality, land use change and myriad of other conditions." Id. at 17.

This reasoning does not seem to be supported by the language of Article 301:2 of NAFTA, which provides (emphasis added):

2. The provisions of paragraph 1 regarding national treatment shall mean, with respect to a state or province, treatment no less favorable than the most favorable treatment accorded by such state or province to any like, directly competitive or substitutable goods, as the case may be, of the Party of which it forms a part.

This language seems to anticipate, and authorize, differences in policies between states, provided there is no arbitrary discrimination in policies within each state. It thus argues directly against the imputation of inter-state differences to the United States as a whole.

Article XXIV.12 of GATT 1994, cited in the Horlick paper at 16, does not undermine this argument. That provision states (emphasis added):

12. Each contracting party shall take such reasonable measures as may be available to it to ensure observance of the provisions of this Agreement by the regional and local governments and authorities within its territories.

This language is very different from that of NAFTA 105, which states: "The Parties shall ensure that all necessary measures are taken in order to give effect to the provisions of this Agreement, including their observance, except as otherwise provided in this Agreement, by state and provincial governments." (emphasis added)

The difference is between "such reasonable measures as may be available" and "all necessary measures." For the United States to avoid any inter-state difference in RPS statutes would require the U.S. Congress to preempt all such state statutes. This action would not be a "reasonable measure," in light of the states' historic role in assuring electric reliability and protecting their retail electricity customers from excess electric prices.¹³

¹³ Arkansas Elec. Coop. Corp. v. Arkansas Public Serv. Comm'n, 461 U.S. 375, 377 (1983)(stating that "the regulation of utilities is one of the most important of the functions traditionally associated with the police power of the States").

4. Standard-related measures

Some have argued that if RPS statutes can be characterized as "standards-related measures" subject to Chapter 9 of NAFTA, they would have to meet a stricter standard than the nondiscrimination principles discussed above. The reasoning appears to be as follows:

1. Article 904:4 of NAFTA provides:
 4. No Party may prepare, adopt, maintain or apply any standards-related measure with a view to or with the effect of creating an unnecessary obstacle to trade between the Parties. An unnecessary obstacle to trade shall not be deemed to be created where:
 - (a) the demonstrable purpose of the measure is to achieve a legitimate objective; and
 - (b) the measure does not operate to exclude goods of another Party that meet that legitimate objective.
2. Article 904:4 of NAFTA resembles Article 2:2 of the WTO Agreement on Technical Barriers to Trade ("the TBT Agreement"). The TBT Agreement provides, in turn, that "Members shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade"; and that "technical regulations shall not be more trade restrictive than necessary to fulfill a legitimate objective."
3. Although the protection of the environment and the preservation of exhaustible resources may be "legitimate objective[s]," and although RPS laws do not exclude non-U.S. electricity meeting the objectives, the RPS laws might not be "necessary" because they are not the "least trade restrictive."
4. Evidence of the non-necessity of RPS laws is their variation among the states. Laws cannot be deemed to be necessary if they vary from each other.

For purposes of this discussion, we will assume, arguendo, that the "least restrictive" standard of the TBT Agreement would apply, without necessarily accepting this premise as correct.

The argument that variations among the RPS laws demonstrate their non-necessity is not logical, for several reasons. First, while the RPS laws have their differences, they have a

significant commonality: the establishment of an obligation to substitute renewable for exhaustible sources for a percentage of sales. This market-based approach is more efficient and more effective than subsidies. It is this common feature that satisfies the necessity tests.

Second, that some state RPS laws fall short of the ideal by, for example, including in the "renewable" category some sources that do cause environmental damage and do use exhaustible resources, does not negate the effectiveness of the aforescribed common feature.

To argue that necessity requires uniformity -- or, put another way, that weaknesses in some states' laws establish the non-necessity of other states' laws -- is to render all U.S. state RPS laws invalid on the simple grounds that some U.S. states have no RPS laws at all.

Third, imposing the type of uniformity sought by supporters of large hydroelectric facilities will render RPS laws ineffective. This result is explained in detail in Part III below.

III. Imposing on North America an Identical Definition of RPS-Eligible Renewables Would Render RPS Statutes Ineffective

The CEC's Working Paper suggests that "harmonizing" the definition of renewable energy in RPS measures would reduce the potential for a legal dispute under NAFTA (CEC, 2001, at p. 57). "Harmonization" is, in effect, the imposition of a fixed standard in each state and nation.

If RPS laws are challenged under NAFTA, one likely challenger will be a party or parties endowed with large-scale hydropower resources. (See, e.g., Hydro Quebec, 2000, at 7.) Therefore, if large hydro is not included in the new definition, RPS laws will remain vulnerable to challenge. On the other side are U.S. states and Canadian provinces that have carefully crafted their RPS laws and proposals to achieve their policy goals effectively and affordably.¹⁴ This Part III explains why federal and sub-federal governments cannot craft effective, efficient RPS laws if they must include all hydropower resources, as well as all other categories of renewable energy resources.

A. Each State has Defined "Eligible Resources" to Achieve the RPS' Environmental, Conservation and Diversification Objectives Without Unnecessary Cost

No RPS law or proposal of which we are aware contains a definition of eligible renewable energy resources that includes the entire universe of such resources -- i.e., every

¹⁴ See, e.g., the January 21, 2002, RPS proposal of the Independent Power Producers' Society of Ontario, which would exclude most existing U.S. and Canadian hydropower, among other exclusions.

fuel and technology type, every existing renewable energy generator, and generators in every location. Rather, governments reduce the universe of available renewable resources to those resources that can help achieve their policy goals without unnecessary cost.

In this Part III.A, we discuss the various factors that play into RPS eligibility requirements. These factors include discerning between competitive and noncompetitive resources, and between generators that provide the desired benefits and those that do not.¹⁵ Then in Part III.B, we explain how the imposition of a fixed, common definition of renewables would render these statutes unable to achieve the goals underlying these eligibility requirements.

1. Competitive vs. noncompetitive resources

In adopting RPS laws, states seek to create a market for resources that require financial support beyond that which is available in the general market. To allow entry to that market by resources that do not require such support, either to maintain or commence production, would provide no benefits while increasing costs. Seeking to maximize benefits and minimize costs, states have determined which resources require RPS support. The determination considers whether a facility is existing or new, and whether it is receiving financial support already.

Existing vs. New. Frequently, not every existing facility of a particular resource or technology type needs support to continue operating. In this situation, states can make eligibility decisions on a plant-by-plant basis, or exclude the entire group from eligibility.

Excluding from RPS eligibility an entire category of existing resources makes economic sense if the entire group (or most of it) does not require support to operate profitably over the long term. But if only a subset of existing facilities requires support, states determine whether the cost of including the entire group of existing facilities -- and raising the RPS percentage requirement to accommodate it -- would outweigh the benefits gained. Costs may outweigh benefits even when the at-risk subset is less costly than the new facilities that would replace them if they are not protected under the RPS.

Other forms of support. States also have looked at the types of support that particular projects already have. When existing resources are already receiving sufficient payments under existing utility contracts entered into under PURPA or under ratemaking policies, they do not require the support of an RPS. Likewise, new facilities whose above-market costs are being recovered through other policies of the state, neighboring states, or the federal government do not require additional support from the state's RPS.

¹⁵ This section draws from NARUC 2001. See that report for further discussion on these points.

2. Generators that provide the desired benefits vs. those that do not

As discussed in Part I above, renewable resources offer many benefits: various types of environmental benefits, conservation of exhaustible resources, greater electricity fuel source diversity, and technology advancement. In deciding which renewables will be eligible to satisfy the RPS, policy makers match their particular policy goals with the characteristics of different renewable resources, including their environmental characteristics, and whether the generator provides benefits to the population that will pay for the RPS policy.

Environmental benefits. If policy makers seek clean air benefits, they might exclude some types of waste incinerators based on evidence that such generators produce hazardous air emissions. Likewise, if they are seeking to reduce carbon dioxide emissions or improve river habitats, they may exclude some or all types of hydroelectric facilities.

Population-benefit nexus. Policy makers usually also impose eligibility requirements on renewable energy generators to ensure a connection between the population of the state and the environmental, fuel diversity, and other benefits that are produced by the generators seeking the benefits of the state's RPS. Some types of nexus requirements, such as in-state location requirements, raise U.S. Constitutional issues and might also create legitimate grounds for a dispute under NAFTA.¹⁶

But states can also impose nexus requirements that differentiate among resources in a way that is far less vulnerable to legal challenge. Namely, they can restrict eligibility to renewable generators, wherever located, that produce the desired benefits for the RPS state. Under this approach, the state would, for example, condition the eligibility of renewable energy generators upon a showing that the generator provides the desired environmental and fuel diversity benefits to the state.

Absent such a nexus restriction on renewable generators, there could be a mismatch between costs and benefits: the costs of the RPS are imposed within the state but some or all of the benefits flow to other states, which become free-riders on the first state's investment. For example, a retail seller in Maine might purchase renewable energy from a generator in California, producing few benefits for Maine while increasing the cost of retail service in Maine. A rational political actor representing rational voters will not support such a mismatch (See Engel, 1999, at 270-71).

¹⁶ For further discussion of the U.S. Constitutional issues, see NARUC 2001, Chapter Three.

In short, a state's exclusion of specific resources, such as hydro, or large hydro, or coal, gas or nuclear, would not be based on any protectionist intent, but on a view that such technologies do not provide as much benefit as other technologies in meeting RPS objectives.

B. A Single, Hemisphere-Wide Definition of "Eligible Resources" Would Leave the States Unable to Achieve Their Objectives at Reasonable Cost

The state's definition of eligibility, and the state's RPS percentage obligation, work together to produce the state's intended benefits at the state's intended cost. Tampering with the eligibility definition would, at best, require states to adjust their percentage obligations and, at worst, render the RPS ineffective. Forcing the inclusion of large hydropower resources into the definition of eligible resources would fall in the "at worst" category. We present an illustrative example.

Example

Consider a state that receives one percent of its power from aging hydropower facilities and one percent of its power from a biomass power plant, all of which are at risk of being supplanted in the market by resources with lower (direct) costs. In addition, a considerable quantity of hydro capacity exists that (a) is not at-risk and (b) is not currently serving the state but could be redirected to do so. The state wishes to protect its existing resources and add an additional five percent of new renewable resources. But the state realizes that, if it includes all existing resources in its definition of RPS-eligible resources, the hydro capacity that is not at-risk would fulfill a substantial portion or all of the seven-percent demand that would be created. The state therefore excludes hydropower from its definition of RPS-eligible resources and reduces the RPS obligation to six percent because, otherwise, it would incur policy costs without reaping any benefits.

If the state were forced to make hydropower eligible for its RPS, it would, at a minimum, incur policy administration costs. In the event that there were more than enough low-cost hydropower to fulfill the entire six-percent demand created by the state's RPS, the available quantity of hydropower should fail to produce a price premium in the RPS market (absent market power), and therefore the only costs that the state would incur would be policy administration costs. But this result would also fail to achieve the state's goals of supporting its at-risk facilities or of supporting the development of additional renewable resources.

In the event that there were insufficient low-cost hydro resources to fulfill the six-percent demand, the state will be forced to pay the market-clearing price in the RPS market for the low-cost hydro resources that do not need additional support. (In the present example, the market-clearing price in the market for tradable RPS credits will be determined by the last, highest-cost resource that is needed to satisfy the RPS obligation. The lower-cost hydro will receive this price.) The state would also have failed to add the full five percent of additional renewable resources.

In both of these cases, the state would more rationally abandon its RPS policy.

Similar problems would arise at the U.S. federal level due to large existing quantities of U.S. and Canadian hydropower resources, most of which have relatively low operating costs.

Conclusion

This paper has explained that state RPS policies need not violate the free trade principles of NAFTA and GATT. The policy justifications for RPS, coupled with their nondiscriminatory intent and effect, assure that the excluded and included resources are located inside and outside the United States.

Because there is no inconsistency with NAFTA, there is no need to harmonize the definition of renewables. Moreover, for the policy and practical reasons explained above, if hydropower -- and all other renewable energy resources, existing or new -- are forced into state and provincial RPS requirements, it would render useless these state policies. In so doing, harmonization would strike down a means of sustaining exhaustible resources that is effective, efficient, and wholly consistent and compatible with competitive electricity markets.

From the perspective of the U.S., effectively nullifying RPS laws would eliminate a tool that promises to rehabilitate renewable energy development after a decade of stagnation as competitive markets were being developed. The RPS policies in effect have already added several hundred megawatts of new renewables capacity. These policies are expected to support the development of over 3,800 megawatts of new renewable energy capacity over the next decade in addition to helping maintain another 3,600 megawatts of existing capacity that might otherwise go off line (see Wiser, Porter and Clemmer 2000. Additional RPSs have been adopted since this analysis was completed).

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