Exhibit 2

Affidavit of Dr. Adonis Yatchew

Regulation of Wireless Facilities On Joint-Use Poles

Affidavit of Adonis Yatchew, Ph.D.

Before the Ontario Energy Board

September 2011

Filed on behalf of Toronto Hydro-Electric System Limited

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(swor	(sworn September 1, 2011)				
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IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15, (Schedule B);

AND IN THE MATTER OF an Application by the Canadian Distributed Antenna Systems Coalition for certain orders under the *Ontario Energy Board Act*, 1998.

AFFIDAVIT OF ADONIS YATCHEW, PH.D. (sworn September 1, 2011)

10 I, Adonis Yatchew, in the City of Toronto, Province of Ontario, MAKE OATH AND SAY:

A. INTRODUCTION AND SUMMARY

Q. PLEASE INTRODUCE YOURSELF TO THE BOARD.

A. My name is Adonis Yatchew. I am a Professor of Economics at the University of Toronto. I completed my Ph.D. at Harvard University in 1980 and have taught at the University of Toronto since that time. In the course of my research and teaching career, I have held visiting appointments at various institutions including the University of Chicago and Cambridge University, UK. I am also a senior consultant to Charles River Associates.

I have advised on energy matters since 1982 and have conducted numerous studies on energy markets in general, and on the electricity industry in particular. My research in econometrics and energy economics has appeared in leading peer-reviewed journals. Most of the examples and applications contained in the graduate level econometrics text which I have written are drawn from energy economics.

I am Editor-in-Chief of The Energy Journal, having served in this position since 2006. Prior to that time I was a Joint Editor of the Journal for approximately ten years. I am principally responsible for publications on the electricity industry as well as technical papers involving mathematical and statistical tools. A detailed curriculum vitae is included as an appendix to this testimony.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. Toronto Hydro-Electric System Limited ("THESL") has experienced a dramatic increase in applications for attachments to its distribution poles, many of which are for wireless antenna mounts on behalf of companies seeking to launch new cellular telephone networks in the Toronto area.

In this connection, I have been retained by THESL to review the CANDAS Application and to examine economic and regulatory issues related to the Application.

Q. WHAT EXPERIENCE HAVE YOU HAD THAT RELATES TO THIS PROCEEDING?

A. In 2004 I coauthored testimony specifically on the pricing of attachment space for joint use poles. This testimony was filed before the Ontario Energy Board.¹ A similar analysis was filed before the New Brunswick Board of Commissioners of Public Utilities in 2005. In 2008, I coauthored a study on the subject for the Canadian Electricity Association.² Since that time, I have also participated in processes and negotiations relating to attachments to utility poles.

¹ "Joint Use Agreements For Power Poles: An Efficient and Equitable Standard, Report Prepared for the Electricity Distributors Association and the Canadian Electricity Association", Bridger M. Mitchell and Adonis Yatchew, Charles River Associates, Ontario Energy Board, RP-2003-0249, August 14, 2003.

² "Cost Allocation for Joint Use Poles", Bridger M. Mitchell and Adonis Yatchew, CRA International, February 2008.

1 My research, editorial and consulting work has included the regulation (and deregulation) of 2 electricity industries, issues of market power and various public policy issues relating to the 3 electricity industry.

My expertise lies in economics generally, and more specifically in quantitative areas of economics, and in energy and regulatory economics. I have participated in numerous regulatory proceedings as well as litigations and other judicial processes. I have been qualified as an electricity industry and economic expert before this Board in past proceedings.

Q. WHAT ISSUES DO YOU INTEND TO ADDRESS IN YOUR TESTIMONY?

A. My testimony will address the following issues:

- 1. Does the 2005 OEB CCTA Decision apply to wireless attachments?
- 2. Are utility poles an essential facility for CANDAS?
- 3. Are utility poles a limited and valuable resource and if so how should this resource be best managed?
 - 4. Are there public interest issues that need to be considered in assessing the CANDAS application?

5. What regulatory approach is best suited for dealing with the CANDAS application for access to THESL poles? Should the OEB forbear from regulating wireless attachments?

Q. WHAT ARE YOUR CONCLUSIONS?

A. I will summarize my conclusions with respect to each of the above.

- <u>The 2005 OEB Decision RP-2003-249 is not intended to apply to wireless attachers.</u> The central focus of the OEB proceeding was on wireline attachments, in particular, those belonging to cable companies. Wireless systems should not be subsumed under the Decision as they are fundamentally different from wireline attachments. Unlike wireline companies which require continuous connected corridors through which their cables must pass, and which must attach to myriad poles at short intervals, wireless providers can transmit and receive their signals from a relatively few number of facilities, placed on a range of possible support structures.
- 2. <u>Utility poles are not an essential facility for CANDAS.</u> Perhaps the best evidence to support this conclusion is that Public Mobile was able to roll out its service in Toronto with minimal reliance on THESL poles for its wireless attachments. Moreover, it was able to commence its service in Toronto, where it did not have access to power poles, earlier than in Montreal, where it presumably had such access.

It is difficult to reconcile CANDAS evidence that DAS systems are extremely flexible, adaptable and can be deployed in a broad spectrum of indoor and outdoor environments, with their assertion that there is no alternative but to attach to utility poles. It would seem that, particularly in urban environments, multiple structures are available for supporting wireless facilities, which do not have the same safety issues associated with power pole attachments. It is my understanding that the Canadian Electricity Association is putting extensive technical evidence before this Board which documents alternative support options.

3. <u>Utility poles are a limited and valuable resource</u>. The deployment of technologies associated with smart meters, control of distributed generation and variable generation, outage response and other smart grid technologies will continue to

increase demand for pole space. The City of Toronto and the TTC have also demonstrated the need for attachment space and should be accorded priority access. Moreover, there will likely be increasing pressure to limit use in order to mitigate visual pollution associated with ever more cluttered poles. Consideration should be given to future use by these entities and by potential entities for whom it is a bona fide essential facility.

- 4. The public interest is served if markets are permitted to accommodate the needs of wireless providers to the extent possible. Markets for wireless services have evolved rapidly and successfully without mandatory pole access for wireless facilities. There is an extensive siting market and a well established process for the placement of wireless antenna facilities. It is in the public interest to ensure that siting markets for all forms of wireless systems continue to evolve. It is not in the public interest to thwart that evolution by mandated access to poles for enterprises that have alternative attachment options. Nor is it in the public interest to transfer a resource from the public domain to a small group of private entities without consideration of alternative uses for that resource and of its market value.
- 5. <u>The Ontario Energy Board should forbear from regulating wireless attachments.</u> Perhaps most importantly, a case for regulatory action on the basis of urgency is not warranted as Public Mobile has demonstrably been able to launch its service. On this basis alone, a case for forbearing, and thus deferring the possibility of regulatory action, can be made.

Furthermore, given that wireless providers have alternatives for delivering their services, THESL, or any other Ontario distributor should not be compelled to render attachment services to such entities. If, for example, Toronto Hydro were to have spare office capacity, it would seem entirely inappropriate to direct it to lease that capacity to private sector enterprises under terms and conditions unsuitable for the Corporation, or at below market rents. Similarly, to the extent that there may be, at a given point in time, spare pole capacity, Toronto Hydro should not be directed to

- lease that capacity to nonessential users. These entities should satisfy attachment
 needs through conventional siting markets.
 - Moreover, a regulatory precedent which requires Toronto Hydro to attach facilities which have alternative siting options could have long-term, far-reaching and adverse consequences, in part by limiting the evolution of siting markets. It would also create a precedential basis for future attachers and potentially lead to a deluge of applicants.
- 8 The preferred approach to satisfying nonessential demand for support structures is to 9 allow siting markets to provide such services and to allow electricity distributors to 10 participate in those markets as they see fit.

Q. WHAT OTHER MATTERS DO YOU INTEND TO ADDRESS?

A. I intend to directly address the "Grounds" which underpin the CANDAS application.³ These include the assertion that THESL, as a public utility, has a higher duty to the "general public"; that THESL has breached its electricity distribution license; that it has engaged in unjust discrimination and undue preference; that its behaviour constitutes anti-competitive behaviour; and, that it and other Ontario utilities have acted with unfettered discretion.

Q. PLEASE SUMMARIZE YOUR VIEWS OF THE GROUNDS UPON WHICH THE CANDAS APPLICATION IS BASED.

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A. <u>"Public Utilities vs. Private Corporations"</u> Public utilities do have responsibilities to the "general public". However, this does not necessarily imply a duty to one or another private corporation, or to an alliance of private corporations such as CANDAS. The evaluation of the

³ Application of CANDAS, Regarding Access to the Power Poles of Electricity Distributors for Purposes of Wireless Telecommunications, Volume I, pages 25-38.

public interest involves balancing many relevant factors to ensure that resources under the
 control of a public corporation are put to their best use, and that shareholders, ratepayers and
 the public receive the full measure of value for those resources.

<u>"Breach of CCTA Order and Electricity Distribution Licences"</u> In my opinion THESL is not
in breach of the 2005 CCTA Decision and Order as that Order was not intended to apply to
wireless attachments. At least two critical and underlying criteria for that Order are not met.
First, wireless attachments do not typically fit within the 2 feet (or less) of communications
space to which that Order applies. Second, unlike wireline facilities, utility poles are not
essential facilities for wireless services.

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11 "<u>Unjust Discrimination and Undue Preference</u>" Differential treatment of entities which have 12 differing characteristics does not imply discrimination. Wireless companies have practical 13 alternatives in much the same way that able bodied drivers can exit their vehicles in narrower 14 spaces than those that are wheel-chair bound or otherwise face challenges in physical 15 mobility. Just as it is not discriminatory to provide wider reserved parking spots for such 16 individuals, the provision of space on poles for wireline attachers and not for wireless 17 companies constitutes neither discrimination nor undue preference.

19 "Anti-Competitive Behaviour" The treatment of pole space as a valuable and limited resource 20 by utilities does not constitute anti-competitive behaviour. Treating it as such and ensuring 21 that sufficient space is available for current and future power company uses as well as the 22 potential needs of entities for which power poles are an essential facility, constitutes prudent 23 management of this resource. Its proper use and valuation contributes to ensuring that a 24 viable siting market for wireless company facilities is not undermined. In the absence of 25 proper valuation the siting market itself becomes distorted and may be limited in its 26 development.

"<u>Ontario Utilities are Acting with Unfettered Discretion</u>" Market discipline is provided by
 alternatives available to wireless companies, the sites where they may choose to attach and the
 technologies that they select. Ontario utilities operate under a host of legal, regulatory, policy
 and marketplace constraints or fetters.

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B. BACKGROUND

Q. WHAT ARE SOME OF THE KEY TRENDS IN THE COMMUNICATIONS INDUSTRY WHICH CAN IMPACT DEMAND FOR POLE SPACE?

A. The demand for high speed internet services or 'broadband' has been growing prodigiously. The expansion of broadband access has stimulated rapidly growing demand for bandwidth intensive applications such as streaming and downloading of music and video. It is expected that these uses will continue to grow rapidly and that video transmission will take up the lion's share of broadband capacity. The wireless spectrum auction conducted by Industry Canada in 2008 has brought new entrants into the wireless services industry, further increasing the demand for transmission sites.

The use of ever more advanced mobile devices also continues to expand rapidly. These 'smart' devices can now provide not only voice transmission, but full mobile access to the internet. They are creating increasing demand for wireline broadband infrastructure, and for systems which provide the initial wireless link. Indeed, in percentage terms, mobile broadband demand has been growing even faster than wireline demand. Some customers are no longer purchasing traditional landline services.

Various types of services are rapidly converging in the communications industry: voice communication, data transmission such as text and internet access, and video/television transmission are becoming progressively integrated over internet protocol (IP) based platforms. Traditional differences between telecom and cable are blurring and becoming anachronistic. Everywhere, the future is dominated by broadband. Telephone services are being delivered over the internet – voice over internet protocol (VOIP) – aptly exemplified by the meteoric rise of Skype.

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Q. WHAT ARE SOME OF THE KEY TRENDS IN THE ELECTRICITY INDUSTRY?

A. Major trends include decarbonization of electricity supply through development of renewables, conservation and demand management programs; the development and implementation of smart meter and smart grid technologies; and, the integration of variable energy resources and distributed generation into transmission and distribution grids. These changes are occurring in an environment of increased regulatory and political uncertainty and evolving regulatory models.

Ontario has undertaken a major renewables development program. Some argue that this program is leading to dramatic cost increases to end-use customers. In addition, major refurbishment and overhaul of distribution infrastructure are being undertaken at many utilities as infrastructure ages. Smart-grid solutions are being implemented and Geographical Information Systems (GIS) are coming into increasing use.

All this requires significant staff and equipment resources at a time when the electricity utility labour force is aging and many experienced employees are approaching retirement age. And, all these changes must be completed without compromising the reliability of the network.

Current and future demand for pole space by distributing utilities is also growing as the industry rolls out smart metering; develops smart grid systems; and installs automatic switching devices.

Q. HOW HAVE ATTACHMENTS TO JOINT USE POLES BEEN REGULATED IN CANADA?

A. Power, cable and traditional wireline telecom companies commonly share poles and other forms of infrastructure to support their lines and equipment. Attachments belonging to these telecom and cable companies are typically located within a two-foot segment of the joint-use pole referred to as the "communications space" (see Figure 1 below).

For many years, attachment rates and conditions were either negotiated or prescribed by the Canadian Radio-Television and Communications Commission (CRTC). These attachment rates were particularly favourable to cable companies.

Through a series of judicial proceedings, it was determined that the CRTC did not have jurisdiction over electricity power poles. As a result, certain provincial energy regulators have, in recent years, begun to regulate electricity distribution pole attachment rates and related matters.

Q. WHY HAS THERE BEEN A NEED TO REGULATE WIRELINE ATTACHMENTS SUCH AS THOSE OWNED BY CABLE COMPANIES?

A. Cable systems, of necessity, have had to construct their systems across populations of poles or networks of underground conduits. The need to regulate cable attachments rested on the argument that attachers could be denied access, or lacking cost-effective alternatives, could be charged excessively high rates by pole or conduit owners. To the extent that alternatives are available to certain classes of potential attachers, this rationale no longer applies.

Q. FOLLOWING A REGULATORY PROCEEDING TO DETERMINE POLE ACCESS CHARGES FOR CABLE COMPANIES, THE ONTARIO ENERGY BOARD RENDERED ITS DECISION IN 2005 IN WHICH IT DECIDED TO REGULATE CABLE ATTACHMENT RATES. DOES A SIMILAR RATIONALE FOR REGULATION APPLY TO WIRELESS ATTACHMENTS?

A. It does not. In that Decision, the Board justified regulatory intervention for wireline attachments in part on the basis of non-discriminatory access as follows:

"The Board agrees that power poles are essential facilities. It is a well established principle of regulatory law that where a party controls essential facilities, it is important that non-discriminatory access be granted to other parties. Not only must rates be just and reasonable, there must be no preference in favour of the holder of the essential facilities. Duplication of poles is neither viable nor in the public interest.

The Board concludes that it should set access charges."⁴

As I will explain further below, and as is documented elsewhere in the evidence, wireless attachments are fundamentally different from wireline attachments such as those supporting traditional cable television lines and fiber optic cable. Wireless attachments can be placed in a variety of locations, so long as they are sufficiently elevated. Indeed, the cellular phone industry has grown and prospered with very little in the way of wireless attachments to power or other utility poles. Power poles are therefore not an essential facility for the wireless industry.

C. ANALYSIS OF KEY ISSUES

1. THE CCTA DECISION DOES NOT APPLY TO CANDAS

Q. ARE THERE FUNDAMENTAL DIFFERENCES BETWEEN THE SITING OF WIRELINE AND WIRELESS FACILITIES?

A. Yes. Wireline facilities belonging to cable, telecom and power companies have commonly shared support structures. The construction of independent populations of poles is not only economically inefficient but also undesirable from an aesthetic and environmental standpoint. Few communities would countenance further cluttering of their visual landscape by parallel systems of poles.

⁴ RP-2003-0249, IN THE MATTER OF the Ontario Energy Board Act 1998, S.O.1998, c.15, (Schedule B); AND IN THE MATTER OF an Application pursuant to section 74 of the Ontario Energy Board Act, 1998 by the Canadian Cable Television Association [CCTA] for an Order or Orders to amend the licenses of electricity distributors. Decision and Order, March 2004, page 3. Henceforth, the "CCTA Decision".

1 Wireless facilities, on the other hand, can be placed in a variety of locations. These include 2 rooftops of commercial, residential and industrial buildings; towers and other elevated 3 structures. Rather than relying upon rights of way along corridors throughout a community, wireless systems require facilities to be installed at a relatively small number of locations. Moreover, the antenna systems themselves can generally be placed on private or on publicly owned structures. As a result, an active siting market has developed.

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Q. IN THEIR EVIDENCE, CANDAS PUTS FORTH THE POSITION THAT DISTRIBUTED ANTENNA SYSTEMS ARE ACTUALLY COMBINED WIRELESS AND WIRELINE ENTITIES THUS MANDATING ACCESS TO POWER POLES. **DO YOU AGREE WITH THIS CHARACTERIZATION?**

A. No. Distributed antenna systems have multiple wireless components. However, they are not wireline systems in the traditional sense of the term. Indeed, the requisite wireline facilities may not even be owned by the DAS owner.

Unlike cable or electricity distribution networks which require continuous corridors in which the wires must lie, distributed antenna systems require access to wireline facilities at a discrete number of access points.

Q. WHEN WIRELESS FACILITIES ARE ATTACHED TO ELECTRICITY DISTRIBUTION POLES, WHERE ARE THEY PLACED?

A. The placement of wireless facilities can vary substantially and differs from wireline facilities. In some cases wireless equipment are placed above electricity lines (e.g., pole-top antennae). Portions may be attached in the "communications space" and they may extend into the clearance space or the separation space. (See Figure 1 below for a typical configuration of a joint-use pole.) This in turn creates safety-related issues beyond those associated with traditional wireline facilities.

Q. IN YOUR VIEW, ARE WIRELESS ATTACHMENTS COVERED BY THE CCTA DECISION BY THE OEB IN WHICH YOU FILED EVIDENCE?

A. No. That proceeding focused on wireline attachments which fit within the communications space. The application was brought by the Canadian Cable Television Association (CCTA) specifically with respect to cable attachments. In its decision, the Board accepted the configuration of a typical joint-use pole as depicted in Figure 1, including the definition of the communications space.⁵

10 Over the course of the four day hearing, "wireless" technology was mentioned but twice, and 11 that with respect to "wireless cable". ⁶ There was no reference to distributed antenna systems.

Much has changed during the intervening years. The CCTA has disbanded. Communications industries are constantly restructuring in the face of competitive forces and changing technologies. Demand for wireless services has been growing at an extraordinary pace and new companies and services have emerged. New swaths of spectrum have been auctioned. Markets have responded effectively to meet the needs of various wireless market participants. These dramatic changes in wireless technologies were neither discussed nor considered within the CCTA proceeding.

Furthermore, as outlined above and supported extensively in other evidence before this Board, wireless systems are fundamentally different from traditional wireline systems. This in turn requires a separate determination as to the appropriate regulatory treatment of this aspect of the wireless business.

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⁵ CCTA Decision, page 10.

⁶ Transcripts, RP-2003-0249, October 26 2004, lines 1510 and 1519.





Total Height: 40 feet.

2. UTILITY POLES ARE NOT AN ESSENTIAL FACILITY FOR CANDAS

Q. ARE UTILITY POLES AN ESSENTIAL FACILITY FOR CANDAS?

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A. No. Utility poles are not an essential facility for the attachment of wireless equipment for the wireless communications industry. Nor are they an essential facility for CANDAS.

Q. PLEASE STATE THE REASONS WHICH LEAD YOU TO THIS CONCLUSION.

A. In order to enter the wireless market, Public Mobile participated in the 2008 Industry Canada Spectrum Auction. Since that acquisition, Public Mobile has successfully launched its services in Toronto and in Montreal. It has done so with little, if any, reliance on utility support structures in Toronto for its wireless equipment.

16 The Public Mobile network was "turned on" in Toronto approximately a month <u>earlier</u> than in 17 Montreal, despite the absence of access to utility poles in Toronto.⁷

Public Mobile rate offerings and service packages in Montreal (where CANDAS members have access to poles) and Toronto (where they do not) are comparable. This suggests that cost structures in the two markets are not sufficiently different to flow through to rates. The close similarity of offerings also suggests that competition in the wireless service market has not been adversely affected.

⁷ "Public Mobile opened stores on March 18, 2010 in Toronto and Montreal. The network was turned on in Toronto on May 26, 2010, <u>http://blog.publicmobile.ca/blog/2010/05/26/our-network-is-ready-its-time-to-talk-toronto/</u> and in Montreal on June 25, 2010, <u>http://blog.publicmobile.ca/blog/2010/06/25/get-talking-montreal-our-network-is-live/</u>.

Public Mobile paid \$52 million for spectrum without having secured access to poles. This also suggests that their spectrum assets could be deployed cost-effectively in multiple ways, and that utility poles were therefore not an essential facility.

Q. ARE UTILITY POLES AN ESSENTIAL FACILITY FOR DISTRIBUTED ANTENNA SYSTEMS?

A. No. Wireless facilities that are required by DAS networks have numerous alternative siting options. A detailed study prepared by LCC International Inc., and filed before this Board by the Canadian Electricity Association provides examples of sites which are currently in use. These include private and public buildings of various kinds, street furniture, towers, flagpoles and structures that are specifically erected for the purpose of accommodating wireless communications. The affidavit of Mr. M. Starkey, filed before this Board on behalf of THESL also contains evidence of alternatives for attachment.

3. UTILITY POLES ARE A LIMITED AND VALUABLE RESOURCE

Q. WHY DO YOU STATE THAT POLE SPACE IS A LIMITED RESOURCE?

A. Pole space is a limited for a number of reasons.

- \blacktriangleright the costs of augmenting space can be quite substantial;
- there is likely limited public tolerance for ever increasing clutter on poles (sometimes referred to as visual pollution);
- there are multiple future uses that should be considered, including wireline facilities, various electricity utility needs, the needs of the City of Toronto and the Toronto Transit Commission.

Q. IS DEMAND FOR POLE SPACE LIKELY TO GROW?

A. Yes. The potential for continued growth in demand for pole space is very substantial. Technologies associated with smart metering and smart grid innovation often require components that need to be placed on poles. Exploding demand for bandwidth may also entail increasing need for wireline facilities which have no alternative but to attach to poles or run through conduits.

Q. IN WHAT SENSE IS POLE SPACE A VALUABLE RESOURCE?

A. In addition to their critical importance as essential facilities, support structures such as poles constitute a valuable resource which, if appropriate conditions are met, may provide support services to nonessential facilities.

For the purposes of providing a useful analogy, consider a circumstance where a public utility has spare office capacity. It may have a future need for that space, but to make best use of the resource, the utility may choose to lease the space for a short or even an extended period. Alternatively, it may choose to sell the asset if it does not expect to need it in the future. In either case, it would do so in the marketplace. It would be unreasonable and unnecessary to direct the utility to lease or sell the space. It would also be unreasonable to set a fixed price (say per square foot) independent of the location of the space as the value of the space would depend on its location and other attributes.

Sites for wireless facilities are also valued by the marketplace. Their prices generally depend on location, suitability for a specific use, period of availability and so on. To the extent that utilities might find it in their interest to lease pole space to nonessential users, they should be permitted to do so at their discretion.

4. MARKETS SHOULD SERVE WIRELESS NEEDS TO THE EXTENT POSSIBLE

Q. SHOULD MARKETS BE RELIED UPON TO PROVIDE SITING OPPORTUNITIES FOR WIRELESS FACILITIES?

A. Yes. It is important to keep in mind that regulatory solutions are generally a second best alternative to those that would be obtained in the marketplace. Indeed, in many cases the regulatory objective is to achieve, as closely as possible, outcomes that would occur if a market could operate. Even in cases where markets operate imperfectly, the possibility of regulatory imperfection or failure must be weighed carefully against the risk of market imperfection or failure.

Q. IS THERE EVIDENCE THAT THE MARKET HAS FAILED IN THE PRESENT INSTANCE?

A. I am not aware of evidence that the market has failed CANDAS. On the contrary, Public Mobile is successfully providing services in its market areas. And there is broad evidence of vibrant siting markets for wireless facilities.

Q. PLEASE DESCRIBE THE SITING MARKETS TO WHICH YOU HAVE REFERRED?

A. The existence of a very active, extensive and competitive siting market is well supported by the presence of companies whose primary business is the siting of wireless and other communications facilities. Consider, for example the corporate profile of American Tower Corporation, a multi-billion dollar company:

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"Founded in 1995, American Tower is a leading wireless and broadcast communications infrastructure company with a portfolio of over 35,000 communications sites, including wireless communications towers, broadcast communications towers and distributed antenna system (DAS) networks. Our portfolio of wireless and broadcast towers consists of towers that we own and towers that we operate pursuant to long-term lease arrangements, including, as of December 31, 2010, approximately 20,900 towers in the United States and approximately 13,900 towers internationally in Brazil, Chile, Colombia, India, Mexico and Peru. Our portfolio also includes approximately 200 in-building DAS networks that we operate in malls, casinos and other in-building applications, and select outdoor environments. In addition to the communications sites in our portfolio, we manage rooftop and tower sites for property owners. Our primary business is leasing antenna space on multi-tenant communications sites to wireless service providers and radio and television broadcast companies. We also offer tower-related services domestically, including site acquisition, zoning and permitting services and structural analysis services, which primarily support our site leasing business and the addition of new tenants and equipment on our sites."⁸

American Tower describes its competitive environment as follows:

"Our rental and management segments compete with other international, national and regional tower companies, primarily Crown Castle International Corp. and SBA Communications Corporation in the United States and Indus Towers in India, as well as wireless carriers and broadcasters that own and operate their own

⁸ American Tower Corporation, 2010 Annual Report, second unnumbered page.

communications site networks and lease space to third parties, numerous independent tower owners and the owners of non-communications sites, including rooftops, utility towers, water towers and other alternative structures. We believe that site location and capacity, network density, price and quality of service have been and will continue to be significant competitive factors affecting owners, operators and managers of communications sites."⁹

Similarly, Crown Castle USA (CCUSA), another multi-billion dollar supplier of siting services describes its competitive environment in the following terms:

"CCUSA competes with (1) other independent tower owners which also provide site rental and network services, (2) wireless carriers which build, own and operate their own tower networks and lease space to other wireless communication companies, and (3) owners of alternative facilities, including rooftops, water towers, broadcast towers, DAS networks, and utility poles. Some of the larger independent tower companies with which CCUSA competes in the U.S. include American Tower Corporation, SBA Communications Corporation, Global Tower Partners and TowerCo. Wireless carriers that own and operate their own tower networks generally are substantially larger and have greater financial resources than we have. We believe that tower location and capacity, deployment speed, quality of service and price have been and will continue to be the most significant competitive factors affecting the leasing of a tower.

Competitors in the network services business include site acquisition consultants, zoning consultants, real estate firms, right-of-way consulting firms, construction companies, tower owners and managers, radio frequency engineering consultants, telecommunications equipment vendors who can provide turnkey site development services through multiple subcontractors, and our customers' internal

9 Ibid, page 8.

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staffs. We believe that our customers base their decisions on the outsourcing of network services on criteria such as a company's experience, track record, local reputation, price and time for completion of a project."¹⁰

Q. IN THEIR EVIDENCE, CANDAS SUGGESTS THAT DEPLOYMENT ON ALTERNATIVE STRUCTURES IS PRECLUDED BECAUSE IT WOULD REQUIRE HUNDREDS OF SEPARATE AGREEMENTS WITH SITE OWNERS.¹¹ WHAT ARE YOUR OBSERVATIONS ON THIS POSITION?

A. The requirement for arranging many agreements does not preclude deployment on alternative structures. Indeed, this is precisely one of the reasons that markets emerge – that is, to coordinate the needs and desires of diverse purchasers and sellers.

To meet the demand side, companies such as American Tower, Crown Castle and others offer rapid online identification of possible attachment sites of various kinds and detailed characteristics of those sites (such as availability of fiber). In many cases, Google Earth and Google 'street view' permit the viewer to obtain a visual assessment without leaving his or her office.

On the supply side, companies actively solicit sites that are suitable for placement of telecommunications facilities. These include buildings of all sizes, structures for stealth deployment and land. Companies also manage sites such as rooftops and arrange leases.¹²

¹⁰ Crown Castle, 2010 Annual Report, page 5.

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¹¹ "In the case of the Toronto DAS Network, alternative solutions (e.g. placement of antennas on buildings), even if workable sites had been available, would have required literally hundreds of agreements with private property owners to permit placing the node equipment on their structures and providing the needed fibre connectivity would require taking fibre connections through many streets and sidewalks." Written Evidence of Tormod Larsen, July 26, 2011,

¹² See, for example, Global Tower Partners, <u>http://en.gtpsites.com/about-gtp.aspx</u>.

Q. IN YOUR OPINION, WHY IS CANDAS SEEKING REGULATORY INTERVENTION?

A. Certainly there are a host of reasons why CANDAS is seeking mandated access to THESL poles, among them technical convenience.

6 However, fundamentally the critical factor is price. The regulated price of access to 7 distributor support structures for essential uses is based on historic cost. I would expect that 8 the current market price for alternative sites for nonessential users is higher, perhaps far 9 higher.

The underlying business model is extremely appealing if a company can obtain access to poles at historically based regulated rates, then resell that access combined with antenna services to wireless service providers at market rates. This may be seen as a form of regulatory arbitrage.

Q. IS THERE A RISK OF REGULATORY FAILURE IF THE OEB WERE TO INTERVENE?

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First, mandated access for nonessential facilities at rates based on historic costs could lead to a deluge of applicants. In this connection, CANDAS asserts in its evidence that all wireless providers will eventually move to a DAS architecture.¹³ Assuming for the moment that this assertion is realized, there could be a rapid increase in demand for pole space by DAS providers. Indeed, once a precedent mandating access for nonessential private users is

A. Yes, there are significant risks.

¹³ "Distributed network architectures are the way of the future." Written Evidence of George A. Vinyard, page 11. "It is likely that all wireless carriers will move towards a DAS-type architecture in the future." Written Evidence of Brian O'Shaughnessy, page 8.

established, wireless providers employing other technologies as well as other nonessential users could seek attachment privileges.

Second, mandated attachment at other than market rates would distort and impede continued
development of relevant siting markets.

6 Third, mandated attachment under conditions and rates not vetted by the market could, in 7 effect, constitute an inappropriate wealth transfer from the ratepayers and the public to a small 8 number of private corporations.

Fourth, in the event that the regulatory authority attempts to mimic market outcomes, it will have a challenging task in determining what those prices should be, particularly as rates would need to vary by location and over time. The potential for error is significant.

Fifth, the regulator and no doubt utilities will experience regulatory burden which could have been avoided. The determination of locational pricing for sites would be one source of significant regulatory costs.

5. THE OEB SHOULD FORBEAR FROM REGULATING WIRELESS ATTACHMENTS

Q. IN YOUR OPINION, IS REGULATORY INTERVENTION URGENTLY NEEDED?

A. A case for regulatory action on the basis of urgency is not warranted as Public Mobile has demonstrably been able to launch its service. On this basis alone, a case for forbearing and thus deferring the possibility of regulatory action, can be made.

Q. IN THE LONGER TERM, IS MANDATED REGULATED ACCESS FOR WIRELESS ATTACHMENT WARRANTED OR DESIRABLE?

A. Since wireless providers have alternatives for delivering their services, THESL should not be compelled to render attachment services to such entities.

A regulatory precedent which requires THESL to attach facilities which have alternative siting options could have substantial adverse consequences. It could lead to excessive demand for pole space by nonessential users, it could thwart evolution of siting markets and result in regulatory failures stated earlier.

The simplest and most appropriate approach would be to allow siting markets to provide these services to nonessential users and to allow electricity distributors to participate in them as they fit. Wireless providers and pole owners would negotiate attachment contracts, if appropriate. The presence of siting alternatives provides a check on the potential exercise of market power by the pole owner.

Q. ARE THERE ADVANTAGES TO FORBEARING REGULATION?

A. Yes, there are important advantages. Siting markets will continue to develop without regulatory intrusions or distortions. This will result in more efficient allocation of resources, including THESL support structures. Significant regulatory burden will be avoided as well as risks of regulatory imperfections or failures.

Q. WOULD FORBEARANCE BE CONSISTENT WITH GOOD REGULATORY PRACTICE?

A. Yes. In the debate about appropriate degrees of regulation one of the widely appreciated maxims has been "competition where possible, regulation where necessary". It would be

appropriate to consider this saying in the present context. To the extent that forces in the siting market can be relied upon to provide alternative attachment options (with associated terms, rates and conditions) a regulatory approach is inferior. Moreover, the maxim is also consistent with a light-handed approach to regulation which is often seen as preferable to a regulatory approach that is overly prescriptive.

Q. IS YOUR RECOMMENDATION CONSISTENT WITH OEB STANDARDS ON FORBEARANCE?

A. Yes, it would be consistent with the framework and standards which the OEB has set for forbearing. Furthermore, it is my understanding that in seeking regulatory intervention, the burden of proof is normally on the applicant, in this case CANDAS. In my view, the applicant has failed to provide justification for the regulation of DAS wireless attachments.

Q. WHAT ARE THE STANDARDS FOR FORBEARANCE SET OUT BY THE OEB?

A. In the course of a proceeding involving natural gas storage, the Board set out its criteria for forbearance.¹⁴ The central objective is to determine whether the relevant market is sufficiently competitive to protect the public interest. The Board also notes that regulatory costs can influence the decision to forbear. Among these costs are the adverse effects that regulation can have on innovation and dynamic efficiency.

Q. PLEASE OUTLINE THE ANALYTIC FRAMEWORK FOR DETERMINING WHETHER THERE IS SUFFICIENT COMPETITION TO PROTECT THE PUBLIC INTEREST.

¹⁴ EB-2005-0551, Natural Gas Electricity Interface Review, Decision With Reasons, November 7, 2006.

A. The analytical framework consists of four components: identification of the product market; determination of the relevant geographic area; calculation of market shares and market concentration ratios; and, assessment of conditions for entry by new suppliers.

In the present case, the relevant market is the market for siting wireless attachments. For purposes of this discussion, I will take the geographic area to be the Toronto Hydro service area.

Q. BASED ON THIS FRAMEWORK, IS THERE SUFFICIENT COMPETITION TO PROTECT THE PUBLIC INTEREST?

A. There are thousands of wireless sites currently operating in Toronto and owned by entities other than THESL.¹⁵ Public Mobile has availed itself of some of these sites to launch its services. Wireless attachments are affixed to THESL poles, but these are owned by the company itself, or in most other instances, by the City of Toronto or the Toronto Transit Commission. Consequently, though THESL plays a public service role in providing attachment space for public entities, it has a negligible share of the market for siting private wireless service provider attachments. The very fact that THESL does not have a material share in this market would support forbearance.

One could ask whether, on a prospective basis, there will be sufficient competition in the siting market. It would be difficult to imagine otherwise.

It is true that poles, in some respects, provide a convenient siting alternative for a certain, and at this point, narrow class of wireless attachments. Poles may be especially attractive if attachment rates are regulated at rates based on historic costs.

¹⁵ See, evidence of M. Starkey at page 27.

From the standpoint of an evolving siting market, there are myriad structures within the THESL service area of varying height, power supply is ubiquitous and fiber can be accessed in numerous locations. The empirical evidence indicates that 'workably competitive' siting markets have evolved as the need has arisen. Given the availability of key elements, there are therefore strong reasons to expect that they will continue to do so.

6 But it is not only markets that adapt and evolve; technology is also advancing constantly. 7 Given the enormous market potential, technical advances with respect to siting can be 8 expected to occur in the direction of greater not lesser flexibility of deployment. This 9 'endogenous technological change' is widely observed in many industries. Within the 10 communications industry, spectrum re-use is an especially prominent example. Stealth 11 deployment is another, less glamorous, but also valuable instance.

I would therefore conclude that both on a current and a prospective basis, there is and, in all likelihood will be sufficient competition to protect the public interest. The source of this competition is rooted in economics, through continuing market evolution, and science, through technological change.

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Q. ARE THERE ANY OTHER REASONS THAT WOULD SUPPORT YOUR RECOMMENDATION OF FORBEARANCE?

A. Yes. As I indicated earlier, the Board identified regulatory costs as a second rationale for forbearance.¹⁶ These costs were broadly interpreted to include not only financial costs on utilities and customers, but also adverse impacts on innovation, responsiveness in the marketplace and unnecessary use of resources.

In the present case, I would suggest that the dampening of incentives for siting market response to DAS placement will reduce innovation in this segment of the siting market. Furthermore, acquiescing to CANDAS demands would open the door for other nonessential

¹⁶ EB-2005-0551, Natural Gas Electricity Interface Review, Decision With Reasons, November 7, 2006, pages 25-26.

attachers, potentially leading to a fundamental shift away from the siting market model to a regulated model for numerous wireless and other attachers.

D. GROUNDS UNDERPINNING CANDAS APPLICATION

Q. ARE YOU IN AGREEMENT WITH THE GROUNDS UPON WHICH CANDAS HAS FOUNDED IT APPLICATION?

A. For the most part, I am not in agreement with the grounds set forth by CANDAS as stated at pages 25-38, Application of CANDAS, Regarding Access to the Power Poles of Electricity Distributors for Purposes of Wireless Telecommunications, Volume I.

(a) "PUBLIC VS PRIVATE CORPORATIONS"

Q. WHAT ARE YOUR THOUGHTS ON THE DIFFERENCES BETWEEN THE ROLES OF PRIVATE AND PUBLIC CORPORATIONS?

A. I agree with the Applicants that public corporations have a broader mandate than private entities. Unlike private corporations, they have an obligation to the public at large. This would generally include receiving fair value for any assets that they lease or sell.

Public corporations are often required to fulfill certain policy objectives set by governments. At present, the Ontario electricity industry is implementing a highly ambitious renewables program that has been put in place by the Province. Some have argued that this program is contributing to large increases in the electricity prices which in turn is leading to cost pressures throughout the Province.

In balancing corporate and various public interests, it would be difficult to conclude that wireless interests or any nonessential attachers should receive preferential treatment or that resources presently in the public domain should be sold, leased or transferred at rates that do not reflect their market value.

(b) "BREACH OF CCTA ORDER AND ELECTRICITY DISTRIBUTION LICENCES"

Q. IN YOUR VIEW, IS THESL IN BREACH OF THE CCTA ORDER?

A. In substantive terms, THESL cannot be in violation as that Order applied to wireline attachments which fit into the communications space.

Furthermore, the intent of the Order is to regulate attachments to poles as essential facilities. For reasons given earlier, power poles are not an essential facility for the applicants.

(c) "UNJUST DISCRIMINATION AND UNDUE PREFERENCE"

Q. DOES THESL'S POSITION CONSTITUTE UNJUST DISCRIMINATION AND UNDUE PREFERENCE?

A. Wireline attachers are fundamentally different from wireless entities as the latter do not require continuous corridors for placement of their wireless facilities. Differential treatment therefore does not constitute unjust discrimination against wireless attachments or preferential treatment of wireline facilities.

(d) "ANTI-COMPETITIVE BEHAVIOUR"

Q. DOES THESL'S POSITION CONSTITUTE ANTI-COMPETITIVE BEHAVIOUR?

A. No. Although THESL has a virtual monopoly on poles, it does not have a monopoly on support structures for wireless facilities, as is evidenced by the expeditiousness with which Public Mobile was able to launch its services.

Furthermore, treatment of pole space as a limited and valuable resource is necessary to ensure that the resource is managed prudently.

(e) "ONTARIO UTILITIES ARE ACTING WITH UNFETTERED DISCRETION"

A. Ontario utilities are not acting with unfettered discretion. On the contrary, they are required to comply with a broad range of regulations, laws and policy directives. In the competitive settings in which they participate, they must meet the rigors of the marketplace.

In the present discussion, market discipline is provided by alternatives available to wireless companies, the technologies that they select, and the sites to which they may choose to attach. There is extensive evidence that private market respond vigorously to demand for siting solutions.

E. CONCLUDING REMARKS

Q. CANDAS EVIDENCE REFERS EXTENSIVELY TO DAS DEPLOYMENTS IN OTHER JURISDICTIONS. IN PARTICULAR, IT SUGGESTS THAT IN SOME CITIES, DAS NETWORKS HAVE BEEN DEPLOYED LARGELY ON POLES. HOW DO YOU INTERPRET THIS EVIDENCE?

1 A. I would not conclude that DAS deployment on poles has occurred of necessity, that is, that 2 distributed antenna systems have no alternative but to attach to utility poles. In my view, this 3 is essentially a cost and price effect. The decision has been made in some jurisdictions to facilitate attachment of wireless facilities to utility poles (electricity and telephone) at 4 5 favourable prices. As a consequence, in those areas DAS developers have not needed to adapt 6 their designs so that they can be attached elsewhere, nor would there have been a need to seek 7 other locations. This, in turn, would have had an adverse effect on the development of siting markets for DAS antennae. 8

The decision to strongly encourage or mandate attachment, in some instances, has been made by a telecom regulatory authority that has favoured its own industry, sometimes at the expense of other industries and ratepayers. While this decision may be reasonable for a telecom regulator, an energy regulator might be more likely to consider the needs of the energy industry and its ratepayers, and arrive at a different conclusion.

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It is also worth noting that wherever power poles are owned by private sector companies, there is no issue of transferring a valuable asset from the public sector to the private sector. That is not the case in Ontario.

Q. YOU HAVE ADVOCATED THAT THE OEB FORBEAR FROM REGULATING THE ATTACHMENTS OF WIRELESS FACILITIES. PLEASE SUMMARIZE YOUR REASONS.

A. It might be helpful to view the Application in a somewhat different light by considering the interests of CANDAS members. The retail service provider, Public Mobile, has multiple options for providing its services and has done so successfully. The urgent need for mandated attachment at regulated rates is evidently unjustified.

DAS developers and other advocates of DAS technology that seek mandated attachment to utility infrastructure at regulated and non-market rates, seem to be motivated by a business

model which effectively involves a subsidy. As new wireless technologies which require denser node distributions proliferate, one would expect a vigorous response from siting markets, just as has occurred in the past.

In short, there is no evidence that siting markets do not work effectively. This argument alone would seem to be a sufficient condition for forbearance. That is, in the absence of a market failure, regulatory intervention does not have a sound foundation.

Q. SHOULD ELECTRICITY RATEPAYERS AND THE PUBLIC SUBSIDIZE THE DEPLOYMENT OF DAS SYSTEMS IN ONTARIO?

A. The subsidy of a specific technology by the public does occur from time to time. Presently, Ontario electricity ratepayers are subsidizing the development of renewable technologies, in particular solar and wind generation, through feed-in-tariffs. The costs have had a significant impact on retail electricity rates.

It would be hard to argue that electricity ratepayers should also subsidize DAS development and deployment. If such a subsidy is deemed to be desirable, it would seem appropriate that it should come from the communications segment of the economy and not from the energy industry.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes is does.

I make this affidavit in support of THESL's motion for a Decision and Order of the Ontario Energy Board:

a. that the CCTA Decision does not apply to wireless communications attachments;

- b. that the Board refrain from exercising its powers on the basis that there is or will be
 competition in the wireless communications market sufficient to protect the public
 interest;
 - c. denying the relief sought by CANDAS and dismissing CANDAS' application; and
 - d. such other relief as THESL may request and the Ontario Energy Board may deem appropriate,
 - and for no other or improper purpose.

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SWORN BEFORE ME

at the City of Toronto, in the Province of Ontario, on September 1, 2011.

Original signed by Adonis Yatchew

John A.D. Vellone A Commissioner, etc. **Adonis Yatchew**

APPENDIX – AUTHOR QUALIFICATIONS

CURRICULUM VITAE ADONIS YATCHEW

Professor of Economics, University of Toronto Editor-in-Chief, The Energy Journal Senior Consultant, Charles River Associates

Department of Economics University of Toronto 150 St. George Street Toronto, Canada M5S 3G7 (416) 978-7128 <u>yatchew@gmail.com</u> Ph.D. Economics 1980 Harvard University

M.A. Economics 1975 University of Toronto

B.A. Mathematics and Economics 1974 University of Toronto

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7 Adonis Yatchew's research focuses on econometrics, energy and regulatory economics. He has held visiting appointments at Trinity College, Cambridge and the University of Chicago. He has 8 9 written a graduate level text on semiparametric regression techniques published by Cambridge University Press. Dr. Yatchew has also written extensively on regulatory schemes in the area of 10 electricity, and has served in various editorial capacities at The Energy Journal since 1995. Dr. 11 Yatchew has conducted major studies in electrical utilities and oil pipelines as well as in the 12 13 airline, natural gas, minerals and banking industries. He has advised public and private sector 14 companies on electricity, regulatory and other matters for over 25 years and has provided 15 testimony in numerous regulatory and litigation procedures.

18 ACADEMIC EXPERIENCE

20	2008	Visiting academic, Department of Mathematics and Statistics, University
21		of Melbourne
22	2008	Visiting academic, School of Economics and Finance, Queensland
23		University of Technology
24	2008	Visitor, National Center for Econometric Research, Queensland
25		University of Technology
26	2005	Visiting Fellow, ARC Center of Excellence for Mathematics and Statistics
27		of Complex Systems, Mathematical Sciences Institute, Australian National
28		University
		-

	1 2004-present	Professor of Economics, University of Toronto					
	2 2001 3	Visiting Fellow, School of Mathematical Sciences, Australian National University					
	4 1986 to 2004	Associate Professor, Economics, University of Toronto					
	5 1989, 1990, 1991	Visiting Research Associate, Harvard University					
	6 1986	Visiting Fellow Commoner, Trinity College, Cambridge U.K.					
	7 1980 to 1986	Assistant Professor, Economics, University of Toronto					
	8 1984	Visiting Research Associate, National Bureau of Economic Research,					
	9	Cambridge, Massachusetts					
1	1982 to 1984	Visiting Assistant Professor, University of Chicago					
1	1 1976	Lecturer, University of Toronto, Scarborough College					
1	12						
1	3						
1	4 EDITORIAL AND	PROFESSIONAL ACTIVITIES					
1	L5						
	6 <i>Current</i> 7 Editor in Chief Th	as Energy Journal (2006 procent)					
1	Mombor Board of	Editor-in-Chief, <u>The Energy Journal</u> (2006-present)					
1	9 Member Editorial	Member, Board Of Editors, <u>Economics of Energy and Environmental Policy</u>					
2	20	bourd, <u>roundations and frends in Beonometries</u>					
2	21 Past						
2	22 Editor, <u>The Energy</u>	Editor, The Energy Journal, (2006)					
2	23 Joint Editor, <u>The E</u>	Joint Editor, The Energy Journal (1995-2005)					
2	Associate Chair for	Associate Chair for Graduate Studies, University of Toronto, 2006 - 2009					
2	25 Joint Editor 1997,	Joint Editor 1997, <u>Distributed Generation</u> , special issue of the Energy Journal					
2	26 Advisory Editor, <u>E</u>	Advisory Editor, <u>Economics Letters</u> (1985-1997)					
2	27 Member, Advisory	v Board, Eurasia Foundation, 1995-2007					
2	28						
2	9 DECENT ACADEM						
10	SU KECENIACADEM	IIC PRESENTATIONS					
0	2 December 2010: I	nvited paper on renewable energy Fourth Asian Energy Conference, Hong Kong					
2	$\frac{12}{32} December 2010. If$	nvited paper on renewable energy, rourdi Asian Energy conterence, nong Kong.					
2	34 October 2010: In	October 2010: Invited paper on quantile regression Workshop on Quantile Regression Methods					
3	Humboldt Univers	sity in Berlin.					
3	36						
3	37 October 2008: K	eynote speaker, Australian Conference of Economists, Gold Coast, Queensland.					
3	38 Title of presentati	on: "Economics, Econometrics and Regulation".					
3	39						
4	August 2007: Key	note speaker, Cemapre Conference on Advances in Semiparametric Methods and					
4	Applications, Lish	oon, Portugal. Title of presentation: "Data on Derivatives, Nonparametric					
4	Regression and the	e Curse of Dimensionality".					
4		and the second					
4	4 Seminars and pre	Seminars and presentations at Boston Univ., Columbia Univ., Georgetown Univ., Harvard Univ.					
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10 **OTHER PAPERS / STUDIES**

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Applied Econometrician", 86 manuscript pages.

28 **RECENT RESEARCH GRANTS**

2011-2014 SSHRC grant "Nonparametric regression when data on derivatives are available".

31 32 2007-2011 SSHRC grant "Nonparametric and semiparametric estimation when data on 33 derivatives are available".

2004-2007 SSHRC grant "Semiparametric demand modeling and testing".

36
37 2003-2004: Grant to develop interactive web-based teaching software for undergraduate statistics
38 at the University of Toronto.

1	OTHER PROFESSIONAL EXPERIENCE:
2	(2010) Propaged testimony on behalf of Noranda Aluminum, Inc. Filed before the Public
3 4 5	Service Commission of the State of Missouri.
6	(2009) Prepared study for Ontario Power Generation on sufficient competition tests for boundary optities in the Optario electricity market
8	boundary entities in the Ontario electricity market.
9 10 11	(2009) Prepared testimony on worldwide paraxylene markets in the context of a contractual dispute before the International Court of Arbitration of the International Chamber of Commerce.
12 13 14 15	(2008) Prepared analysis of incentive regulation of capital and operating costs and productivity growth for electricity distributors. Filed before the Ontario Energy Board.
13 16 17 18	(2007) Prepared analysis of distributor benchmarking of capital and operating costs on behalf of the Electricity Distributors Association. Filed before the Ontario Energy Board.
19 20	(2007) Filed evidence on market power before the Market Surveillance Panel in Ontario.
21 22	(2005-2007) Prepared analyses of pricing of investor communications services.
22 23 24 25	(2007) Prepared testimony on behalf of the Electricity Distributors Association on utility benchmarking of capital and operating costs. Filed before the Ontario Energy Board.
23 26 27	(2004-2007) Prepared various analyses in a class action and settlement proceeding involving billing of natural gas.
28 29 30	(2004, 2005, 2006) Prepared odds of winning prizes in promotions by a leading U.Sbased international fast-food chain.
31 32 33	(2006) Prepared testimony on incentive regulation. Filed before the Ontario Energy Board.
34 35 36	(2006) Prepared testimony on cost-sharing of capital and operating costs of joint-use power poles. Filed before the New Brunswick Board of Commissioners of Public Utilities
37 38 39	(2005) Prepared testimony on cost-sharing of power poles by cable companies on behalf of Thunder Bay Hydro.
40 41 42	(2004) Prepared testimony on cost-sharing of capital costs of power poles by cable companies. Filed before the Ontario Energy Board.
43 44 45	(2003) Prepared testimony on behalf of large Ontario electricity distributors on distributor service area amendments. Filed before the Ontario Energy Board.
TJ	

(2003) Prepared testimony on behalf of J.D. Irving Ltd. on rates of return, performance based regulation and benchmarking. Filed before the New Brunswick Board of Commissioners of Public Utilities.

(1998-2006) Member, Board of Directors, EnerConnect.

(1993-1998) Prepared major studies for the Municipal Electric Association on restructuring of the electric utility industry in Ontario.

(1997) Prepared analysis of securities lending for Canada Trust.

(1992) Prepared study on pipeline cost allocation.

 (1982-1995) Consultant to the Municipal Electric Association at the Ontario Hydro Rate Hearings before the Ontario Energy Board.

(1991, 1992, 1993, 1994) Prepared short term market assessment and forecasts for Bell Mobility cellular telephone sales.

(1991-1992) Research Director for the Municipal Electric Association in their intervention before the Environmental Assessment Board in connection with Ontario Hydro's 25 year Demand/Supply Plan.

(1992) Prepared testimony on forecasts of electricity demand for Ontario. Filed before the Ontario Environmental Assessment Board.

(1990) Prepared statistical analysis in connection with a legal proceeding on anticompetitive behavior relating to the supply of paper forms.