

Studies in Energy Policy



August 2008

Securing Ontario's Power Supply

Market Forces Are Superior to Government Fiat

by Gerry Angevine





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Introduction

The Ontario government, under Premier Dalton McGuinty, is preparing to adopt a new energy plan that prescribes both the amount of electricity-generating capacity and the specific types of capacity (such as wind power, hydropower, and solar power) for 20 years into the future. This publication examines the “Integrated Power System Plan” and its implications for energy consumers and the Ontario economy. Although officials express a desire to restrain electricity costs, this central-planning approach actually invites rate escalation.

Perpetuating government control over power supplies draws a measure of support from some sectors of the energy industry. The Canadian Wind Energy Association, for example, characterized the province’s plan as “visionary” (Canadian Wind Energy Association, 2007). The CEO of the Canadian Nuclear Association said he and his colleagues are “keen” to participate in the government’s planning process (Murray Elston, 2007: 8). Their enthusiasm undoubtedly stems from the fact that both nuclear energy and so-called renewables are granted additional market share under the McGuinty scheme.

The Ontario Chamber of Commerce, meanwhile, is urging the government to implement the plan while, at the same time, calling for “private investment and competition in the energy sector” (Ontario Chamber of Commerce, 2007a: 4). But, as this report details, government interference will inhibit both private investment and competition.

Proponents of regulation argue that government control has “kept the lights always on.” This is not entirely accurate, of course, as the Northeast Blackout of 2003 demonstrated. Such simplistic reasoning also ignores the issue of cost. That is, government regulation of electricity supply has exacted a hefty toll, including artificially high rates for commercial and industrial firms and massive cost overruns for the construction and refurbishment of nuclear power plants. For example, the cost of constructing the Darlington nuclear plant was initially estimated at \$5 billion; the final cost exceeded \$14 billion (Moore, 2003).

As our analysis confirms, decisions about energy supplies are best left to industry professionals, who are best equipped to assess current market conditions and forecast the future; and utility shareholders, who have the strongest incentives to ensure that management’s decisions are sound. Government is ill-equipped to determine either the optimal mix of “feedstocks,” the basic energy sources used to generate electricity, or the means to maximize investment in generating capacity. And, considering the political bent these days to demonize all things carbon, the government can hardly be depended upon to ensure abundant and affordable energy supplies.

A brief history of electricity planning in Ontario

Until its dismantling by the Harris government in 1999, Ontario Hydro had been the primary supplier of electricity in the province and solely responsible for determining the generating capacity necessary to meet current and future demand. This approach was questioned in the late 1970s, when provincial officials became concerned about the utility's cost overruns on nuclear power projects and the specter of high-priced hydroelectric developments. They responded by creating the Ontario Royal Commission on Electric Power Planning, [1] which was charged with devising new methods of planning to meet energy demand at the lowest cost. However, the lengthy deliberations of the commission failed to yield satisfactory results, [2] in part because the exercise was driven by politics as much as policy.

Subsequently, the Harris government sought to restrain rising energy costs by dismantling Ontario Hydro's monopoly and introducing a modicum of competition in electricity supply. To that end, Ontario Hydro was restructured into five distinct entities:

- 1 Ontario Power Generation, to generate electricity;
- 2 Hydro One, to operate the transmission and distribution grid;
- 3 Electrical Safety Authority, to address the safety of electrical products and equipment sold and used in Ontario; [3]
- 4 Independent Market Operator, to operate Ontario's electricity grid and its wholesale electricity market;
- 5 Ontario Electricity Financial Corporation, to manage the utility's debt and financial obligations. [4]

1 This became popularly known as the "Porter Commission" after its chairman, Dr. Arthur Porter, a professor of engineering at the University of Toronto.

2 The Porter Commission concluded that restraining the demand for power rather than increasing generating capacity represented the best means for ensuring adequate energy supplies (Porter Commission, 1979; Hampton, 2003: 130).

3 The Electrical Safety Authority is a non-profit corporation that operates under the Electricity Act, 1998 and an administrative agreement with the Ministry of Government and Consumer Services.

4 It is noteworthy that both Ontario Power Generation and Hydro One remained in government hands. Despite the Harris administration's supposed desire for a competitive energy market, it did not cede control of the bulk of Ontario Hydro's assets.

The restructuring plan called for introducing competition in electricity supply, in part, by reducing the amount of power that the restructured utility could bring to market. [5]

Within 10 years, Ontario Power Generation was to control no more than 35% of the total electricity capacity in the province. Initially, it was to divest (to competitive suppliers) a total of 4,000 megawatts (MW) of fossil-fueled generation within 42 months. [6] The second phase involved spinning off any remaining capacity in excess of 35% of the provincial total by 2011 (Ontario Power Generation, 1999: 18–24).

As an “incentive” to divest in timely fashion, the government required Ontario Power to provide rebates to customers to offset the rate imbalance of its monopoly. The rebates were based, in part, on the amount of electricity it continued to produce. Therefore, the longer it took to divest generating capacity, the larger the rebates it was forced to pay (Ontario Power Generation, 2002: 14–15).

Competition commenced in May 2002, with the expectation that retail rates would fluctuate with wholesale prices. But within only a matter of months, wholesale electricity prices rose higher than anticipated. [7] Fearing a consumer backlash, the government resumed rate regulation. Lower retail rates were established for residential customers, as well as for small businesses, farmers, and other favored groups (Ontario Ministry of Energy, 2002). Larger businesses (up to 250,000 kilowatt hours per year) were likewise granted rate “relief” in March 2003 (Ontario Ministry of Energy, 2003). Faced with such regulatory interference and the prospect of limited returns, investors understandably became reluctant to build new generating capacity or otherwise enter the market. Consequently, Ontario faced a challenge in meeting future electricity demand.

As of June 2007, Ontario had an installed generating capacity of 31,214 MW. (The sources of this capacity are shown in figure 1.)

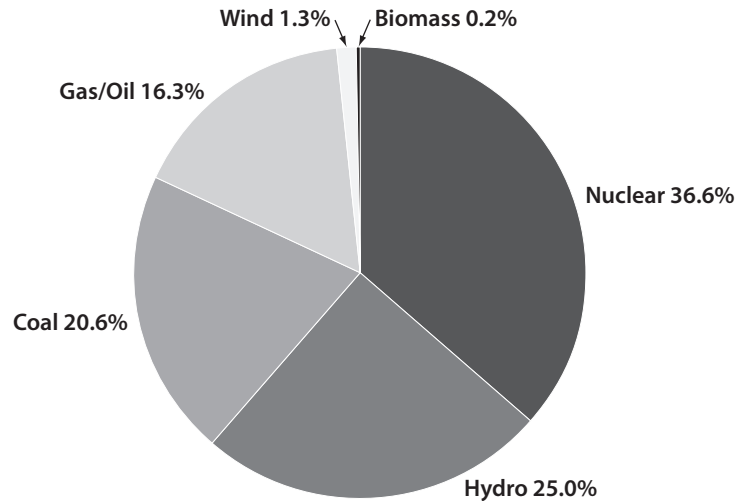
Nuclear power plants in the province are aging, and environmental alarmists have convinced the government that coal plants must be shuttered “in the earliest practical time frame” to remedy global warming. The reduction in existing nuclear and coal capacity is projected by the Ontario Power Authority to approach 18,000 MW by 2027. [8] The power authority also indicates that

5 The electricity generated by competitive suppliers was to be free from rate regulation.

6 In place of fossil-fuel generating capacity, the utility had the option of substituting 1,000 MW of new hydroelectric capacity.

7 The spike in wholesale prices was the result of a temporary shortage of supply, increased demand during a hot summer, and higher costs for natural gas.

8 The Ontario Power Authority was established by the Ontario Electricity Restructuring Act, 2004. The board of directors of the authority is composed of a chief executive officer and 10 individuals appointed by the Minister of Energy and Infrastructure (Ontario Electricity Restructuring Act, 2004: Part II).

Figure 1: Ontario's Electric Generating Capacity (June 2007)

Source: Ontario Power Authority, 2007: 4, Exhibit D, Tab 3, Schedule 1, Table 2.

there could be an additional reduction of 3,500 MW in gas/oil thermal-power capacity by 2027 (Ontario Power Authority, 2007: 4, Exhibit D, Tab 3, Schedule 1) as purchase contracts expire. [9] During the same period, annual peak electricity demand [10] in the province is projected to increase by about 7,400 MW (Ontario Power Authority 2007: 3, Exhibit D, Tab 3, Schedule 1). Thus, new generating capacity of between 25,400 MW to 28,900 MW [11] will be needed by 2027 if current projections of supply and demand hold true.

The planning process

Among other provisions, the Ontario Electricity Restructuring Act, 2004 requires the Ontario Power Authority to assess the adequacy and reliability of electricity resources and to “conduct independent planning for electricity generation, demand management, conservation and transmission and develop integrated power system plans for Ontario” (Ontario Electricity Restructuring Act, 2004: Part II). The law also requires the power authority

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- 9 Many of the contracts to purchase power from privately owned electricity generators will expire between 2012 and 2018. Because a ministerial directive encourages the use of natural gas to meet peak demand, the future role of this non-utility capacity is to be reassessed.
- 10 The term “peak demand” refers to the maximum power required during a specific period of time.
- 11 Some environmental groups are calling for reductions in demand rather than any increase in generating capacity.

to encourage “market-based” responses for meeting energy needs (Ontario Energy Board, 2006b: Part One: The IPSP).

In preparing an integrated power-system plan, the Ontario Power Authority also must satisfy directives issued by the Ontario Minister of Energy and Infrastructure. [12] The directives may specify a supply mix of various types of power generation, including alternative energy sources, as well as the elimination of others, such as coal-fired power plants (Ontario Electricity Restructuring Act, 2004: Part II). On June 13, 2006, then-Minister Dwight Duncan directed the Ontario Power Authority to follow five specific goals in crafting the Integrated Power System Plan (Ontario Energy Board, 2006a). These are to:

- 1 define energy conservation programs and actions to reduce peak demand by 1,350 MW as of 2010 and by an additional 3,600 MW as of 2025;
- 2 increase Ontario’s installed capacity of new, renewable, energy sources by 2,700 MW (from the 2003 base) and increase the total capacity of renewable energy sources to 15,700 MW by 2025; [13]
- 3 plan to allow nuclear capacity to continue to meet a major portion of Ontario’s base-load [14] electricity requirements but limit installed in-service nuclear power capacity to 14,000 MW during the period from 2007 to 2027;
- 4 maintain capacity for use of natural gas to fill peak demand and pursue applications that allow use of natural gas in cogeneration and combined heat and power applications;
- 5 replace coal-fired capacity in Ontario with “cleaner” sources in the earliest practical time frame that ensures adequate generating capacity and electricity system reliability.

The power authority submitted its proposed plan to the Ontario Energy Board [15] on August 29, 2007. The board is charged under the Ontario Electricity

12 The Ministries of Energy and Infrastructure were merged in 2008.

13 This would represent slightly more than 40% of the projected 2025 requirement, including an allowance for “reserve” capacity in the event of outages or surges in demand (Ontario Power Authority, 2007: 3, Exhibit D, Tab 3, Schedule 1).

14 The term “base load” refers to power that is available on a continuing basis.

15 The Ontario Energy Board is composed of at least five members appointed by the Lieutenant Governor in Council (Ontario Energy Board Act, 1998: Section 4.1). The board’s authority is granted in the Ontario Energy Board Act, 1998 and the Ontario Electricity Act, 1998: Section 25, subsections 29 and 30, respectively.

Act, 1998 with ensuring that the plan complies with the directives issued by the Minister of Energy and Infrastructure and that it is “economically prudent and cost effective” (Ontario Electricity Act, 1998: Section 25.30, art. 4).

The drawbacks of the McGuinty plan

The proposed plan is internally inconsistent, a consequence of conflicting government directives. On the one hand, the plan is supposed to be “economically prudent and cost effective.” But it cannot possibly be so given the primary directive to replace coal with high-priced renewables. Nor can the plan promote “market-based” strategies if the government dictates quotas on the use of particular fuels.

1 Coal

Resource planning ordinarily requires analyses of the benefits and costs of all available sources of electricity generation. Yet the Ontario Power Authority failed to conduct economic analyses to determine the most cost-effective mix of future energy supplies. Instead, the proposed supply mix has been largely based upon the government’s fixation with abolishing coal-fired power plants.

Well-intended or otherwise, the elimination of coal-fired power plants would not yield measurable health or environmental benefits (Green, 2007; Green and Brown, 2005). Ontario’s coal-fired power plants produce less than $\frac{1}{10}$ of 1% of global “greenhouse gas” emissions (McKittrick, Green and Schwartz, 2005). Meanwhile, China is building one new coal-fired plant every 12 days or so, which more than offsets reductions in Ontario’s emissions by an exponential margin (Green, 2007).

The closure of coal-fired power plants would impose higher energy costs on the Ontario economy. Any substitute to low-priced coal power will cost more to produce. And, the loss of the lowest-priced fuel source also will ease the rate discipline that otherwise results from competition. Even more problematic is the prospect that the province would be left without ready capacity in the event of an unexpected outage from the limited supply mix.

The government of Ontario is either ignorant of the latest clean-coal technology or, worse, has opted to ignore it in favor of courting “green” voters. For example, a group of US energy firms is developing cutting-edge technology at multiple clean-coal plants capable of capturing and storing carbon dioxide (United States, Department of Energy, 2008). Although the capital cost of such technology is high, unit costs will drop considerably once the technology is replicated on a large scale. For its part, the British Government is committed to reducing post-combustion emissions from coal-fired power plants (United Kingdom, Department for Business, Enterprise and Regulatory Reform, 2007). To work with British firms on perfecting the new technology could reap substantial rewards for Ontario—if the cost of retrofitting plants did not exceed the economic advantages of coal-fired power.

Given the promising direction of research and the lack of environmental or public-health risk, it is sheer folly for the Ontario government to insist upon closing all coal-fired power plants. Even without the advent of better emissions-capture technology, the directive will rob the economy of much-needed low-priced energy.

2 Nuclear power

Nuclear power and natural gas (combined-cycle gas turbines) were the final two “candidate resources” considered for the proposed supply mix. The power authority considered nuclear power only after establishing the quota for “renewables” (in place of coal) and after projecting the reduction in demand that supposedly would be achieved under future conservation measures.

A cost assessment undertaken by the power authority reportedly supported the selection of nuclear generation over natural-gas turbines. But the power authority was hard-pressed to conclude otherwise. The government directed the group to designate the use of natural gas only for periods of peak demand and other situations of “high-value.” [16]

Ontario’s current nuclear power operating capacity is 11,419 MW (Ontario Power Authority, 2007: Exhibit D, Tab 5, Schedule 1, table 8) (table 1). This is composed of 16 units at three sites. Two units at the Bruce A site are not operational but are being refurbished for restart. In addition, there are two units at the Darlington site that are idle (figure 2).

The quota of nuclear power proposed in the plan was limited at the outset by a government directive that it not exceed 14,000 MW. However, the Ontario Chamber of Commerce, among others, has urged the government to lift the artificial limit on nuclear capacity given the shortage of electricity that could result from abolishing coal-fired power plants (Ontario Chamber of Commerce, 2007: 6–7).

Existing nuclear-power facilities in the province would reach the end of their “useful life” and require decommissioning by 2027—absent refurbishment. However, the refurbishment project at Bruce A [17] will restore 3,040 MW of nuclear capacity that otherwise would be decommissioned during the period covered by the plan (Ontario Power Authority, August, 2007: Exhibit D, Tab 6, Schedule 1).

The Integrated Power System Plan proposes two options for adding new nuclear capacity (tables 2 and 3). Dr. Bryne Purchase, executive director of the Queen’s Institute for Energy and Environmental Policy, warns that

16 In this context, “high-value” refers to incidences when there is an available supply of natural gas where incremental generating capacity is needed and alternative fuels would be more costly.

17 The project involves refurbishing and restarting units 1 and 2; refurbishing unit 3; and extending the operating life of unit 4.

Table 1: Nuclear power capacity in Ontario

Station	Installed capacity (MW) of operating plants
Pickering A	1,030
Pickering B	2,064
Darlington	3,524
Bruce A	1,540
Bruce B	3,261
Total	11,419

Source: Ontario Power Authority, 2007: Exhibit D, Tab 5, Schedule 1, table 8.

Figure 2: Status of Ontario's Nuclear Generating Stations (2008)

Source: Ontario, Ministry of Energy and Infrastructure, 2008: Status of Ontario Nuclear Facilities. Used by permission.

Table 2: Plan for Adding Nuclear Capacity (Case 1A)

Facility	Action	Capacity to be added
Pickering B	Refurbishment	2,064 MW
Bruce A	Refurbishment	3,040 MW
Bruce B/Darlington	Refurbishment	6,785 MW
To be decided	New Capacity	1,400 MW
Total		13,289 MW

Source: Ontario Power Authority, 2007: Exhibit D, Tab 6, Schedule 1.

Table 3: Plan for Adding Nuclear Capacity (Case 1B)

Facility	Action	Capacity to be added
Bruce A	Refurbishment	3,040 MW
Bruce B/Darlington	Refurbishment	6,785 MW
To be decided	New Capacity	3,400 MW
Total		13,225 MW

Source: Ontario Power Authority, 2007: Exhibit D, Tab 6, Schedule 1.

the plan's schedule for new and refurbished nuclear capacity is unrealistic: "The cost and reliability of the province's electricity supply hangs in the balance. Each of the nuclear projects will need to be completed on time and within budget—an outcome for which there is no Ontario precedent" (Purchase, 2008: 25).

3 *Natural gas*

As previously noted, the McGuinty administration directed the power authority to plan for the use of gas-fired power generation only during periods of peak demand. In determining this quota, the power authority simply calculated the difference between the peak-period contributions from other sources and the anticipated demand (Ontario Power Authority, 2007). Consequently, the volume of gas-fired capacity included in the Integrated Power System Plan is treated as a residual source of energy. This level of capacity is likely to be considerably less than the volume that would be added if the decision was left to the market.

The decision to limit the quota of gas-fired generation likely reflects the government's concern about the volatility of gas prices and a decline in Canada's production of natural gas. However, neither price expectations nor concerns about production capacity justify curbs on the use of natural gas, which is clean and plentiful.

There is little doubt that there exist sufficient stores of natural gas to meet Ontario's requirements for decades to come. Canada has enormous quantities of undeveloped gas reserves in the north and offshore, and within shale formations [18] in the foothills of the Rocky Mountains and elsewhere, including Quebec, as well as in various coal seams. Imports of liquefied natural gas can keep prices in check.

¹⁸ New techniques such as horizontal drilling and high-pressure fracturing allow access to gas reserves in shale that, previously, were uneconomic to develop.

Renewables

The McGuinty administration is proposing to increase the generating capacity of renewables [19] in the province by a whopping 90% over the next two decades, from the current 8,258 MW to 15,700 MW in 2025. Doing so certainly would win the government lots of green points but it also would represent a hefty new energy tax across the province. We salute individuals, entrepreneurs, or interest groups researching ways to improve the reliability of renewables and to lower costs. But the premier's directive represents a massive subsidy to select energy suppliers—the costs of which will be borne by Ontario consumers.

Renewable energy currently costs more than conventional energy, and it is far less reliable. (Were renewables affordable and efficient, a government mandate would not be necessary to force people to buy it.) And, once assured of substantial market share, suppliers of renewable energy will have far less incentive to make their products more price competitive.

The costs to construct renewable power capacity have been rising because so many politicians are instituting renewable energy quotas, thereby increasing demand for components (Edison Foundation, 2007: 9–10). Adding to the costs will be the need to extend the transmission grid to unconventional sites. In determining the quota for renewables, the power authority insists that the plan would ensure that the most economic sources would be tapped first. Still, there's no assurance that the cost of renewable power will be competitive with conventional sources.

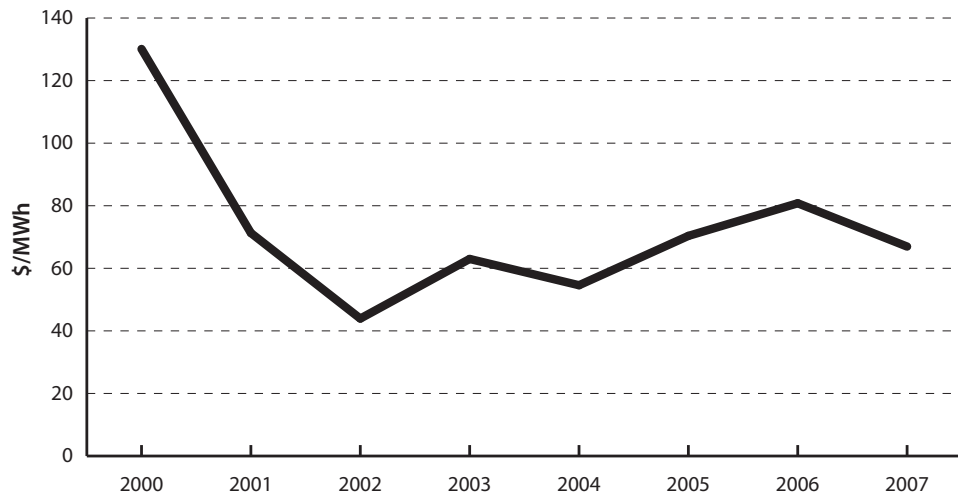
Conclusion

The McGuinty government obviously considers the market to be incapable of meeting electricity demand in the province now or in the future. But competitive forces are superior to government fiat for determining the supply mix of electricity.

Deregulation has succeeded elsewhere. The Alberta experience is particularly instructive. A competitive wholesale market was launched in 2001 and, as shown in figure 3, electricity prices there have not soared as opponents predicted. Indeed, market conditions have remained vibrant, according to the latest annual report by the Alberta Market Surveillance Administrator, who noted:

A robust market design and a level playing field breed market confidence, a necessary precondition for investment. The number and diversity of

19 In this discussion, “renewables” refers to hydro-electricity, wind, solar and biomass.

Figure 3: Alberta Power Pool wholesale price (annual averages)

Source: Alberta Electric System Operator. 2008.

generating capacity additions announced in 2007 suggest that investors remain confident in Alberta's electricity market ... The notable feature of 2007 was the market's ability to continue to produce fair, efficient and openly competitive outcomes while adapting to wide ranging change in the marketplace. (Alberta Market Surveillance Administrator, 2008: 5)

Moreover, investment in new capacity is keeping pace with the growth in demand. For example, some 4,400 MW of new capacity has been added, including more than 3,000 MW of gas-fired generating capacity, 450 MW of coal-fed capacity, and significant amounts of wind generation.

Deregulation in Texas has spurred more than \$20 billion in new generating capacity and plans are underway for additional projects worth at least that much (Bill Peacock, 2008). Rates have held relatively steady compared to regulated jurisdictions.

Recommendations

The McGuinty government's embrace of central planning places Ontario consumers at risk of escalating electricity rates and the attendant economic downturn. Indeed, the government ignored cost in preparing its dictates of both sources and quotas of electricity capacity. Consumers would be far better served if market forces, not government fiat, were allowed to determine the best mix of generating capacity.

Major changes

- ❧ Repeal provisions of the Electricity Restructuring Act, 2004 that authorize the Ontario Power Authority to develop an Integrated Power System Plan.
- ❧ Repeal provisions of the Electricity Restructuring Act, 2004 that authorize ministerial directives relating to electricity generation capacity.
- ❧ Rationalize environmental regulations. Federal and provincial standards should be harmonized to lower transaction costs and thus improve compliance. Attracting investment in new generating capacity requires coherent and consistent rules. Regulations should only set standards, not dictate technologies.

Interim changes

Major reforms can take time to implement. Thus, in the interim, we recommend the following changes to the proposed Integrated Power System Plan.

- ❧ Reject the proposed decommissioning of all coal-fired power plants; allow clean-coal technologies to be implemented in Ontario.
- ❧ Reject limitations on the amount of nuclear or gas-fired generating capacity. A diversity of generating capacity would help to ensure the reliability and security of electricity supplies.
- ❧ Eliminate mandates for “renewable” energy. Market competition can force suppliers of renewables to cut costs and improve technologies, thereby positioning their products as preferable to conventional sources.
- ❧ Privatize initiatives for energy efficiency and demand-reduction services. The provincial government should not be competing with private energy consultants.

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Dr. Angevine has undertaken domestic and international studies in the markets for natural gas (including trade, pipelines and storage), oil and oil products (including oil sands, refining and investment), and electricity (including deregulation, water rentals, and renewables). He has advised the Alberta Department of Energy and testified before the National Energy Board as an expert witness. He has A.M. and Ph.D. degrees in Economics from the University of Michigan, a M.A. Economics degree from Dalhousie University and a B.Comm. from Mount Allison University.

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菲沙研究所的願景乃一自由而昌盛的世界，當中每個人得以從更豐富的選擇、具競爭性的市場及自我承擔責任而獲益。我們的使命在於量度、研究並使人知悉競爭市場及政府干預對個人福祉的影響。

Nous envisageons un monde libre et prospère, où chaque personne bénéficie d'un plus grand choix, de marchés concurrentiels et de responsabilités individuelles. Notre mission consiste à mesurer, à étudier et à communiquer l'effet des marchés concurrentiels et des interventions gouvernementales sur le bien-être des individus.

تتمثل رؤيتنا في وجود عالم حر ومزدهر يستفيد فيه الأفراد من القدرة على الاختيار بشكل أكبر، والأسواق التنافسية، والمسؤولية الشخصية. أما رسالتنا فهي قياس، ودراسة، وتوصيل تأثير الأسواق التنافسية والتدخلات الحكومية المتعلقة بالرفاه الاجتماعي للأفراد.

Nuestra visión es un mundo libre y próspero donde los individuos se benefician de una mayor oferta, la competencia en los mercados y la responsabilidad individual. Nuestra misión es medir, estudiar y comunicar el impacto de la competencia en los mercados y la intervención gubernamental en el bienestar de los individuos.

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