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**Phasing-Out Coal-Fired Electricity in Ontario**

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**Introduction**

The phase-out of coal-fired electricity production in the Canadian Province of Ontario has been widely described as one of the most significant measures taken by any government in the world to reduce greenhouse gas (GHG) emissions.<sup>1</sup> The phase-out of coal, which in the early 2000s constituted a quarter of the province's electricity supply, was completed in 2014. The phase-out was associated with dramatic improvements in air quality in southern part of province. As such, it is regarded as a core environmental legacy of the 2003-2018 Liberal governments of Premiers Dalton McGuinty and Kathleen Wynne.

Although an undeniable success in terms of emissions of GHGs, smog and acid rain precursors, and heavy metals, like mercury, the province's approach to the phase-out did involve significant trade-offs in terms of the environmental and economic sustainability of the province's electricity system. The phase-out was also a product of a wider politicization of decision-making around the system, the consequences of which continue to affect the province's politics profoundly.

**The Coal Phase-Out: A History**

*The Role of Coal-Fired Electricity in Ontario*

As shown in **Table 1**, Ontario constructed six coal-fired electricity plants between the early 1950s and mid-1980s. Up to the 1950s the province's electricity system had been almost entirely hydro-electric. However dramatic post-war growth in electricity demand outstripped the province's the supply of readily developable hydro sites. The coal-fire plants were constructed to bridge supply until the province's planned nuclear energy program could be realized, a process that would stretch from the 1960s to the mid-1990s.<sup>2</sup> The coal-fired plants also provided back-up supply for periods of high electricity demand.

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<sup>1</sup> Sarah Petrean, "Ontario's coal phaseout in perspective." *Clean Energy Canada*. January 17, 2017, <http://cleanenergycanada.org/ontarios-coal-phaseout-perspective/>.

<sup>2</sup> See N.B.Freeman, *The Politics of Power: Ontario Hydro and its Government 1906-1995* (Toronto: University of Toronto Press, 1996).

**Table 1: Ontario's Coal-Fired Electricity Plants**

<b>Name and Location</b>	<b>Commissioned</b>	<b>Capacity</b>	<b>Fate</b>
Hearn (Toronto)	1951	1200MW	Shutdown 1983, abandoned.
Lakeview (Mississauga)	1962	2400MW	Shutdown 2005, demolished.
Thunder Bay	1963	306MW	Converted to biomass 2015, shutdown 2018.
Lambton (Sarnia)	1969	1980MW	Shutdown 2013, demolished.
Nanticoke	1972-78	3964MW	Shutdown 2013, demolished
Atikokan	1985	211MW	Converted to biomass, 2014.

*The Beginnings: Acid Rain Control.*

While the Ontario coal phase-out is generally viewed as a response to issues related to climate change and air quality, environmental questions about role of coal-fired electricity in the province first arose around an earlier issue – acid rain. A complex process of domestic and international advocacy through the 1970s led to the imposition of control orders on the leading sources of sulphur dioxide and nitrogen oxides in the province, including the Inco facility in Sudbury, and Ontario Hydro's coal-fired power plants.<sup>3</sup> Ontario Hydro was specifically ordered, in January 1981, to reduce its combined sulphur dioxide and nitrogen oxide emissions by 42.5 per cent within three years.<sup>4</sup>

The acid rain issue remained high on the agenda with the defeat of the Progressive Conservative (PC) party "dynasty" and its replacement by a Liberal minority government, led by David Peterson, and supported by Bob Rae's New Democrats, in the aftermath of the 1985 provincial election. In December 1985 the new Minister of the Environment Jim Bradley announced the imposition, by cabinet, of special

<sup>3</sup> On the acid rain issue see Doug Macdonald, *The Politics of Pollution* (Toronto: McClelland and Stewart, 1991) pp.241-252. See also M. Winfield, *Blue-Green Province: The Environment and the Political Economy of Ontario* (Vancouver: UBC Press, 2012), pg.32

<sup>4</sup> See S. Oziewicz, "Hydro plans 40% reduction in emissions over 10 years; Smith skeptical of timing," *The Globe and Mail*, January 27, 1981.

regulations on the four largest sources of acid-causing gas emissions in the province.<sup>5</sup> Under the program, known as Countdown Acid Rain, Inco, Ontario Hydro, Falconbridge Ltd. and the Algoma Steel Co. Ltd., were required to reduce their total sulphur dioxide emissions from the 1980 level of 1,772,000 tonnes per year to 795,000 tonnes by 1995.

Ontario Hydro, for its part, planned to meet its 1994 target of 175,000 tonnes per year largely by mothballing coal-fired generating facilities as new nuclear plants, particularly the Darlington facility east of Toronto, came into service.<sup>6</sup> The coal-fired plants would however, be held 'in reserve.'

### *Coal and the 'Common Sense Revolution.'*

The arrival of a Progressive Conservative government lead by Mike Harris in 1995 would have major, if initially unexpected, implications for the fate of Ontario Hydro's coal-fired plants.

The new government's "Common Sense Revolution" (CSR) platform had said little about electricity issues, other than to promise a five year freeze on hydro rates.<sup>7</sup> In practice, the government embarked on what would be the most extensive restructuring of the electricity sector in Ontario since the creation of the Ontario Hydro Electric Commission in 1906. Strongly influenced by developments in the United Kingdom and at the state and federal levels the United States,<sup>8</sup> the government moved to abandon Ontario Hydro's near monopoly on electricity system planning and control of major generating assets and to embrace a 'market' model for the system. Under these models the role of utilities in long-term planning for electricity supply would be removed. Rather investors would make decisions about where and when electricity generating facilities should be built, on the basis of their assessment of the potential market for the power they would produce.<sup>9</sup>

An Advisory Committee on Competition in Ontario's Electricity System, chaired by former federal Finance Minister Donald Macdonald, was appointed shortly after the election. The Committee's report, published in June 1996 recommended the elimination of Ontario Hydro's monopoly on generation and the introduction of a competitive electricity market. The report also recommended the privatization of much of Ontario

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<sup>5</sup>.Ontario Ministry of the Environment, *Countdown Acid Rain* (Toronto: Queen's Printer, 1986).

<sup>6</sup> I.Dick et.al, "Air Quality" in D.Estrin and J.Swain, eds., *Environment on Trial* (3<sup>rd</sup> ed) (Toronto: Canadian Institute for Environmental Law and Policy and Emond-Montgomery Publishers, 1993) pp.474-476.

<sup>7</sup> PC Party of Ontario *The Common Sense Revolution*, pg.9.

<sup>8</sup> J.Swift and K.Stewart, *Hydro: The Decline and Fall of Ontario's Electric Empire* (Toronto: Between the Lines, 2004) Chapters 4 pp.57-71 and 6 pp.96-116 for a discussion of the introduction of market models in Chile, the United Kingdom and the United States.

<sup>9</sup> For a detailed discussion of the electricity market concept see D.N.Deweese, "Electricity Restructuring in Canada," in G.Bruce Doern, *Canadian Energy Policy and the Struggle for Sustainable Development* (Toronto: University of Toronto Press, 2005). See also R.Daniels Ed., *Ontario Hydro at the Millennium: Has Monopoly's Moment Passed?* (Toronto UTP, 1996)

Hydro's thermal (i.e. coal and oil) and hydroelectric assets, and the consolidation of municipal electric utilities.<sup>10</sup>

The government responded to the committee's report in November 1997 with White Paper on electricity policy entitled *Direction for Change: Charting a Course for Competitive Electricity and Jobs in Ontario*<sup>11</sup> The White Paper proposed the creation of competitive wholesale and retail electricity markets by 2000, providing the foundation for the *Energy Competition Act*, enacted in October 1998. The legislation divided Ontario Hydro into five separate entities: Ontario Power Generation (OPG), which would own the utility's generating assets (including the coal-fired plants); Ontario Services Corporation (later named Hydro One) to operate the transmission infrastructure; an Independent Market Operator (IMO) to operate and administer the wholesale electricity market; the Ontario Hydro Financial Corporation, which assumed responsibility for the \$20 billion of Ontario Hydro's \$38 billion debt which was 'stranded' as a result of the utility's break-up; and the Electrical Safety Authority (ESA), which was to assume Ontario Hydro's regulatory functions with respect to electrical safety. All of the successor entities would continue, like Ontario Hydro, to be owned by the province. One of the major themes of the government's direction was to reduce Ontario Hydro's dominant position in the system, from ownership of 85 per cent of generating assets to 35 per cent of those assets by 2010.<sup>12</sup>

Serious problems emerged at Ontario Hydro even as the government was contemplating its dissolution. In July 1997 an external review raised major concerns regarding the maintenance and safety of Ontario's nuclear generating assets.<sup>13</sup> In response, Ontario Hydro adopted a Nuclear Asset Optimization Plan (NAOP). Under the plan, seven of the utility's twenty power reactors<sup>14</sup> were taken out of service for repair and overhaul. Although not immediately apparent, the NAOP and its consequences would ultimately set in motion the chain of events that would lead to the phase out of coal-fired electricity generation in Ontario.

As part of the NAOP, Ontario Hydro indicated its intention to rely its five coal-fired generating facilities (Lakeview, Nanticoke, Lambton, Thunder Bay, and Atikokan)<sup>15</sup> to replace the power supplies lost as a result of the taking out of service of the seven nuclear units. This, inevitably, led to major increases in emissions of smog and acid rain precursors, heavy metals, and greenhouse gases from these facilities. In the result, as

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<sup>10</sup> Advisory Committee on Competition in Ontario's Electricity System *A Framework for Competition: The Report of the Advisory Committee on Competition in Ontario's Electricity System to the Ontario Minister of Environment and Energy* (Toronto: The Committee 1996).

<sup>11</sup> Government of Ontario, *Direction for Change – Charting a Course for Competitive Electricity and Jobs in Ontario* (Toronto: Queen's Printer 1997).

<sup>12</sup> Winfield, *Blue-Green*, pp.102-103.

<sup>13</sup> Ontario Hydro, *Report to Management IIPA/SSFI Evaluation Findings and Recommendations* (Toronto: Ontario Hydro, July 1997).

<sup>14</sup> Pickering A Units 1-4 and Bruce A Units 1, 3 and 4. Bruce A Unit 2 had been shut down in October 1995.

<sup>15</sup> A sixth facility, the Hearne Plant on the Toronto Waterfront, had been retired in 1983.

shown in **Table 2** between 1995 and 2001, as the plants' outputs rose, their greenhouse gas emissions increased by a factor of 2.3, and emissions of the smog and acid rain precursors sulphur dioxide (SO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>) doubled and increased by a factor of 1.7, respectively.

**Table 2 Ontario Power Generation's Coal Plants: Electricity Generation and Emissions 1995-2001.**<sup>16</sup>

## Appendix C

### Ontario Power Generation's Coal Plants: Electricity Generation and Emissions, 1995 to 2001

	1995	1996	1997	1998	1999	2000	2001
Electricity Generation (Gwh)	16,699	18,915	24,523	33,275	34,068	41,446	37,185
Greenhouse Gases (tonnes)	15,400,000	17,900,000	22,430,000	29,800,000	30,530,000	37,640,000	35,090,000
Sulphur Dioxide (tonnes)	74,100	84,500	123,150	140,810	140,580	163,510	147,090
Nitrogen Oxides (NO) (tonnes)	28,200	35,100	42,770	54,320	49,240	49,450	42,170
<small>1 Gwh = 1,000,000 kilowatt-hours  Sources: Ontario Power Generation, <i>Towards Sustainable Development: 2001 Progress Report</i>, Appendix A; <i>Towards Sustainable Development: 1999 Progress Report</i>, Appendix A; Email from Bob Kozopas, Ontario Power Generation, August 22, 2000.</small>							

### *The emergence of the smog Issue*

The large increases in emissions associated with the NAOP occurred as the issue of the health impacts of the smog episodes which were occurring with increasing regularity in southern Ontario became a major public concern. The situation led to a number of high profile interventions by health professionals. A major report released by the Ontario Medical Association (OMA) in May 1998 characterized the smog situation as posing a "serious health risk to the people of Ontario."<sup>17</sup> The report, which

<sup>16</sup> J. Gibbons, Countdown Coal: How Ontario can improve air quality by phasing out coal-fired electricity generation (Toronto: Ontario Clean Air Alliance, February 2003), Appendix C.

<sup>17</sup> The Health Effects of Ground Level Ozone, Acid Aerosols and Particulate Matter (Toronto: Ontario Medical Association, May 1998) Conclusions, accessed at <http://www.oma.org/phealth/ground.htm#conclusion>

represented the first major intervention by the OMA in an environmental issue since the late 1960's,<sup>18</sup> was critical of the likely impacts of the NAOP on air quality and more generally of the province's performance on air quality issues.

On the basis of the emergence of a better scientific understanding of the health effects of air pollutants, the OMA report recommended that the province take action around the introduction of an electricity market in Ontario to ensure major reductions in emissions of sulphur dioxide and nitrogen oxides.<sup>19</sup> Subsequent reports by local Medical Officers of Health further emphasized the health impacts of poor air quality in the province.<sup>20</sup>

Three of OPG's coal-fired plants, Lambton, Nanticoke and Lakeview, were located directly in the southern Ontario airshed most affected by smog. The province's electricity consumption patterns, which were now moving towards peaking in the summer due to increased air conditioning loads, further reinforced the problem. Summer peaks meant that the coal plants were being run at maximum capacity at the time when the conditions for smog formation were at their worst.<sup>21</sup>

The combination of the emergence of the smog issue and implementation of the NAOP led to the establishment of what would become the key policy entrepreneur in the coal-phase out story – the Ontario Clean Air Alliance. The alliance was founded in 1997 as a project of the Canadian Institute for Environmental Law and Policy.<sup>22</sup> The alliance rapidly assembled a diverse coalition of supporters including municipalities, private sector companies, unions, health professions and associations and other environmental organizations.

The alliance initially focused on the establishment of emission caps for greenhouse gases, nitrogen oxides and sulphur dioxide for the electricity sector.<sup>23</sup> OCAA was specifically concerned over the government's direction to Ontario Hydro to sell generating assets to reduce its dominant position in the emerging market. The utility was also under pressure to sell those assets, including the coal-fired plants, as going concerns, to maximize the revenues their sale would generate. Those revenues could then contribute to paying down Ontario Hydro's debt.

The federal government added to the pressures on the province over air quality issues by initiating discussions with the US federal government to develop an Ozone

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<sup>18</sup> The OMA's previous submission had been on the development of the province's 1967 *Air Pollution Control Act*. <http://www.oma.org/phealth/ground.htm#executive>

<sup>19</sup> <http://www.oma.org/phealth/ground.htm#recommendations>

<sup>20</sup> See, for example, Toronto Public Health, *Air Pollution Burden of Illness in Toronto: Summary Report* (Toronto: City of Toronto, May 2000).

<sup>21</sup> See B.Cundiff, *Ontario's Coal Phase Out: Lessons learned from a massive climate achievement* (Toronto: Ontario Clear Air Alliance, 2015) <https://www.cleanairalliance.org/wp-content/uploads/2015/04/CoalPhaseOut-web.pdf>, pp.19-21.

<sup>22</sup> The Alliance later moved its institutional home to Pollution Probe.

<sup>23</sup> J.Gibbons and S.Bjorkquist *Electricity Competition and Clean Air* (Toronto: Ontario Clean Air Alliance, 1998).

Annex to the 1991 Canada-US Air Quality Agreement.<sup>24</sup> The Annex was eventually signed in October 2000. Its provisions included a cap on nitrogen oxide emissions from coal-fired power stations in central and southern Ontario, opening the possibility of federal regulation of these facilities if the province did not take steps to reduce their emissions on its own.<sup>25</sup> That possibility was reinforced with the addition, in May 2001, of particulate matter 10 microns in diameter (PM<sub>10</sub>) and then, in July 2002, sulphur dioxide and nitrogen oxides, volatile organic compounds, nitric oxide, ozone and gaseous ammonia - all smog components or precursors - to the list of toxic substances under the *Canadian Environmental Protection Act* (CEPA).<sup>26</sup> The listing of these substances under CEPA would permit the federal government to regulate their emissions directly.

In response to these pressures the province announced, in January 2000, its intention to impose new sulphur dioxide and nitrogen oxide emission caps on OPG's coal and oil fired plants as of January 2001 as part of its "strategic attack" on air pollution. The government also unveiled plans to pursue an emission trading system for contaminants that "cause smog, acid rain and other air pollution problems."<sup>27</sup> The announcement was immediately criticized for its failure to address pollutants from the electricity sector other than sulphur and nitrogen oxides, and flaws in the proposed emission trading system. These would allow OPG to exceed its emission limits by purchasing emission 'credits' from Canadian or US companies in Ontario's airshed.<sup>28</sup>

Under continuing pressure from the OCAA's campaign, reinforced by the anticipation of reports from the Ontario Medical Association<sup>29</sup> and the City of Toronto's Medical Officer of Health<sup>30</sup> highlighting the role of the coal-fired plants in southern Ontario's air quality problems, the province announced in May 2000 an "environmental" moratorium on the sale of OPG's coal-fired plants.<sup>31</sup> Proposed electricity sector emission regulations were eventually announced on March 26, 2001, along with a discussion paper on emissions trading for the electricity sector.<sup>32</sup>

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<sup>24</sup> The 1991 agreement had been principally concerned with the acid rain.

<sup>25</sup> Protocol Between the Government of Canada and Government of the United States of America Amending the "Agreement Between the Government of Canada and the Government of the United States of America on Air Quality. Full text at [http://www.ec.gc.ca/cleanair-airpur/CAOL/air/can\\_usa\\_e.html](http://www.ec.gc.ca/cleanair-airpur/CAOL/air/can_usa_e.html)

<sup>26</sup> <http://www.gazette.gc.ca/archives/p1/2002/2002-07-27/html/reg-eng.html>

<sup>27</sup> Ministry of the Environment, "Enhancing Ontario's Air Quality," Media Backgrounder January 24, 2000.

<sup>28</sup> J.Gibbons, Pollution Loopholes: An Assessment of Ontario's Approach to Air Pollution Control in the Electricity Sector (Toronto: Ontario Clean Air Alliance, 2000), accessed at <http://www.cleanairalliance.org/files/active/0/pollutionloophole.html> March 2, 2009.

<sup>29</sup> Ontario Medical Association, Illness Costs of Air Pollution: Summary of Findings (Toronto: OMA, June 2000).

<sup>30</sup> Pengelly, Campbell, Ennis, Ursitte and Li-Muller, Air Pollution Burden of Illness in Toronto.

<sup>31</sup> K.Clark and J.Yacoumidis, Ontario's Environment and the 'Common Sense Revolution: A Fifth Year Report (Toronto: Canadian Institute for Environmental Law and Policy, 2000), pg.72.

<sup>32</sup> Ministry of the Environment, "Improving Ontario's Air Quality" Media Backgrounder, March 26, 2001.

A phase-out of the Lakeview coal-fired plant by April 2005 was announced by Environment Minister Elizabeth Witmer. Any replacement facility would be required meet same emission standards as “efficient natural gas technology.”<sup>33</sup> That requirement was incorporated into a regulation in October 2001.<sup>34</sup> The government subsequently refused to approve proposed sales of the Thunder Bay and Atikokan Plants for “environmental reasons,” and made any future sales conditional on the conversion of the coal-fired plants to natural gas.<sup>35</sup> These steps, sometimes referred to as the “Witmer standard,” represented the beginning of the end for the province’s coal-fired plants.

In the face of continuing air quality problems, pressure for more dramatic action on the coal plants continued to build. The Legislature’s Select Committee on Alternative Fuels, established in June 2001, heard a succession of witnesses highlighting the health impacts of the coal plants. The committee’s report, released the following year, recommended the closure of the Thunder Bay and Atikokan plants by June 2005 and the remaining coal-fired plants by 2015.<sup>36</sup>

### *2003-2007 A coal phase-out moves to centre stage.*

All three major political parties in Ontario entered the October 2003 election with platform commitments to the phase-out coal-fired electricity. The governing Progressive Conservatives, now led by Ernie Eves, election committed closing all of Ontario’s coal-fired power plants by 2015.<sup>37</sup> The NDP’s *Publicpower* platform was more ambitious, proposing a 2007 closure date.<sup>38</sup> The Liberals, who now led by Dalton McGuinty, who would emerge from the election with a strong majority government, also committed to “shut down” Ontario’s coal burning power plants by 2007.<sup>39</sup>

The Eves government had established an Electricity Conservation and Supply Task Force to consider the province’s path forward on electricity matters in light of the concerns over supply adequacy and price instability that had flowed from the market experiment. The task force’s January 2004 report effectively recommended the abandonment of the market model adopted through the 1998 *Electricity Act*. Instead the task force proposed that the province develop a long-term integrated system plan to guide the development of the supply and demand resources needed to meet the province’s power requirements. The government would provide guidance on the composition of supply in the Ontario electricity system.<sup>40</sup> The McGuinty government

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<sup>33</sup> Elwell, Castrilli and Chau, *Ontario’s Environment and the Common Sense Revolution: Sixth Annual Report*, (Toronto: Canadian Institute for Environmental Law and Policy, 2001) pg.44.

<sup>34</sup> Environmental Commissioner of Ontario (ECO), 2001/02 Annual Report (Toronto: ECO, 2002), pg.88.

<sup>35</sup> Smith and Stewart, Hydro, pg.173.

<sup>36</sup> Select Committee on Alternative Fuel Sources Final Report (Toronto: Legislative Assembly of Ontario, 2002), recommendation 32.

<sup>37</sup> Progressive Conservative Party of Ontario *The Road Ahead: Policy Paper 6: Safeguarding the Natural Environment* (Toronto: PC Ontario Party, 2003).

<sup>38</sup> Ontario New Democratic Party, Publicpower: Practical Solutions for Ontario (Toronto: Ontario NDP, 2003).

<sup>39</sup> Ontario Liberal Party, Growing Strong Communities, pp.3-5.

<sup>40</sup> Electricity Conservation and Supply Task Force, Final Report (Toronto: Ministry of Energy, 2004) pg.69.



responded to the task force report through the *Electricity Restructuring Act*,<sup>41</sup> adopted in December 2004.

The legislation confirmed the step away from the market model towards what the government was now describing as a “hybrid” system of markets and planning,<sup>42</sup> symbolized by the redubbing of the Independent Market Operator as the ‘Independent Electricity System Operator (IESO).<sup>43</sup> The legislation created a new entity, the Ontario Power Authority (OPA).<sup>44</sup> The OPA was mandated to develop a 20-year Integrated Power System Plan (IPSP) for the province’s electricity system.<sup>45</sup> It could also enter into contracts generation or conservation services.<sup>46</sup> The legislation provided for the issuance of directives to the OPA by the Minister of Energy with respect to the content of the IPSP.<sup>47</sup>

On May 2, 2005 the Minister of Energy wrote to the OPA requesting advice on an appropriate mix of supply options for Ontario’s future electricity system over the next 20 years. That advice was delivered by the OPA in December 2005. The OPA recommended that the system continue to be dominated nuclear power, which would provide fifty-per cent of the province’s generating capacity through a combination of refurbishments of existing plants and new build. Coal would be phased out between 2005 and 2015, being replaced by a combination of natural gas fired generation and new renewables – principally a combination of refurbished hydro facilities and new wind power projects.<sup>48</sup>

The Supply Mix Advice report was widely criticized by environmental organizations. The advice was seen to overestimate future demand, underestimate the potential contributions from conservation, low-impact renewables and cogeneration, overstated the risks and costs associated with natural gas generation, and underestimate the costs and risks associated with nuclear power.<sup>49</sup>

In response to the supply mix report the government issued a Supply Mix Directive to the OPA regarding the IPSP that it was to develop. Conceding some ground to the OPA’s critics the June 13, 2006 directive more than tripled the targets for conservation and demand management recommended by the OPA, to a 6300 MW reduction in peak demand by 2025, but on the whole the directive followed the power

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<sup>41</sup> *The Electricity Restructuring Act 2004*, S.O., 2004, c.23.

<sup>42</sup> On the emergence of a “Hybrid” system see Ontario Power Authority, [Supply Mix Advice: Background Reports 3.1 Overview of the Development of Power System Planning in Ontario](#) (Toronto: OPA, 2005).

<sup>43</sup> *Electricity Restructuring Act*, Part II.

<sup>44</sup> *The Electricity Restructuring Act*, , Part II.1.

<sup>45</sup> *The Electricity Restructuring Act*, s.25.30.

<sup>46</sup> *The Electricity Restructuring Act*, s.25.2 (5), 25.32.

<sup>47</sup> *The Electricity Restructuring Act*, s.25.30(2).

<sup>48</sup> Ontario Power Authority, [Supply Mix Advice and Recommendations](#) (Toronto: Ontario Power Authority, December 2005), [http://www.powerauthority.on.ca/Report\\_Static/1139.htm](http://www.powerauthority.on.ca/Report_Static/1139.htm).

<sup>49</sup> See, for example, M.Winfield, M.Horne and R.Peters, [The Ontario Power Authority Supply Mix Advice Report: A Review and Response](#) (Toronto and Drayton Valley, The Pembina Institute, February 2006), accessed at [http://pubs.pembina.org/reports/OE\\_OPA\\_Com\\_SupMix\\_%20Feb2706.pdf](http://pubs.pembina.org/reports/OE_OPA_Com_SupMix_%20Feb2706.pdf).

authority's December 2005 advice. Nuclear power was to remain the foundation of the system, with nominal cap of 14,000MW of capacity (substantially more capacity than actually in service at the time), accompanied by a doubling of renewable capacity to 15,700 MW, and supplemented by "high efficiency and high value" uses of natural gas.

Crucially, the directive signalled a backing away from the government's commitment to phase-out coal-fired electricity in 2007, simply requiring that the plan provide for the replacement of coal-fired generation "in the earliest practical time frame that ensures adequate generating capacity and electricity system reliability in Ontario."<sup>50</sup> The directive was again widely criticized by environmental advocates for its focus on nuclear energy, abandonment of the 2007 coal-phase-out target date, and exemption of the overall planning process from the *Environmental Assessment Act*.<sup>51</sup>

The IPSP, proposing \$60 billion in investments in energy supply and conservation (including \$27 billion on nuclear energy) was filed with the Ontario Energy Board in August 29, 2007,<sup>52</sup> just prior to the start of the 2007 election campaign. A regulation requiring the cessation of the use of coal at the province's four remaining coal-fired power plants by 2014 was adopted at the same time.<sup>53</sup> From the government's perspective the electoral advantage of apparent closure on electricity file, supported by a renewed commitment to a coal phase-out and modest support for renewable energy and conservation, which helped divide some of the environmental opposition to the plan, was seen to the override political risk of parts of the ENGO community actively campaigning against the IPSP.<sup>54</sup>

The move in the direction of a coal phase-out was further reinforced by the emerging issue of climate change. The McGuinty government's interest in the climate change file intensified with the arrival of the Conservative minority federal government led by Stephen Harper in January 2006. The new federal government, with its political base in western Canada, had a strong desire to back away from the previous federal Liberal governments' commitments under the Kyoto Protocol to reduce Canada's GHG emissions by 6 per cent relative to 1990 by the first (2008-12) commitment period under the protocol.<sup>55</sup> Ontario was particularly concerned about the potential distributional impacts of the Harper government's approach to the climate change issue, which was

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<sup>50</sup> The Hon.D.Duncan, Directive to OPA re: Integrated Power System Plan, June 13, 2006.

<sup>51</sup> See, for example, Ontario Clean Air Alliance, "Liberals blackout on energy" Media Release, July 20, 2006.

<sup>52</sup> Ontario Power Authority, Integrated Power System Plan, (Toronto: Ontario Power Authority, August 29, 2007), accessed at <http://www.powerauthority.on.ca/Page.asp?PageID=924&SiteNodeID=320>.

<sup>53</sup> Ontario Regulation 496/07.

<sup>54</sup> "New energy plan for a new era," (Editorial) The Toronto Star, August 30, 2007.

<sup>55</sup> D. Macdonald, "The failure of Canadian Climate Change Policy: Veto Power, Absent Leadership, and Institutional Weakness," in VanNijnatten and Boardman, *Canadian Environmental Policy and Politics*, 3rd edition. 152-66.

seen to favour the western oil and gas industry at the expense of manufacturing in eastern Canada.<sup>56</sup>

Ontario announced its own Go Green climate change plan in June 2007.<sup>57</sup> The plan committed to reducing the province's GHG emissions to 6 per cent below 1990 levels by 2014, 15 per cent by 2020, and 80 per cent by 2050. The commitment to phase out coal-fired electricity generation was the centrepiece of the plan, with coal then accounting for 25 per cent of the province's electricity supply, supplemented by major investments in public transit and a cap-and-trade system for other large industrial sources. The plan itself acknowledged that these measures alone would not be sufficient to fully meet its targets.<sup>58</sup>

The Liberal platform going into the October 2007 election committed to carrying through on the climate change plan, including a coal phase-out by 2014. With respect to the IPSP, in September 2008 the OEB's formal hearings on the IPSP were suspended after a few weeks of deliberations when the newly appointed Minister of Energy and Infrastructure, George Smitherman, ordered the OPA to rework the IPSP to incorporate more renewable supply and conservation. At the same time, Smitherman reiterated the province's commitment to a nuclear capacity goal of 14,000MW and a coal-phase-out.<sup>59</sup> In practice the withdrawal of the 2007 IPSP would represent the end of the government's formalized approach to electricity system planning. The government's wider plans were profoundly disrupted by the fall 2008 global financial crisis. Among other things, the financial collapse triggered a further crisis in the North American automobile manufacturing industry. As a result, the province's economy lost nearly 250,000 jobs between the fall of 2008 and the spring of 2009.

Picking up on signals from the incoming Obama administration in the United States, the province made strong moves to linking its economic recovery strategy to environmental sustainability, particularly in the form of the 2009 *Green Energy and Green Economy Act* (GEGEA). The act provided, among other things, the authority for a feed-in tariff (FIT) mechanism similar to those employed in Germany, Spain, and Denmark, for low-impact renewable energy sources. FIT mechanisms pay the owners and operators of renewable energy projects a guaranteed fixed price for the electricity produced by their facilities.<sup>60</sup> In addition to supporting the phase-out of coal-fired

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<sup>56</sup> I. Urquhart, "Don't Look to Premiers for Leadership," *Toronto Star*, August 10, 2007.

<sup>57</sup> Ontario, Ministry of the Environment, *Go Green -- Ontario's Action Plan on Climate Change* (Toronto: Queen's Printer for Ontario, 2007).

<sup>58</sup> See ECO, *Finding a Vision for Change: Annual Greenhouse Gas Progress Report 2008/09* (Toronto: December 2009). See also Pembina Institute, *Highlights of Provincial Greenhouse Gas Reduction Plans* (Drayton Valley, AB, August 2009).

<sup>59</sup> Notes for remarks By The Honourable George Smitherman, Deputy Premier, Minister of Energy and Infrastructure Ontario Energy Association Niagara Falls, Ontario September 18, 2008, accessed at <http://www.mei.gov.on.ca/english/news/?page=speeches&speech=18092008>.

<sup>60</sup> Pembina Institute, *Fact Sheet: How feed-in tariffs maximize the benefits of renewable energy*, (Calgary: The Pembina Institute, N.D.) <https://www.pembina.org/reports/feed-in-tariffs-factsheet.pdf>

electricity through the development of renewable energy sources, it was hoped that the FIT program would prompt the development of a renewable energy technology manufacturing and services sector in the province. It was expected that this would help to replace some of the manufacturing jobs lost in the 2008 economic downturn.<sup>61</sup>

Along with a number of competitive request-for-proposal processes, the FIT did facilitate a large increase in renewable energy capacity in the province. From a starting point of virtually zero in 2005, approximately 4500MW of wind and 450MW of solar PV capacity had been installed by the end of 2018.<sup>62</sup> At the same time, the program became the target of growing criticism over rising electricity costs and the need for additional power supplies in the face of declining electricity demand.<sup>63</sup> It would be effectively terminated by McGuinty's successor, Kathleen Wynne, for larger projects in 2013, and for smaller ones in 2017.<sup>64</sup>

#### *Completing the phase-out 2011-14.*

The 2011 Liberal platform again committed to the completion the phase-out of coal-fired electricity. The Liberals emerged from the election just short of a majority government (a "major minority" in Premier McGuinty's words). The electricity question plagued McGuinty's final term in office. Serious complications arose around the government's cancellation of proposed gas-fired electricity plants in Oakville<sup>65</sup> and Mississauga, both part of the coal-phase-out process, in the run-up to the 2011 election. The plants had faced very strong local opposition in both communities.<sup>66</sup> It would emerge in the aftermath of the election that the cost of cancellation of the plants, for which contracts had been signed between the OPA and the proponents, would approach \$600 million.<sup>67</sup>

The legislative opposition's pursuit of the issue, in the context of the minority legislature produced by the October 2011 election, would be central to McGuinty's October 2012 decision to prorogue the legislature and announce his intention to resign.<sup>68</sup>

<sup>61</sup> Winfield, M., "Ontario's Green Energy and Green Economy Act as an Industrial Development Strategy" in S. McBride and C. Carla Lipsig-Mummé eds., *Work and the Challenge of Climate Change: Canadian and International Perspectives* (Kingston and Montreal: McGill-Queens University Press, 2015).

<sup>62</sup> Independent Electricity System Operator (IESO) *Ontario's Supply Mix* accessed March 30, 2020, <http://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Ontario-Energy-Capacity>.

<sup>63</sup> Winfield, M., and Dolter, B., "Energy, Economic and Environmental Discourses and their Policy Impact: The Case of Ontario's Green Energy and Green Economy Act." *Energy Policy* 68 (2014) 423-435.

<sup>64</sup> Ontario Ministry of Energy, "Ontario Working with Communities to Secure Clean Energy Future," News Release, 30 May 2013. See also Winfield, M., "Environmental Policy: Greening the Province from the Dynasty to Wynne" in J. Malloy and C. Collier eds., *Government and Politics of Ontario 6<sup>th</sup> Ed.* (Toronto: University of Toronto Press, 2016).

<sup>65</sup> Jenkins, J. and A. Artuso, "Cancelled Oakville Gas Plant to be Moved to Napanee," *St. Catharines Standard*, 24 September, 2012.

<sup>66</sup> "Liberals Halt Mississauga Power Plant: Gas-Powered Plant Will Be Relocated," 24 September 2011. <http://www.cbc.ca/news/canada/toronto/story/2011/09/24/tor-election-power-plant.html>

<sup>67</sup> A. Artuso, "Gas Plant Cancellations Cost \$585 Million: Ontario Power Authority," *The Toronto Sun*, 30 April 2013.

<sup>68</sup> K. Howlett, A. Morrow, and P. Waldie, "Ontario Premier Dalton McGuinty

McGuinty was succeeded as premier by Kathleen Wynne in February 2013. Wynne's leadership platform was silent on electricity issues, beyond a specific commitment to continue the coal phase-out.<sup>69</sup> The phase-out would ultimately be completed at the end of 2014 with the closure of the Nanticoke and Lambton facilities, and the conversion of the Thunder Bay and Atikokan facilities to burn biomass (i.e. wood pellets). The phase-out continued to be referenced as a major component of the government's comprehensive 2016 Climate Change Action Plan (CCAP).<sup>70</sup> At the same time, the fallout from the Liberal government's handling of the electricity file would continue play a defining role in the province's politics.

### *The Aftermath: The Fair Hydro Plan and Doug Ford*

In June 2016, the government adopted legislation merging the IESO and OPA.<sup>71</sup> Perhaps more significantly, the legislation eliminated the requirement for the development and publication of IPSPs by the merged entity or for their review by the OEB before implementation. Instead, system plans would be developed by the minister of energy and approved by the cabinet. The OEB and IESO would then be required to implement those plans. In effect, the legislation dropped the pretense of rational planning, subject to meaningful independent public review, for the province's electricity system. Instead it formalized a paradigm of political management in electricity system planning.<sup>72</sup>

A major expression of the politization of decision-making around electricity came at the beginning of March 2017. With high hydro costs being consistently identified as the leading public concern facing the province<sup>73</sup> the government announced a "Fair Hydro Plan." The plan was to reduce electricity rates by 25 per cent for the following five years, beginning 1 July 2017,<sup>74</sup> with the intention of removing the issue of hydro rates from the political agenda before the provincial election in 2018. The plan relied principally on extending the financing period for debt associated with new electricity infrastructure, typically from twenty to thirty years. The potential additional financing costs of this approach, along with the elimination of the HST on hydro bills, were estimated at \$45 billion, with the costs largely falling on future consumers.<sup>75</sup>

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Resigns," *The Globe and Mail*, 15 October 2012.

<sup>69</sup> www.KathleenWynne.ca, "Enable communities to prosper," accessed March 25, 2013.

<sup>70</sup> Government of Ontario, *Ontario's Five Year Climate Change Action Plan: 2016 – 2020* (Toronto: Queen's Printer, 2016), [http://www.applications.ene.gov.on.ca/ccap/products/CCAP\\_ENGLISH.pdf](http://www.applications.ene.gov.on.ca/ccap/products/CCAP_ENGLISH.pdf).

<sup>71</sup> Bill 135 – *The Energy Statute Law Amendment Act, 2016*, S.O. 2016, c. 10.

<sup>72</sup> Winfield and MacWhirter, "The search for sustainability."

<sup>73</sup> Nanos Research. 2016. "Hydro Rates are the Top Issue For Ontarians; PCs Lead and Wynne Takes an Image Hit." November. <http://www.nanosresearch.com/sites/default/files/POLNAT-S15-T711.pdf>.

<sup>74</sup> Office of the Premier, "Ontario Cutting Electricity Bills by 25 Per Cent: System Restructuring Delivers Lasting Relief to Households across Province" *News Release*. March 2, 2017.

<sup>75</sup> Auditor General of Ontario, *Special Report: The Fair Hydro Plan: Concerns about Fiscal Transparency, Accountability and Value for Money*. (Toronto: Queen's Printer 2017).



In the end, the plan had no impact on the election outcome in 2018, which resulted in a major defeat for the Liberals, and the election of a populist PC Premier, Doug Ford. Relief from energy costs, particularly electricity costs, was a major theme in the PC platform. Blame for those costs was laid squarely at the feet of the GEGEA FIT program and the greenhouse gas emission cap and trade system that was at the heart of the 2016 CCAP.<sup>76</sup> Although the Ford government moved quickly to dismantle the cap and trade program and the CCAP programs financed through it,<sup>77</sup> and to repeal the GEGEA,<sup>78</sup> there was no effort to reverse the coal phase-out. Indeed, it was referenced as an important success in the Ford government's own "made-in-Ontario" environment plan, released in December 2018.<sup>79</sup>

### Technical and Landscape Factors Facilitating a Coal Phase-out in Ontario

Beyond the political and policy dynamics of the coal phase-out, a number of external factors converged to facilitate a phase-out in Ontario. These included the following.

#### *Declining electricity demand and conservation*

The phase-out of coal-fired generation was assisted by a significant decline in electricity demand in the province from the mid-2000s onwards, as shown in **Figure 1**. The decline was despite continuing growth in the province's population and economy. The shift has been attributed in large part to economic restructuring away from energy-intensive manufacturing and resource extraction and processing activities, towards less energy-intensive service, knowledge and information-based sectors.<sup>80</sup> The impact of conservation programs put in place since 2003 was also a factor.<sup>81</sup>

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<sup>76</sup> Ontario Progressive Conservative Party *Plan for the People* (Toronto; PC Ontario Party, 2018).

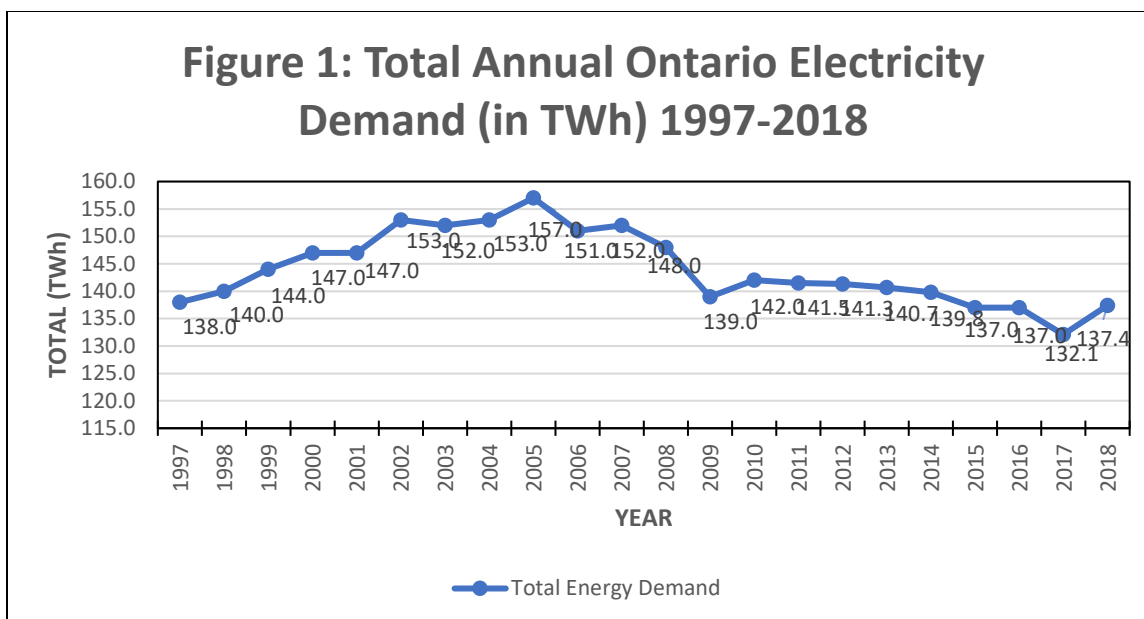
<sup>77</sup> See Winfield, M., and Kaiser, K., "Ontario and Climate Change," for J. Onusko and D. Anastakis, eds., *Ontario Since Confederation: A Reader* (Toronto: University of Toronto Press – in Press).

<sup>78</sup> See Bill 87 *An Act to amend various statutes related to energy* S.O. 2018 c-6 (a.k.a. "The fixing the hydro mess act").

<sup>79</sup> Ontario Ministry of Environment, Conservation and Parks, *A Made-in-Ontario Environment Plan* (Toronto: Queen's Printer 2018), <https://www.ontario.ca/page/made-in-ontario-environment-plan>.

<sup>80</sup> Ontario, Ministry of Finance. "Ontario's Long-Term Report on the Economy" (Toronto: Queen's Printer, 2014) <https://www.fin.gov.on.ca/en/economy/ltr/2014/ltr2014.pdf>. See also Winfield, M., "Electricity Planning and Sustainability Assessment: The Ontario Experience," for R.B. Gibson, ed. *Sustainability Assessment: Applications*. (London: Earthscan 2016)

<sup>81</sup> Environmental Commissioner of Ontario, 2019 "Energy Conservation Report" (Toronto: ECO, 2019). IESO, "Technical Planning Conference Presentation," September 13, 2018, Slide 23.



### *New gas-fired generating capacity*

Between 2004 and 2012 the province added 5500 MW of natural gas fired generating capacity, in the form of new combined cycle facilities, a single cycle peaking plants and combined heat and power facilities.<sup>82</sup> The contracts for these facilities were structured around capacity payments ensuring that the capital costs of facility construction will be retired at the end of these contracts, regardless of facility utilization rates. The development of new natural gas-fired generating facilities coincided with historically low natural gas prices in North America, prompting a widespread displacement of coal-fired generation by natural gas throughout the United States.<sup>83</sup>

### *Return to service of refurbished nuclear facilities.*

Four of the seven nuclear reactors “laid-up” through the NAOP were refurbished returned to service. These included two units each at the Pickering<sup>84</sup> and Bruce<sup>85</sup> facilities. Two unrefurbished units at Bruce were also returned to service.<sup>86</sup> All of the refurbishment and repair projects ran seriously over budget and behind schedule.<sup>87</sup>

<sup>82</sup> Ontario, Phasing Out Coal.

<sup>83</sup> D.Saha, “Natural Gas Beat Coal in the US. Will Renewables and Storage Soon Beat Natural Gas?” World Resources Institute, July 8, 2019, <https://www.wri.org/blog/2019/07/natural-gas-beat-coal-us-will-renewables-and-storage-soon-beat-natural-gas>.

<sup>84</sup> Unit A1 (515MW) returned to service 2003. Unit A4 (515MW) returned to service 2005. Refurbishment of units A2 and A3 was abandoned as uneconomic

<sup>85</sup> Units A1 and A2 (both 830MW) returned to service 2012.

<sup>86</sup> Unit A3 2004; Unit A4 2003.

<sup>87</sup> M.Winfield, A. Jamison, R. Wong, and P. Czajkowski *Nuclear Power in Canada: An Examination of Impacts, Risks and Sustainability* (Drayton Valley: Pembina Institute, December 2006). [https://www.pembina.org/reports/Nuclear\\_web.pdf](https://www.pembina.org/reports/Nuclear_web.pdf), Table 6.4.

### *New non-hydro renewables*

Along with a number of competitive request-for-proposal processes, the GEGEA did facilitate a large increase in renewable energy capacity in the province. As noted earlier, from a starting point of virtually zero in 2005, approximately 4500MW of wind and 450MW of solar PV capacity was installed by the end of 2018.<sup>88</sup> A number of upgrades and refurbishments were also undertaken on OPG's existing hydro-electric facilities.

### **Outcomes and Assessment**

#### *Program Outcomes : Environmental/Air Quality*

As shown in **Figure 3**, the phase out of coal-fired electricity in Ontario resulted in major reductions in emissions of GHGs, smog and acid rain precursors, and hazardous air pollutants, particularly heavy metals.

**Table 3: Electricity sector emissions reductions in Ontario<sup>89</sup>**

<b>Pollutants</b>	<b>2005</b>	<b>Decrease</b>	<b>2015 (est.)</b>
<b>GHG (MT)</b>	32.9	87%	4.25
<b>NOx (T)</b>	48.1	86%	6.8
<b>SOx (T)</b>	114.3	99.6%	0.4
<b>Hg (kg)</b>	326	100%	0.0

The coal phase-out had direct positive impacts on air quality in Ontario. In 2001, the province issued seven smog advisories covering 23 days, the most on record at that time. 2005 was the worst year, with 15 advisories covering 53 days. The number of advisories dropped to virtually zero from 2013 onwards,<sup>90</sup> coinciding with the closure of the coal plants.

At the same time, the phase-out did involve some significant environmental trade-offs. The province's approach to the phase-out involved a significant re-expansion of role of nuclear generation, which grew from 43 per cent of electricity output in 2003 to more than 60 per cent from 2014 onwards.<sup>91</sup> The growth in nuclear generation resulted in increases in the production of extremely hazardous and long-lived up and

<sup>88</sup> Independent Electricity System Operator (IESO) *Ontario's Supply Mix* accessed March 30, 2020, <http://www.ieso.ca/en/Learn/Ontario-Supply-Mix/Ontario-Energy-Capacity>.

<sup>89</sup> Government of Ontario, *The end of coal*, <https://www.ontario.ca/page/end-coal>.

<sup>90</sup> [http://www.airqualityontario.com/history/aqi\\_advisories\\_stats.php](http://www.airqualityontario.com/history/aqi_advisories_stats.php);  
[http://www.airqualityontario.com/aqhi/advisories\\_stats.php](http://www.airqualityontario.com/aqhi/advisories_stats.php).

<sup>91</sup> Ontario, *End of coal*.



downstream waste streams. Nuclear is also associated with unique and uniquely severe accident and security risks and carries with it significant losses in system flexibility at the operational and planning levels.<sup>92</sup> A sustainability assessment of the 2007 IPSP concluded that the coal vs nuclear refurbishment and expansion trade-off that underlay the plan was unacceptable from a sustainability perspective. Both options presented severe, although different, immediate and long-term negative consequences, while better options were available.<sup>93</sup> As noted earlier, the phase-out was also associated with the construction of a large fleet of new natural gas-fired generating facilities, which can have significant air quality impacts, particularly in terms of emissions of GHGs, nitrogen oxide and particulate matter, when operating.

### *Costs and Benefits*

In purely economic terms, coal-fired generation offered a relatively cheap and reliable electricity sources. Viewed in wider terms, the cost of coal-fired generation was much higher. A 2005 study completed for the province estimated that the total annual cost of coal-fired electricity, including health, financial and environmental costs, was \$4.4 billion (2004\$). At the same time, the period over which the phase-out occurred was associated with major increases in electricity prices, particularly for residential consumers. What consumers paid per kwh of electricity more than doubled from the early 2000s to 2018.<sup>94</sup> The situation with respect to electricity costs became a point of major political controversy, leading to the 2017 Fair Hydro Plan. Even then it was widely seen as a contributing factor in the Wynne government's defeat in the 2018 election.<sup>95</sup>

As of 2003, the Electricity Conservation and Supply Task Force had estimated that two-thirds of the system's generating assets (including the coal plants) would need to be refurbished or replaced over the following twenty years.<sup>96</sup> The capital costs of these investments were embedded in what is referred to as the "Global Adjustment" (GA) component of electricity bills.<sup>97</sup> As shown in **Figure 2**, in recent years the GA has risen to account for approximately 80 per cent of the electricity portion of consumers' bills.<sup>98</sup>

### **Figure 2 – Average Global Adjustment vs. Average Market Electricity Price (2009-2019)**

<sup>92</sup> Winfield, M., et al., *Nuclear Power in Canada*.

<sup>93</sup> Winfield, M., Gibson, R., Markvart, T., Gaudreau, K. and Taylor, J., "Implications of Sustainability Assessment for Electricity System Design: The case of the Ontario Power Authority's Integrated Power System Plan," *Energy Policy*, 38 (2010) 4115-4126.

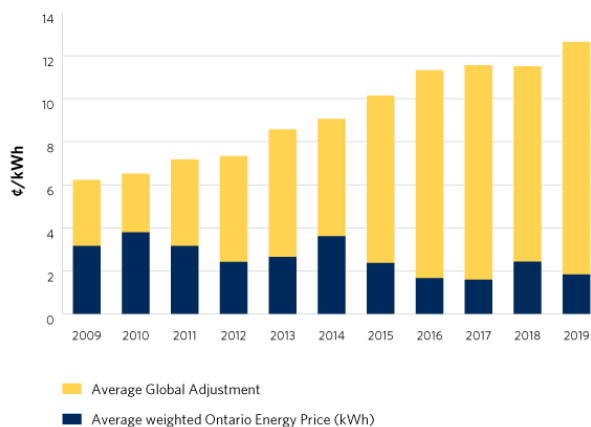
<sup>94</sup> <http://ieso.ca/power-data/price-overview/global-adjustment>

<sup>95</sup> See, for example, M.Gurney, "COMMENTARY: Ontario voters punished Kathleen Wynne's 'stretch goal' approach to politics," *Global News*, June 8, 2018, <https://globalnews.ca/news/4263200/matt-gurney-kathleen-wynne-stretch-goal-politics/>.

<sup>96</sup> <https://collections.ola.org/mon/7000/10318176.pdf> Figure 1A

<sup>97</sup> <http://ieso.ca/power-data/price-overview/global-adjustment>

<sup>98</sup> <http://www.ieso.ca/en/Power-Data/Price-Overview/Global-Adjustment>



Although the GEGEA FIT program has been widely blamed for the increases in the A,<sup>99</sup> the breakdown of the contributors to the charge tells a more complex story. As of March 2020, renewables, principally wind and solar, accounted for approximately 25 per cent of the GA. Nuclear, principally the costs of the first Pickering and Bruce refurbishments accounted for over 50 per cent, and is expected to account for an ever higher portion as the refurbishments of the Bruce and Darlington facilities proceed. Natural gas fired generation accounted for 10 per cent, largely driven by capacity payments for the natural gas-fired plants constructed between 2004 and 2012.<sup>100</sup> The upgrading and refurbishment of transmission and distribution infrastructure, reflected in the “delivery” portion of bills, usually accounting for about one third of the total bills, added further costs.<sup>101</sup> Industrial consumers were able to avoid the GA part of their electricity bills through a variety of mechanisms,<sup>102</sup> meaning that the bulk of the capital costs of rebuilding the system fell on residential consumers.

Although the Ford government took steps to clarify the costs of the 2017 Fair Hydro Plan,<sup>103</sup> its core elements have been left in place. The result has been a situation where hydro rates are being kept artificially low through subsidies out of general revenues of \$5.6 billion/yr.<sup>104</sup> There are ongoing debates whether the reconstruction of the system could have been achieved at lower costs. Particularly strong arguments occur over the necessity and costs of new renewable energy sources, new gas-fired

<sup>99</sup> See, for example, R.R. McKittrick, *Environmental and Economic Consequences of Ontario's Green Energy Act* (Vancouver: The Fraser Institute, 2013) <https://www.fraserinstitute.org/sites/default/files/environmental-and-economic-consequences-ontarios-green-energy-act.pdf>.

<sup>100</sup> <http://www.ieso.ca/en/Power-Data/Price-Overview/Global-Adjustment>

<sup>101</sup> [https://environmentaldefence.ca/wp-content/uploads/2017/02/17-05\\_ED\\_MediaBackgrounder\\_Electricity-FINAL.pdf](https://environmentaldefence.ca/wp-content/uploads/2017/02/17-05_ED_MediaBackgrounder_Electricity-FINAL.pdf)

<sup>102</sup> Winfield, M., and Gelfant G., “Distributed Energy Resource Development in Ontario: A socio-technical transition in progress?” *Energy Regulation Quarterly*, January 2020 - [Volume 7](#), Issue 4, 2019.

<sup>103</sup> See Bill 87 *An Act to amend various statutes related to energy* S.O. 2018 c-6 (a.k.a. “The fixing the hydro mess act”).

<sup>104</sup> <https://www.cbc.ca/news/canada/toronto/ontario-hydro-rates-spending-1.5446353>.

generation and nuclear refurbishments, as well as the availability of lower cost alternatives through conservation and hydro imports from Quebec.<sup>105</sup>

Given the scale of the overall system reconstruction that took place between 2004 and the present, the range of elements that contributed to the phase-out (conservation, declining demand, new renewable and natural gas fired generation and nuclear refurbishments) and scope of possible scenarios for the retention of coal, such as major pollution control retrofits, it is virtually impossible to define a specific marginal cost for the coal phase-out. Any assessment is further complicated by the consideration that with the possible exceptions of Nanticoke and Atikokan, the province's coal-fired power plants were at or approaching technical end-of-life in the early 2000s, requiring major reconstructions or replacements regardless of any policy decisions made by the province.<sup>106</sup> At the same time, the coal phase-out *per se*, is rarely blamed for the electricity cost increases seen over the period.

### *Process Assessment*

One of the central critiques around the province's post-2003 approach to decision-making around the electricity system has been that it has become increasingly, explicitly politicized.<sup>107</sup> That process culminated in the adoption of Bill 135 in 2016. The bill effectively eliminated the requirement for a formal evidence-based planning process around the electricity system, and instead established a system based on directives from the political level to the province's energy agencies.

The coal phase-out highlighted several trade-offs associated with this politicized decision-making model. On the one hand, the phase-out was strongly resisted by key institutional actors in Ontario electricity system (e.g. OPG/OPA/IESO) and the major industrial consumers represented by the Association of Major Power Consumers of Ontario (AMPCO). In that context, it is highly unlikely that the phase-out would have occurred without consistent direct political and formal directives provided by the McGuinty and Wynne governments to the OPA and IESO. The same could be said regarding the province's progress on energy conservation and renewable energy development. At the same time, the province has been left with no real electricity system planning process, and an apparent acceptance of political direction as opposed to open, evidence-based decision-making around major infrastructure decisions, as the norm.<sup>108</sup>

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<sup>105</sup> MacWhirter and Winfield, "The Search for Sustainability in Ontario Electricity Policy."

<sup>106</sup> The anticipated life for coal-fired power plants is in the range of 40-50 years. R.Y.Cui et.al., "Quantifying operational lifetimes for coal power plants under the Paris goals" *Nature Communications* **10**, 4759 (2019). <https://www.nature.com/articles/s41467-019-12618-3>. This would suggest non-policy driven closure dates as follows: Nanticoke 2012-2028; Atikokan 2025-2035; Thunder Bay 2003-2013; Lambton 2009-2019; and Lakeview 2002-2012.

<sup>107</sup> <https://on360.ca/30-30/ontario-360-reforming-ontarios-energy-policy-transition-briefing/>; See also Winfield and MacWhirter, "The search for sustainability."

<sup>108</sup> Winfield and MacWhirter, "The search for sustainability."

### *Political Assessment*

The key advocacy coalition for a coal phase-out, led by the OCCA was very broad, including not just environmental NGOs, but also public health agencies, the medical professions (doctors and nurses), municipalities, and organized labour (except the Power Workers' Union). The presence, and active engagement and advocacy by the health professions through the OMA, Registered Nurses Association of Ontario, and Ontario Public Health Association was particularly important in overcoming opposition from the major institutional actors in the system (e.g. OPG and OPA/IESO), industrial power consumers, and the Power Workers' Union.<sup>109</sup>

### *Temporal Assessment/(policy resiliency)*

The demolition of the southern Ontario coal plants (Lakeview (2006-07), Nanticoke (2018-19), and Lambton (2019-20) make a large-scale return to coal virtually impossible. The Thunder Bay plant was converted to burn biomass (wood pellets) but is now retired. Only the Atikokan plant remains in service, running on wood pellet biomass. There seems no serious consideration of restoring the role of coal in the province's electricity system. Indeed, the phase-out is referenced as a major achievement in the Ford government's December 2018 Environment Plan.

In the longer term, however, some of the environmental gains from the coal phase-out may be significantly eroded. The province currently plans to run the fleet of gas-fired plants commissioned between 2004 and 2012 to make up for potential power shortfalls from the retirement of the Pickering nuclear facility in 2024, and refurbishments at the Bruce (6 units) and Darlington (4 units) nuclear plants between 2020 and 2033. Thirty to 40 per cent of the reductions in emissions of greenhouse gases and smog precursors obtained through the coal phaseout could be lost through such a strategy.<sup>110</sup>

### **Conclusions**

The phase-out of coal-fired electricity generation in Ontario, completed in 2013, has had significant, measurable, positive effects on environmental quality, particularly with respect to acid rain, smog and greenhouse gas emissions. At the same time, the phase-out did involve significant trade-offs in terms of the environmental sustainability of the province's electricity system. Assessments of the economic costs of the phase-out are difficult, given its complex relationship with the overall reconstruction of the province's electricity system. The phase-out was also a product of a wider politicization of decision-making around the system. The phase-out demonstrates both the advantages of that trend in terms of the implementation major structural changes to a

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<sup>109</sup> See. B.Cundiff, *Ontario's Coal Phase Out: Lessons learned from a massive climate achievement* (Toronto: Ontario Clear Air Alliance, 2015) <https://www.cleanairalliance.org/wp-content/uploads/2015/04/CoalPhaseOut-web.pdf>. Melissa Harris, Marisa Beck, Ivetta Gerasimchuk, *The End of Coal: Ontario's coal phase-out* (Winnipeg: International Institute for Sustainable Development, 2015), 12, <https://www.iisd.org/library/end-coal-ontarios-coal-phase-out>.

<sup>110</sup> <http://www.ieso.ca/Powering-Tomorrow/Data/The-IESOs-Annual-Planning-Outlook-in-Six-Graphs>

system with deeply embedded institutional interests, and also the risks around the erosion of transparent, evidence-based decision-making around major infrastructure projects.