

Hand-Mills to Wind Turbines: Technology Gatekeeping in Medieval Europe and in Contemporary Ontario

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In contemporary Ontario and in medieval England, the power and political influence of propertied classes and labour aristocracies were (and are) used to restrict popular access particular technologies, and to facilitate private appropriation of wealth.¹

Past and present political-economic constraints on propagation of particular technologies, and on types of ownership of particular technologies, are explored in this commentary.

Milling in Medieval England

In the medieval period – ca. 1150 – 1400 CE – every English village or manor had a mill, or mills, sited on water courses, for grinding various grains into flour, the main ingredient of bread, a dietary staple. Mills were held by manorial lords, or by religious institutions such as abbeys. Peasants or serfs who worked a lord's land were required to bring their grain to the lord's mill for grinding. For this, the peasant had to provide a proportion of his grain – the 'multure' – to the lord. The amount of the multure varied widely. In

some cases, serfs paid one-thirteenth while free men paid one-twenty-fourth (Bennett 1987: 133).

Peasants who used hand-mills – querns – or who were caught trying to have their grain ground at a mill not held by their lord were fined. "If men were caught on the way to a rival mill, the custom of the manor was often such that, if the offence was other than the first, the lord was entitled to seize the man's horse, while his miller took whatever [grain] or flour the wretched man was carrying" (Bennett 1987:131).

Lords designated particular millers to operate mills. Community ownership of mills by peasants and/or villagers was not an option.

In the feudal social order, it was in the miller's interests to insure that the lord's milling monopoly was enforced. While milling often involved hard, skilled work, it also afforded opportunities for millers to cheat peasants by adulterating high quality grains. Bennett cites a medieval riddle: "What is the boldest thing in the world? A miller's shirt, for it clasps a thief by the throat daily" (1987:135).

In *The Canterbury Tales*, Chaucer caricatured the miller as a drunken boor who would not be dissuaded from telling his obscene – but hilarious – tale.

Not surprisingly, there was widespread peasant resistance to milling monopolies. For example, peas-

1 The relevance of medieval restrictions on hand-mills to constraints on deployment of renewable energy technologies in Ontario was first suggested by Alice L. Bartels, co-author of *When the North was Red, Aboriginal Education in Soviet Siberia* (McGill-Queens, 1995). Responsibility for any errors of fact or interpretation, however, rest with the author.

ants who revolted against the Abbey of St. Albans in 1274 installed hand-mills in their own houses. In 1327, the townspeople forced the Abbey to grant a charter which allowed them to keep hand-mills. The concession was later repudiated. The Abbott forced people to surrender their millstones and had them cemented into the floor of his parlour. During the peasant revolt of 1381, peasants levered up the Abbot's floor (Bennett 1987).

Electric Power In Ontario

Just as milling was essential for providing the necessities of life in medieval England, so generation and transmission of electric power are essential for providing the necessities of life in industrial societies, including Ontario.

Generation and transmission of electric power in Ontario were, until recently, operated almost entirely as public utilities. Publicly-owned hydroelectric generating facilities and, later, coal-fired generating plants were mandated to provide electric power, at cost, to Ontarians. Ontario Hydro – formerly the Hydroelectric Power Company – did not pay taxes and was not intended to make a profit (Swift and Stewart 2004; Hampton 2003).

Between the early 1970s and the early 1990s, twenty CANDU nuclear reactors began generating at Pickering, Bruce, and Darlington. Further construction of nuclear generating facilities was curtailed in 1993 because an economic downturn had reduced demand for electric power (Swift and Stewart 2004).

In the mid-1990s, the Conservative government, led by Premier Mike Harris, passed legislation aimed at facilitating privatization of electric power generation and transmission. Ontario Power Generation (OPG) and Hydro One (for transmission) were carved out of Ontario Hydro and disestablished as Crown Corporations. By this time, problems of safety and reliability of Ontario's nuclear reactors had become increasingly apparent. An accumulated nuclear debt of \$38 billion had forced Ontario Hydro into "effective bankruptcy" (Ontario Sustainable Energy Association (OSEA) 2011: 3).

Plans were made to decommission some of the oldest reactors and to refurbish others. The generating capacity of the closed reactors was to be made up

by OPG's five coal-fired plants (Swift and Stewart 2004).

In 2001, a private business partnership became the licensed operator of the Bruce Generating Station. This partnership – Bruce Power – now consists of Cameco (31.6 percent ownership), a major producer of nuclear fuels, TransCanada Corporation (31.6 percent), BPC Generation Infrastructure Trust (31.6 percent), The Society of Energy Professionals (1.2 percent), and the Power Workers Union (PWU), Local 1000 of the Canadian Union of Public Employees (4 percent). The PWU operates the Bruce reactors, OPG's remaining coal-fired generating plants, and Hydro One. Bruce Power, excluding Cameco, contracted to refurbish and restart some of the Bruce reactors (Swift and Stewart 2004).

In 2003, air quality in southern Ontario, linked to coal-fired power generation, as well as greenhouse gas emissions from coal-fired plants, were election issues. So were major cost overruns for refurbishing reactors and safety concerns about transportation and storage of nuclear waste (Swift and Stewart 2004).

The Liberals, led by Dalton McGuinty, won the election of 2003. The McGuinty government committed to phasing out coal-fired electricity generation by 2007 (Swift and Stewart 2004). This date was later pushed back to 2014. Phasing out of coal-fired generation was strongly opposed by the PWU. Current plans to convert the remaining coal-fired plants to biomass or natural gas have been welcomed by the PWU (Don Mackinnon, President of the PWU, 2011).

The McGuinty government established the Ontario Power Authority (OPA), an independent non-profit corporation, which was mandated to plan power generation, conservation, and transmission in Ontario in accordance with government priorities (Swift and Stewart 2004).

Government plans for electric power generation in 2025 are currently aimed at achieving a mix of nuclear (approximately 50 percent), hydroelectricity (approx. 25 percent), and renewables – i.e., wind, biomass, and solar (approx. 25 percent) (OSEA 2011).

In an attempt to promote renewable energy technologies, the OPA has signed twenty-year contracts at guaranteed prices for electricity generated by wind turbines, biomass facilities, and photovoltaic

installations. Under this Feed-in Tariff (FIT) programme, electric utilities, including Hydro One, are obligated in most cases to transmit power generated under FIT contracts. Renewable energy facilities generating more than ten megawatts receive lower prices than smaller generating facilities (OSEA 2011; Greenpeace Canada 2010).

Many Ontarians have mounted photovoltaic (PV) systems on their property to generate electric power under the FIT programme. The OPA requires that FIT contracts for generation under ten megawatts must be signed by the owners of roofs where PV systems are to be mounted. This measure is aimed at preventing fraud by private firms offering to lease roof space for PV systems.

The FIT programme has proved to be surprisingly successful. Energy produced by renewables in 2011 has far outstripped projected levels (Greenpeace Canada 2010; Morris 2011). So far, however, the proportion of renewables in Ontario's projected energy mix has not been increased.

Lords, Capitalists, And Cooperatives

Large, privately-owned wind farms share Lake Huron's Bruce Peninsula with the reactors operated by Bruce Power. Electricity generated from Bruce Peninsula wind farms and nuclear reactors is transmitted south along a single corridor to urban centres, including Toronto. This transmission capacity includes a new line for Bruce nuclear generating facilities built at public expense for \$650 million (OSEA 2011).

To provide an alternative to private ownership of wind farms on the Bruce Peninsula, two wind energy co-ops, Lakewind and the Countryside Energy Cooperative, were organized. Even though these cooperatives successfully raised capital, acquired sites for turbines, and mobilized community support, the OPA denied them transmission capacity (Toronto Renewable Energy Cooperative (TREC) 2011).

Just as community-ownership of medieval mills was disallowed by lords, so community-ownership of windfarms on the Bruce Peninsula has been effectively disallowed by the OPA. Also, the proportion of renewable energy in the Ontario energy mix has been restricted because of the OPA's commitment

to nuclear power. Thus, the OPA, representing the Ontario government, acts as a gatekeeper of types of ownership of wind farms. Private ownership has, so far, been favoured over community ownership.

The OPA also acts as a gatekeeper for the types of energy technologies which will be deployed, and nuclear energy is favoured over wind energy. This parallels restrictions on milling technologies and types of ownership of mills imposed by medieval lords.

The analogy between lords and the OPA should not, however, be pushed too far. The wealth and power of lords was patriarchal and hereditary. The wealth and power of clerical lords was patriarchal and oligarchic. The OPA, in contrast, is ultimately controlled by a democratically-elected government which could, presumably, abolish the OPA altogether. During the election campaign of 2011, the Conservatives pledged, if elected, to abolish the FIT programme (d'Aliesio 2011). The New Democratic Party pledged to restrict FIT contracts to small-scale projects (personal communication from an NDP activist, October 2011). The extent to which these electoral strategies actually involved democracy will be seen below.

Millers And Power Workers: Labour Aristocrats

According to classical Marxist theory, labour aristocracies arise in cases where capitalists gain super-profits by monopolizing key sectors of production, infrastructure, and exchange. For example, in European overseas empires, raw materials produced by cheap labour in colonies were processed in metropolitan centres. While workers and peasants in colonies were usually controlled by direct coercion exercised by colonial authorities, segments of working classes in metropolises received significant improvements in wages and working conditions from deliberate trickling-down of monopoly superprofits. Thus, the growth of labour and progressive movements in metropolises was forestalled (Lenin 1924).

The crucial condition for the rise of labour aristocracies is monopoly, whether or not it is situated in the context of overseas empires.

In medieval England, lords had monopolies on milling. In so far as the wealth and power of millers

derived from concessions granted by lords, millers can be seen as labour aristocrats. While they performed arduous, skilled labour, millers shared lords' interests in restricting milling technology and ownership of mills. Similarly, the relatively high wages and good benefits of skilled PWU workers derive largely from the monopoly enjoyed by Bruce Power and Hydro One. Like medieval millers, PWU workers can be seen as labour aristocrats.

Not surprisingly, the PWU (CUPE Local 1000), along with their capitalist partners in Bruce Power, oppose renewable energy technologies – especially wind power. They also oppose the FIT program (Mackinnon 2011). Tyler Hamilton, an environmental columnist for the *Toronto Star*, has suggested that the PWU and Hydro One have deliberately delayed and obstructed connection of FIT projects to the Ontario power grid in order to sabotage the FIT program (Hamilton 2011).

Renewable Energy Technologies Versus Nuclear Power in the Election of 2011

The role of the PWU in the Ontario election of October 2011 supports the analysis presented above. According to a full-page PWU ad in the *Toronto Star* which appeared just before the election, "... the tens of billions Ontario has spent on intermittent wind and solar energy is not delivering the promised benefits to the environment or the economy" (quoted in Hamilton 2011). No data were offered in support of this claim.

The claim that the FIT programme did not provide anticipated jobs was repeated by the Ontario Auditor-General shortly after the election. The study that the Auditor-General used to support this conclusion was funded by the fossil-fuel industry (Natural Resources Defence Council 2009).

Wind Concern Ontario (WCO), a coalition of mostly rural groups opposed to wind energy, also played a prominent political role in the election. The WCO and other anti-wind-power activists claimed that the Ontario Liberal government had suppressed a host of complaints that wind farms have damaged the health of nearby residents (Seglins and Nicol 2011). Mass media, including the CBC, reported these claims uncritically. Studies of the health effects

of wind turbines on Europeans who have lived near wind farms for decades were not investigated. Nor were sources of funding for the WCO. Some Liberal MPPs believe that the WCO was largely funded by the nuclear power industry. It has also been suggested that the WCO was funded by the PWU (see BigCityLib Strikes Back 2011). Because the WCO did not file for third-party status before the election, it was not legally required to report its sources of funding.

The Liberals were able to form a minority government. Some renewable energy supporters and prominent Liberals suggest that the WCO/PWU campaign against wind energy and the FIT program cost the Liberals at least seven rural seats (personal communication from a Liberal MPP, December 2011).

The Spectre of Global Climate Change

During the election campaign, the WCO and other critics did not address the necessity of promoting renewable energy technologies in order to reduce greenhouse gas emissions. Why was this issue avoided? Perhaps it was because most major political parties wished to avoid public controversy regarding the politics of climate science – notably, the view that combustion of fossil fuels produces greenhouse gases which contribute significantly to global climate change. Climate science denial seems to be a central feature of the ideology of right-wing mass media, such as Fox News in the US and Sun Media in Canada. For example, John Robson wrote in the *Toronto Sun*, "Not only is the Kyoto Protocol flawed, but the science behind it is utter twaddle" (10 December 2011). Refutations of climate science denial can be found at www.skepticalscience.com.

Liberal-left politicians and most proponents of renewable energy technologies seem reluctant to openly oppose climate science denial. This may be related in part to the unrelenting promotion of the Alberta tar sands by the Harper government (see Dillon, Thompson, and Orange 2010).

Subsidies for Nuclear Energy and Renewable Energy

During the election campaign, the PWU and the Conservatives avoided the issue of massive and ongo-

ing public debts – at least \$14 billion – and subsidies for nuclear energy (OSEA 2011), focusing instead on subsidies for renewable energy provided by the FIT program. ‘Hidden’ subsidies for nuclear energy include government loan guarantees, government assumption of insurance risks, government support for nuclear research and development, and government responsibility for transport and storage of nuclear wastes (OSEA 2011). In contrast, subsidies for renewable energy technologies under the FIT program are transparent, and will be relatively short-lived (OSEA 2011). For example, as costs of photovoltaic (PV) panels decline, so will guaranteed FIT prices for solar power.

As for PWU and WCO claims that wind and solar power are “intermittent,” the Ontario Sustainable Energy Association points out that installation of combined-heat-and-power (CHO, or cogeneration) technologies at major Ontario industries that operate 24/7 would, in conjunction with renewable energy technologies, remove the need for base load electricity provided by nuclear power (OSEA 2011; also, see “Cogeneration.” <http://en.wikipedia.org>. Retrieved Dec., 2011). Installation of CHO technologies would cost a small fraction of the ongoing public subsidies for nuclear energy. As well, promising storage technologies are now under development (see Patel 2011a; Bullis 2011b).

Querns and PV Systems

Hand-mills, or querns, were a Neolithic technology, widely used by European peasants before the imposition of feudalism. In medieval England, lords and millers realized that free access to querns impeded appropriation of wealth from peasants. Consequently, peasant/serf access to querns was prohibited. Similarly, access to high-efficiency renewable energy technologies (RETs) might impede appropriation of working people’s wealth by capitalist owners of fossil fuel and nuclear industries. For example, PV systems now generate power in Lesotho, thus removing dependence diesel-powered generators (see United Nations Development Programme n.d.). In India, PV water-pumping in rural areas is now cheaper than diesel-powered water pumping (see Trivedi 2011). High-efficiency PV systems mounted on apartment

balconies or embedded in windows might significantly reduce dependence of Ontario urban-dwellers on for-profit nuclear and fossil fuel industries (see www.tropiglas.com).

Technological breakthroughs promise major increases in the efficiency of PV materials (for example, see Bullis 2011a). For example, some experimental PV materials, unlike conventional PV materials, tap the entire range of the light spectrum, both visible and invisible (Bourzac 2011). Others use nano-materials and quantum processes to boost PV efficiencies (Patel 2011b). It remains to be seen whether access to such technologies will be blocked by capitalists or others who stand to lose wealth and power by their propagation, just as access to querns was blocked by lords and millers in medieval England.

Interestingly, individual milling of grain was only legalized in Scotland in 2004.

The situation described above is perhaps reminiscent of the attempt by the Canadian inventor, George Cove, to commercialize his solar energy device in the early 20th century. Cove was allegedly kidnapped in 1909. His kidnapers offered him \$25,000 and a furnished house if he would stop promoting his solar electric generator (Bartels 1997). In a 1909 article on Cove’s solar energy device, Winthrop Packard wrote that the “direct rays of the sun” could not be monopolized by coal barons and oil kings (quoted in Bartels 1997:47-48). This raises the possibility that “coal barons and oil kings,” acting to protect their wealth and power from the advent of a renewable energy technology, were behind Cove’s alleged kidnapping and the attempt to buy him off.

Cove later attempted to build a tidal power installation on the Bay of Fundy in Nova Scotia (Bartels 1997). Although Cove’s tidal power installation was destroyed by a storm, it prefigured contemporary tidal power experiments (Harris 2011).

Goliards and Global Climate Change

The peasant uprising in medieval St. Albans (see above, p. 52) was typical of the chronic conflict between lords and peasants/serfs during the feudal period. Lords claimed that their class position was divinely-ordained. From the lords’ point of view, members of the lower orders who questioned or

resisted the feudal social order were defying God. Peasant rebels deserved earthly torment and eternal damnation (see Engels 1978). From the point of view of most peasant rebels, lords were exploiters and oppressors whose actions defied scripturally-prescribed egalitarianism. Lords who persisted in oppressing and exploiting peasants/serfs deserved earthly torment and eternal damnation (see Engels 1978; Macek 1958). There was, however, a secular counter-ideology during the medieval period which perhaps more aptly applies to current struggles over energy technologies.

Goliards were itinerant scholars and renegade clergy who lived by busking and begging (*ca.* 1140-1275 CE). Goliard poetry, exemplified by the well-known *Carmina Burana*, celebrated drunken revelry, sexuality, and good food (Whicher 1949). It implied that there is no afterlife; otherwise fear of hell would have inhibited clerical corruption. Chance, not divinity, governs human affairs. Chance – or, Fortuna – can arbitrarily ruin the wealthy and powerful, or raise up the poor and powerless. The best-laid plans can be dashed by Fortuna.

Is the Goliard worldview relevant to current struggles over energy technologies? Perhaps. Despite valiant efforts to propagate renewable energy technologies in order to forestall further global climate change, carbon emissions continue to rise. The profit-driven juggernaut of fossil fuel and related industries, underpinned by state support, neo-conservative ideology, right-wing mass media, and climate science denial, threatens to release huge amounts of methane and carbon dioxide as the Arctic ice and permafrost thaw. Whether humans can survive rising sea levels, increased levels of carbon dioxide in the atmosphere, and an increasing frequency of extreme weather events, may be largely in the hands of Fortuna.

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