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Recent Developments in Renewable Energy in Remote Aboriginal Communities, Ontario, Canada

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Northern Ontario's 25 remote aboriginal communities are looking to introduce renewable electricity sources into their diesel-powered systems. This paper reviews community electrical systems, past renewable electricity projects, as well as available renewable resources, generation alternatives, and supportive targets and policies for community owned renewable electricity generation in Northern Ontario. Communities are transforming their electrical systems by introducing renewable electricity into their electrical systems and participating directly in the proposed transmission line that would connect 21 of the 25 communities to the provincial grid. Renewable projects are financially supported by federal and provincial programs and take the form of small scale applications under "behind the meter" agreements, or community scale projects under power purchase agreements with HORCI, the utility that services 15 remote communities. Under the long-term option of the interconnection to the provincial grid, communities are expected to be supplied with low carbon, reliable and affordable electricity, and to be able to participate in the development of larger scale community owned renewable electricity generation assets. The model of increased aboriginal community decision making authority is used to increase their socioeconomic benefits and self-sufficiency and may serve as a valuable model for other community assets and service delivery in the future.

Keywords: Ontario, remote aboriginal communities, indigenous communities, renewable electricity, community ownership, transmission line, energy transition

Introduction

Ontario's 25 remote aboriginal[1] communities are highly dependent on diesel for electricity generation and are looking to introduce renewable electricity sources into their electrical systems. Diesel generated electricity is responsible for direct (combustion) and indirect (e.g. transport, including delivery by airplane in some cases) greenhouse gas emissions, fuel spills and fuel tank leakages during transportation and storage, as well as limitations to economic development due to imposed load restrictions (AANDC, 2012b). Although some of Ontario's early utility owned renewable electricity projects experienced performance issues (Weis & Ilinca, 2008), there is renewed interest in hydroelectricity, wind, solar and biomass cogeneration

[1]The term aboriginal community is used in this paper. It is recognized that some communities prefer the term indigenous community while others prefer aboriginal community and that both are used in the literature.

applications to address emission, cost, reliability and self-sufficiency issues. Community ownership or partnership is encouraged to build local capacity and to increase local socio-economic benefits. The next sections of this paper provide an overview of Ontario's remote aboriginal communities, the capacity and type of current electricity generation systems, electricity price and rate structures, future demand expectations, renewable resource availability, as well as policies, plans, and existing and future projects to support renewable electricity generation in the remote communities.

Population

There are 37 remote communities in Ontario, of which 25 are aboriginal communities with a population of approximately 15,000[2]. The communities are isolated and accessed only by winter roads and air, while the community of Fort Severn is additionally accessed by barge[3, 4] (OPA, 2014). There are only two communities with a population over 1,200 and 11 communities have a population between 300 and 800 (Table 1). Most of the communities are members of the Nishnawbe Aski Nation (NAN), a political territorial organization representing 49 northern Ontario First Nation communities with an estimated total membership (on and off reserve) of around 45,000 (NAN, 2014). The communities are also grouped by Tribal Council (Windigo First Nations Council, Wabun Tribal Council, Shibogama First Nations Council, Mushkegowuk Council, Matawa First Nations, Keewaytinook Okimakanak, and Independent First Nations Alliance) based on certain regional, ethnic or linguistic characteristics (NAN, 2014).

Electricity system

Northern Ontario's remote communities are serviced by Hydro One Remote Communities Inc. (HORCI), and Independent Power Authorities (IPAs) (Table 1 and Figure 1). HORCI, a Hydro One subsidiary company, distributes electricity to 21 remote communities in Northern Ontario, of which 15 are aboriginal communities (Hydro One, 2013; Service Ontario, 2013). HORCI services 3,332 customers and generates electricity from 18 generation stations using 55 generators, two hydroelectric stations (in Deer Lake and Sultan), and four wind demonstration projects (two in Kasabonika Lake FN, one in Fort Severn and one in Big Trout Lake) (Hydro One, 2012; COGUA, 2013; HORCI, 2012).

IPAs, established in the 1970s, are community owned and operated utilities servicing 11 northern Ontario remote aboriginal communities (Hydro One, 2012; OEB, 2008). IPAs currently operate 10 stations and 34 generators[5], and service 1,462 customers (1,287 residential, 52 general service and 113 governmental customers) (OEB, 2008). IPA communities' members mention certain

[2] 2011 National Household Survey. Released November 13, 2013.http://www12.statcan.gc.ca/nhs-enm/2011/ref/no13reserves/table-tableau.cfm?Lang=E&CSD_UID=3560085 (accessed January 31, 2014).
[3] http://www.mndm.gov.on.ca/en/northern-development/transportation-support/northern-ontario-winter-roads
[4] http://www.hydroone.com/OurCommitment/RemoteCommunities/Pages/home.aspx
[5] The communities of Keewaywin and Koocheching are served by the diesel plant in Keewaywin.

benefits from running their own power systems, namely local control (which directly affects rate settings according to community needs), support for members facing poverty issues, opportunities for local job creation, and a source of community pride (NAN, 2014a; OEB, 2008).

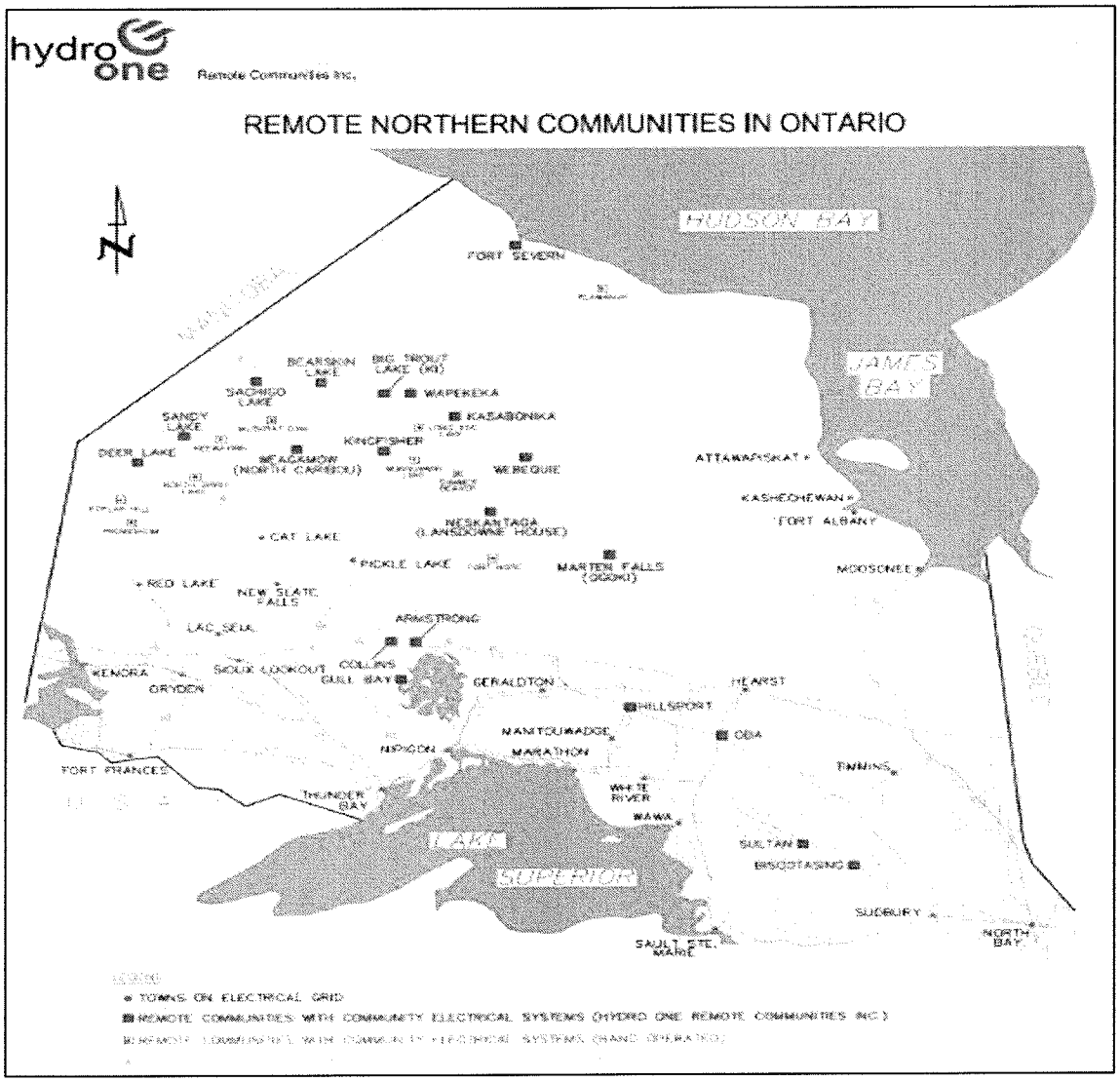
Table 1: Remote aboriginal communities, Ontario

Nr	Community name	Other name	Population 2011[6]	Diesel plant capacity kW[7]	Annual energy demand (2011) MWh[8]	Member-ship	Utility
1	Bearskin Lake FN		400	825	2,826	NAN	HORCI
2	Deer Lake FN		722	825	5,018		
3	Fort Severn FN		477	550	2,420		
4	Kasabonika Lake FN		890	825	4,114		
5	Kingfisher Lake FN		415	825	2,370		
6	Marten Falls	Ogoki Post	234	610	1,438		
7	Neskantaga FN	Lansdowne	240	705	1,795		
8	North Caribou Lake FN	Weagamow, Round Lake	810	825	4,480		
9	Sachigo Lake FN		420	550	2,847		
10	Sandy Lake FN		1,954	3,250	11,290		
11	Wapekeka FN	Angling Lake	371	550	2,535		
12	Webequie FN		670	825	2,737		
13	Whitesand FN	Armstrong	262	1,400	4,104		
14	Kiashke Zaaging Anishinaabek FN	Gull Bay, Gull River	218	550	1,282	Other First Nation	
15	Kitchenuhmaykoosib Inninuwug FN	Big Trout Lake	971	2,600	6,059		
16	Kee-Way-Win FN	Niska	337	350	2,364	NAN	IPAs
17	North Spirit Lake FN		275	420	2,085		
18	Wawakapewin FN	Long Dog	22	55	n/a		
19	Pikangikum FN		2,280	1,250	5,033		
20	Poplar Hill FN		495	600	2,189		
21	Muskrat Dam Lake FN		267	650	2,116		
22	Nibinamik FN	Summer Beaver	335	705	1,996		
23	Weenusk FN	Peawanuck, Winisk	234	400	2,249		
24	Wunnumin Lake FN		516	1,115	2,213		
25	Eabametoong FN	Fort Hope, Ebanetoong	1,085	1,565	3,400		
	Total		**14,900**	**22,825**	**78,960**		

Source: AANDC and NRCan (2011); (HORCI, 2012); OEB (2008).

[6] See also: http://pse5-esd5.aadnc-aandc.gc.ca/fnp/Main/Search/FNPopulation.aspx?BAND_NUMBER=540&lang=eng.
[7] According to AANDC and NRCan (2011) and OEB (2008).
[8] According to AANDC and NRCan (2011), unless otherwise noticed.

Figure 1: Remote communities of Northern Ontario and their electricity providers



Source: HORCI (2012, p.7).

Electricity rates

Electricity rates in HORCI's communities are differentiated between the Standard-A and the non-Standard-A rate. Residential and commercial customers pay the Non-Standard-A subsidized rates, which are equivalent to customers who are connected to the main Ontario grid. Federal, provincial and community buildings pay the Standard-A rate, which equals the cost of electricity generation in the remote communities (0.92 $/kWh in 2013), and is applicable to all accounts paid directly or indirectly out of federal and/or provincial government funding. Electricity costs in IPAs are estimated to be approximately 2% higher than HORCI electricity costs, due to the lack of economies of scale in fuel purchasing and equipment maintenance (OPA, 2010; OEB, 2008). HORCI's residential customers' rates are subsidized mainly by AANDC and Ontario's Rural or Remote Rate Protection (RRRP) funding mechanism. IPAs receive subsidies from

AANDC to support residential consumers but rates are significantly higher for general service and governmental accounts (see Table 2), due to the lack of the RRRP subsidy, since IPAs are not licenced by the Ontario Energy Board (OEB, 2008).

Table 2: Electricity rates in Ontario's remote communities

Rates type	HORCI electricity rates for 2013	IPAs electricity rates
Non-Standard-A	Energy charge first 1000 kWh.....0.08 $/kWh Energy charge next 1500 kWh.....0.11 $/kWh Energy charge all additional kWh ....0.17 $/kWh	Residential.... 0.18 $/kWh -0.25 $/kWh Business..... 0.18 $/kWh-0.90 $/kWh Government...0.90 $/kWh-1.90 $/kWh
Non-Standard-A General Service	Energy charge first 1000 kWh.....0.08 $/kWh Energy charge next 1500 kWh.....0.11 $/kWh Energy charge all additional kWh ...0.17 $/kWh	
Standard-A Residential	Energy charge first 250 kWh...0.56-0.84 $/kWh Energy charge all additional....0.64-0.92 $/kWh	
Standard-A General service	Energy charge.....0.64-0.92 $/kWh	

Source: Hydro One (2012, p.748); OEB(2008).

Future power requirements and plans

Electricity generation in the HORCI operated communities increased at an average 2% annually from approximately 24,500,000 kWh in 1990 to approximately 59,000,000 kWh in 2011, due to population, dwelling and community building increases (HORCI, 2012). Similarly, electricity generation for the IPA communities increased an average of 2% annually between 2004 and 2011 (OEB, 2008). Future electricity load is forecast to increase due to community population growth and new resource development projects within Nishnawbe Aski Nation territory connected with the discovery of significant deposits of nickel and copper in the Ring of Fire area (Burkhardt, Rosenbluth, & Boan, n.d.; NRCan, September 2012). Under these resource development projections, OPA (2010) and OPA (2014) anticipate a load increase from 18 MW to 85 MW and generation needs from 84,000 MWh to 394,000 MWh between 2013 and 2053 (Table 3).

Table 3: Forecast peak demand for Ontario's 25 remote aboriginal communities

Description	Forecast Peak Load for the 25 remote communities				
	2013	2023	2033	2043	2053
Peak Load (MW)	18	27	38	57	85
Energy consumption (MWh)	84,000	122,000	179,500	266,000	394,000

Source: OPA (2010, p.23).

Additionally, Ontario's 25-year economic plan for Northern Ontario (Ministry of Infrastructure, 2011) identifies renewable energy generation as an emerging priority economic sector. Ontario's Long Term Energy Plan targets 20,000 MW of renewable energy generation by 2025, or approximately half of the provincial installed capacity, with 10,700 MW being wind, solar and bioenergy, and 9,300 MW being hydroelectric power (OME, 2013). Provincial targets for electricity generation also call for increased participation by aboriginal communities in clean electricity generation based on local resources, to address pressing socioeconomic and environmental issues (OME, 2013; AECOM, 2012).

Table 4: Available renewable energy resources in Ontario's remote aboriginal communities

Renewable resource	Wind		Solar	Hydroelectricity [3]				
Community name	Average wind speed (m/sec) [1]	Average wind speed (m/sec) [2]	Monthly Aver. Normal Radiation (kWh/m^2. day) [2]	Size MW	Energy GWh/y	Capacity factor	Capital cost $million	LUEC[9] $/kWh
Bearskin Lake FN	6	4.07	3.62	5.6	24.4	0.5	36	0.086
Deer Lake FN	5.5	6.11	2.81	5.4	23.8	0.5	32	0.08
Fort Severn FN	7	5.20	3.51	-	-	-	-	-
Kasabonika Lake FN	5	4.0	3.79	6.9	30.4	0.5	50	0.091
Kingfisher Lake FN	5	4.1	3.57	2.4	13.9	0.44	16	0.108
Marten Falls	-	4.15	3.68	4.3	19	0.5	24	0.078
Neskantaga FN	-	4.17	3.70	23	114	0.56	123	0.059
North Caribou Lake FN	5.5	4.12	3.61	-	-	-	-	-
Sachigo Lake FN	5.5	4.05	3.63	5.3	23.4	0.5	36	0.089
Sandy Lake FN	5	4.03	3.59	15.5	76.1	0.56	86	0.062
Wapekeka FN	6.5	4.10	3.61	6	26.3	0.5	54	0.109
Webequie FN	5.5	4.21	3.62	23	114	0.56	142	0.066
Whitesand FN (Armstrong)	-	4.23	3.60	-	-	-	-	-
Kiashke Zaaging Anishinaabek FN	6	4.42	3.81	2.2	9.5	0.5	11.5	0.083
Kitchenuhmaykoosib Inninuwug FN	6.5	4.10	3.61	5.5	24.1	0.5	36	0.089
Kee-Way-Win FN	5.5	4.05	3.59	24.1	119	0.56	140	0.063
North Spirit Lake FN	5.5	4.07	3.60	2.6	9.9	0.44	16	0.104
Wawakapewin FN	5	4.10	3.58	4.3	18.9	0.5	37	0.109
Pikangikum FN	-	4.03	3.61	8.2	36.1	0.5	44	0.071
Poplar Hill FN	-	4.00	3.67	11.8	57.8	0.56	65	0.064
Muskrat Dam Lake FN	-	4.07	3.59	38	185	0.56	196	0.056
Nibinamik FN	-	4.16	3.64	17	85.3	0.56	96	0.062
Weenusk FN	7	6.97	3.33	4.1	18	0.5	22.6	0.078
Wunnumin FN	5.5	4.14	3.64	13.5	66.5	0.56	83	0.068
Eabametoong FN	-	4.20	3.67	26	129	0.56	141	0.059

Source: [1] Weis & Ilinca (2010), [2] NASA surface meteorology and solar energy-available Tables[10]; [3] Hatch, (2013).

Availability of renewable energy sources in northern Ontario

A total of 1,500 MW of potential hydroelectricity capacity has been identified for Northern Ontario (SNC Lavalin, 2006), of which approximately 270 MW are in the proximity of 20 of the 25 remote aboriginal communities (NAN, 2014b; Hatch, 2013). Aboriginal communities have also examined the creation of a transmission line in cooperation with industrial proponents to connect communities and future mining projects with the provincial grid, and access 155 MW of hydroelectricity potential that are within 30 km from the proposed Wataynikaneyap transmission line (OWA, 2014b; WP, 2012). These resources can produce renewable electricity at a lower cost than the current diesel plants (Table 4)[11] (OWA, 2014b; Hatch, 2013; WP, 2012). Wind resources of 6-7 m/s are available at Deer Lake FN, Fort Severn FN and Weenusk FN, while the rest of communities have wind speeds of about 4 m/s (at 50 m height), which is considered low for the development of wind projects, under current capital and electricity generation costs (Weis & Ilinca, 2010; Maissan J. , 2006; Weis & Ilinca, 2008; ARI, 2003). Finally, solar resources in

[9] LUEC= Levelized Unit Electricity Cost
[10] https://eosweb.larc.nasa.gov/cgi-bin/sse/grid.cgi?email=skip@larc.nasa.gov
[11] The Levelized Unit Electricity Cost (LUEC) presented does not include transmission costs.

northern Ontario's remote communities are considered sufficient, with average direct solar radiation in the range of 2.81-3.81 kWh/m^2.day (Table 4).

Renewable electricity policies and promotion

Support for renewable energy projects in Ontario was strengthened with Ontario's Green Energy and Green Economy Act (GEGEA) in 2009. The Act provided financial support for renewable energy projects and access to transmission and distribution for proponents (OME, 2012). The Act was criticized for its high incentives and their subsequent consequences on the global adjustment portion of electricity bill increases and, therefore, its effects on the provincial economy; positive effects of job generation were offset by losses due to the closing of conventional electricity facilities (Auditor General, 2011; Angevine, Murillo, & Pencheva, 2012; Winfield, 2013). Although renewables were blamed for the increases in electricity rates, the larger share of the extra costs in the global adjustment portion of electricity bills were the result of long term contracts with nuclear and gas plants (IESO, 2016). For example, between October 2011 and September 2012 the contribution of nuclear and natural gas contracts to the global adjustment were 42% and 26% respectively versus a contribution of 17% by renewable contracts, including hydroelectric generation (Navigant Cons., 2014).

Within the Green Energy Act, aboriginal participation in on-grid renewable energy projects is possible through the Feed-In-Tariff (FIT) and microFIT programs or through the generation procurement for projects of 500 kW or more, which includes the Hydroelectric Standard Offer Program (HESOP), the Large Renewable Procurement (LRP), and the Combined Heat and Power Standard Offer Program (CHPSOP 2.0) (IESO, 2015). Aboriginal participation is encouraged by providing priority points (when an aboriginal community has greater than a 15% economic interest in the project), while financial assistance is provided through reduced security payments ($ 5/kW regardless of the renewable fuel type), and price adders for addressing increased development costs. Access to capital is facilitated through the Aboriginal Loan Guarantee Program (ALGP), administered by the Ontario Financing Authority (OFA), for transmission projects and wind, solar and hydroelectric generation projects (OFA, 2016). Ontario's Aboriginal Energy Partnerships Program (AEPP), which includes the Aboriginal Renewable Energy Fund (AREF), the Aboriginal Community Energy Plan (ACEP) and the Education and Capacity Building (ECB) Program, address both the financial barrier of high renewable energy initial capital costs and technical support for renewable project development (AEPP, 2016). Implementation of these programs led to aboriginal participation in approximately 240 projects with over 1,000 MW of clean electricity capacity connected to the main grid (OME, 2013).

Besides provincial support, remote communities in Ontario and other provinces and territories benefitted from federal programs that supported capital expenses for renewable electricity generation. Programs launched by the federal government between 2001 and 2016 included the Aboriginal and Northern Climate Change Program (ANCCP), the Aboriginal and Northern

Community Action Program (ANCAP), the ecoENERGY for Aboriginal and Northern Communities Program (EANCP) and the Climate Change Adaptation Program (CCAP), and covered both remote and non-remote aboriginal communities. Additionally, the ANCAP provided funding for community energy planning and capacity building (AANDC, 2014a; AANDC, 2014b; AANDC, 2014d). Finally, at the community level, HORCI supported diesel displacement and emissions reductions through technological upgrades, fuel switching, demand side management, "behind the meter"[12] and "net metering"[13] arrangements, and the Renewable Energy INovation DiEsel Emission Reduction (REINDEER) program, which provided a local FIT tariff for the connection of renewable electricity projects in HORCI serviced communities (HORCI, 2012).

Renewable electricity generation in remote communities

The 25 remote aboriginal communities in Northern Ontario are powered by diesel generators and a limited number of renewable electricity projects. There are approximately 23 MW of installed diesel capacity, which generated approximately 79,000 MWh/year in 2011, consumed 22,000,000 liters/year of diesel fuel, and contributed 67,000 tonnes $CO_{2,eq}$/year in $CO_{2,eq}$ emissions[14] (Table 1).

Remote communities in Northern Ontario investigate both participation in renewable electricity generation and direct connection to the provincial grid as means to reduce their dependence on diesel and to improve their socioeconomic conditions using renewable resources. In the case of connection to the provincial grid, and based on the experience from the development of Five Nations Energy Inc.[15], communities anticipate increased electricity reliability, reduced environmental impacts and risks, and socioeconomic benefits, such as new residential sub-divisions, new schools and recreational facilities, and electrically heated homes (Five Nations Energy Inc., 2006). The 21 remote communities participating in the development of the Wataynikaneyap transmission line, expect similar benefits to be associated with the electrification of resource developments in the Ring of Fire area through aboriginally owned renewable electricity generation and transmission (OME, 2013; WP, 2013b; WP, 2012). The ownership model proposed for the transmission line involves using some of the revenue

[12] "On-site, behind the meter": electricity generation connected to consumer's side of the meter that provides power to offset electricity purchased form the utility. Since behind the meter electricity generation offsets retail kWh purchased, the benefit received is superior to a negotiated Power Purchase Agreement. See (Kildegaard & Myers-Kuykindall, 2006).

[13] "Net metering" allows customers that generate their own electricity from renewable electricity technologies to feed excess electricity generated back into Hydro One's distribution system for a credit towards your electricity costs. See: http://www.hydroone.com/Generators/Pages/NetMetering.aspx.

[14] Assuming an average efficiency rate of 3.6 kWh/litre for the diesel engines and an average of 0.00080 tonnes $CO_{2,eq}$/kWh, for direct carbon emissions (emissions resulting from diesel and natural gas combustion only). See HORCI (2012).

[15] Five Nations Energy Inc. is the first aboriginal transmission line established in 2001 that connected three northern Ontario remote communities. The communities of Fort Albany and Kashechewan were connected in 2001 and Attawapiskat in 2003 (Five Nations Energy Inc., 2006).

generated by the transmission line to purchase an increasing equity share in the project from the private partner until it becomes 100% First Nation owned (WP, 2017; NOB, 2016; WP, 2016).

> *"Our people's vision is to own, control and benefit from major infrastructure development in our homelands. Through this partnership, we are changing the landscape of how First Nations can do business into the future. Together we have reached a major milestone towards getting our communities off diesel generation, and improving the socio-economic situation for everyone's benefit."* Margaret Kenequanash, Chair of Wataynikaneyap Power (Ontario Newsroom 2015).

Remote aboriginal communities are also gaining direct experience with small renewable electricity projects. Four of the first wind demonstration projects were installed in the communities of Kasabonika Lake FN, Fort Severn FN, Weenusk FN and Big Trout Lake (Kitchenuhmaykoosib Inninuwug FN) in 1997, and one of the first hybrid hydroelectricity-diesel systems was installed in Deer Lake in 1998 by Hydro One (Ah-You & Leng, 1999). These projects are owned by HORCI and reduce diesel consumption and greenhouse gas emissions in the communities (HORCI, 2012). Deer Lake's 490 kW hydroelectricity plant achieves the highest emissions reductions displacing approximately 36% of community's fuel consumption (HORCI, 2012) and the community examined further upgrades in cooperation with HORCI to improve performance and community benefits. Between 2013 and 2016 there have been 12 community owned solar photovoltaic projects with a total of 338 kW installed in energy intensive community facilities (such as the water and wastewater plant, schools and arenas) in 11 remote communities (Table 5). The projects were developed under a "behind the meter" agreement, and reduce facilities' electricity consumption and, thus, electricity expenses paid from band council and government budgets, therefore allowing funds to be focused on other pressing community needs.

Eight more solar photovoltaic installations on community facilities are planned for Kingfisher Lake FN, Keewaywin FN, North Spirit FN, Wapekeka FN, Wunnumin Lake FN, Eabametoong FN, Sachigo Lake FN, and Webequie FN (Table 5). Furthermore, community scale solar installations under Power Purchase Agreements (PPA) with HORCI are being examined for Kasabonika Lake FN and Fort Severn (MNDM, 2015). Finally, the community of Whitesand FN in planning the generation of electricity and thermal power for community needs through a combined heat and power plant (CHP) plant (Neegan Burnside, 2013), increasing the number of Ontario's remote communities involved in renewable electricity generation to seventeen.

Table 5: Renewable electricity projects in remote communities, Ontario

	Community	Hydro MW	Wind kW	Solar kW	Year	Source
Existing projects						
1	Bearskin Lake FN					
2	Deer Lake FN	0.49			1998	Ah-You & Leng (1999)
				152	2014	WN (2014); HORCI
				10	2014	(2014)
3	Fort Severn FN		n.d.		1980	Ah-You & Leng (1999)
				20	2015	See[16]
4	Kasabonika Lake FN		30		1997	Ah-You & Leng (1999)
			30		2013	
				10	2015	
5	Kingfisher FN			10	2013	See[17]
6	Marten Falls FN					
7	Neskantaga FN					
8	North Caribou Lake FN			18	2016	See[18]
9	Sachigo Lake FN					
10	Sandy Lake FN					
11	Wapekeka FN					
12	Webequie FN					
13	Whitesand FN					Neegan Burnside (2013)
14	Kiashe Zaaging Anishinabek FN					
15	Kitchenuhmaykoosib Inninuwug		50		1997	Ah-You & Leng (1999)
16	Keewaywin FN			20	2015	See[19]. See also[20]
17	North Spirit Lake FN			20	2015	See[21]
18	Wawakapewin FN			18	2013	Enermodal (2013)
19	Pikangikum FN					
20	Poplar Hill FN,			20	2015	See [22]
21	Muskrat Dam Lake FN			20	2015	
22	Nibinamik FN					
23	Weenusk FN		n.d.		1997	Ah-You & Leng (1999)
				20	2015	See[23]
24	Wunnumin Lake FN					
25	Eabametoong FN					
	Total	**0.49**	**110**	**338**		
Proposed projects						
1	Fort Severn FN			300		MNDM (2015)
2	Kasabonika Lake FN			250		
3	Kingfisher FN			n.d.		
4	Wapekeka FN			n.d.		
5	Wunnumin Lake FN			n.d.		See[24]
6	Weenusk			n.d.		
7	Keewaywin			n.d.		n.d.=no data
8	Eabametoong FN			n.d.		
9	Sachigo Lake FN			n.d.		
10	Webequie FN			n.d.		
	Total			**550**		

[16] http://www.daigroup.ca/keewaywin.html
[17] http://www.shibogama.on.ca/?q=node/103
[18] https://www.youtube.com/watch?v=Ypz3Ucb5yas
[19] http://www.bullfrogpower.com/wp-content/uploads/2015/09/Day1-Part1-CanadianSolar_09-16-2015.pdf.;
[20] http://www.daigroup.ca/keewaywin.html
[21] http://www.bullfrogpower.com/wp-content/uploads/2015/09/Day1-Part1-CanadianSolar_09-16-2015.pdf.
[22] http://www.daigroup.ca/diesel-offset-solar-projects.html
[23] http://www.daigroup.ca/diesel-offset-solar-projects.html
[24] EANCP: https://www.aadnc-aandc.gc.ca/eng/1334855478224/1334856305920#sect1

Conclusion

Remote aboriginal communities in Ontario are transforming their electrical systems by introducing renewable electricity projects and participating in plans for the Wataynikaneyap transmission line that would connect most communities to the provincial grid. While early renewable electricity projects were developed by the local utility (HORCI), recent projects in 11 remote communities were owned by the communities, and concentrated on solar photovoltaic applications connected to energy intensive community facilities. These projects operate under "behind the meter" agreements in cooperation with HORCI, displace diesel fuel, reduce greenhouse gas emissions, and reduce local electricity expenses. Projects were financially supported by federal and provincial programs and eight further solar plants based on this successful deployment model are proposed. These renewable energy projects provide some immediate benefits, but to date the scale is small. Deeper transitions from diesel to renewables are being studied. One long term option that is being planned is the creation of a transmission line that will connect 21 of the 25 remote communities to the provincial grid, supply communities with clean, reliable and affordable electricity, and provide the opportunity for the development of larger scale community owned renewable electricity generation assets. The model of community ownership of assets has been demonstrated with some of the small renewable energy generation projects and is being proposed for the transmission line with multiple First Nations collaborating as partners and co-owners. The model of increased aboriginal community decision making authority is used to increase their socioeconomic benefits and self-sufficiency and may serve as a valuable model for other community assets and service delivery in the future.

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Carswell. Energy Law and Policy. Table 2: Ontario Feed-in Tariff Program Prices. (Gordon Kaiser and Bob Heggie, Editors)

ENERGY LAW AND POLICY

Gordon Kaiser and **Bob Heggie**, Editors

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Table 2:
Ontario Feed-in Tariff Program Prices

Technology	Capacity (MW)	Price (c/kWh)
Biogas	0.5-10	14.7
Biogas	>10	10.4
Landfill gas	≤10	11.1
Landfill gas	>10	10.3

Source: Ontario Power Authority

VI. Feed-in Tariffs Increase Demand for Transmission and Distribution Investments

Several features of the feed-in tariff program can be expected to drive much higher levels of investment in transmission and distribution systems. The first, and perhaps most important, feature is the lack of a concept of sufficient renewable generation. The program remains open regardless of demand or supply conditions in order to provide a steady stream of investments that will stimulate the economy and create green jobs. Similarly, since success in the program will be measured primarily by investment and job creation, those setting prices have stronger incentives to set prices high enough to ensure many applications for contracts.

The consequence of high prices is high demand for contracts, which can be expected to overwhelm existing connection capacity available. Given that renewable generation has a "right to connect", the high demand for contracts results in transmission and distribution network investment to accommodate that demand. Thus, a feed-in tariff program is expected to become the main driver for investment in transmission and distribution, and will most likely lead to a much larger investment in these systems.[3]

VII. Regulatory Policy in a "Green Economy" World

Two principal factors will affect regulatory policy in the "green economy" world. First, in contrast with the "industrial economy" where the electricity sector played an important economic role through the provision of reliable low-cost electricity, the economic role of the electricity sector in the green economy is to create jobs within the sector. Higher electricity prices are needed to pay for the renewable energy production from feed-in tariffs in order to create these green jobs. The impact of higher electricity prices is not a primary green economy concern.

The second factor affecting regulatory policy will be the critical role played by transmission and distribution investment. Substantial investment in transmission and distribution will be needed to develop and sustain the green economy. The regulatory oversight of that investment is therefore key.

These two factors create tension with traditional regulatory policy. Regulator normally close the gap between the utilities' private interests and the public interes by restraining utilities from overbuilding their transmission or distribution net works. In this case, green economy policy needs more investment in such network to be successful and places less value on the impact of increased electricity produc tion from renewable resources on electricity prices. The key question for regulator is, when they receive an application for transmission system expansion, wha weight should they give the impact on ratepayers in determining whether that trans mission investment should be approved or not.

One response might be to argue that to support the green economy regulator should set aside consideration of the incremental costs to consumers of the in creased transmission and distribution investment. Given that the regulator does no have any role in approving the price or quantity of renewable power generation which constitutes much of the rate impact of a feed-in tariff program, the incremen tal impact of network investments on consumers is relatively unimportant. Conside that Germany, the country that pioneered the feed-in tariff program in 1994, had n economic regulator until 2005. Under this reasoning, any regulatory risk of trans mission project non-approval constitutes a regulatory barrier.

However, regulators are justified in continuing to oversee transmission an distribution development in the public interest. First of all, such investments are no trivial in absolute terms or in consumer impact. The scale of desired transmissio investments in Ontario, to give one example, would more than double the existin transmission rate base. The necessary distribution investments are also quite signi icant. Together, the rate impact from network investments is expected to be of sim lar magnitude to the anticipated generation investments.

Second, regulators should be able to define limits on what constitutes a pru dent investment in networks to serve new renewable generators. In cases wher connection of relatively small quantities of renewable resources would result i high connection costs borne by ratepayers, regulators should not approve the in vestment. Network connection costs to be borne by ratepayers can be assesse against the benefits in terms of the quantity of renewable resources that should b connected as well as impact on the reliability and quality of service.

In regulating the green economy in the public interest, regulators will find th they have the same responsibility but less scope to protect ratepayers than in trad tional regulation. Much more transmission and distribution investment will need t be approved, even though it will be connecting relatively expensive generatic whose output may be surplus to current system needs. Current regulatory instru ments, which tend to discourage such investments, will need to be reformed.

VIII. Retooling Regulatory Instruments

Many regulatory instruments influence the development of transmission an distribution systems, from overseeing network rates and investment to establishin rules for allocating connection capacity and connection costs. These instrumen can be retooled to meet the new political mandate to expand the system. At th same time, the regulator must be mindful of its public interest mandate and, parti ularly, the impact of investment on price and reliability.

This retooling process should have three objectives:

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3 In Ontario, the initial response of 8,000 MW of contract applications greatly exceeds the 2,500 MW of existing transmission capacity. See Ontario Power Authority, "Ontario's Feed In Tariff Program Backgrounder", online at: <http://fit.powerauthority.on.ca/Storage/100/10985_Apr_8_Backgrounder_FINAL.pdf>.

Carswell. Energy Law and Policy. Incentive Regulation for North American Electric Utilities. Pages 276 and 277 (Gordon Kaiser and Bob Heggie, Editors)

ENERGY LAW AND POLICY

Gordon Kaiser and Bob Heggie, Editors

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The combination of input price pressures and required infrastructure expansions can also compel companies to file more frequent rate cases. Recurring rate case filings are costly and time-consuming. A shortened rate case cycle is also synonymous with less "regulatory lag". Under COSR, regulatory lag bolsters companies' incentives to operate efficiently since it allows shareholders to retain all benefits from cost-reduction efforts until rates are reviewed. These benefits naturally increase if rate reviews become less frequent or take place in more distant periods. Since more frequent rate case filings weaken performance incentives and distract managers from their basic business, they may also encourage deterioration of operating performance.

History suggests that this is a legitimate concern. The last time U.S. energy utilities needed to file frequent rate cases was between 1974 and 1985. During this period, unit cost growth accelerated due to a combination of (sometimes related) circumstances that included rapid input price inflation, the exhaustion of scale economies, major plant additions, slower growth in demand, and changes in nuclear power plant regulations. Regulators responded to the situation with an unprecedented wave of cost disallowances. Stagnant and declining productivity also exacerbated the upward pressures on utility costs and contributed to the push in the 1990s for industry restructuring and enhanced competition.

Incentive regulation can help energy utilities to avoid going "back to the future". IR approaches enable companies and regulators to manage the rate case process more effectively and reduce regulatory costs. At the same time, well-crafted IR plans create balanced incentives for utilities to manage their operating and capital budgets more efficiently. Enhanced efficiency can make benefits possible for both customers and shareholders compared with a continuation of COSR.

This article briefly reviews the application of IR to energy utilities. We evaluate the advantages and disadvantages of IR compared with COSR. We then present a taxonomy of incentive regulation options as well as some notable approved plans for each approach. We then describe the IR experience in Ontario, including the most recent IR Order from the Ontario Energy Board (OEB), which includes a number of innovative features and is likely to provide the foundation for incentive regulation in the province for years to come.

II. Cost-of-Service Regulation: Pro and Con

It can be argued that, in many instances, COSR works reasonably well in meeting the needs of utilities and their customers. After all, North America has constructed the world's largest and most reliable energy supply and delivery network via regulated entities operating under cost-of-service methods. When COSR works properly, it provides strong signals for utilities to build the infrastructure needed to provide consumers with reliable and affordable service.

However, there are certainly cases where COSR has broken down. This is particularly true when business conditions are unusually volatile and there are strong pressures on the unit cost of service. The slow, resource-intensive nature of COSR can make it difficult to respond to these pressures in a timely manner. Prudence reviews can be used opportunistically to disallow costs for decisions that appear bad in hindsight, with no counterbalancing allowance for superior returns for good management decisions.

COSR is also criticized for its failure to create strong performance incentives.

This parallels the critique that economists have made about the merits of competition for contestable, but traditionally regulated, utility services. Economists generally believe that when services are not characterized by natural monopoly conditions, competition is feasible and preferable to regulation.[2] Similarly, most economists believe that for natural monopoly services, the regulatory system should attempt to harness and replicate the same incentives for efficient performance that exist in competitive markets. It is widely believed that COSR fails to create these incentives.

The heart of the problem is the high cost that must be incurred for regulators to fully understand a utility's operations. If they knew the efficient way to produce and market utility services, regulators could simply set prices to recover the minimum cost of providing the optimal array of utility services. Unfortunately, it is often difficult even for utility company managers to recognize best practices given the substantial uncertainty that exists regarding future supply, demand, and policy conditions. The challenge is much greater for regulators since they are apt to have little direct experience with utility operations. Economists describe this situation as "information asymmetry", which the COSR rate case process attempts to redress through a time-consuming, costly, and often inefficient process of information requests, processing, and analysis.

Some measures can be taken to contain these regulatory costs. For example, rate cases may occur relatively infrequently. As discussed, extending the period between rate cases is known as regulatory lag, but the potential for regulatory lag is limited for most energy utilities. Prices of some utility inputs, like natural gas, are volatile. A failure to adjust rates for changes in the cost of these inputs would make earnings volatile, thereby raising the cost of capital. Regulatory lag is further constrained since prices in most utility industries must trend upward to compensate utilities for unavoidable input price inflation. Infrequent rate cases become even less tenable when there is rapid industry change or when companies want to modify their rate structures and service offerings in response to changing market conditions.

Regulatory cost can also be contained by restricting practices that complicate regulation. For example, service offerings may be limited and rate structures kept simple. These restrictions can harm efficiency, especially where demand is elastic. Unresponsive rate and service offerings, for instance, can lead to uneconomic bypass of the company's services. More typically, margins from services to markets with high demand elasticity will not be maximized, so that a larger share of the utility's cost must be recovered from other customers.

III. The Potential Advantages of Incentive Regulation

Incentive regulation can be viewed as an improvement in regulatory "technology" that delivers greater benefits to customers even as it reduces regulatory costs. The main idea behind IR is to establish rules that produce a reasonable risk-return balance and create inherent incentives for utilities to meet desired regulatory objec-

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2 An industry characterized by natural monopoly is one where the technology of production allows a single firm serving the entire market to produce at lower cost than any other possible combination of firms serving that market

Dungan, Peter and Murphy, Steve. 2014. *An Au-Thentic Opportunity: The Economic Impacts of a New Gold Mine in Ontario*. Toronto, Ontario: Rotman School of Management, University of Toronto.

ECONOMIC IMPACT OF NEW GOLD MINES NWO (OPERATIONAL PHASE)

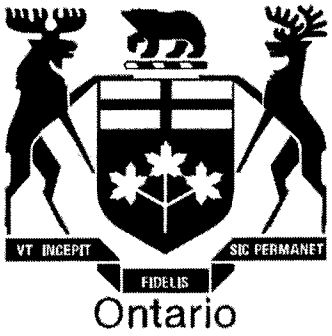
(Imminent New Producers)

Annual Projected Revenue:

	Employees	GDP Contribution (Ontario)	Gov. Revenue (Royalty / Taxes)	Ontario Revenue Share	Communities' (Local Taxes)
Red Lake					
Goldcorp - Cochenour	100	$ 231,000,000	$ 70,000,000	$ 28,000,000	$ 9,000,000.0000
Pure Gold - Madsen	400	$ 213,000,000	$ 65,000,000	$ 26,000,000	$ 8,300,000.0000
Dryden					
Treasury Metal - Goliath	200	$ 36,000,000	$ 11,000,000	$ 4,600,000	$ 1,400,000.0000
Fort Frances					
New Gold Inc. - Rainy River	600	$ 301,000,000	$ 95,000,000	$ 38,000,000	$ 11,500,000.0000
Geraldton					
Greenstone Gold - Hardrock	450	$ 301,000,000	$ 95,000,000	$ 38,000,000	$ 11,500,000.0000
White River					
Harte Gold - Sugar Zone	100	$ 66,000,000	$ 20,000,000	$ 8,000,000	$ 2,600,000.0000
TOTALS:	1850	$ 1,148,000,000	$ 356,000,000	$ 142,600,000	$ 44,300,000

Reference: Dungan, P. and Murphy, S (2014): An Au-thentic Opportunity: The Economic Impacts of a New Gold Mine in Ontario, Rotman School of Management, University of Toronto & Ontario Mining Association

Ontario Energy Board file EB-2007-0707. January 16, 2008. *Issues Proceeding 3.* Transcript, pages 172-178. (Krassilowsky, Anne)



Ontario

ONTARIO ENERGY BOARD

FILE NO.: **EB-2007-0707**

VOLUME: **Issues Proceeding 3**

DATE: **January 16, 2008**

BEFORE:	**Pamela Nowina**	**Presiding Member**
	Ken Quesnelle	**Member**
	David Balsillie	**Member**

EB-2007-0707

THE ONTARIO ENERGY BOARD

IN THE MATTER OF Sections 25.30 and 25.31 of the Electricity Act, 1998;

AND IN THE MATTER OF an Application by the Ontario Power Authority for review and approval of the Integrated Power System Plan and proposed procurement processes.

Hearing held at the Metro Toronto Convention Centre
South Building, Room 714, Toronto, Ontario
on Wednesday, January 16, 2008,
commencing at 9:03 a.m.

ISSUES PROCEEDING 3

B E F O R E:

PAMELA NOWINA	PRESIDING MEMBER
KEN QUESNELLE	MEMBER
DAVID BALSILLIE	MEMBER

region, both current and in the future, while at the same time properly consulting with the people of northwestern Ontario.

Thank you for allowing me the opportunity to speak today.

MR. CYR: And Madam Chair and Panel members, representing the third of our team of intervenors, Mayor Anne Krassilowsky, president of Northern Ontario Municipal Association, also Mayor of Dryden, will speak.

SUBMISSIONS BY MS. KRASSILOWSKY:

MS. KRASSILOWSKY: Thank you, Mr. Cyr, and good afternoon, Madam Chair and Panel. The North Ontario Municipal Association is the voice of 35 municipalities, communities, towns and townships across the north. We cover a huge land mass, as has been explained to you, and we have the majority of the people of northwestern Ontario that NOMA carries the voice for.

I'm here today to strongly support the submission of the City of Thunder Bay, the Town of Atikokan, and the Common Voice Energy Task Force as presented by Mr. Cyr and by my colleague Mayor Brown and Mr. Bosch. This is indeed a collaborative effort and is a strong and extreme example of how the northwest works together at all times to pursue common goals.

I want to underline the unique nature of our area, as outlined to you in Mr. Cyr's presentation, by telling you the story of two of our communities. Let me start with the small community of Pickle Lake.

That's located about 250 miles northeast of my community, the City of Dryden, and we all are approximately 11 to 1,200 miles from where we sit at this table today. It is at the end of one of the radial lines that John spoke of earlier in these submissions.

Pickle Lake is fed by a 115-kilovolt power line that comes across, as you saw on the map, from Ear Falls. Pickle Lake's current capacity is 15 MW. This line was built way back in the 1940s. It's old and it's antiquated. It is 156 miles long and has 2,275 structures, each of those structures with three cross arms.

You can only imagine what wind or lightning storm, the havoc that that can cause, to say nothing of the ice storms and the massive blow-down areas that we have throughout Ontario, and especially in northwestern Ontario.

The Musselwhite Mine, which is 90 miles north of Pickle Lake, draws upon Pickle Lake's electricity supply. Musselwhite is a 4,000 tonne per day gold producer.

Further, the nearby Ozznaburg reserve also draws upon Pickle Lake's electricity supply, plus there are 22 First Nation reserves north of Pickle Lake, each with an average population of a thousand people, and all use Pickle Lake as their transportation and commercial hub.

These 22 reserves use diesel generators as their only source of electricity. Most of that diesel goes in by the ice roads and the winter roads in the north, and only in the wintertime.

Right now, currently there is virtually no additional

capacity in Pickle Lake, and right now they have only 3 MW available. Both Musselwhite Mine and Richview Resources, who is the owner of the past-producing Thierry diamond mine that is north of Pickle Lake, require more electricity, and they can't get it.

In order for Pickle Lake to meet the expected electricity demand in the next few months, they require a further 15 MW. Without it, neither mine will develop, and no other economic development, such as -- which was previously discussed, the press wood paper mill, can even begin to happen.

According to one of my municipal colleagues in Pickle Lake, these are good news stories that are going to waste. But that's not the whole story.

The Town of Pickle Lake has approximately 20 to 50 power outages a year, and typically it takes a minimum of 12 hours to restore that power, and sometimes longer.

For example, last year Pickle Lake suffered a 36-hour power outage. The impact to human life up there of those outages, I can only ask you the sit right now and think what that means. It was 30 below when I left Dryden. It is 35 to 38 below for this weekend in Pickle Lake. I don't know what you would begin to do without power. And they have lived that way for years, to say nothing of the food and stuff that goes to waste in the summertimes.

If you look at the road closures that happen there, or evacuations due to fire, or accidents, this has a tremendous, tremendous impact to that and a lot of other

communities across northwestern Ontario.

Thanks to ongoing pressure from municipal officials, Hydro One has replaced over 500 poles on the line. That line to Pickle Lake, that work has been done over the last five years, but if you think about the length of that line and what it means, at that rate it will take 20 years to complete.

Pickle Lake requires a loop line system to increase capacity and reliability to the area. A loop line would provide for growth of the mining sector and forestry sector. It would also allow for the connection of First Nation people, communities and reserves who are presently, as I've said, on diesel generators -- that would allow them to come up on the grid ask thereby promote economic development and an improved standard of living in those communities.

The bottom line is Pickle Lake's electricity supply is neither adequate nor reliable, just another example of life in northwestern Ontario.

Let me now turn to talk of another of my neighbours, which is Red Lake. As you probably know, Red Lake is one of the biggest gold mines in the world, and Red Lake is a northwestern community with a long history of viable mining operation. Red Lake is located 134 miles northwest of Dryden, again on a single road up and down.

It is with its sister community of Balmertown, which is located another 4 miles to the north. And thanks to last year's upgrade by Hydro One, for the first time in

years the existing community is receiving a stable electricity supply.

Before 2007, three- to four-hour outages were not uncommon, with one outage that went on overnight, over 12 hours.

The main concern of Red Lake now, however, is the demand, of course, will surpass capacity in the short term. Currently Red Lake's capacity at 57 MW can accommodate no more than two more mines. They are presently using 40 MW.

A typical mine uses 5 to 10 MW, and they feel and see right now that one mine coming into production, possibly in as early as two to five years, the Gold Eagle Mine, and, realistically, there are two or three more mines that could also be up and running in those same years.

In fact, I believe the head frame is on its way up on the one mine as we speak.

Plus, there is a value-added lumber mill being constructed this year, and much mining exploration continues to go on in that area. This value-added lumber mill, when you look at what that means, that's a First Nation, Aboriginal/non-Aboriginal group of people, including Red Lake, Dryden, Eagle Lake, and Wobegone Lake Ojibway Nation, along with the Kangecum.

You know what the forestry industry faces today and what we face in northwestern Ontario and the lost jobs that are there and that impact to the family. Being able to construct that mill and have the power to run it is absolutely essential to those lives that are so affected in

northwestern Ontario.

In the short term, Red Lake, its neighbour Balmertown, and the surrounding area will likely surpass its capacity. I am told by Red Lake municipal officials that Hydro One analysis confirms that Red Lake's capacity in the near term may be exceeded.

The big concern is that to increase Red Lake's capacity, the process to install the transmission upgrades - i.e., environmental assessments, et cetera - will take many years, and it is important to appreciate that during this wait, mining options may cost $50 to $100 million. And, of course, that will not be economically feasible to even begin to develop those mines.

Another concern now in Red Lake is the Hydro One policy of user pay recovery, which passes on some of that transmission cost to the main user, which is again a further discouragement to economic development in northwestern Ontario. When we contacted Red Lake on Thursday, they indicated that they had been in regular contact with Hydro One about their circumstances, and yet no one had informed them about the IPSP nor the OEB hearings.

These are just two of the examples of what IPSP needs to address if it is to work for the northwest, the people, and industry.

I guess my plea would be to ask you to consider the lives of the people. We've talked about industry and what it means, but this affects lives and jobs and communities,

and the closing of those doors for people who have been there for generations upon generations. It's a way of life. And we don't want to see that disappear.

And electricity plays a great, great part in the economic feasibility and the lives of these communities, the people. We have families who are going 1,000 to 1,500 miles away. They phone to kiss their children good night at night, because they can't even afford to sell their homes to move away. And electricity and energy plays a big part, a huge part, in bringing those people home.

I would respectfully ask that this portion of the IPSP that pertains to northwestern Ontario be sent back to the drawing board to prepare a plan that is done for the northwest and in conjunction with the people of northwestern Ontario.

Thank you. Thank you, John.

FURTHER SUBMISSIONS BY MR. CYR:

MR. CYR: Thank you, Anne. That concludes our submission, Madam Chair and Panel members. Let me say in closing, however, that, although we have been critical of the IPSP, without doubt the Ontario Power Authority has a huge task in attempting to develop for the first time a comprehensive plan.

That they have gone this far is an absolutely commendable achievement, and we don't intend to lose sight of that. We are simply pointing out that in terms of process, going forward, it will make more sense if we can hive off a plan to be developed for northwestern Ontario

Greenstone/Marathon Local Advisory Committee. *Appendix J: Local Advisory Committee Report on the Social-Economic Benefits of Electricity Options*.

Appendix J: Local Advisory Committee Report on the Social-Economic Benefits of Electricity Options

A - Executive Summary

The Local Advisory Committee (LAC) position is that both the evaluation of options and resultant recommendations in the Greenstone- Marathon Integrated Regional Resource Plan (IRRP) are seriously flawed – particularly with respect to the Near-Term analysis- because proper consideration was not given to the social-economic implications to the local communities of the various options being analysed.

The LAC believes this flawed analysis results from the following:

- The IESO's definition of "least societal cost options" fails to adequately reflect the true social-economic costs and benefits of the different options on the local communities;
- The IESO analysis does not adequately recognize that options that provide future flexibility are extremely beneficial to long term planning;
- The IESO's Ontario Resource and Transmission Assessment Criteria (ORTAC) as interpreted in this IRRP discriminates against electricity consumers in Northern Ontario; and
- The IESO has failed to properly address recent reliability data with respect to circuit A4L.

It is the position of both the municipal LAC and the First Nation LAC that the best near term and long term options for the Greenstone portion of the sub-region all begin with the immediate commencement of a new 230 kV transmission line to the Geraldton area and that the Province needs to declare this 230 kV transmission line as a "priority project".

B - Social-Economic Analysis of Options by Local Communities

The IRRP states that it "identifies least societal cost options" and makes it recommendations based on this analysis.

The LACs believe that due to the limited mandate of the IESO their analysis is seriously flawed because it fails to adequately reflect the true social-economic costs and benefits of the different options on the local communities.

As a result, the First Nation LAC and the municipal LAC prepared the following analyses of the options that were included in the IRRP.

1)First Nation Social-Economic Analysis

The communities of Waaskiinaysay Ziibi Inc. (WZI) (which include AZA, BNA, BZA, RRIB, and Whitesand First Nations), and the lower Matawa communities, (Aroland, Ginoogaming and Long Lake #58 First Nations) are working together towards development of high voltage electricity transmission line upgrades that will enable increased economic development in their respective territories.

Generally, First Nations core values include a responsibility to the land and the environment as well as the membership of the First Nation. The communities are very proud of their Anishinabek heritage and wish to protect these values while moving forward to be active participants in the modern economy. It is generally accepted that increased and successful economic development is the key to unlocking an improved standard of living and quality of life for aboriginal people in Canada. Within the WZI and lower Matawa communities, it is believed that economic development is not just about increasing wealth for a few individuals, but also about ensuring improvement in the overall well-being of community members. Self-sufficiency is not only a goal of leadership but is also desired by community members who seek to improve their own self esteem. The purpose of encouraging economic development is to create jobs, build capacity and stimulate the local economy, thereby generating wealth for the community that can be returned to the community in the form of improved programs.

The communities are willing to explore opportunities to partner with the private sector, or the governments of First Nations, municipal, Ontario and Canada in order to employ larger numbers of community members, maximize economic efficiency and enhance their quality of life. Economic development opportunities are critical to the successful future of our First Nations, as to be sustainable, there is a need for sustainable outside revenue sources other than government transfer payments. Projects like the transmission line provide an investment opportunity that will result in a long term sustainable income stream that can be used to invest in other projects, or for community needs. As our Nations are generally impoverished and reliant on governments for funding, it is critical that we are in a position to take advantage of such economic development opportunities that will improve the future for our community members.

It is anticipated that the transmission line upgrade in a single stage, 230 kv level will be developed and owned by the communities in partnership with a licensed transmitter, that will be selected through a competitive process. The project will meet the anticipated future needs of Greenstone Gold Mine's Hardrock and Brookbank developments, TransCanada's Energy East pipeline conversion project, and other potential renewable and low-carbon power generation projects that are currently stranded without a strengthened transmission grid.

We anticipate that benefits will be seen in these areas:

First Nations Social and Community Development Benefits,

- As First Nations will be partners in the project, they will be in a strong position to ensure that community members benefit to the maximum extent possible in the form of both employment and business opportunities.
- Construction of the transmission line and the related substations is expected to generate numerous jobs ranging from management, supervision, engineers and manual labour.
- A large volume of goods will need to be transported to the project area. These include steel tower or wood poles sections, wires and other materials. This will generate a significant amount of work for hauling companies transporting materials.
- Local transportation will also be required for the transport of the construction materials as well as workers to and from the project area.
- The project will also result in the generation of employment opportunities during operational phase. These will involve journeymen, linesmen, line patrol teams, as well as operation and maintenance teams among others.
- The communities will build capacity at all levels through employment, governance, and job shadowing. This will result in skills development, increased job qualifications and hands on experience obtained by First Nation peoples through the development, planning, construction, operations and ownership/management phases of the project.
- There will be a significant short-term increase in economic activity in the project area from the purchase of construction materials, to the procurement of services.
- First Nations-owned companies will benefit through preferential access to construction and operations contracts from the project.
- The workers that are employed in the construction phase will require basic goods and services such as food and accommodation, which will benefit local businesses in the project area.
- There is a multiplier effect that is a result of spending the revenues from the First Nations investment in the project and an economic impact of workers buying products and services in the local economy.
- Two new communities – BNA and AZA First Nations – will have the power necessary for their development.
- The communities will have a future opportunity to develop clean energy generation projects to feed into the grid.

Benefits to the Federal and Provincial Governments

- The project is considered to be an economic development opportunity enabler. Due to the current transmission constraints, it is not currently possible to connect large projects or new communities to the existing electricity system in the area.
- All levels of government will see the benefits associated with having improved power infrastructure to support natural resource development and improve the competitiveness of northwestern Ontario.
- The governments will benefit through additional tax revenues that include income (personal, corporate and payroll) and consumption (sales and excise) taxes.
- Generally, for electricity infrastructure projects, income taxes have been at 8% of capital investment and operating expenditures. As many of the workers will be from the First

Nations and may be exempt from paying income tax, this number may be lower for this project.

The Transmission Line will serve as an Economic Enabler:

High voltage transmission at the 230 kv level is an enabler of long term socio-economic activity. The improved availability of reliable reasonable cost energy in an underdeveloped, relatively underprivileged area can open up economic opportunities that could not be contemplated without a reliable source of energy. 230 kv high voltage transmission can enable the appropriate synergies which would allow for solid positive socio-economic growth in the Greenstone region. When planning a new high voltage transmission line, the incremental cost of installing fibre optics is not considerable given the cost of extending a fibre-only line into the area. Fiber-optic cables allow for improved and lower cost communications to the area, permitting transmission of internet, cable television and telephone signals over longer distances and at higher bandwidths (data rates) than wire cables. Fibre optics enable communities to utilize video conferencing, participate in distance education, and access improved health services through tele-medicine which can all benefit communities. When planning, the fibre optic requirements should take in consideration regional needs, not only the current and future needs of the transmission line customers.

The socio-economic growth of First Nations communities has been constrained by the existence of long term paternalistic policy and programming directed at First Nation communities by the governments of Canada and Ontario. Welfare policy programming in particular has left Aboriginal communities dependent on transfer payments from the various levels of government for survival. First Nations leadership have been working towards re-empowering the communities to assist their people in becoming proud and strong successful members of the First Nations community within Ontario and Canada.

High profile enabler projects like a 230 kv high voltage transmission line can have a significant positive impact on the growth of a community and the outlook of community members. It is very important to demonstrate to the First Nations people that they are capable of leading and building regional infrastructure that would support the sustainable development of a stronger local economy. A simple statement like, "Our project is bringing benefits to our community, which is enabling our community to grow" can be very powerful and can assist First Nations community members in escaping from the multi-generational welfare that was the result of the Indian Act.

An example of this sort of development is the local capacity, the sense of pride and other social benefits that the Five Nations Energy Inc. (FNEI) transmission line brought to the communities that it serves. FNEI constructed a 270 km long transmission line that services the remote communities of Attawapiskat, Fort Albany, and Kashechewan, replacing diesel generators. Before FNEI, schools, community centres, and arenas all struggled without a reliable grid connection, which limited the growth of the communities which were tied into the budgets of the federal government for upgrades to the diesel generation system. There was a chronic

electricity shortage which acted as a barrier to social infrastructure. Since the line has been operational, benefits to the communities include increased reliability, reduced environmental impact and risk, and economic development such as new residential sub-divisions, new schools and recreational facilities.

FNEI has also created long-term sustained jobs, allowing community members to work and raise a family in their home community rather than subsisting on social assistance. The Five Nations project also creates hope for young people coming through an education system that they may also have an opportunity to work, live, and raise their family in their home community. It cannot be understated how important it is for First Nation people to remain in contact with their homelands.

The leadership of the First Nation communities have recognized the need for development in their homelands which would allow people to stay at home, or to come home, or to temporarily leave the community for education purposes with the strong prospect of coming home to work and raise their family: to this end, the WZI communities have been planning and moving ahead with large industrial and energy projects, as well as resource development opportunities, but have been constrained by a lack of transmission capacity in the region.

Some of the major developments and projects that this new transmission infrastructure would enable include:

- The development of the Bingwi Neyaashi Anishinaabek and Animbiigoo Zaagi'igan Anishinaabek reserves, both located in the Municipality of Greenstone. Both communities require an advanced infrastructure system in order to meet the needs of their membership.
- Forestry operations have been contemplated by several communities, including the potential developments of sawmills and pellet plants.
- Several tourism initiatives have been contemplated among the First Nations.
- Other junior exploration companies operating in the region may have the power required for their future operations. These operations would significantly benefit the WZI communities.
- Several small hydro, wind, solar, and co-generation opportunities have been explored by all of the WZI communities.

2) Social-Economic Analysis of Options to Local Municipalities

The residents of the Municipality of Greenstone deserve to have their basic infrastructure needs met in a manner at least roughly equivalent to other Ontario residents. This requires a reliable electricity system that not only supports the modern health, safety, social and economic requirements of current residents and businesses but also provides a reasonable chance at future economic and social growth.

The Province would only allow an electricity system, that regularly interrupts for lengthy periods entire communities across a 200 km section of the TransCanada highway, to exist in Northern Ontario.

The IRRP clearly demonstrates that the A4L has, for years, failed and continues to fail to meet even the minimum Provincial standards for forced outage duration. What the IRRP fails to adequately acknowledge is that even efforts to improve the forced outage record result in extensive and lengthy "planned" outages of sometimes even longer duration to these same residents. Both forced and planned outages bring significant disruption to social and economic life in these communities. The frequency and duration of which would never be allowed to exist in Southern Ontario.

The IESO's justification in Appendix E for not taking sufficient action to bring the reliability of the supply to Greenstone up to Provincial standards is based on economic approaches that are employed in Texas and Australia but not included in the Ontario standards. How likely is it that Texas and Australia electricity consumers are exposed to 8 hour outages when the temperature is -40C?

The inadequate transmission system also serves as a significant barrier to the economic and social development of the Municipality of Greenstone, the local First Nations and in some cases the entire Province. Time and time again it has shown itself to be a significant impediment to growth both locally (e.g. Greenstone Gold) and/or Provincially (e.g. Ring of Fire, Energy East).

Economic development in this region is regularly impeded by the time it takes to complete infrastructure development over such large distances. The IESO's mandate and its definition of "societal costs" is so limited that its approach to regional planning fails to meet the needs of Northern Ontario. The Province needs to show leadership with respect to infrastructure development.

C - Benefits to Long Term Planning of Flexible Options

The LACs believe that regional planning should recognize that options that provide future flexibility are inherently preferable to options that either limit or preclude future options. This is particularly true when different options have similar near term costs.

There were 3 different scenarios presented by the IESO, with varying alternatives within those scenarios (see page 36 of 74). The IESO has produced all the background estimated costs in detail (Appendices A to I) and within all that material several key options become quite apparent.

On page 37 of the report, there are two recommended stages, but no real recommendation as to which one is better. That apparently is not the mandate of the IESO, but the community LAC members felt it

should be reviewed from a socio-economic benefit perspective as well and this recommendation should be made part of the overall report to possibly assist the proponent(s) in making a decision in which direction to take.

Recommended stage 1 – to accommodate the Geraldton mine, requires the proponent to install 40 MVA of reactive compensation + customer based grid connected gas fired generation at their site. The cost of this option is $65M. This option would look after the immediate needs of the Mining proponent in the Greenstone area, but there are other considerations that possibly should be taken into account.

The scenario whereby the proponent simply looks after itself in the immediate timeframe does not recognize the facts that there are other identified possibilities that should be recognized. There are other identified mining concerns located in the general area and the upgrades as laid out do little to accommodate that. The First Nation communities that are within the Greenstone vicinity, along the A4L Corridor and in the Mattawa areas all have potential to expand loads, but are not accommodated. The Municipality of Greenstone has the potential to grow, but the capacity to do so is not met by the self generation scenario. Possible connection to the Ring of Fire is not accommodated. Load expansion for the possible TCPL Pumping Stations is not accommodated.

The singularly largest concern for the Municipality of Greenstone and all other customers connected to the current A4L Circuit is the possibility of improving their security of supply. The inclusion of VAR support and upgrades to sections of the A4L to accommodate the new mining load does nothing to improve this supply security issue. Scenario C, which is a culmination of the Scenario B options, provides this improved security, but without first of all building a new 230 kV supply into the Greenstone area, in a timely fashion, Scenario C may not come to fruition and from a socio-economic point of view, this is certainly not desirable.

If the proponent(s) decide to forego the 115 kV upgrades, leaving the 230 kV scenario to develop "somewhere" down the road, this is seen as possibly short sighted and a poor use of Capitol dollars.

The 3 scenarios as shown in Table 7-2, found on page 36 of the Report, gives a fair representation of the projected NPV costs.

Scenario A which does nothing is not an option.

Scenario B which has a staged plan solely based upon the 115 kv system, does not allow for future expansion. The various options of B1, B2 and B3 all have attendant costs and added future costs and also do nothing for future expansion capabilities. Indeed, it would appear that there could be a resultant stranded asset possibility, should it be decided to move to a full 230 kv transmission line. Reactive compensation, off-grid generation and replacing sections of the circuit A4L are fine for the short term, but do not allow for future expansion, such as a supply to the Ring of Fire or TCPL upgrading.

Scenario C allows for supply at the 230 kV level, which would be needed in the mid term timeframe at the very least and the comparisons of the NPV costs between Scenario B and Scenario C are very close if properly analysed.

The best option for all stakeholders is contained on page 58 of the IRRP but not brought forward as either a specific recommendation or as a unique option. The IESO has estimated that the NPV cost of a

new 230 kV transmission line to Longlac is $70 M – approximately equal to the total cost of their recommended Stage 1 for Scenario B (i.e. $65M).

However, the 230 kV line offers everything the IESO's recommended Stage 1 offers plus much more flexibility for the future and greater benefits in both the near term and the long term:

- An immediate solution to the A4L reliability issues;

- Economic opportunities for the local First Nations;

- A first step towards a supply to the Ring of Fire and the remote Matawa First Nations; and

- Most of what is required to supply Energy East.

The IESO recommended Stage 2 includes, in addition to the 230 kV line, a new 115 kV line with a NPV cost of $90M. That brings the total cost of their recommended Stage 2 to $160M. That line is justified on the pipeline developer needing to connect all of the pumping stations to the transmission system and avoiding single contingencies affecting adjacent pumping stations. Surely the pipeline developer could achieve the desired reliability at far less cost by allowing ONE of the new pumping stations to have its own generation and allowing the remaining stations to be connected to the transmission system.

For the last five years the Municipality of Greenstone and the local First Nations have been pressing the Province and the IESO for a new 230 kV transmission line to Longlac. The Province's resistance has been based on the argument that it is not the least cost option and that it does not meet the timing requirements. The IRRP study has shown that it is the least cost option. If the Province had declared it "priority project" at any time in the past five years it would have been built in time to meet the needs. The timing argument is simply a catch 22 that can only be addressed through leadership by the Province.

D - How ORTAC Discriminates Against Northern Ontario Communities

As outlined in Appendix A of the IRRP, ORTAC outlines Load Restoration Criteria for various contingencies with the size of load "at risk" being the prime criteria with respect to the maximum time to restoration.

For the Greenstone region, both now and under the all of the near term considerations, the load at risk due to the loss of the A4L is and will be less than 150 MW. This means that according to ORTAC criteria the maximum time to restoration is 8 hours. (Note- In the next section it will be shown that the reliability record of the A4L has deteriorated significantly over the last 4 years and that even the 8 hour maximum has not been respected).

An 8 hour maximum discriminates against Northern Ontario communities because it fails to recognize that an 8 hour outage to a 200 km wide area of the Province at -40C has vastly different implications to consumers and communities than a similar sized load in a 10 km wide area of Southern Ontario at -5C.

This discrimination is both historical and systemic.

Over the last 15 years, very few new transmission facilities have been placed in service in Northern Ontario due to the limited economic development that has occurred during this period. This fact combined with Section 4.6.1 of the current Transmission System that states-

"All facilities that came into service, were procured or were ordered prior to May 1, 2002 are deemed to be in compliance with the performance standards and technical requirements set out the Code."

combine to severely limit the modernization of the transmission system in Northern Ontario.

If all facilities that came into service prior to 2002 are "deemed to be in compliance" and very little has been built in Northern Ontario since then Northern Ontario's electrical customers are stuck with an outdated system.

The result is that only in Northern Ontario are there radial transmission lines of the length of A4L with no means of backup.

E - Reliability Performance of A4L

Figure E-2 of the IRRP shows that for the most recent period on the graph (2012-14) the duration of forced outages has more than doubled from the previous period. The accompanying text states that as a result its performance failed to meet the required standard.

Furthermore, it is obvious from both the March 8th 2016 incident mentioned in the report and the subsequent outages that have occurred on the A4L since March that when the 2014-2016 data is eventually added to the graph that A4L performance will continue to fail to meet the established reliability standard.

The A4L has failed to meet the reliability standard for four years straight yet the IESO concludes that it "does not believe further reliability-based investments are justified".

It is also worth noting that the above noted interruption data does not include regular lengthy "planned outages" during this period. Given that the A4L is a lengthy radial circuit with no means of backup, these planned outages contribute significantly to the social-economic costs to the local communities of inadequate supply.

This combination of an extended period of substandard forced outage combined with significant "planned outages" over such a large geographic area is only permitted to exist in Northern Ontario.

Common Voice Northwest Energy Task Force. October 29, 2013. *Electrical Demand and Supply for Northwestern Ontario*. Thunder Bay, Ontario.

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Electrical Demand and Supply for Northwestern Ontario

The Energy Task Force

The Common Voice Northwest Energy Task Force (ETF) has been in existence, in one form or another since it was created as a Sub-Committee of the Northwestern Ontario Municipal Association (NOMA) in 2005. In 2008 it evolved into one of the Task Forces operating under the mandate of Common Voice Northwest a regional research organization. The ETF acts as advisors to NOMA, the Northwestern Ontario Associated Chambers of Commerce (NOACC), City of Thunder Bay and the Municipality of Atikokan specifically, and all municipalities and Chambers of Commerce in the Northwest in general.

The members of the Energy Task Force include retired operators of the Ontario Hydro transmission, distribution and generation systems, current and former CEO's of regional hydro utilities, economic development officers and board members and municipal councillors.

The ETF also relies on the knowledge of those individual municipalities and Chambers of Commerce along with the local economic development officers to inform the energy needs of the entire region – the Districts of Rainy River, Kenora and Thunder Bay.

The ETF has been a key participant, through its various partners, in a range of matters before the OEB and matters under the jurisdiction of the Ontario Power Authority (OPA), the Integrated Electrical System Operator (IESO) and Ontario Power Generation (OPG). This engagement includes the following:

- Integrated Power System Plan – phase 1 and 2
- Ontario Energy Board
    - IPSP
    - East West Tie selection of a Transmitter
    - Reliability Must Run Contract for the Thunder Bay Generating Station
    - Micro Embedded Generation initiative
    - Regional Planning
- Atikokan GS Conversion
- TB GS Conversion
- Merging of Local Distribution Companies (LDC)
- Long Term Energy Plan

- North of Dryden Plan

It is also important to note that the ETF through its partners have expended over $900,000 in legal fees since 2007, in order to protect the interests of the Northwest before the Ontario Energy Board. While approximately 60% of these costs have been recovered, the remainder represents a significant commitment by the Northwest to obtain an energy system that will meet its needs for the future. In addition, the volunteers of the Energy Task Force have expended thousands of hours reviewing, commenting and reacting to the documents produced by agencies with budgets in the hundreds of millions of dollars per year.

Supply and Transportation of Electricity in the Northwest

In general, the Northwest currently relies on two completely different methods of generation[1] and two equally different methods of moving electricity from one point to another.

Generation

On the generation side, the Northwest relies on hydraulic generation (dams and run of the river) and on thermal and co-generation (Atikokan and Thunder Bay Generating Stations as well as a gas generator near Beardmore and the output from co-gen facilities at area paper mills)[2]. There are a number of renewable generators in the region (plus a few that have received licences but are not under construction as of yet) however, as they only operate when their source of energy is available (wind and sun) they are not taken into consideration when planning the overall system.

All generators, with the exception of the Atikokan GS and the Dorion Wind Farm, introduce electricity into the grid at 115 kv. This output is delivered directly to end users through the 115 kv distribution[3] system of Hydro One.

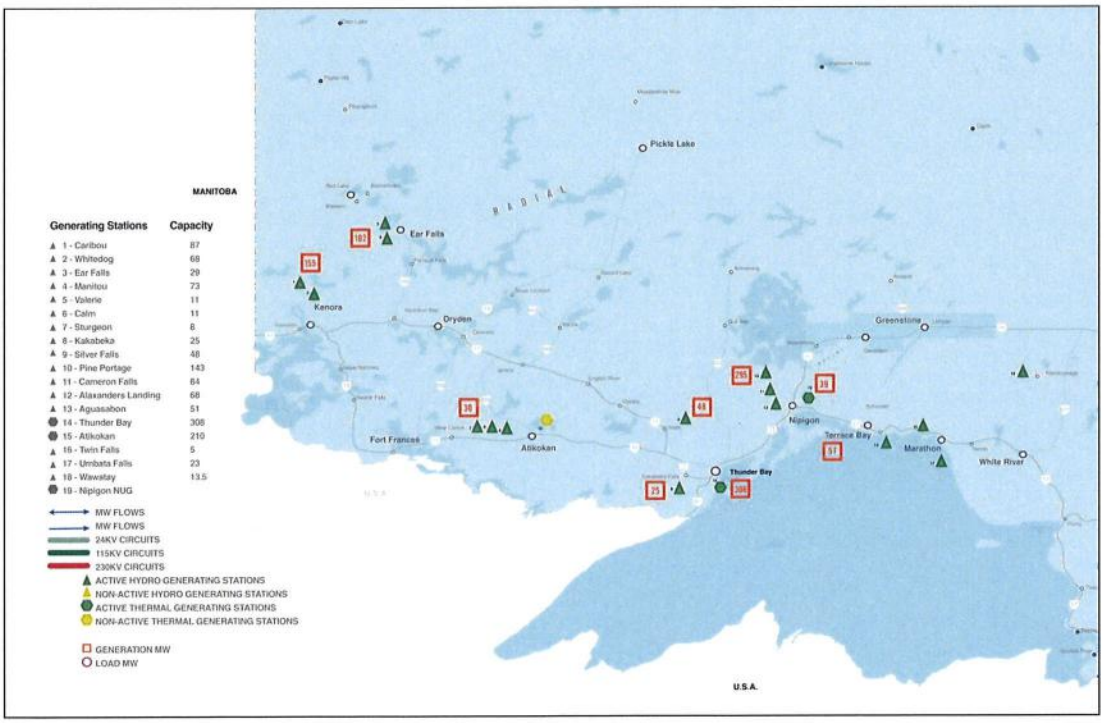


FIGURE 1 GENERATORS IN THE NORTHWEST

[1] While there is some wind, solar and biomass energy generation in the region, the overall impact is minimal given the total projected load for the Northwest. It is also important to note that wind and solar generation must be 'backed up' by dispatchable energy such as thermal or hydraulic (that supplies electricity when the sun is not shining and the wind is not blowing)

[2] Resolute Forest Products in Thunder Bay and Fort Frances

[3] Even though the 115 is considered a transmission level, because it is used to distribute the power to all of our NWO customers, to be stepped down for further distribution we will refer to it as Distribution throughout this document.

Transporting Electricity

There are two distinct systems to move electricity around the Northwest– transmission at 230 kv and distribution at the lower 115 kv rate.

Distribution

The Northwest's loads are all on the 115kv system, being supplied by generation that is directly connected to that 115 kv System. The 115 KV system was originally built to connect those customers to generation located within the area and it was not until the 1970's that the 230 kv system was installed. (Excess MWs are transferred up to the 230 kv system through Auto Transformers located in Kenora, Dryden, Fort Frances, Atikokan, Thunder Bay and Marathon.)

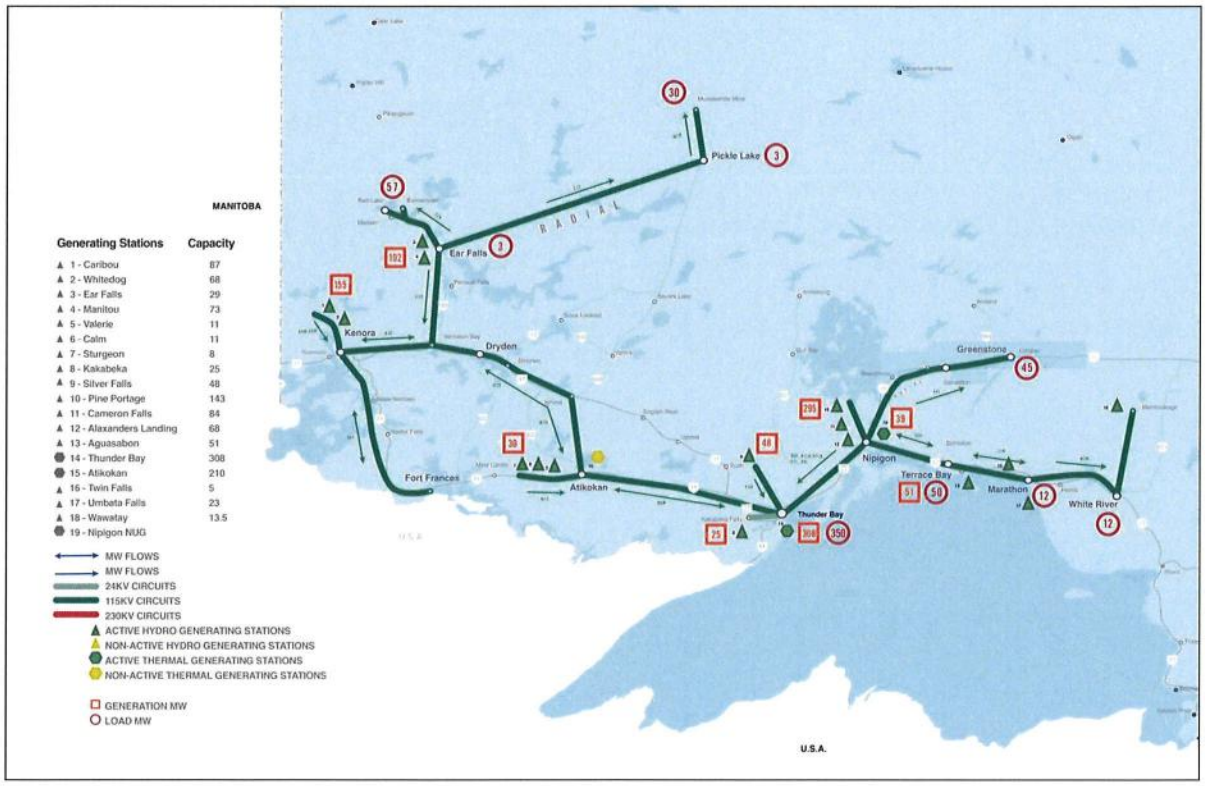
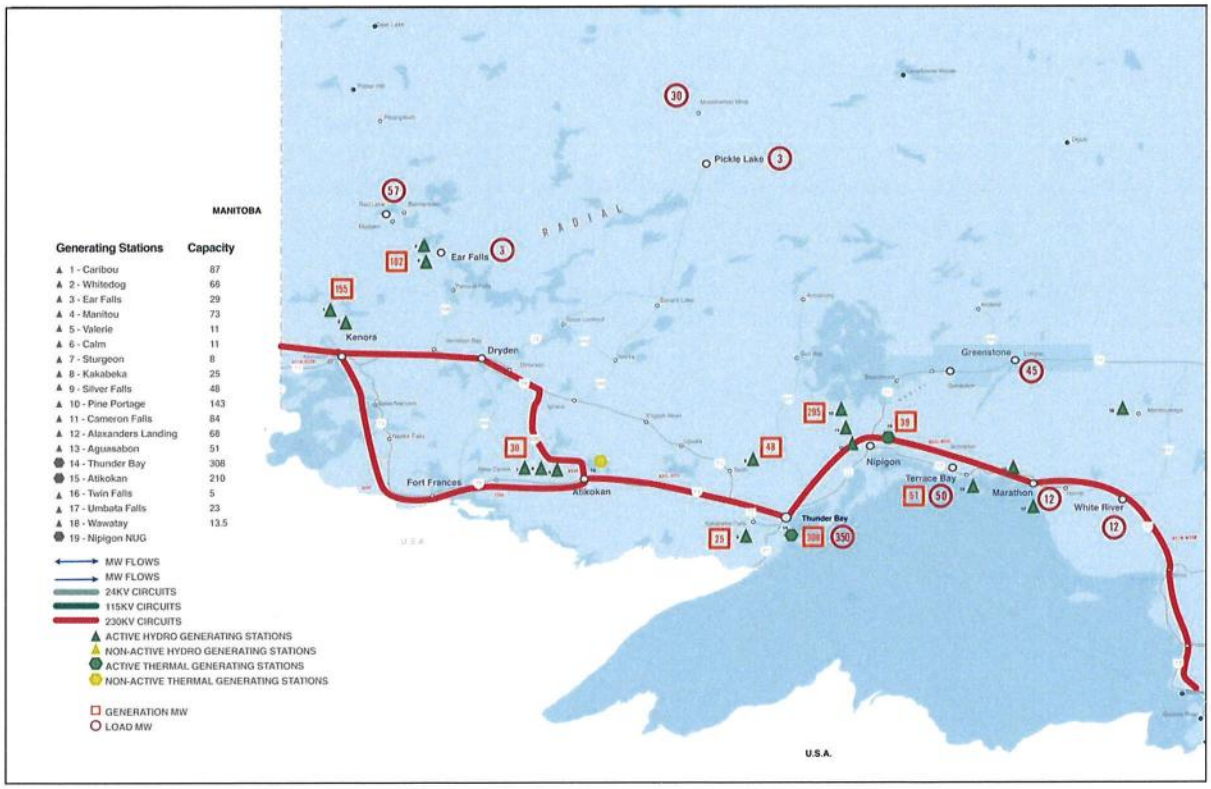


FIGURE 2 115 KV DISTRIBUTION SYSTEM (ARROWS SHOW DIRECTION ELECTRONS CAN AND DO MOVE AS REQUIRED)

Transmission

Transmission at 230 kv is the system that moves energy between jurisdictions rather than delivering it directly to customers. Very few generators produce electricity at the 230 kv rate[4]. The east-west tie line connecting Manitoba to Northeastern Ontario (with a current capacity[5] of 350 MW) is the transmission system in the region. There is a minor 115 vk distribution connection (100 MW) to Minnesota at Fort Frances.

The one exception to both generation or supply and the movement of electricity is when energy is obtained from outside of the region at times when the local generators are not able to supply the required amount of power or when surplus energy is sent out of the region.



[4] Atikokan GS and the new Dorion Wind Farm supply to the grid at 230 kv

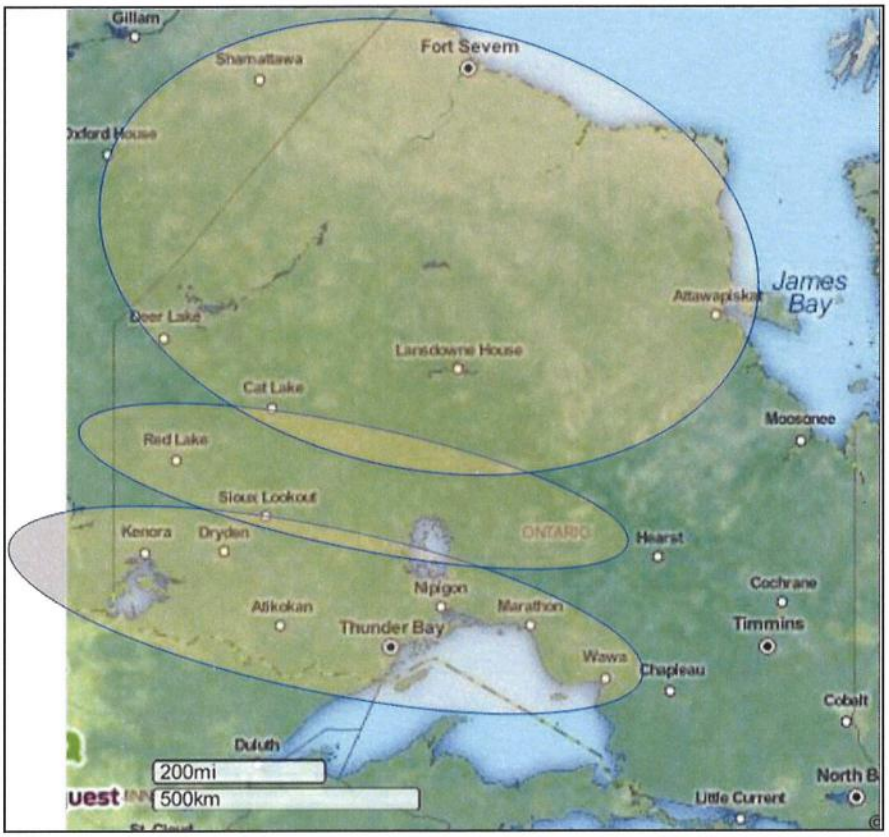
[5] The OPA is proposing to expand the East West Tie to 650 MW. This expansion is currently expected to be in service by 2018

Overview

There are three different approaches to the delivery of energy in the Northwest. The lower tier (as shown in the map below) represents the more urban area of the region with significant distribution and transmission assets, including the ability to easily absorb new load. Outages are infrequent in this area.

The mid tier represents the area with intermittent supply. The Municipalities of Ear Falls, Red Lake, Pickle Lake and Greenstone are served by what is called a radial line. This 115 kv circuit dead ends at each of the most northern communities and when there is an interruption the community(s) between the point of disruption and the end of the line are without power, sometimes for many days.

For example, on Friday October 5th 2012 the Municipality of Red Lake experienced an unscheduled 37 hour electrical power outage due to a fault on the E2R transmission line. Besides all the local businesses that were affected Goldcorp in Balmertown and all its' workings were also affected. The cost of this outage to Goldcorp was $5.9 million.[6]



In July of 2011 a forest fire wiped out the distribution line serving Pickle Lake. It took crews 10 days to restore power to Pickle Lake and Musselwhite Mine (to its north).

The third or top tier includes all of the First Nation Reserves that are powered through local diesel generation. This includes Reserves north of Ear Falls, Pickle Lake and Greenstone as well as those in the vicinity of Lake Nipigon (although not located inside

[6] Appendix A contains a detailed analysis of the cost of the outage

the oblong shape on the map). The Energy Task Force has not assumed that it represents the interests of the remote First Nations or their Treaty Organizations. What the ETF has done, however, is incorporate the load demands as expressed by those First Nations into our projections. We have also insisted that the upgrades to service the radial line communities of Greenstone, Pickle Lake and Red Lake must be of sufficient size to enable the remote First Nations to have access to sufficient power when they do connect to the Ontario Grid.

Future Loads Drive the Need

A key role of the Energy Task Force has been to quantify the known future demand for electricity in the Northwest. This is done so on the assumption that the load will drive the supply and the method of delivering the required electricity. The ETF relied on specialists' knowledgeable in the field of mining and forestry development to quantify the loads, their locations and the timing of the requirement for connection to the grid. The ETF limited it's examinations to those facilities that are planning for connections up to 2020. Approximately 22 mines, a handful of sawmill type forestry facilities and the conversion of one of TransCanada Pipelines' natural gas lines to the transportation of crude are included in the analysis as is the connection of all of the remote First Nation communities to the grid..

The ETF continues to provide information to the OPA and to the Minister of Energy to ensure that the province plans appropriately for the needs of the region.

To the right is the map prepared by the Thunder Bay Community Economic Development Commission to identify the mines that are working towards opening over the next 7 years:

The Energy Task Force has projected that the future load for the Northwest up to 2020 will be in the range of 1,600 MW. It and its partners have recognized that timely availability of a connection to the electrical grid is a key determinate of the viability of any of the new mines. If the connection is not there when it is required, the investment may go elsewhere. Also, this projected load includes that needed to not only replace the diesel generated electricity on the remote First Nation communities but allows for business and residential growth in those same communities.

In January of this year, the Ontario Power Authority was projecting a total 2020 load of approximately 800 MW[7]. As a result of the data and mine-by-mine information provided by the ETF to the OPA, by May of this year, the OPA had increased their projections to 1,400 MW with one senior planner indicating that "any plan must meet the needs of the region." While the OPA's projection is still less than that identified by the ETF, the agencies acceptance of an additional 600 MW of load is an indication that the ETF was correct all along.

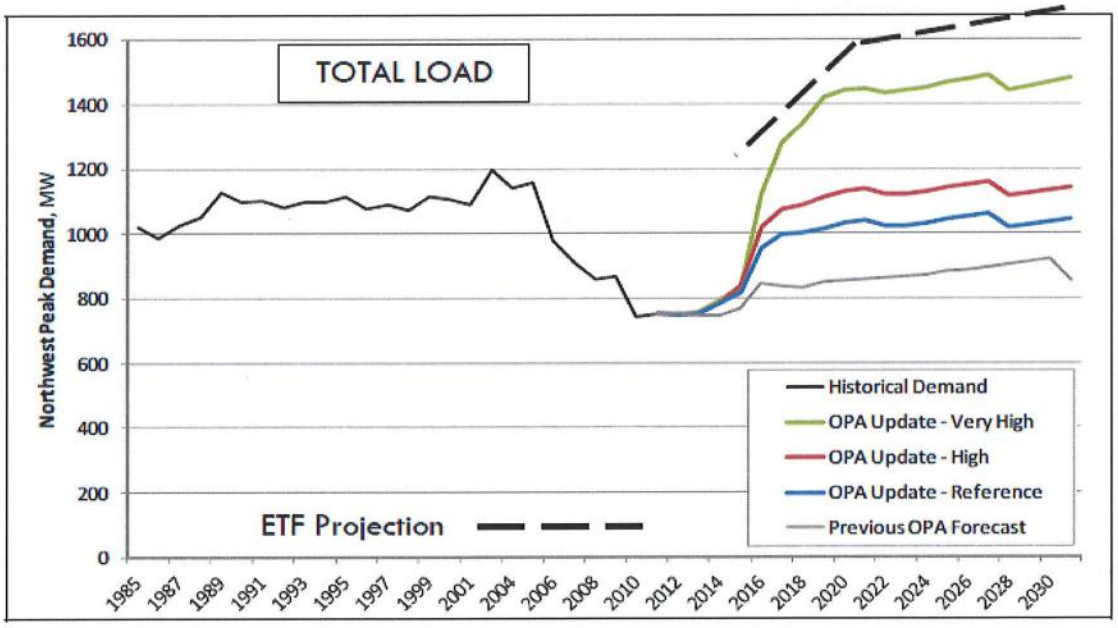


FIGURE 3 COMPARISON BETWEEN MAY LOAD PROJECTIONS - OPA AND ETF

[7] Current load as agreed to by both the OPA and the ETF is approximately 720 MW

Jurisdictional Considerations

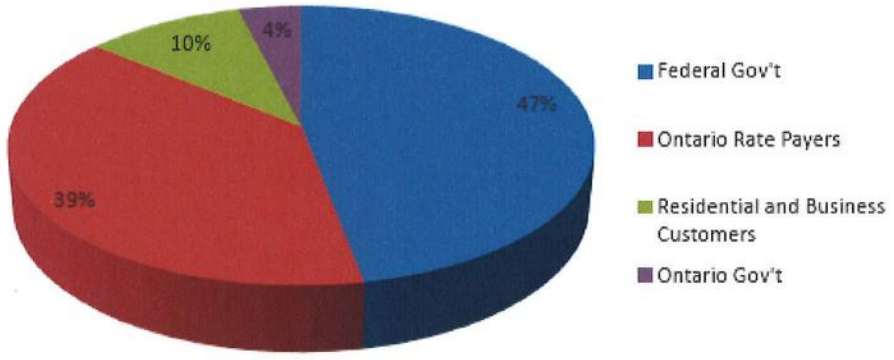
The planning and development of hydro electric generation, transmission and distribution is a provincial responsibility. One exception is in Treaty areas, traditional lands and Reserves which fall, in part, under Federal jurisdiction. The other exception is that moving Reserves off diesel will only occur if the existing radial lines to Red Lake, Pickle Lake and Greenstone are enhanced to a level where they can provide the needed power to the remote communities.

Financial Implications for Federal Government

The Ontario Power Authority has determined that 47% of the cost of supplying electricity to the remote communities is born by the Federal Government. This amounts to $31.6 million per year.

Figure 2: Estimated Current Share of Annual Cost of Diesel Generation in the 25 Remote Communities by funding source

Current Total Cost is estimated to be about $68 Million per year



Source: OPA[2]

According to a study[8] conducted by SNC Lavalin ATP Inc. called "Transmission Line Concept For Northern Ontario Off-Grid Communities" for the Nishnawbe Aski Development Fund "Over 20 years, the total savings begin to appear between the two systems [diesel vs distribution], totalling more than $800 million. Over the 50 years modeled, the difference reaches a higher order of magnitude exceeding $5 billion."

[8] The study commenced in 2009

The following is an excerpt from the SNC Lavelin report:[9]

Table 9.3 - Cost Comparison Summary (in $ Millions)

Supply Option	Annual cost in 2009	Annual Cost in 2029	Cumulative Cost 2009-2029
Diesel Generation system	$ 49.7	$ 109.3	$1 591.6
Transmission Concept	$ 37.4	$ 30.2	$ 709.6

Applying the OPA's 47% would suggest that the savings for the Federal Government would be in the range of $376 million over the first 20 years and $2.3 billion over the 50 year modeling period.

Economic and Taxation Impact

Advantage Northwest, Mining Readiness Strategy prepared by SNC Lavalin for the City of Thunder Bay, Fort William First Nation and the Thunder Bay Community Economic Development Corporation identified the impact of the mining growth in Northwestern Ontario. The report projected that the average annual impact on GDP for just 10 of the mines in the planning/development phase is found in SNC's table ES1

Table ES.1

Average Annual Impact on GDP and Employment

GDP Impact (in millions)			
Impact	Ontario Annual Average	N.W.O Annual Average (79% Ontario)	Thunder Bay Annual Average (60% N.W.O)
High	$2,089	$1,650	$990
Medium	$1,791	$1,415	$849
Low	$1,492	$1,179	$707
Employment			
Impact	Ontario Annual Average	N.W.O Annual Average (66% Ontario)	Thunder Bay Annual Average (60% N.W.O)
High	12,350	8,151	4,891
Medium	10,586	6,987	4,192
Low	8,821	5,822	3,493

The same report stated that "The average annual federal government revenues generated in Ontario is estimated to be between $218 and $305 million (2012 dollars) from mining activity in the ten year period (2013-2022)". The combined net benefit to the Government of Canada from the savings in diesel plus the increased taxation revenue for the first 10 mines is in the range of $237 to $323 million a year.

[9] Page 55 of the SNC Lavalin Report

Conclusion

The Federal Government has a key role to play in ensuring that the remote communities can be and are connected to the Ontario Electricity Grid. One one hand, it will reduce ongoing operating costs for energy to those communities, while on the other hand the facilitation of the new mines will enrich the federal treasury by between $218 and $323 million a year. At the same time, ensuring that the remote communities are moved off diesel and onto the grid will enable the reserves to grow, both in terms of residential housing and in business opportunities. The extension of the grid will also enable the First Nations to develop hydro-electric generation providing a new source of revenue that will allow them to move towards prosperity and self sufficiency.

First Nation Participation

A number of First Nation communities have come together to put forward proposals for hydro-electric development, both on the generation side and the transmission/distribution component.

The following is a brief outline of those activities:[10]

Ojibways of Pic River

Probably the longest involved First Nation Pic River has developed hydro-electric generation within their traditional territories. Their first run of the river generator became operational in 1991, and was followed by two more (2001 & 2008) and together they generate 41.5 MW. All projects have been done in partnership with Canadian Energy companies. Pic River is pursuing an additional 140 MW of generation.

Pic River also led a consortium of Robinson Superior Treaty First Nations[11], in conjunction with a number of energy companies in proposing to be the 'transmitter' to design the enhanced East West Tie Line between Wawa and Thunder Bay. Their proposal included a percentage of ownership of the future transmission line.

They were not successful, and subsequently have filed an appeal with the courts. The appeal seems to be for a Divisional Court Review of the Ontario Energy Board's decision making in the selection of Next Bridge Infrastructure as the Designated Transmitter in the design and development of the East West Tie upgrade.

Whether or not the dispute gets resolved by Next Bridge giving up a 1/3 interest in the project to Bamkushwada LP[12]. the compromise they do reach, whatever it turns out to be, will likely become the precedent for FN participation in all future energy infrastructure projects in the Northwest Region, if not the province.

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[10] This may not be a comprehensive list as it is likely that other First Nations are working on their own projects and the ETF is not aware of them.

[11] Pic River is one of six limited partners in Bamkushwada LP. The six partners are:

- (1) Red Rock Indian Band,
- (2) Pays Plat First Nation,
- (3) Ojibways of the Pic River First Nation,
- (4) Pic Mobert First Nation,
- (5) Michipicoten First Nation and
- (6) Fort William First Nation.

[12] Bamkushwada LP is one of three limited partners in EWT LP (the other two being Hydro One Inc., and Great Lakes Power Transmission EWT LP, the latter itself being a partnership of Brookfield Infrastructure Holdings (Canada) Inc. and Great Lakes Power Transmission Inc.). Shares of EWT LP's general partner, East-West Tie Inc., are held equally by Bamkushwada LP, Great Lakes Power Transmission Inc. and Hydro One.

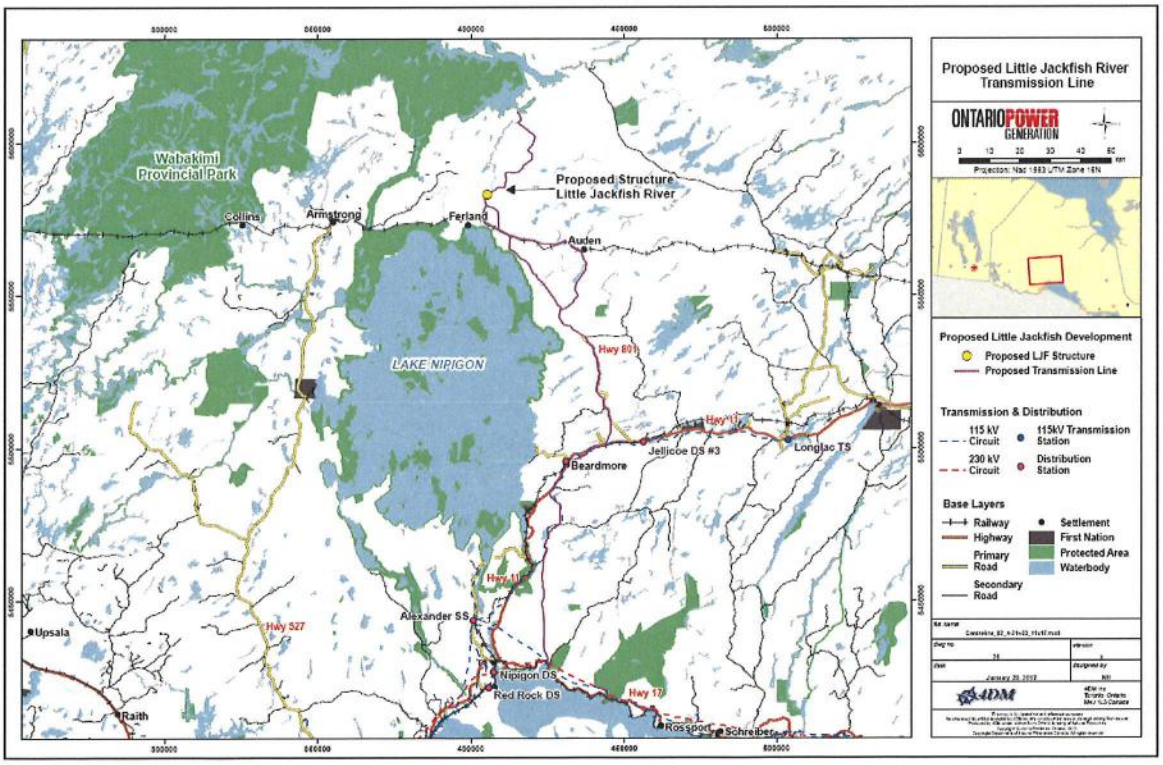
Lake Nipigon First Nations

Ontario Power Generation is proposing to develop 80 MW of renewable hydroelectric generation in partnership with Waakinaysay Ziibi Inc (WZI) – a development corporation representing Lake Nipigon First Nations (LNFN). WZI will have a significant equity interest in the Little Jackfish Hydro-Electric Generation Project. Five of the six Lake Nipigon First Nations are actively involved in the project.

The project remains close to shovel ready. The Environmental Assessment for the project is approaching the completion phase and OPG continues to work with the FN Partners in WZI to complete the community consultations required to initiate the closing of the EA. This is expected to be completed early in the new year.

A significant amount of Geotechnical and hydrology work has been completed to optimize the project design and improve the cost profiles. The hydrology design has allowed the project to incorporate some time shifting and storage of water which will help with the accommodation of more wind and renewable on the gird as this project will have some ability to help with offsetting the variable nature of these types of generation.

The tender for the EPC contracts have been developed and the pricing has been prepared so that it could be used to start the contract discussions with the OPA. Because of the lack of commitment on the transmission infrastructure, the project costs also include a provision for a 115 kv transmission line from Kama bay east of Lake Nipigon to the project site. The EA work for this transmission alignment has also been included in the EA work for the project, so it is also nearly complete.



The FN partners which are in the development company WZI have already received $25 M funding support from the MNR to complete job skilling to participate in this project

What is currently preventing the project from launching is the rate contract that is needed from the OPA. Once a Hydroelectric Supply Agreement (HESA) is received from the OPA, OPG would be in a position to proceed with the project.

North of Dryden Sub Zone

There are two competing First Nation consortiums competing for the rights to become the "transmitter" to design a new transmission or distribution line from the Dryden area to Pickle Lake and beyond to connect to the remote First Nations.

Wataynikaneyap Power is a First Nations owned new Transmission Company and an equal partner between Central Corridor Energy Group (CCEG) and Goldcorp, the largest representation of potential customers for the new line. A total of 18 First Nations[13] are now part of Wataynikaneyap Power. Ten are shown connected to phase II of their plan.

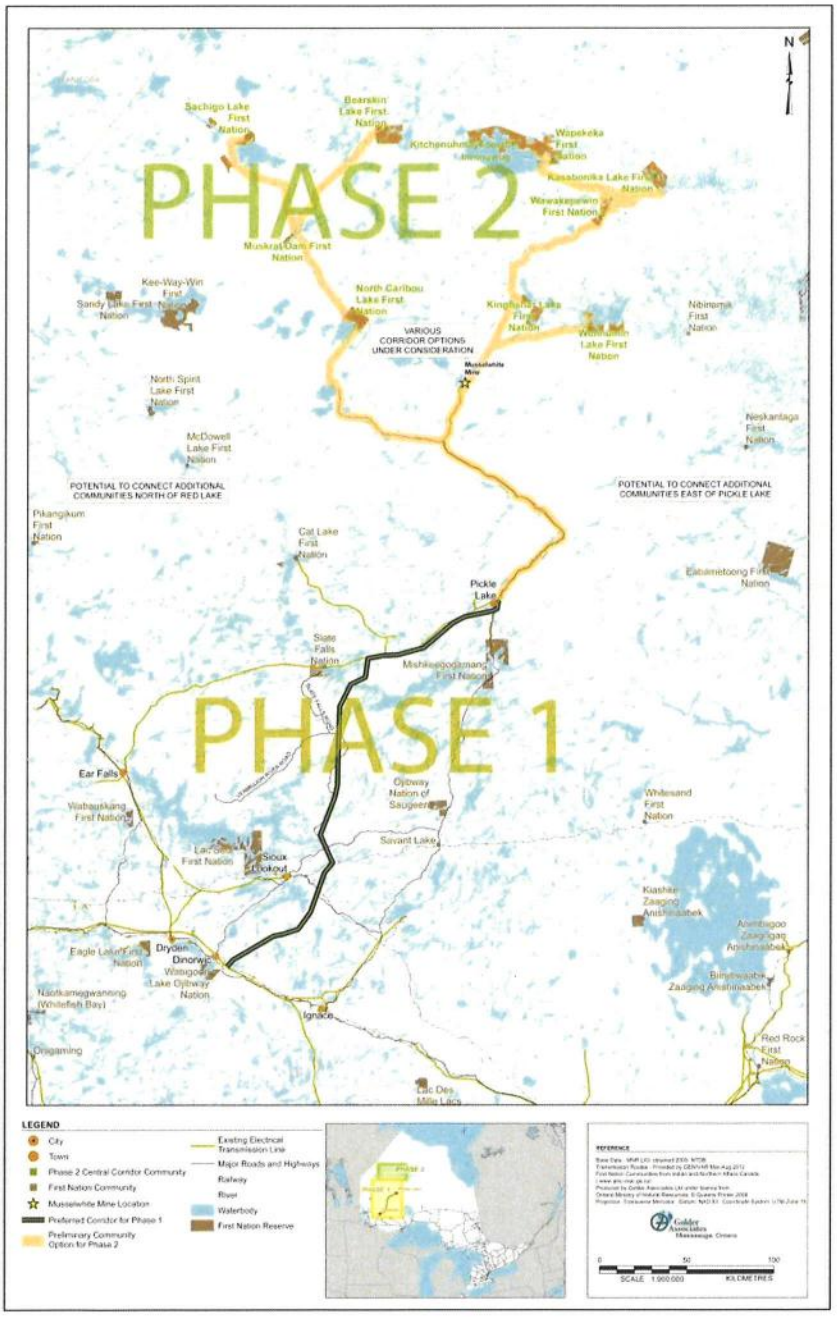


FIGURE 4 WATAYNIKANEYAP POWER PROPOSED CORRIDOR

[13] 5 new First Nations joined this mor

Sagatay Transmission LP

Sagatay Transmission L.P. was formed to plan and develop a new 230 kV high voltage electricity transmission line to Pickle Lake. A preliminary preferred route has been identified from Ignace to Pickle Lake utilizing the Highway 599 corridor. The original partners in Sagatay were the Mishkeegogamang First Nation, the Ojibway Nation of Saugeen First Nation and Morgan Geare. In March 2013, Sagatay welcomed Algonquin Power & Utilities Corp. as a partner.

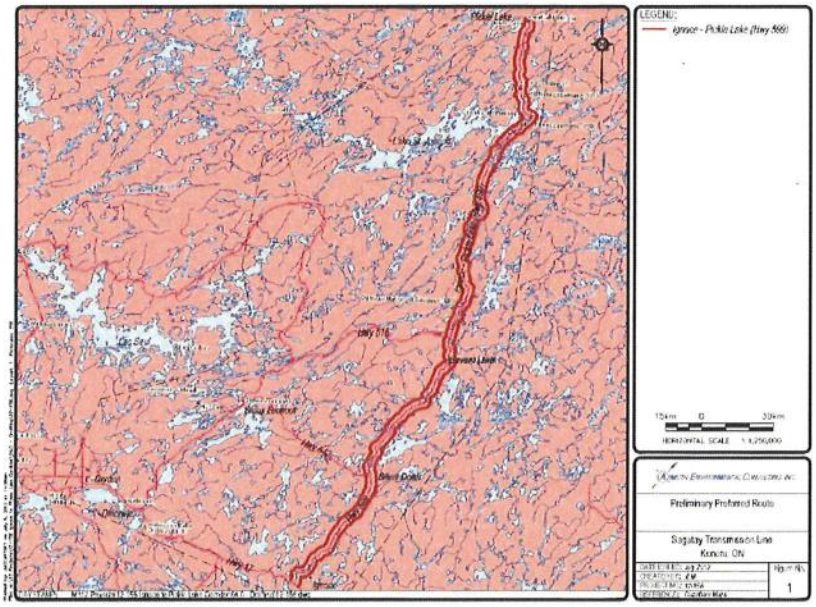


FIGURE 5 SAGATAY TRANSMISSION LP PROPOSED CORRIDOR

Appendix A Goldcorp Power Outage

On Friday October 5th 2012 the Municipality of Red Lake experienced an unscheduled 37 hour electrical power outage due to a fault on the E2R transmission line. Besides all the local businesses that were affected Goldcorp in Balmertown and all its' workings were also affected. The cost of this outage to Goldcorp was $5.9 million.

Goldcorp performs gold ore extraction and processing at an average rate of 600,000 ounces per year. The price of gold on that very day, had risen to an all time high of $1,798.10 a troy ounce.

For October 5th, 2012 Goldcorp would have produced 1,644 ounces in a 24 hour day or 68.5 ounces in one hour. Due to the way gold production processes works, the facility took approximately one shift (12 hours) to become fully operational after the outage. This represented a 50% productivity reduction over that 12 hour shift.

So here are the losses quantified:

68.5 (oz/hr) x 37 (hrs) x $1,798.10 (per oz)	$4,557,284.45
68.5 (oz/hr) x 12 (hrs. x 50%) x $1,798.10 (per oz)	739,019.10
Total loss to Goldcorp	$5,296,303.55

In addition, as it was not possible to predict when power would be restored, Goldcorp retained their operational staff on site at a further cost to their company - a cost that will not be repaid. The loss of wages for three 12 hr shifts x 300 workers per shift x $60 hr = $648,000 wages and no productivity. This brings the total cost of the power outage to **$5,944,303.55.**

So due to the fact that there is no built in redundancy in this 115 KV radial transmission line (E2R), and that it is built grossly under capacity to handle future loads (need twin circuit 230 KV transmission line), huge economic losses will be realized.