

**SWIDERSKI ENGINEERING INC. – project reference list (2011)**

Site name	Site Owner	Turbine Manufacturer	Turbine Type	Scope	Throat Dia	PowerMax before	PowerMax after	Notes
					[m]	[kW]	[kW]	
St. Raphael	Algonquin Power Ltd. (Canada)	Norcan Hydraulic Turbine Inc.	Francis	New runner	1.65	1050	1280	Efficiency increase ok 5%, cavitation reduction/elimination
Marshfield # 5	Green Mountain Power Ltd. (USA)	Norcan Hydraulic Turbine Inc.	Francis	New runner	1.40	4500	5200	Efficiency increase ok 3.5%, cavitation reduction/elimination
Copenhagen	ENEL North America Inc.	Norcan Hydraulic Turbine Inc.	Francis	New runner	1.28	1500	1700	Efficiency increase ok 4%, cavitation reduction/elimination
Vergennes	Green Mountain Power Ltd. (USA)	Norcan Hydraulic Turbine Inc.	Double Horizontal Francis	New turbine in existing chamber	1.05	700	835	Efficiency increase ok 8%, cavitation reduction/elimination
Lower Lachute	ENEL North America Inc.	Norcan Hydraulic Turbine Inc.	Francis	New runner	1.68	3900	4500	Power increase (15%), efficiency increase approx. 3%, cavitation reduction/elimination
Porabka	ESP SA (Poland)	ZRE Gdansk Sp. Z o.o	Francis	New runner	0.65	360	450	Power increase by 25%, efficiency increase by 7%, runner replacement only, spiral case unit.
Waterbury	Green Mountain Power Ltd. (USA)	Norcan Hydraulic Turbine Inc.	Francis	New runner	1.40	5200	5800	Runner replacement to increase output to the limit of the refurbished generator(12%)
Abenaki	Abenaki Pulp and Paper (USA)	Norcan Hydraulic Turbine Inc.	Francis	Upgrade of camelback-type unit	1.52	2200	2900	Replacement camelback unit to match new generator rating (30% power increase)
Lushui	Hubei Province Water Authority (China)	Norcan Hydraulic Turbine Inc.	Francis	New runner	1.60	2300	2500	Increased power and efficiency by approx. 5%, elimination of turbine and penstock instability. Extended operating range
Salto Grande	ESI (Nicaragua)	Norcan Hydraulic Turbine Inc.	Francis	New runner	0.61	900	1000	Runner replacement, elimination of cavitation, power and efficiency increase (approx 5%)
Wausau	United Kiser (USA)	Kiser Hydro LLP	Francis	New runner	1.73	625	735	Runner replacement for the purpose of power increase ( 18%)
Coya5	Pacific Hydro (Chile)	Norcan Hydraulic Turbine Inc.	Francis	New runner	1.13	10000	12000	Runner replacement of high head, spiral case Francis unit - power increase by 12%
McVittie	OPG (Canada)	Norcan Hydraulic Turbine Inc.	Double Horizontal Francis	Upgrade of camelback-type unit	1.27	1100	1500	Replacement of the camelback-type unit, existing pressure case and upgraded generator, power increase by 36%
St Croix	Xcel Energy (USA)	Kiser Hydro LLP	Triple Francis	Replacement of runners	1.23	2780	3200	Replacement of three Francis runners in an existing configuration, power increase by approx 15%
St . Anthony	Xcel Energy (USA)	Kiser Hydro LLP	Double Horizontal Francis	Replacement of runners, pressure casing modification	1.42	2800	3200	Power increase by 14%
Brule	WE Energies (USA)	Kiser Hydro LLP	Francis	Runner replacement	1.44	2100	2200	Efficiency and stability improvement
Olcza	ZEW Roznow Sp. Z o.o.	ZRE Gdansk Sp. Z o.o	Francis	New unit replacing old one	0.33		200	
Kuznice	ZEW Roznow Sp. Z o.o.	ZRE Gdansk Sp. Z o.o	Francis	New unit replacing old one	0.33		135	
Grodek 1&2	Elektrownie Wodne Sp. Z o.o. (Poland)	ZRE Gdansk Sp. Z o.o	Double Horizontal Francis	Runners replacement	0.97	1200	1400	Turbine efficiency increased by 5%
Grodek 3	Elektrownie Wodne Sp. Z o.o. (Poland)	ZRE Gdansk Sp. Z o.o	Francis	Replacement of double horizontal unit with single runner Francis	1.20	1150	1350	Double horizontal Francis replaced with single-runner unit. The same generator unmoved.
Santa Maria	INDE (Guatemala)	Norcan Hydraulic Turbine Inc.	Francis	Runner replacement	0.68	2100	2230	Power increase by 6%, elimination of cavitation erosion
Siempre Viva	ESI (Nicaragua)	Norcan Hydraulic Turbine Inc.	Francis	Runner replacement	0.72	1500	2900	Custom runner design to facilitate turbine operation at new powerhouse
South River	South River Village (Canada)	Norcan Hydraulic Turbine Inc.	Double Horizontal Francis	New double-discharge turbine	0.64		800	
Theresa	Enel (USA)	Norcan Hydraulic Turbine Inc.	Double Horizontal Francis	Runners replacement	0.70	875	1000	Power increase by 14% - only runners replaced
Kruger	Kruger (USA)	Norcan Hydraulic Turbine Inc.	Double Horizontal Francis	Runners replacement	1.44	2000	2200	Power increase by 10% - only runners replaced
Beldens	Omya (USA)	Norcan Hydraulic Turbine Inc.	Double Horizontal Francis	New runners and distributors	1.00	750	950	Power increase by 27% - new runners and distributors designed to fit existing pressure case and draft chest
Weedon	City of Sherbrooke (Canada)	Norcan Hydraulic Turbine Inc.	Double Horizontal Francis	New runners and distributors	1.44	1300	1600	Power increase by 23% - new runners and distributors designed to fit existing pressure case and draft chest
Clark Falls	Central Vermont Public Service Corporation (USA)	Norcan Hydraulic Turbine Inc.	Kaplan	New runner blades	2.16	3000	3200	Efficiency increase ok 3% do 6%, rozszerzenie zakresu regulacji
Beanery	ENEL North America Inc.	Norcan Hydraulic Turbine Inc.	Kaplan	New runner-distributor assembly	1.50	180	385	Nedw Axial Flow double regulated turbine custom designed to fit existing intake flume - power doubled over previously installed Francis.
Newbury	ENEL North America Inc.	Norcan Hydraulic Turbine Inc.	Propeller	New runner-distributor assembly	0.40	35	55	Minimum flow unit - custom design to fit existing piping system.
Conestogo	Grand River Conservation Authority (Canada)	Norcan Hydraulic Turbine Inc.	Kaplan	New runner-distributor assembly	0.95	500	750	Extreme operating range (6m to 22m)
Jastrowie	Elektrownie Wodne Sp. Z.o.o (Poland)	ZRE Gdansk Sp. Z o.o	Kaplan	New runner blades	1.68	720	900	New runner blades to increase turbine output by 25%
Elliot Falls	Ellot Falls Power Corp (Canada)	Norcan Hydraulic Turbine Inc.	semi-Kaplan	New runner and tuning vanes	1.55	325	400	Efficiency increase approx. 5%, cavitation reduction/elimination
Chudutierre Falls - Grinder Room	Energy Ottawa Ltd. (Canada)	Norcan Hydraulic Turbine Inc.	Kaplan	Turbine upgrade	1.20		750	Upgrade of existing Axial flow turbine by providing new runner blades
Bracebridge	Bracebridge Generation Ltd.	Norcan Hydraulic Turbine Inc.	Kaplan	New turbine withing existiong powerhouse	1.78		1800	Completely new 6-blades S-type turbine
Madawaska	City of Edmundston (Canada)	Norcan Hydraulic Turbine Inc.	Kaplan	New unit	3.25		4900	New design of complete hydraulic flow passages
Ragged Rapids	OPG (Canada)	Norcan Hydraulic Turbine Inc.	Kaplan	New runner blades	2.58	4600	5000	Replacement of runner blades in existing Kaplan turbine to increase power and lower cavitation exposure
Hardwick	City of Hardwick (USA)	Norcan Hydraulic Turbine Inc.	Kaplan	New runner blades	1.02	900	950	Goal of the refurbishment was to eliminate erosion caused by cavitation and increase hydraulic efficiency