



GLOBAL BUSINESS REPORTS

This report was researched and  
written by Global Business Reports

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# Redefining priorities for Québec's Hydro Power Cluster

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Optimizing at home, building new capacity abroad

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Chaudière hydroelectric  
facility, in Québec.  
Photo courtesy of Innergex

# Where hydro power is king

## La Belle Province’s Energy Mix: a task made easy by nature

A land of lakes and rivers, Québec benefits today from an abundance of clean and green energy, vastly generated by means of hydro power, which is increasingly complemented by the province’s eastern wind energy farms. Government owned Hydro-Québec rules over power generation, transmission and distribution in the province, and, over the years, the utility has decisively contributed to the establishment of a world-renowned cluster of hydro actors across the supply chain. The hydro industry’s tradition contrasts with the wind sector’s youthfulness, whose expansion was prompted by the recent liberal governments and their 4,000 MW wind power RFPs. With its energy surplus estimated to last until 2027, Québec and its players are now looking inwards to optimize the province’s aging hydro infrastructure, while properly integrating Gaspésie’s wind sector contribution. More importantly, they are looking at foreign markets, where their expertise could shape many developing countries’ energy infrastructures.



Boralex’s Ocean Falls hydroelectric dam. Photo courtesy of Boralex

## Québec’s Dominant Hydro Power

Boasting more than a million lakes and 4,500 rivers that represent over 40% of Canada’s water resources, Québec’s choice for energy generation was destined to be hydroelectricity. At the end of 2012, the province had an installed capacity of 35,829 MW, but that figure should reach 40,000 MW by 2015, as outlined in the government’s Energy Strategy. With 60 generating stations, 26 large reservoirs, 664 dams and 97 control structures, hydro power currently accounts for roughly 96% of Québec’s power supply; moreover, it represents over 50% of Canada’s total hydro energy. All this impressive portfolio falls under the management of Hydro-Québec, the government owned utility, whose history dates back to 1944. After the development of the gargantuan 15,000 MW James Bay complex in the 1970s and 1980s, Hydro-Québec was not involved in any major projects for several years. However, that changed over the last decade: between 2005 and 2013, Hydro-Québec commissioned a series of large hydro power generating units: Eastmain 1 (480 MW), Eastmain 1-A (768 MW), Sarcelle (150 MW), Tournestouc (526 MW), Peribonka (385 MW), and Chute-Allards and Rapides-des-Couers (138 MW). Furthermore, by 2020, Hydro’s new chef-d’oeuvre, La Romaine (1,550 MW), comprising four units, will also come online. La Romaine 2 is scheduled for commissioning in 2014, while La Romaine 1 will follow suit in 2016.

The nature of hydro power has also allowed for a healthy diversification of Québec’s energy landscape over the last 10 years, with the government deciding to create a wind power sector in the province. “Québec has the best energy mix people can hope for, with wind and hydro power. We can use wind power in winter, when the output is good, and store precipitation in the dams. Then, during summer, when wind is low, we can use that winter precipitation to smoothen output: it is the ideal scenario,” added Daniel Laplante, president of AIEQ, Québec’s Electric Industry Association.

Hydro-Québec’s activity over the years has led to the formation of a tremendous hydro knowledge base in the province. Companies across the hydro supply chain have flourished in Québec and their expertise has become sought-after worldwide. Exp is a diversified engineering firm with presences across the US and Canada. In Québec, the company employs over 1,000 people. In recent years, Exp has been involved in the La Romaine, La Sarcelle, and the Chute Allard and Rapide-des-Coeurs projects, as-

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sureing mechanical and electric works for their auxiliary units. However, the benefits of working in Québec extend abroad. Jean Lavigne, Exp's vice-president for energy, explained: "In Québec, we have developed expertise in hydro-electricity alongside Hydro-Québec. We leverage and apply this to other markets as well, in places such as Western Canada, Africa and India. The experience we have gained working with Hydro-Québec has enabled us to export our expertise and develop a similar relationships with other clients as well."

Essential actors of the hydro cluster include turbine manufacturing powerhouses such as Alstom Hydro, Andritz Hydro, and Voith Hydro who all have a strong presence in Québec. French giant Alstom has had a powerful impact on Canada's hydro market, as discussed by Pierre Gauthier, president of Alstom Canada: "Alstom has serviced over half of the Canadian hydro power capacity through its manufacturing plant at Sorel-Tracy. Furthermore, we were recently awarded the La Romaine 2 and 3."

Beyond new projects, however, Alstom is targeting the rehabilitation market. Since 2012, the town of Sorel-Tracy hosts Alstom's global center for technology for innovation in hydro retrofitting. "We secured the rehabilitation contract for La Grande 2, Hydro-Québec's biggest power plant. Through our technology we can provide dramatically increased efficiency. Alstom can increase power outputs by 30% just by replacing the plant's equipment, which accounts for only 10% of the project's cost. Multiply this through the next 50 years and you see that the returns are impressive," added Gauthier.

Alstom is not the only global turbine manufacturer to have one of its technology centers in Québec. In 2008, Austrian



Hydro-Québec's Chenier Static VAR Compensator Substation, 735 kv. Photo courtesy of Exp.

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Daniel Laplante,  
president of AIEO

# Interview with Thierry Vandal

PRESIDENT AND CEO, HYDRO-QUÉBEC



**Please give us an overview of Hydro-Québec's evolution within the province, from your founding to your position today as one of the world's largest producers of hydropower?**

Hydro-Québec was founded in 1944. We gained scale in the 1960s with the acquisition of a number of local and regional power companies, and in the 1970s and 1980s we developed the 15,000-MW James Bay Hydroelectric Complex. This development really gave us a global standing in terms of generation and transmission. The 1990s saw little development taking place because of lower demand growth. Over the last five to 10 years, however, we have been able to launch a significant new phase of large hydro development, adding 4,000 MW to the system. Our most recent development is at Romaine, which is a \$6.5-billion project. We are currently investing \$1.8 billion into high voltage transmission to bring this resource to market.

One key aspect for Hydro-Québec is the quality of communication and relationships we have established with First Nations aboriginal groups throughout our operations. We involve them in our projects from the beginning. They have established businesses in procurement, air transportation, construction, and even catering. In the \$5-billion Eastmain Rupert project, we have awarded close to \$500 million in contracts to First Nations businesses. At the same time as we are developing these relationships, we are very proud of our environmental record and the way that we are able to install these major hydro developments so as to allow the ecosystems to remain vibrant and productive after the projects are completed.

**In April 2013, the New York Public Service Commission approved a plan to build a 1,000 MW transmission line between Québec and New York City. What impact will this project have on export potential for Hydro-Québec?**

Currently, we have 6,000 MW of export capacity to move power to markets in New England, New York, Ontario and New Brunswick. Hydro-Québec's system of large-scale hydro reservoirs is the equivalent of a very large wholesale battery for the greater Northeast region. In addition to the renewable hydropower we produce, we store power that we have purchased off-peak with the intention of reselling it on-peak when power demand is greatest. We can store more power in our reservoirs than a state like New York can consume in a full year. Now we are working on transmission projects to bring more of that power to our export markets. This new project will be a \$2 billion-plus, 1,000-MW mainly-underwater direct current line down the Hudson River through New York state into Queens, New York. Our US partner, TDI, with the backing of the Blackstone Group, has acquired the necessary permits from New York and we are expecting the Presidential permit later this year. We will also need a permit from the US Army Corps of Engineers because we will be laying wire.

Our other key transmission project will also be a high capacity direct current line starting from the Eastern Townships area of Québec, near Sherbrooke, and serving New Hampshire, Connecticut, and Massachusetts. The end point will be Franklin, New Hampshire. This 1,200-MW project is not as advanced as the New York project in terms of the actual permitting process, but it is a key focus for us, working with our US partner, Northeast Utilities.

**What role is Hydro-Québec playing to help meet the government's goal of integrating more wind energy into the province's power supply?**

The integration of wind energy on our grid is really a function of how much policy support there is from the government. The Québec government has established wind power supply mandates to the level

of 4,000 MW overall. Hydro-Québec has run large RFPs to meet these mandates. We are purchasing the wind power on behalf of ratepayers in Québec, and we also handle the integration on the grid. To ensure that the wind power would not be a drag on the transmission grid, we pushed our equipment suppliers to put the best that they had into these generators in terms of technical aspects, like low voltage ride through and the ability to supply reactive power. The grid is as robust today as it was before these wind farms were attached to the system. Also, for the first time, Hydro-Québec itself is going to be developing wind in the coming years.

**What expectations do you have for Hydro-Québec's growth over the next three years?**

Because our business cycle is long, the generation projects we are looking at right now will be commissioned in the next decade. In the coming year or two we are hoping to have one, if not two significant new transmission interconnections under construction to New York and New England. This will give us the ability to bring more on-peak power to market, during those periods of higher consumption, and put our storage capacity to better use in the greater Northeast, which will lend greater efficiency to the market.

We anticipate a low commodity price environment for at least the next three to five years because of shale gas, which is a tremendous resource. The absolute level of prices is not going to be at 2008 levels in the foreseeable future, but we have the ability to create strong shareholder value through on-peak sales and the unique storage component of our assets, which is quite large.

giant Andritz Hydro acquired several of GE Hydro's global assets: now, the province hosts Andritz Hydro's global center of competence for Francis turbines. "GE Hydro's complementary technology and global footprint made the company very attractive for Andritz Hydro. We acquired low-head environment technology and at the same time, we were able to benefit from Montreal's core of engineering expertise: virtually everyone that worked for GE was transferred to Andritz," said Daniel Carrier, vice-president of operations at Andritz Hydro. Five years after the GE acquisition, Andritz Hydro has consolidated its Canadian business with large projects in British Columbia (BC Hydro's Mica plant) and Labrador (Nalcor Energy's Muskrat Falls project). Looking forward, the company is targeting the rehabilitation market in Québec, as well as expanding into new product areas: "We still have a lot to offer to this province's hydro power industry: our strong local presence and tradition in this environment recommend us for future projects. Québec will turn more and more to the refurbishment of existing facilities and since a large part of the existing base was installed by us, that means we have the detailed knowledge needed to properly optimize it. We are also interested in seeing the evolution of some of our newer products, such as our hydraulic gates," noted Keith Pomeroy, vice-president of sales and marketing at Andritz Hydro.

Indeed, with an aging hydro infrastructure, rehabilitation is high on Hydro-Québec's agenda, and the utility is currently undergoing works at nine of its large hydro structures, among which Beauharnois, La Tuque and Manic 1 and 2.

While the construction and rehabilitation of large hydro projects is underway, Québec's small hydro sector has not been receiving much attention in recent times. IPPs active in this market segment were affected in February 2013, when the government cancelled six such projects, citing economic reasons and the province's existing energy surplus as its main reasons for it doing so.

Hydro power will undoubtedly remain the backbone of Québec's energy supply for decades to come. However, with the advent of wind energy and the probable halt of new construction projects after La Romaine, the next step will require the optimization of this increasingly complex

system. Frédéric Schenk, director of industrial services at Swiss certification and testing giant SGS, discussed the sector's perspectives: "Given the US's shale gas boom and Québec's existing energy surplus, return maximization will be essential moving forward. Hard-asset knowledge is already very well established in Québec, largely due to Hydro-Québec – the challenge will be to go beyond that; to transi-

tion from the industry's build phase, to the maintenance and improvement stage of the cycle. This will require building complex predictive models that will optimize the management of dams and basin flow rates, based on such factors as global warming and weather variability. Furthermore, green energy sources will also have to be properly managed and integrated within the system. Lastly, by incorporating a good market

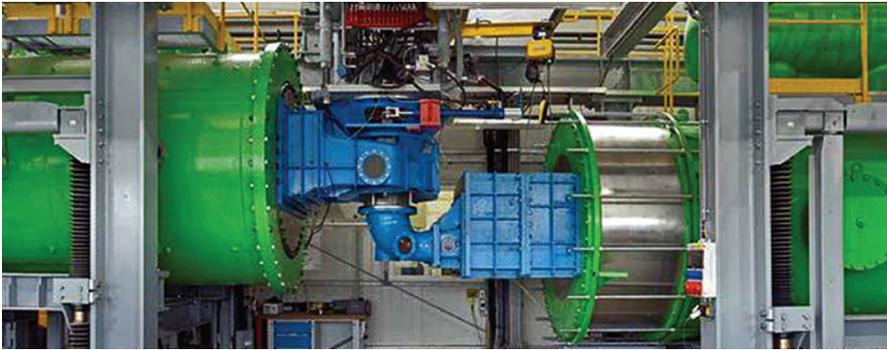


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Hydraulic turbine test lab- Lachine QC. Photo courtesy of Andritz Hydro

understanding within this complex picture, strong decision support systems can be created – these will allow for highly accurate recommendations to be offered to the decision makers in charge of managing the hydro-electricity assets, integrating sometimes conflicting goals such as maximizing income, flood protection and environmental protection. SGS will continue to grow its expertise with the province’s strong hydro cluster and we will leverage Québec’s value and knowledge base for the benefit of our global organization.”

## Gaspésie’s Wind Sector

### The Outset – Diversifying Québec’s energy portfolio while reviving an economically depressed region

In 2006, Jean Charest, Québec’s liberal party premier at the time, unveiled his 2006-2015 Energy Strategy, one which would dramatically change the province’s power landscape: through IPPs (Independ-

ent Power Producers), Hydro-Québec was to achieve a wind power generation target of 4,000 MW by 2015, an equivalent of 10% of the province’s energy supply. Beyond the goal of diversifying the province’s power portfolio with another green alternative, the decision also had strong social and political considerations.

With a population of roughly 94,000, the Gaspésie–Îles-de-la-Madeleine is an administrative region located in Québec’s extreme east: traditionally reliant on industries such as fishing, pulp and paper, and mining, the region entered a state of economic depression in the early 2000s when several key businesses shut down. Nonetheless, when everything was down, wind picked up. The government’s call for wind power was destined to revive the Gaspésie, by exploiting its eolic potential. Seven years later, in September 2013, 1,866 MW of wind-power were already operational, with another 1,596 MW under construction. “Québec now has 5,000 wind-industry related employees and nearly 1,200 of them work in the Gaspésie. There is a wealth of consulting expertise and there are also a number of research institutes, including the TechnoCentre éolien, a unique organization specializing in northern wind conditions and icing,” said Alex Couture, director of project development at EDF EN Canada, an EDF Energies Nouvelles subsidiary with a vast wind energy portfolio in Québec.

The first major development occurred in 2003, when Hydro-Québec Distribution issued the first 1,000 MW RFP, which was shortly followed by a second 2,000 MW RFP in 2005. In 2009, a third, 500 MW RFP, was put forth: 250 MW were destined for municipalities, while the other 250 MW were aimed at Aboriginal communities. By the late 2000s, the minimum 30% Gaspésie local content requirements had led to the establishment of a healthy supply chain in the peninsula, with companies such as Fabrication Delta (wind-towers), Composites VCI (nacelles), Marmen (wind-towers) and LM WindPower (wind-blades) setting up dedicated shops across the region. Finally, in May 2013, Québec’s current premier, Pauline Marois, completed her predecessor’s 4,000 MW promise and even went the extra mile with 100 MW by announcing a final 800 MW RFP, that would bring investments of C\$2 billion. This latest batch would be assigned in four blocks: 150



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MW for the Assembly of Mi'gmaq communities of Québec, 300 MW for competitive bidding in the Gaspésie, 150 MW for other parts of Québec and, for the first time, 200 MW of projects to be developed by Hydro-Québec itself.

Founded in 1991 in Ontario, First Canadian Title, part of FAF International, provides title insurances and other real-estate related services to a wide market, and the company has taken advantage of the wind sector developments in Québec to extend its reach. "We can insure any type of real estate in the energy sector, including those of high value. We have recently been focusing on windmill farm projects; historically, we have insured hydroelectricity projects in the province. Contiguity of land is essential for an energy/power project; a leading facet we insure. Québec has an excellent land registry system with little risk and title insurance is affordable to the investors; nonetheless, title problems may still occur. Insurance should be a fundamental part of a transaction," stated Laurent Nadeau, CEO for Québec at First Canadian Title.

### From Development to Operation – Québec's Wind Power IPPs and their 300 feet tall machines

Cartier Wind Energy, a 2004-founded joint-venture between TransCanada Pipeline and Innergex, is one of Gaspésie's major developers. Cartier won 600 MW during the first RFP and now operates five wind parks: Baie-des-Sables (109.5 MW), Anse-à-Valleau (100.5 MW), Carleton (109.5 MW), Gros-Morne (211.5 MW) and Montagne Sèche (58.5 MW). "Cartier was the first company to accelerate the wind sector value chain in Québec. We have been a pioneer in many ways, especially in management and social acceptability. The ministry has used our documentation and experience as a framework for wind energy for the next 2000 MW bids, making Cartier a model for other developers. Our focus will now be on the operational side of wind parks, coping with the extreme elements of the north like ice-rain, heavy snow, and low temperature. We have over 300 kilometers of road, 310 kilometers of power transmission lines, and five power substations within our wind parks to keep them operational," explained Robert Guillemette, CEO of Cartier Wind Energy.



Alex Couture,  
Project Development Director,  
EDF EN Canada



Robert Guillemette, CEO,  
Cartier Wind Energy

Northland Power, a Canadian IPP established in 1987, was the other big winner of the first RFP, with its Jardin D'Éole (127.5 MW) and Mont Louis (100.5 MW) wind projects, which were brought online in 2009 and 2011 respectively. Now, the company, which has a portfolio of 1,300 MW of operational assets, is turning its attention to community and municipality projects: "In Québec we are working with a particular entity (Regie), which is an organiza-

tion formed by multiple RCMs (Regional County Municipalities), in our case, five, to solve the financing issues that often occur with municipality projects, which are usually smaller in scope," said Robert Demers, business development director for Québec at Northland Power.

EDF EN Canada is one of the major winners of the second and third RFPs; since 2009, the company managed to secure over 1,000 MW of

A large advertisement for EDF EN Canada. It features a background image of a wind turbine in a snowy, forested landscape under a blue sky. On the left, there is a white rounded rectangle containing the EDF logo (an orange flower-like shape) and the text "edf énergies nouvelles". Below the logo, the text reads "TRUSTED LEADER IN PROJECT DEVELOPMENT AND OPERATIONS &amp; MAINTENANCE". At the bottom of the advertisement, there are two columns of contact information. The left column lists "EDF EN Canada" with phone numbers for Ontario (416.363.8380) and Québec (513.397.9997), and the website www.edf-en.ca. The right column lists "EDF Renewable Services" with phone number 514.525.8728, email O&amp;Mbusdev@edf-re.com, and website www.edf-renewable-services.com.

wind power projects in Québec, which will all be completed by 2015. Massif du Sud (150 MW), Lac Alfred I (150 MW), Lac Alfred II (150 MW), and Saint-Robert-Bellarmin (80 MW) are EDF EN's main operating assets at the moment. "RFPs in Québec are far better structured and more straightforward than other provinces. However, it is important to understand the dominance of French in the Québec energy sector; every contract with Hydro Québec is in French," noted Couture.

"The standards in Québec are very high. It is probably the toughest grid to connect to from a regulations standpoint, but it is worth it because it is a strong, reliable grid. In 2011, EDF EN Canada had nothing built in Québec. Two years later, we have a tremendous amount of knowledge on how to build wind farms in Québec and how to see things. One of the innovative strategies we employed was to erect turbines very early on – this showed great foresight, as it allowed getting the teething process out of the way early," added David Gallagher, program manager at EDF EN.

The exclusive turbine provider for EDF EN's Québec wind farms is REpower Systems Inc. Canada, a subsidiary of the global German-based group. Over the last years, the group Canadian's presence grew impressively, from three employees in 2010, to over 100 today. "Québec was our point of entry into the Canadian market. 2012 was a record year for us, in which we installed 200 machines, for a total of more than 400 MW and in 2013 we reached the 550 MW mark. REpower's Canadian subsidiary comprises 10-15% of REpower's global turnover, a high figure considering



Northland Power's Mont Louis Wind Farm, photographed by Joan Sullivan.

that we have subsidiaries in ten countries. Today, because of the confidence earned from our Montreal office's track record of success, all of REpower's North American operations are managed out of Montreal. Our approach has been to use even more local resources than were required. We utilize blades manufactured in Gaspé by LM Wind Power, which also happens to be our global supplier, and towers produced in Matane by Marmen. We already use Marmen for projects in the United States, which demonstrates that Québec's plan to create local champions in the wind sector is really working. Overall, between 46% and 49% of the value of REpower's turbines is created in Québec," said Helmut Herold,

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Michel Letellier, President  
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CEO of REpower Systems Inc. Canada.

One of Cartier's parent companies, Innergex Renewable Energies, is a Canadian IPP with a diversified renewables portfolio that contains hydro, wind and solar projects, for a total capacity of 617 MW. In May 2013, Innergex was awarded the 150 MW wind project for the assembly of Mi'gmaq communities of Québec. "Innergex has been very proactive with respect to First Nation partnerships; we are very proud of this achievement and over the years, we have built a corporate culture of openness in understanding how First Nations operate in the market in Canada," explained Michel Letellier, President and CEO of Innergex. "Nonetheless, we would like to see a standardization of regulations across the energetic markets when it comes to environmental supervision. Renewable energy IPPs have many environmental criteria that they need to uphold and we are perfectly happy to do that but, at the same time, we are in direct competition with other energy sector players that are not subjected to the same rules," added Letellier.

Pauline Marois' new 800 MW RFP gave the sector some reasons to celebrate, albeit not enough for a market with so many active players, hungry for business. Vestas traditionally occupied the first position in the global market shares for wind turbines, but recent years have seen it struggle to maintain that title, with GE and China's Sinovel challenging its authority. Present at the very beginning of Québec's wind energy development, the Danish company did not get involved in any of the first major RFPs. "In Canada, we are still have the largest market share (around 35% of the total capacity), with an installed base of over 2,500 MW. Now, Vestas is back in Québec and we are going to be compet-

ing hard; sales is like hockey – sometimes you get checked but then you need to get back up, to show people that you can take a hit and keep ticking. So look out for Vestas to reestablish its dominance in Canada," said Chris Brown, president of Vestas, US and Canada.

### Coping with Remote Location Challenges

The remote placement of wind farms has also triggered the development of complementary infrastructure across Québec's extreme east. Consequently, assuring logistical and power support in these regions during construction and operations has been a key issue to tackle for developers. But where some sees challenges, others see opportunities.

A traditional player in providing temporary power and temperature control solutions to remote locations is Aggreko, which in 2013 celebrated 50 years of existence. The company has been steadily increasing its presence in Canada in recent times – notably,

in Western Canada. "Now, we are shifting our attention to Eastern Canada, where we see tremendous potential for our solutions, given the natural resource investments presently going on," said Peter Brouwer, vice president Eastern Canada Aggreko. "Aggreko has technicians throughout Eastern Canada and our preventative maintenance programs are very strong. Real-time monitoring by a dedicated team from our Remote Operations Center quickly troubleshoots issues to maximize uptime, a critical element for remote communities. We are expanding and opening service centers across Québec and we benefit from one of the newest fleets in the province. Aggreko provides off-grid commissioning for IPPs that develop wind farms: in Québec we collaborated with Northland Power on one such project. We managed to deliver the project on time and on budget, and most importantly, in a safe manner. We see good future potential for this in Québec, given the government's openness to renewable energy sources," added Brouwer.

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Erik Thorsrud, general manager,  
Atlas Copco Construction

is a Québécois logistics company whose history dates back to 1967 and which has seen its energy business become more important in recent years, notably through wind sector developments. Roger Gervais, president of SDV Canada, discussed the company's focus: "We have a specialty in power plant and windmill projects, but at the same time, one of our main and longstanding clients is Alstom Hydro. Although our interest in the wind sector is recent, we have already done three big projects. We delivered them successfully, and in this small industry clients talk amongst themselves. During 2013, SDV was already preparing for the work it was awarded for 2014 for the biggest wind farm in Canada, the Parc des Laurentides. Foresight is especially important in the wind sector, where we have to deliver one complete tower every day – if ever we fail, construction has to be postponed and there will be 400 inactive workers, at great expense."

Meanwhile, Atlas Copco, which celebrated 140 years of existence in 2013, has made a name for itself in Canada and the world through its comprehensive mining sector services. Now, a new division, dedicated to construction projects across the country, is trying to leverage the company's cross-sectorial ties to make an impact in Québec: "Canada's East Coast development will be driven by projects in which Québec will have a big role to play, such as the Energy East Pipeline. This potential prompts us to look at ways of expanding our footprint here. In Québec, we are targeting power projects, which, during the phase of their construction, will require portable energy sources – this is where we can shine with our portable diesel-fueled generator sets. The develop-

ments of the wind energy sector in Québec can act as an opportunity for us because of the often remote locations of wind farms; furthermore, these projects also lead to the construction of adjacent roads, a process which we can also support," noted Erik Thorsrud, president of Atlas Copco Construction Equipment Canada.

## Future Success – Different Paths for Different Players

Looking forward, it is difficult to foresee how Québec alone will be able to sustain all of Gaspésie's dynamic wind players. With a new Energy Strategy expected for 2014, optimists hope to see an increase of the 10% share wind energy has in the province's power mix. However, Québec's energy surplus and the US' shale gas frenzy do not currently prompt the need for more MW generation. While the province's wind repowering cycle starts in 2024, current works will keep players busy only until 2017. "According to one of our studies, Gaspésie's players need a minimum market of 300 to 350 MW per year to survive; even so, they would be working only at a 40% capacity rate," said Frédéric Côté, general manager of TehnoCentre éolien, which played an essential role in developing Gaspésie's wind cluster.

Until 2024, new business for IPPs such as Boralex, a big second RFP winner, with projects such as the 272 MW Seigneurie de Beauré wind farm, will depend exclusively on calls for tenders. On the other hand, local maintenance service providers such as Techéol, East Coast Wind and Suspendem Rope Access will be finding plenty of work in Québec, as wind farms are gradually coming out of their warranties. However, the most challenging and exciting path ahead will be the one for Gaspésie's home-grown manufacturers, such as Composites VCI and Fabrication Delta, which will survive by competing on the global markets. Already, Composites VCI has shifted its manufacturing facilities to Brazil, where it is accompanying its traditional Gaspésie partner, GE. Meanwhile, Fabrication Delta will be looking to leverage its strategically-placed New Richmond plant to engage the north-eastern American markets.

Having outgrown Québec, these companies will take the fight abroad, where survival of the fittest will determine success.

## Québec's Solar Energy – In the shadow of hydro and wind

With its recent pro-wind policies and its abundance of lakes and rivers, Québec has not left much room to grow for its solar power segment. Even so, some support initiatives have surfaced in recent years: in March 2012, Québec's Ministry of Natural Resources announced the creation of the PAIESO program, a C\$7 million fund aimed at supporting the installation of solar thermal and photovoltaic systems. Overall however, the implementation of large-scale solar projects is still far from becoming reality in the province, as Jean-Francois Samray, president of AQPER, Québec's Renewable Energy Association, explained: "It will be tough for solar to connect to the grid, as Québec is already active in other renewable technologies. A paper by the Edison Research Centre demonstrated that given

its relatively cheap cost, the more popular solar power becomes, the more it will jeopardize the way electricity is charged to the consumer. More individual solar electricity production means less grid-kWh consumption; still, the network's maintenance costs will be there, which would lead to more expensive kWh rates. Subsequently, even more people would move to solar – but the grid has to exist. On the other hand, Québec still has many remote areas where people can use solar technologies, so there will always be a market for it."

Momentarily however, Québec's solar opportunities lie mainly in off-grid and mini-grid installations. Founded in 2009, Rackam is a Québécois company that benefited from Québec's IRAP (Industrial Research Assistance Program) financial support during its incipient development phases – now, the company specializes in providing solar thermal power to industrial players. Having spent two years developing its concentrated solar power technology and showcasing its potential, the company is now launching its two first large projects. Moreover, look-

ing beyond Québec, Rackam is targeting international expansion. Mathieu Chagnon, president of Rackam, discussed his company's future markets of interest: "We are a Québec-based company because a lot of good engineering is here, and there are good opportunities for research and to find investors. A large part of our supply chain is also Québécois, but our market is mostly international. We pursue two paths of research in partnership with the University of Sherbrooke and during our early research we were able to receive federal government subsidies. In two years, we will certainly have business activities in the US and Europe. Rackam is evaluating many foreign projects, and will continue to look at many more in the future."

Looking in the long-term, the key for scaling up solar power in Québec will be to attract political support, as Brian Wilkinson, president of Matrix Energy, a Québécois solar photovoltaic company with 28 years of experience in the field, concluded: "Very few solar programs in the world have made economic sense thus far, but every utility



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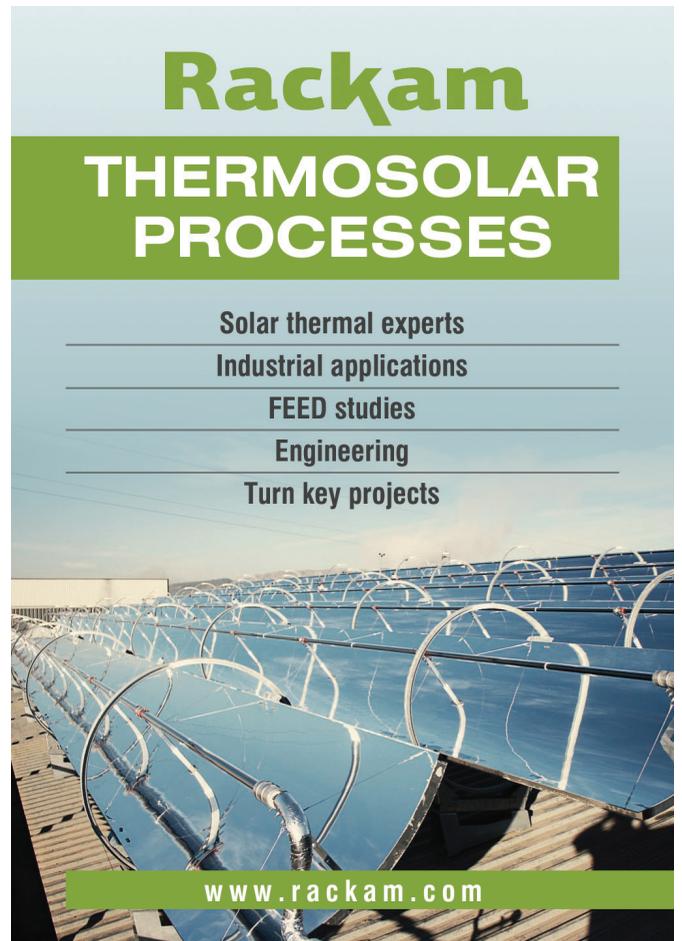
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in the world exists because of government subsidies. The idea that solar technology is incompatible with the grid is false. Today, you can put in a photovoltaic system for not much more than C\$1.50/watt and it will last more than 25 years. Québec can flood more territory, use wind, or engage in fracking – all these options have their issues. On the other hand, we have a reserve sitting there in the sky that in one hour produces the world's energy needs for a year."

## Québec's Ample Power Transmission and Distribution

Hydro-Québec's transmission and distribution arms, Hydro-Québec TransÉnergie and Hydro-Québec Distribution, operate the most extensive network in North America, covering 33,639 km of lines and 516 substations. To capitalize on the province's energy surplus, strong ties have been made with other Canadian provinces, as well as with the US: 17 interconnections exist between Québec and systems in Ontario, New Brunswick and the NE of the US, with a total export capacity of 7,994 MW.

The network's sheer size, alongside Québec's need to efficiently integrate its new wind energy supply, has brought smart grid technologies to the forefront of discussions in recent times: a big role in the development of the necessary processes is played by Hydro-Québec's IREQ research center, an organization renowned worldwide for its technological prowess. With over 35 years of experience in remote management and network automation, Vizimax is a Québécois company that resulted from the merger of SNEMO, an electrical product manufacturer and STR, a utilities engineering consulting firm. Jean-Guy Lacombe, CEO of Vizimax, discussed the company's collaboration with Hydro-Québec and the integration of renewables to the grid: "Our objective in the power industry is to move from master/slave architecture to client/server architecture where smart-grid power will be distributed in the field. Smart Grid automation is a specialized market – there is no room for experimentation. When Hydro-Québec requires new technology or assistance, they look to Vizimax to work with IREQ to find a solution. One of our recent projects helps five



Jean-Guy Lacombe,  
CEO, Vizimax,

small wind parks connect to the grid without causing noise disturbance, electricity tipping, or consequent power outages on the network. Québec will however see a lull in building new hydro generation projects. This is why Hydro-Québec is seeking to sell its expertise globally and secure new project streams. Vizimax will follow that trend and look outward as well."

## Québec – A naturally fit data-center hosting environment

In June 2013, Swedish networking powerhouse Ericsson AB announced plans to build a new information technology center in Montreal, a project that will attract more than C\$1 billion in investments into Québec. Ericsson's data center is just one of the many facilities of its kind scheduled for commissioning in the province: with an excess of cheap, clean energy, Québec is quickly stepping up to become a jurisdiction of preference for this energy-intensive industry, which is projected to spend \$126 billion annually by 2015. Jeff Edward, vice president operation at Cogeco Data Services, explained the market's demand dynamics: "In this tough economic environment, companies started to analyze their overheads more closely and realized that the construction and maintenance of IT infrastructure is one of their major cost drivers; however, since this is only an auxiliary component of their activity, they are now increasingly outsourcing it to companies like ours so they can take a step back and focus on their core business." Cogeco Data Services gained an important footprint in Québec through the acquisition of MTO

Telecom in 2011 and now, the company is working on developing its new flagship project in Montreal.

“Québec is an ideal place for the placement of data centers. Firstly, cold climates offset the tremendous heating loads that the computers themselves have. Secondly, since data transfer is a key issue, Québec’s excellent IT infrastructure places it ahead of other jurisdictions. Finally, since data centers deal with highly sensitive information, they must be located in geo-politically suitable environments, and Québec is just that,” said Benoît Parent, general manager for power generation, Cummins Eastern Canada. The company provides generator sets for standby, prime power, and continuous applications, and has identified the data center business as being one of its prime targets in Québec. “Cummins Eastern Canada has been involved with data center systems for some time and we benefit from having dedicated sales and service teams in Québec and an emergency rapid response team in Mississauga. We supply the generator sets, the switchgear and the various schemes that allow Tier III and Tier IV reliability standards for data centers. Since generators are often placed together in enclosed spaces, Cummins Eastern Canada offers fire proof modularization for its products. Consequently, we offset the risk of the entire system going offline due to an accident occurring with just one of the components,” described Parent.

Data centers are more energy-intensive today than ever and thus, power availability and costs are essential for their economic feasibility. “Data centers are notorious for consuming large amounts of energy so any low-cost environment automatically becomes very attractive for the industry. With its extremely competitive power prices and

its energy surplus, Québec is the perfect market. We now see tremendous opportunities in this province, which is going to be our key target over the next years,” noted Vello Ehvert, president of Ehvert Mission Critical, a company that specializes in the engineering, procurement, construction, integration and support of data centers.

The sector has also benefited from a recent shift in the provincial government’s

policy towards it. As opposed to Scandinavian and US authorities, Québec’s previous liberal government did not offer the tax breaks and the preferential electricity prices needed to attract the industry’s heavyweights. The sector was deemed not sufficiently attractive from a job-creation perspective, a sensitive issue in Québec, which saw its employment rate grow only 0.8% in 2012. Now, Pauline Marois’s ad-



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Benoît Parent, general manager for power generation, Cummins Eastern Canada

ministration has promised Hydro Québec's preferential L pricing rate for large power users and a 10 year corporate tax holiday for companies investing more than C\$300 million in data centers. Nonetheless, these measures were not the decisive factors for the private sector players' interest in Québec "The current incentive scheme's barrier-to-entry is too high, even for a project of our scale, of 100,000 square feet. However, there is a tremendous amount of IT infrastructure expertise in Québec, which also has a lot of pent-up demand for data center space: overall, we are very excited about this market's perspectives," concluded Edward.



6.4 MW of uninterrupted power. Photo courtesy of Kelvin Emtech

as NYC and Toronto's costs were more than double that figure, at 11.55 c/kWh and 10.60 c/kWh, respectively. Stimulating efficiencies in this context was always going to be an uphill battle for Québec's energy efficiency players, even with a helping hand from their government.

"The 1990s was a tough period for the energy efficiency market as power was relatively cheap. However, in 2000, the price of gas escalated, creating a new market for energy efficiency. During this period, Québec's Liberal government intro-

duced new legislation that institutions should reduce their energy consumption by 15% and attached to this legislation were grants and rebates," explained André Rochette, founder of Ecosystem, a company specialized in HVAC (heating, ventilation and air-conditioning/cooling) management. Since its creation in 1993, Ecosystem expanded its reach abroad (Toronto/NYC), while also securing local landmark projects, such as Montréal Biodôme's energy optimization.

Heat recovery systems are also Sofame Technologies' specialization. Set up in 1984, the business has since developed innovative proprietary technologies, such as the Percotherm®, Percofrac™, or Percomax® industrial-scale water heaters; to date, the company has over 330 projects in its portfolio. John Gocek, CEO of Sofame Technologies, discussed the market's receptiveness: "Québec has been a productive market for us; it is a high heating zone because of its cold temperatures. It is not difficult to explain to our customers the cost saving and environmental benefits of recovering waste heat. Since 2008, customers' budgets have been tight however – that is a high hurdle, but we are still finding lots of opportunities at large power plants and multinational corporations with environmental objectives. The big trend today is district integrated cogeneration plants, emitting waste heat at various high temperatures; Sofame's direct contact technology recovers almost 100% of waste heat, regardless of scale. A high-profile project for Sofame and recipient of an ASHRAE award is Montréal's Trudeau Airport; we are achieving 97% boiler-room efficiency, and the airport is being heated at 140F by waste heat from the boilers. The project has become the model for future heating in the industry."

Initially founded as a systems' integration firm, Distech Controls is a Québec-grown energy management company which saw its international business take off in the early 2000s in markets such as Asia and Europe. Having been one of the first Canadian companies to adopt open systems and standards for energy control technology, Distech is now targeting the full spectrum of commercial and institutional buildings: "Distech Controls pushed the implementation of open standards further, by standardizing our technology solution on recognized open protocols not only for the products themselves, but also by embracing "open" business practices. As an example, we made our programming software freely available, to all end user clients. Combining open technologies with an open business model, clients could optimize and improve their processes, select best of breed products, only limited by their needs, and this changed the way business was done at the time. Building owners want comfort, energy efficiency and to make their buildings greener – they seek freedom when it comes to technol-

## Energy efficiency's fight in a low-cost electricity environment

Québec's abundant power generation has made the province a continental leader in low-cost electricity. Recent Hydro-Québec studies show that the average electricity prices in Montreal for residential customers were 6.76 c/kWh, compared to 22.57 c/kWh in NYC, or 13.89 c/kWh in Calgary. Furthermore, for large power customers, Montreal prices were at the 4.76 c/kWh mark, where-



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ogy and do not want to be tied in with one supplier or another," said Etienne Veilleux, president and CEO, Distech Controls.

Looking ahead, construction-market regulations will strongly influence regional business; nonetheless, competing in Québec's tough environment has enabled these companies to have the edge abroad. "The Québec-gained expertise made it easier for Ecosystem to enter jurisdictions with higher electricity prices and our strongest growth potential at the moment is in New York and Toronto. Québec's current low prices of electricity and gas, as well as the government's lack of direction on energy policies, dilute the desire to activate energy-efficient projects. We are hoping that the expertise built in Québec in this field will not be lost due to a lack of vision," noted Rochette. "The biggest factors of growth for the future of our segment are construction and government regulations; the future looks good for our line of business," added Veilleux.



Enerkem produces biofuels and chemicals from non recyclable household garbage. Photo courtesy of Enerkem

noted Bertrand Blanchette, co-president of Groupe Berlie-Falco.

Considering its innovation-prone biofuel/biogas players, such as Enerkem, Québec might want to reconsider its future energy mix plans: "The trend towards even more environmentally-friendly and innovative ways of producing power has brought with it a lot of debate on diversification into other energy sources in Québec. The government is certainly aware of these concerns, but it may be a while before we see significant shifts in the market structure," concluded Morel.

In the meantime, the year 2014 will bring forth Québec's new Energy Strategy: one of the most daring ideas on its agenda will be the implementation of electric transportation in Québec, an initiative which would decrease fossil fuel dependence, lower emissions, and make good use of the province's extra megawatts. While innovative initiatives, such as the Electric Circuit and the lithium iron phosphate batteries have been developed by Hydro-Québec in recent years to facilitate electric transport, the complete implementation of this ambitious plan is still on the horizon. More immediately, rather than looking inwards, Québec's energy industry players will have to direct their efforts to more attractive foreign jurisdictions, while leveraging their province's strong engineering and technological base.

## Biogas/Biofuel Opportunities and Conclusion

"In spite of Hydro-Québec's dominance, Québec is still a strong, open market," said Peter Morel, president of Pöyry Montreal, one of the two offices responsible for the northeastern North-American market for the Finnish multinational engineering company. Traditionally strong in Québec's forestry industry, Pöyry has recently shifted its attention to opportunities in bio-fuels and biomass. "While Québec is home to some interesting biomass-powered cogeneration projects, the low costs and high efficiency of hydroelectric power leave little room for diversification into large-scale biomass energy production," noted Morel. "We will however stay focused in second generation biofuels like ethanol – there is good interest there, because it produces energy while reducing carbon footprints," added Zennie Lamarre, vice president of projects at Pöyry Montreal.

Indeed, biofuel and biogas opportunities are out there for the taking in Québec. Traditionally proficient in organic waste dewatering and drying, Groupe Berlie-Falco has recently focused on also providing biogas energetic output to its municipal and industrial clients, through the process of anaerobic digestion. Having already obtained visibility in foreign markets such as the Middle East, Groupe Berlie-Falco is now targeting its domestic market: "Canada offers good support for the industry, given the C\$650 million subsidy program for composting and biogas plants. Québec's goal of eliminating organic waste going to landfills by 2020 is very ambitious and the fact that the province is part of the Western Climate Initiative are both signs of its commitment to reducing greenhouse gas emissions. However, the province needs to also provide the financial incentives necessary to attract the private sector on board – this would make business self-sustainable for the future. Nonetheless, we believe 2014 will be a very active year in our segment,"

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