GREBE

Generating Renewable Energy Business Enterprise

Northern Periphery and Arctic Programme

Nordkraft – Northern Energy Expertise

Knowledge and Technology Transfer Case

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Nordkraft – Northern energy expertise

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Background

Nordkraft is a Norwegian energy group focusing on development, production and distribution of renewable energy. In addition, the group has power sales and other energy-related businesses. The business focuses on planning, construction and operating hydro and wind energy plants. The company owns 22 power plants with total capacity of 330 MW.

The group has departments on development and construction, energy production, energy networks, energy trade (50% ownership of Kraftinor together with Lofotkraften), and energy services and consulting (through Enerconsult). The total employment of Nordkraft is approximately 110 FTE jobs, energy network has approximately 40 000 customers, and annual energy sales are about 900 - 1100 GWh/a.

Business areas and local expertise

The Nordkraft operates in both hydro and wind power, which provides full local employment for their installers. As the company designs, plans, builds, operates and maintains the power plants, there is available work for the local people and local socio-economic benefits are evident. The installers of the first Siemens 2.3 MW variable wind turbines were trained by Siemens (certified training). Together with operation experiences of first demonstration plants of this kind, this has generated knowledge that supports the planning of new wind parks, their operation and maintenance. Nordkraft now carries out training locally. The expertise of the local staff can be utilised at hydro power plants, wind power plants and measuring stations. This balances the seasonal variations in employment and enables company providing full-time jobs for their technicians.

Wind power investment projects

The business strategy of Nordkraft has focused especially on planning, development and operation of the plants, and capital has been released by selling power plants to external investors, with SL Capital buying 13 hydro power plants recently. Nordkraft has expertise to provide wind parks as turnkey solutions to external investors and continue as the service provider afterwards. Therefore, the investment risk remains at the investor, and Nordkraft can focus on utilising their specific expertise. The strategy provides significant growth opportunities, as there are not many operators providing this type of energy system planning and operating in northern areas with extreme weather conditions and challenging terrains.

The Finnish energy company Fortum acquired 172MW of wind capacity in northern Norway from Nordkraft. The transaction relates to the 32MW Nygårdsfjellet wind farm, and the fully permitted 50MW Ånstadblåheia and 90MW Sørfjord projects. Fortum and Nordkraft have also agreed to co-operate on their construction and operation. Ånstadblåheia and Sørfjord are due to be commissioned in 2018 and 2019.

The first of the wind power investments by Fortum is Nygårdsfjellet wind farm located right beside E10 road on Skitdalshøgda. The windmills are scattered around the regulated Skitdalsvatn, which is one of the reservoirs to Nygård power plant. The wind farm consists of 14 wind turbines with a total capacity of 32,2MW. The windmills have an installed capacity of 2,3MW each. The entry of Nygårdsfjellet wind farm was done in two stages. The first three demonstration turbines were put into operation in 2006 and the last 11 in 2011. Average annual production is 105GWh, equal to normal consumption of approximately 5200 Norwegian households. Annual average wind speed measured 50 meters above the ground along the cost of Norway is approximately 8m/s. The production on Nygård wind farm starts at 3m/s and is stopped at 25m/s to avoid damage to the turbine.

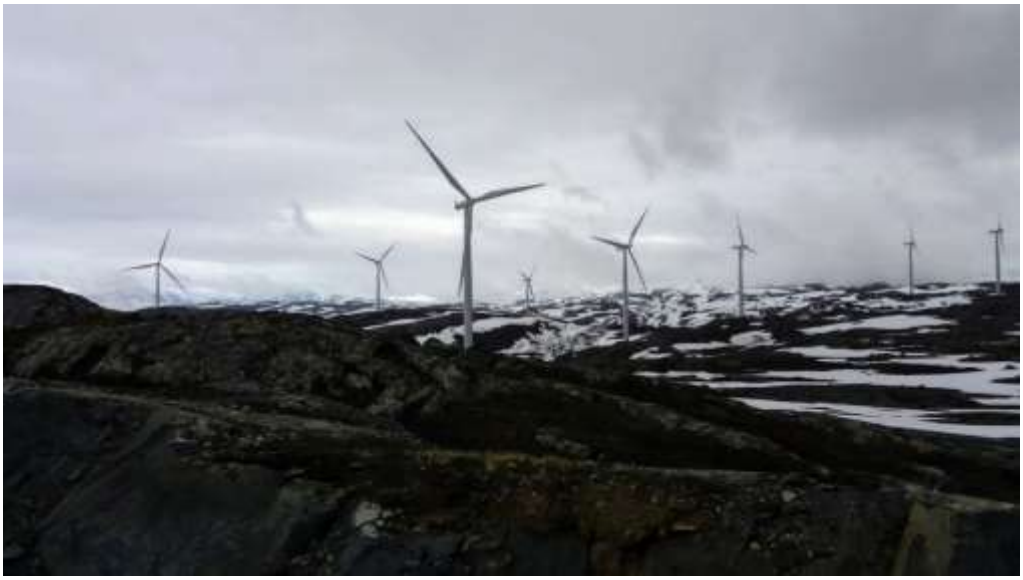

Figure: Fortum Nygårdsfjellet wind farm operated by Nordkraft.

The approximately 30 million euro investment in Nygårdsfjellet is an example of a growth strategy by larger energy company accessing new market areas via regional partner companies, or technical expertise via contract or ownership of the specific technology providing companies. At same time, this cooperation provides growth opportunities for SMEs as they avoid capital costs of wind power parks and can focus in their specific area of expertise.

Local expertise and innovations supporting the technology transfers

The investment of a new wind power plant in arctic region may include several challenges, such as construction in challenging terrains, establishing robust based structures in rock ground, finding suitable transportation vehicles and constructing the required road infrastructure to the plants. With local expertise and innovations (such as rock adapters for base structures), these challenges can be overcome.

Nordkraft has expertise supporting effective technology transfer and adaptation in the region, such as:

- Expertise and research on wind power production and plant operation/technology in arctic conditions
- Road construction: efficiency, required features for the transportation equipment, and minimizing the impact on landscape
- Suitable vehicles to operate in mountainous areas
- Establishing base structures in rocky terrains by patented rocky adapters
- Grid building in challenging terrains
- Identifying, estimating and utilising local energy resources, such as mountain winds toward the sea
- Establishing local support and compensating any potential disturbance

Overall, the local knowledge on the operational conditions and applying technology can be essential for the success of the technology transfer. The successful demonstrations of Siemens variable wind turbines, identified excellent wind resources, and local learning and capacity development, created new opportunity to expand with an external investor. The business model where investor and operator share the technical risk (bore by Nordkraft) and economic investment risk (bore by Fortum) provide growth opportunities for both.

Conclusions

The energy business model of Nordkraft includes business operations in energy infrastructure planning, development, construction, operation, maintenance and trade. The focus on establishing and operating the systems, and avoiding or sharing the capital investment risks, provides growth opportunities. For instance, the latest development includes about 50 MW Ånstadblåheia (Sortland) wind park with Fortum, including 14 Vestas 3.5 MW generators producing about 140 GWh electricity annually. The long-term emphasis on local expertise and business diversity provides permanent jobs in the sector supports the local socio-economic development.

Nordkraft provides very comprehensive expertise on renewable energy system development, establishment and operation in arctic region on northern Norway, facilitating technology transfers and investment projects in the region.

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Project Partners

GREBE will be operated by eight partner organisations across six regions:

WDC

Action Renewables
the future of energy, today

Luke
Natural Resources Institute Finland

FPN
Forskningsparken i Narvik

eri

Fermanagh & Omagh District Council
Comhairle Ceantair Fhear Manach agus na hÓmaí

Innovation Center Iceland

Karelia

About GREBE

GREBE is a €1.77m, 3-year (2015-2018) transnational project to support the renewable energy sector. It is co-funded by the EU's Northern Periphery & Arctic (NPA) Programme. It will focus on the challenges of peripheral and arctic regions as places for doing business, and help develop renewable energy business opportunities provided by extreme conditions.