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Hydropower: The Unlikely Economic Base for the Complete Sovereignty of Greenland

About eight percent of Earth's freshwater is located in Greenland. Theoretically, this would mean that Greenland has some of the greatest potential for hydropower in the whole world. However, nearly all its freshwater is permanently frozen. In fact, Greenland is one of the countries with the lowest level of installed hydropower capacity, despite the abundance of (frozen) water. Hence, this resource—one that assured a means of agricultural, energy, and industrial development in Western Europe, the Americas, Africa, and Asia—is in fact continually dormant.

In the 1940s, there were only about 15,000 people living in small villages along the coasts of this remote Danish colony. For them, energy came from oil imported from outside Greenland, or from coal, which was used for heating. The few buildings with electricity depended on insular electricity generation based on diesel- or gas-driven engine-generator sets. A grid for the supply of electricity did not exist, and even in the larger villages, a centralized supply of electricity was unknown until the 1940s. The complete lack of electrical infrastructure was mainly a consequence of Danish colonial policy. Ever since it annexed Greenland as a colony, Denmark adopted a paternalistic no-contact policy towards the island. Consequently, 1940s Greenland looked very similar to the society that early Danish colonialists had encountered when they first came to the island. Hunting, fishing, and cryolite mining were the mainstays of the economy.

Even though the cryolite mine in Ivigtut was also the largest consumer of energy in Greenland, its needs were modest and diesel-powered. In fact, the whole energy supply of Greenland was based on imported fossil fuels. In the remote settlements, the use of electricity was often limited to battery-powered appliances. Greenland was a land barely touched by the electrification of the Western world. The majority of fuels, like train oil or blubber, were side products of the hunting industry. Although there is no solid data available, we can safely state that Greenland had one of the lowest amounts of energy per capita in the whole world. Things changed only gradually when in 1924 a coal mine commenced operations in Qutdligssat. With a total production of 570,000 tons of coal (other sources mention up to 600,000 tons) in the period between 1924

and 1972, the coal mine was an important element of domestic energy production, but it did not approach levels that would allow energy to be exported as a foundation of the economy (Taagholt and Bach 1985, 33; GEUS 2012).

When the US military established bases on Greenland during World War II (Hobbs 1941) the situation remained unchanged, as each of these military installations included its own power station that utilized imported fossil fuels for electricity production. At one of the Cold War installations of the US Army, there was even a modular nuclear power plant, clearly demonstrating that the use of hydropower seemed to be out of reach even for the military industrial complex of one of the global superpowers (Daugherty 1963). Of course, in the period after the end of World War II, all larger settlements were supplied with local electricity grids, but the power stations supplying them were based on diesel-driven generators, and thus still reliant on imported fuels.

In the 1980s Greenland's energy authority prepared a hydroelectricity development program as the first step towards ending the complete dependency on imported energy. This plan included the use of hydropower for the development of export-oriented industries (Taagholt and Bach 1985, 36). Although the program was designed to supply large sections of the island with electrical energy from hydropower stations, the only hydropower station that was realized before the year 2000 was the Buksefjord plant, which mainly supplies the Greenlandic capital Nuuk and was far too small to allow the export of electrical energy. With an installed capacity of 45 megawatts (30 megawatts up to 2008), the total capacity of the plant is still modest (Greenland Development Inc. 2012). In 2005, the 1.2 megawatts station at Tasiilaq was opened to supply the city's utilities. Three years later, Qorlortorsuaq station followed; its purpose was to supply the towns of Qaqortoq and Narsaq with a total capacity of 7.2 megawatts. Then, in 2009, the station in Sisimiut began supplying 15 megawatts of electricity from Lake Tasersuaq. In 2013 the completion of the hydropower station at Ilulissat was expected to add 22.5 megawatts. With a cumulative hydropower capacity of nearly 91 megawatts, Greenland was on target to supply the majority of its households with hydroelectric energy. Nonetheless, production is still low. A recent estimate of the energy needs of US military installations on the island concluded that Greenland is still dependent on the import of energy despite advances in the use of hydropower (King 2011).

Regardless, when it comes to domestic consumption of energy on Greenland, we can safely say that there has been a successful transition from imported fossil fuels to local hydropower. The two elements that do not fit into such an energy transition are either external, like the US military installations on the island, or related to ideas of an indirect export of energy in the context of gaining complete sovereignty.

The Question of Sovereignty

Greenland became a Danish colony via a gradual process dating back to the arrival of the Danish missionaries in 1723 (1767). Although other nations contested the Danish rights to the island, most notably when Norway claimed a portion of East Greenland in the early 1930s, Denmark established a colonial trading company (KGH) and subsequently a colonial administration that it financially subsidized (Blom 1973). This situation changed only for a short period during World War II when Denmark came under Nazi occupation and Greenland became a de facto sovereign nation. This status was possible only as the United States had two vital interests on the island that it sought to protect with military force and with a recognition of the sovereignty of the island. One was the cryolite deposit and mine in Ivigtut; the other was its geostrategic location with regards to the war. The US needed cryolite for manufacturing aluminum-based products (specifically aircraft), a fact that gave Greenlandic sovereignty an economic anchor.

It was a sovereignty that existed only as long as World War II continued; when the war ended, the de facto sovereignty also ended. All political powers were transferred back to Denmark. The global market for Greenlandic cryolite fueled by the war collapsed; in fact, the development of artificial cryolite synthesis made mineral cryolite redundant (Dixon and Scott 1947). The few other domestic industries like small-scale mining, fisheries, and fur production could not sustain an independent economy without colonial subsidies (Taagholt and Bach 1985). Nostalgia for independence from Denmark existed, but there was also a sense of belonging to Denmark, and without an economic base to back up sovereignty there was no alternative to returning to the status of a Danish colony. Even after new industries were developed, they were simply too small to support complete economic independence.

Thus the major issue was how to generate sufficient revenue within the colony to render the Danish subsidies academic. Colonies with rich deposits of sought-after and easily accessible resources like oil could aggressively attract direct foreign investment. Greenland does not have such high-value natural resources. The few operations in the context of gold mining or the extraction of lead and zinc are comparatively small in scale and, because of the Arctic environment, very cost intensive ("Greenland" 2010). Even if they can be continued or expanded, the royalties gained from these operations will by no means be large enough to replace the subsidies from Denmark and to sustain complete political sovereignty of the island. The same applies to non-extractive industries. A number of such industries have been set up since the change from home-rule government to self-rule government in 2009, yet their combined revenue is still far below the point of being able to support political sovereignty without external subsidies. If it is hoped that the process from colonial government via home-rule government (1979) to self-rule government (2009) will continue towards complete economic and political sovereignty of Greenland, the most important question is which industry can provide the financial base for a financially sustainable sovereignty. Although it appears somewhat unlikely that hydropower might become the most relevant base for Greenland's economic future, it seems to be the best option available for many people in Greenland.

Besides the generation of hydropower, there is the question of distribution of electricity. Direct export of electricity to other markets is simply impossible with the technology currently in place, as the distances between Greenland and these markets are excessively large. As direct export is not possible, the only available alternative seems to be indirect export of hydropower: that is, attracting foreign industries whose production processes are electricity-intensive, shipping in their complete raw materials, processing them with Greenlandic electricity, and then shipping the processed materials to the respective markets. The best-known model for such an indirect export of electrical energy up to now is the Icelandic aluminum industry, which produced in 2010 some 780,000 tons of aluminum, placing Iceland twelfth on the list of global aluminum producing nations (US Geological Survey 2011). This became possible only because of the abundance of hydropower in Iceland. But while such aluminum smelters were definitely an economic success story, the projects attracted strong environmental opposition (BBC 2012). In the aftermath, large aluminum-producing multinational companies like the mainly US-based ALCOA group began to look elsewhere for new production sites.

On paper, Greenland seemed to be an ideal location for such new aluminum smelter projects. In particular, the natural harbors, the relative proximity to European and American markets, and the theoretical abundance of hydropower made the island a prime target for aluminum smelter projects and hydropower. Furthermore, the Greenlandic self-rule government established in 2009 was looking for a source of revenue to replace the Danish subsidies, and the development of a large-scale aluminum industry seemed to offer such a solution. The remaining problems seemed to be technical, not least the construction of hydropower stations and the question of how to secure investors in the wake of the growing opposition that had greeted similar Icelandic adventures.

While the construction of small-scale hydropower stations for domestic energy production has helped to solve many of the technological problems of hydropower generation on Greenland, the question of upfront investments was still largely unanswered when the Greenland government and ALCOA started negotiations on the project. Both sides agreed that their respective interests substantially converged. However, assuming that the technological problems will be solved and the partners will find a solution regarding the upfront investments, is there really a common interest? For ALCOA the main objective is cheap energy for a new aluminum smelting operation, ideally in a region with a low level of resistance to the project. For the Greenlandic government, the most important aspect of the project is replacing the subsidy from Denmark with a domestic source of revenue and thus creating an economy that would be able to support and maintain complete sovereignty. In short, both sides are interested in the economic factor but for completely different, if pragmatic, reasons.

The Greenlandic self-rule government is based on a democratic and parliamentary structure, but the very limited source of revenue weakens its government. One large-scale hydropower project serves just one customer. One of the main arguments that proponents of the project advance is that Greenland gained its economic sovereignty during World War II mainly thanks to the cryolite mining activities of a single company. However, there are four differences between the historical mining operations and the proposed project. First, the mining was comparably smaller in scale and its upfront costs were marginal in comparison to the hydropower-aluminum smelter project. Second, cryolite was exportable to customers all around the globe and the whole operation was dependent not upon the operational decisions of a single multinational

company, but on a wider network of buyers and their political and commercial obligations. Third, the Greenlandic authorities handled the mining operation themselves, a task that was made simple by the relatively low level of technology but that is completely impossible in the proposed combined hydropower-aluminum smelter project. Finally, cryolite mining provided an economic base for a de facto sovereignty only under conditions specific to World War II, whereas the large hydropower-aluminum smelter project guarantees a Greenlandic sovereignty entirely dependent upon one multinational company.

Is there no future for a Greenlandic sovereignty based on the utilization of the island's abundant potential for hydropower? It is hard to say. The main weakness of the proposed project is not the idea of basing economic sovereignty on hydropower per se, but that it focuses and depends entirely upon a single customer. As long as electricity cannot be transported over greater distances, a sovereignty based on hydropower will be impossible to attain. Therefore the question for Greenland is: If sovereignty is based on hydropower, is it really sovereignty?

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