

A&Q Hydro Power Project – Consultant Tender

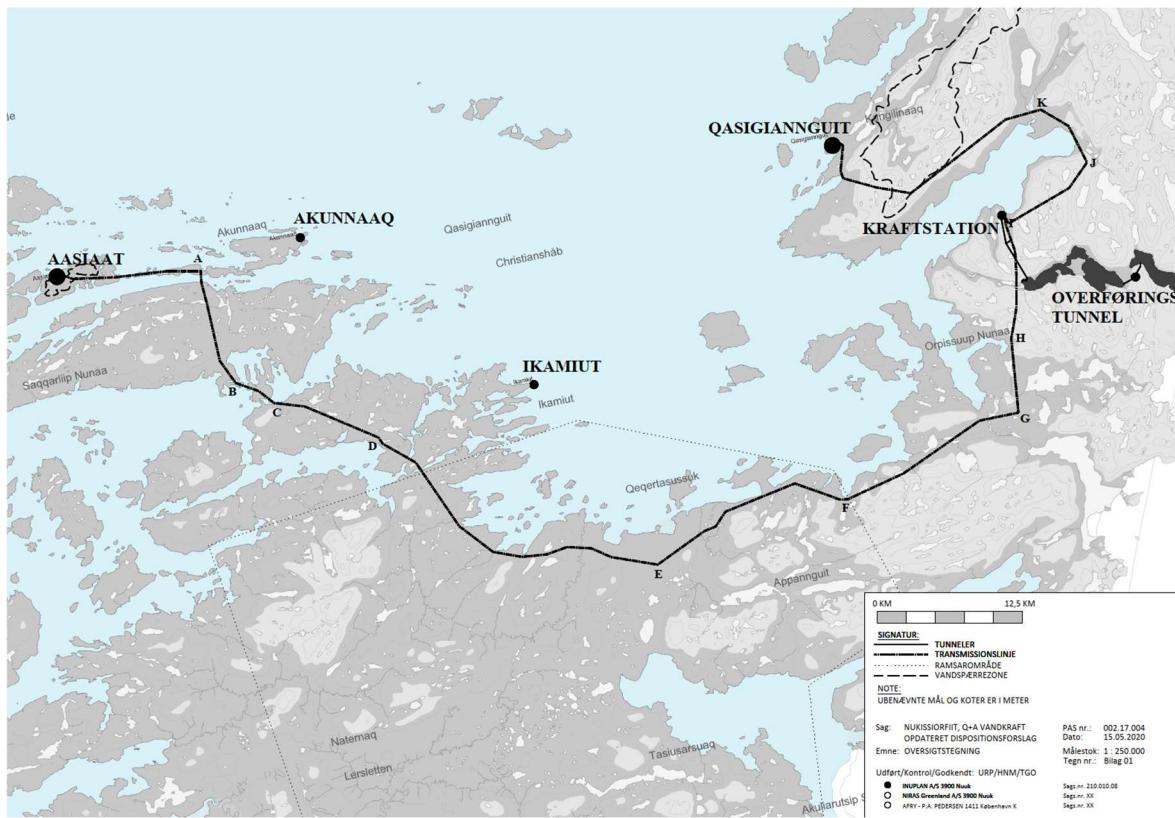
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Scope of the Project

1 Background

Aasiaat and Qasigiannguit are two cities in Greenland located at the southern part of the Disko Bay area in Greenland. Today light, power and heat are supplied with electricity from diesel generators and oil-fired boilers.



Energy need for 2019 and expected forecast from 2026-2050 is outlined in table below

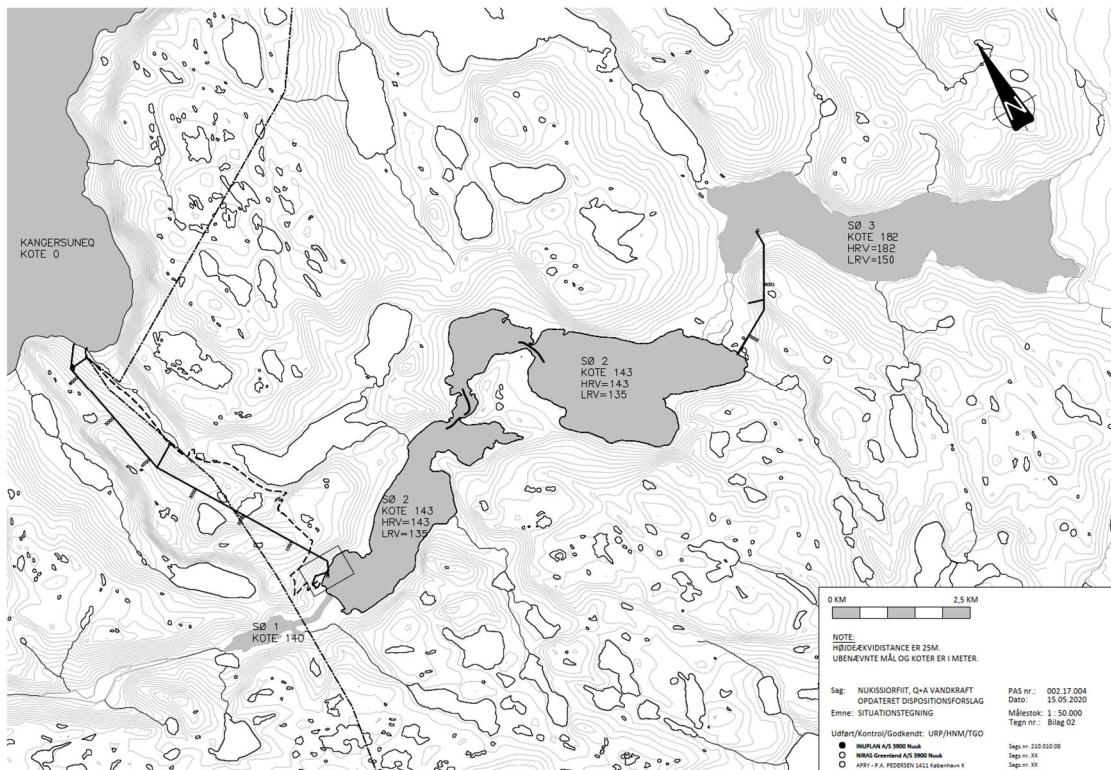
Total energy need for light/power and heat [MWh]	2019	2026	2050	Increase p.a.
Aasiaat	39.479	72.347	69.581	-0,16%
Qasigiannguit	11.746	21.593	11.819	-2,48%
Total energy need	51.225	93.940	81.400	

As part of an overall strategy outlined in “Sector Plan for Energy and Water Supply 2017” a goal is to widely implement green energy where possible in 2030. Part of that goal is to displace fossil fuel from the supply of Qasigiannguit and Aasiaat.

The Greenlandic parliament, Inatsisartut, have with Act no. 22 of 1. December 2021 established the framework for construction, financing and operation of hydropower stations with necessary facilities to supply of Nuuk and Qasigiannguit and Aasiaat.

2 Description

For a new hydropower station to supply Qasigiannguit and Aasiaat, the following is proposed



The hydroelectric power plant utilizes the water resources from the Kuussuup Tasia catchment area and supplies Aasiaat and Qasigiannguit with energy for electricity and heating.

The facility uses Qinngap Ilulialeeraa (Lake 3) as the upper reservoir and Kuussuup Tasia (Lake 2) as the lower reservoir and intake basin. A regulated transfer tunnel will be constructed between the two lakes. No dam will be built.

The inlet tunnel leads to an underground power station located near the fjord to the north. The water is discharged into the fjord through a short tunnel. The power plant also includes an above-ground portal building, from which the access tunnel leads to the power station.

The power station is expected to be equipped with three Francis turbines; each rated at 7.0 MW. All structures must be designed and dimensioned with consideration for the presence of continuous permafrost in the area.

From the power station, one transmission line will run to a transformer station in Qasigiannguit and another line to a transformer station in Aasiaat. When constructing the

transmission line to Aasiaat, special consideration must be given to crossing the Ramsar site Naternaq (the Clay Plain).

The hydropower plant's potential from 2026–2050 can cover the future electricity demand and between 92.5–94.7% of interruptible heating needs, assuming a heat demand of 18 MWh/year per inhabitant, with production at the town gate averaging approximately 84 GWh/year over the period. Interruptible electric heating will be fully covered if the heat demand remains below 15.5 MWh/year per inhabitant. When the heat demand exceeds this level, oil heating will be required.

Main data is outlined in table 1.

Table 1 Main Data		Unit	Qty
Catchment area, ice-free		km ²	157
Catchment area, glacier		km ²	~135
Average annual runoff measured 2010–2019		hm ³	310
Average annual runoff forecast 2026–2050		hm ³	285
Reservoir capacity, Lake 2		hm ³	86
Reservoir capacity, Lake 3		hm ³	208
Gross head		m	143
Inlet tunnel	Length	m	6.200
	Cross-section	m ²	16
Outlet tunnel	Length	m	530
Access tunnels (intake/adit/power station)	Length	m	1.360
	Cross-section	m ²	25
Transfer tunnel excl. channel	Length	m	2.050
	Cross-section	m ²	16
Access tunnel	Length	m	300
Turbines	Francis	MW	3×7
Transmission line	Voltage	kV	60
Length to Qasigiannguit	60 kV overhead line	km	38
Length to Aasiaat	60 kV overhead line	km	117
Max production at town gate*)		GWh/year	84

*) The production is based on the forecast for 2026–2050 and depends on market demand.

3 Prerequisites for the Construction of the Facility

Location

The hydroelectric facility is located approximately 20 km east-southeast of Qasigiannguit. The facility utilizes water from the Kuussuaq River, which is intercepted at the outlet of Kuussuup Tasia. Lakes Kuussuup Tasia and Qinngap Ilulialeeraa are used as reservoirs for the facility.

These lakes are hereafter referred to as “Lake 2” and “Lake 3.” “Lake 1” refers to the lake immediately downstream of Lake 2, but it is not included in this construction of the hydropower plant. The hydropower plant is situated at the Kangersuneq fjord.

General Structure of the Facility

The hydropower facility utilizes the catchment area around Lake 2 and Lake 3. In addition to precipitation, Lake 3 also receives runoff from a glacier, and its outflow goes to Lake 2.

Both lakes are used as reservoirs (see Appendix 3). Lake 3 is the main reservoir, with storage capacity created by lowering the lake level by 32 m from its natural surface elevation at +182 m. The reservoir is drawn down in proportion to consumption and supplies Lake 2 through a transfer tunnel with a controllable valve.

The secondary reservoir is created in Lake 2 by lowering the lake level by 8 m from its natural surface elevation at +143 m. From the intake at Lake 2, water is conveyed through a tunnel to the underground power station near the fjord.

