

## **KARANIJUKAR HYDROELECTRIC PROJECT – ICELAND**

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The Kárahnjúkar dam is a concrete-faced rock fill dam (CFRD) type with a maximum height of 193m and, when completed it will be the highest of its kind in Europe and among the highest in the world. When full the level of the 57km<sup>2</sup> the Háslón storage reservoir will reach the height of 625m above sea level, and its shores will reach the edge of the Brúarjökull glacier.

From the Háslón reservoir, the water runs through 53 km of headrace tunnels to an intake at the Valþjófsstaðafjall escarpment. Two steel-lined vertical pressure shafts lead the water from the intake to the underground powerhouse. The total length of the tunnels involved in the Kárahnjúkar project is about 73 km. The installed power of the Kárahnjúkar project is 690 MW, produced in six generating units (Francis turbines).



### **The dams**

The key to the economical development of the Jökulsá í Fljótssdal and Jökulsá á Dal glacial rivers lies in the region's topography and geographical conditions. In places extremely low-lying, the Fljótssdalur valley traverses the highland plateau north of Vatnajökull, creating ideal conditions for power production. As a result, the project is based on a head, or drop, of about 600 metres.

The Kárahnjúkar dam will have a maximum height of 193 m and will be constructed using 8.5 million m<sup>3</sup> of fill materials. The Desjará dam will be 60 m in height. Read more on key figures here.

The structure of Kárahnjúkar dam is of the concrete-faced rock fill dam (CFRD) type, and when complete will be the highest of its kind in Europe and among the highest in the world. The rock fill used in its construction is quarried just upstream of the dam in the reservoir area, and is placed in compacted layers. During construction, the river flows through two diversion tunnels under the western bank of the dam.



## The reservoir

Completing the trio are two smaller saddle dams which will also be built at Kárahnjúkar. These are the Desjarárstífla dam to the east, and Sauðárdalsstífla dam to the west. Both will be rock-fill dams with an earthen core, and together the three will combine to feed the main 57km<sup>2</sup> Hálslón storage reservoir.

On the east side of the mountain Snæfell, the Jökulsá í Fljótssdal river is dammed about 2 km downstream of the Eyjabakkafoss waterfall on the north side of the Eyjabakkar wetlands. The intake pond this creates has been named Ufsarlón, and water from three tributary rivers on the eastern side of the Jökulsá is also diverted into it.

## The tunnels

From the Háslón reservoir, the water runs through a tunnel under the Fljótsdalsheiði moor to a junction with another tunnel running from the Ufsarlón pond, and from there is carried north-east through a combined headrace tunnel to an intake at the Valþjófsstaðafjall escarpment. Two steel-lined vertical pressure shafts lead the water from the intake to the underground powerhouse. Each shaft is 420 metres high, and the total head of the project is 599 metres. The powerhouse houses six Francis turbines, each with a rated output of 115 MW.



Herewith follow the main features of the Project:

<b>Kárahnjúkastífla dam</b>	
Maximum dam height	193 m
Dam length	730 m
Fill materials	8.5 million m <sup>3</sup>
<b>Háslón reservoir</b>	
Area of full reservoir	57 km <sup>2</sup>
Length of reservoir	25 km
Live storage	2,100 million m <sup>3</sup>
Reservoir full supply level (FSL)	625 m a.s.l.
Reservoir minimum operating level (MOL)	575 m a.s.l.
Háslón reservoir catchment area	1,806 km <sup>2</sup>
Average inflow to Háslón reservoir	107 m <sup>3</sup> /s
<b>Main Tunnels</b>	
<b>Approx. 72 km</b>	
Headrace from Háslón (dia: 7.2-7.6 m)	39.7 km
Headrace from Ufsarlón (dia: 6.5 m)	13.3 km
3 adits to headrace (dia: 7.2-7.6 m)	6.9 km
2 diversion tunnels and adit at dam	2,4 km
2 diversion tunnels Hraunaveita (dia: 4.5 m)	3.7 km
Tailrace tunnel (dia: 9.0 m)	1.3 km
<b>Turbines</b>	
Francis, vertical axis	
Number	6
Rated output per unit	115 MW
Installed capacity	690 MW