



E-CO Energi

E-CO Energi is one of Norway's leading energy groups. Its core business is the ownership and management of hydroelectric power stations. E-CO Energi is owned by the municipality of Oslo. The other operations are organised under the auspices of E-CO Vannkraft and Oslo Lysverker

E-CO Vannkraft is Norway's second-largest hydropower producer

With mean annual production of 11 TWh, E-CO Vannkraft is one of Norway's largest hydropower producers. We own and operate 29 power-production facilities in southern Norway, including Norway's third-largest power station, Aurland I.

All E-CO's facilities are controlled from a power centre in Gol. The interaction between the power centre, planned maintenance and production planning helps ensure optimal utilisation of the available reservoirs.

Besides these facilities, E-CO Vannkraft is part owner of Oppland Energi, Opplandskraft, Embretsfosskraftverkene and Norsk Grønnkraft.

		GJUVA	BREKKEFOSS	HEMSIL I	HEMSIL II	NES
Catchment area	km2	40	218	225	896	2420
Inflow	mill. m3	34		250	707	2188
Reservoir capacity	mill. m3	34		205	239	1347
Length of service tunnel	km	1.5	0.5	15	15	31.6
Head	m	410	38	540	375	285
Installed output	MW	10	1.6	2x35	2x49	4x62.5
Average production	GWh	30	9	293	545	1330
Max absorption cap.	m3/sec	3	4.5	16	31	110
Generators	MVA	11	2	2x39	2x55	4x70
Transformers	kV	11	21	2x50	2x55	4x70
Construction start (year)		1956	1957	1957	1957	1962
Constr. start/finish (years)		1957	1957	1960	1960	1967
Upgraded					2005-2006	

		HOL I	HOL II	HOL III	USTA	LYA
Catchment area	km2	725	902	939	539	130
Inflow	mill. m3	790	955	986	662	
Reservoir capacity	mill. m3	870	0.7	0.9	476	
Length of service tunnel	km	17.3/4.5	0.07	3.75	22.1	1.4
Head	m	308/408	48	98	540	183
Installed output	MW	2x45/2x50	26	2x30	2x90	2.7/2.8
Average production	GWh	712	95	228	780	21
Max absorption cap.	m3/sec	56	71	75	40	3.6
Generators	MVA	2x50/2x55	33	2x35	2x100	5.5
Transformers	kV		2x9.5/400	12/400	2x12/300	2x13.5/300
Construction start (year)		1940	1953	1953	1962	2007
Constr. start/finish (years)		1956	1957	1958	1965	2008
Upgraded		2009-2012				



Pure power. Pure value creation.
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HALLINGDAL

A production area surrounded by scenic natural beauty

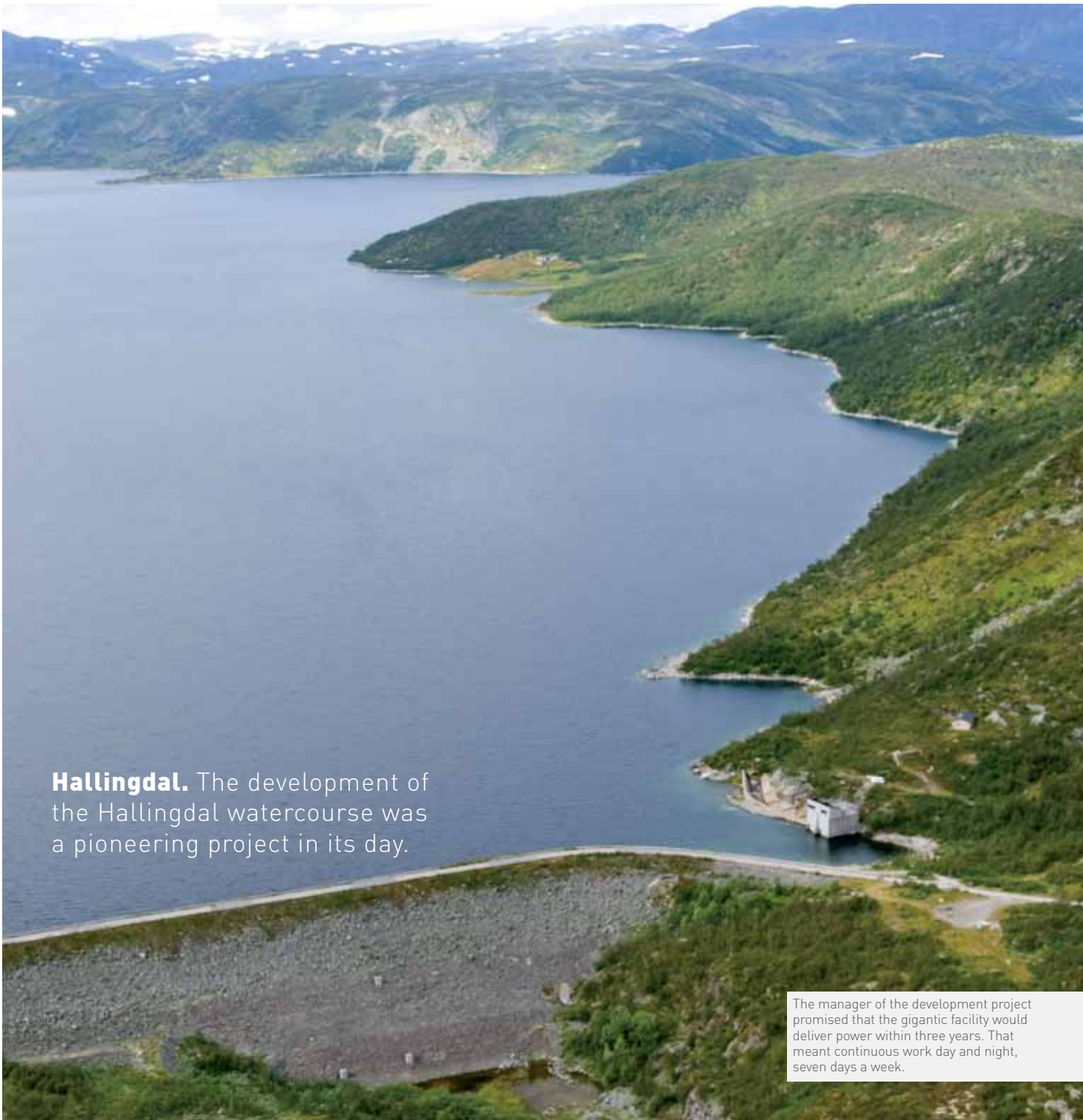


Old culture meets new

Norway's hydropower has been developed by people with a time perspective completely different from what we have today. These pioneers from Norway's past thought at least 50 years ahead. They thought in terms of what we might call 'the infinite future'. The power stations built by these people have generated electricity more or less continuously since start-up, without noticeable wear on the turbines or generators. Some plants have been in operation for nearly 100 years.

All energy production leaves a footprint on the environment. For example, hydropower production encroaches on the environment during construction. Nowadays, construction work is carried out carefully to allow nature to recover rapidly once a facility has been completed.

Hydropower technology may be more future-oriented now than ever before. Hydroelectricity is clean green power - clean to make and clean to use. Not least, it is created in a clean natural environment. The future depends on clean green power. This is what makes hydropower eternal.



Hallingdal. The development of the Hallingdal watercourse was a pioneering project in its day.

The manager of the development project promised that the gigantic facility would deliver power within three years. That meant continuous work day and night, seven days a week.

A Francis turbine with the world's then largest pressure head was brought online in 1949. The site was Hallingdal, and the power station was Hol I. A string of tunnels led the water to the power station. The longest tunnel was 17 kilometres long and had a diameter of 5 metres. There was a 400-metre drop to the station. The water pressure was immense. The size of the project created quite a sensation when it was built. It became a symbol of the tremendous opportunities afforded by 'modern' technology.

As if that were not enough, after passing through the turbines, the water that ran into the River Holselva was as clean as ever! Although such things are taken as a matter of course today, they were ground-breaking at the time.

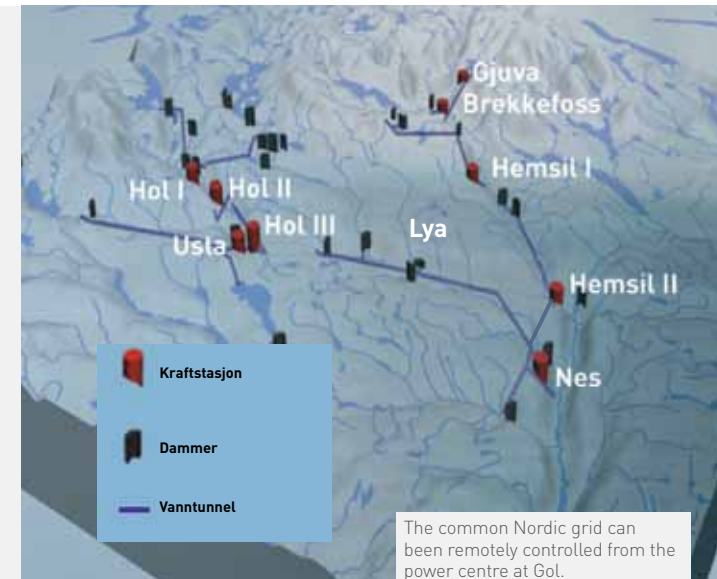
In 1953, the project moved on to Hol II and Hol III. These stations were built in an entirely new way: completely inside the mountain to make them virtually invisible. Development subsequently began on the River Hemsil that runs through the Hemsedal Valley. The Hemsil I power station was built halfway up the Hemsedal Valley, while Hemsil II was built in Gol. Two smaller power stations, Brekkefoss and Gjuva, are located at the head of the valley.

The last phase of the Hallingdal development project harnessed the huge head comprising the Usta power station and the main river between the Strande Fjord and Nes. The Nes inlet tunnel is more than 30 kilometres long and has a cross section of some 8 x 8 metres, making it one of the largest power station tunnels in the world!

The Hallingdal reservoirs contain a total of 1 600 million cubic metres of water. Altogether, the facilities produce four billion kWh in a normal year. This means the majestic mountains of Hallingdal produce enough energy to power 200 000 single-family dwellings in the Nordic countries. The power centre that remotely controls production at a large number of Norwegian power stations is located at Gol.

Energy production in a beautiful scenic area

Norwegians are famous for their close ties to nature. Walking/hiking is a favourite pastime for most Norwegians.



Consequently, we want to preserve nature since we use the great outdoors for recreational purposes.

The beautiful mountains of Hallingdal offer far more than just panoramic views. They also comprise an important production area. The raindrops that fall on these scenic surroundings are converted into the energy required to maintain our modern lifestyle.

Although it is one of our major industries, today's hydropower production has practically no impact on the environment and causes no pollution whatsoever. Norway's largest hydropower production sites are actually among the country's most popular outdoor tourist destinations.



The first development project left the inlet pipes visible.



Inlet tunnels and power stations were also built inside mountains.