

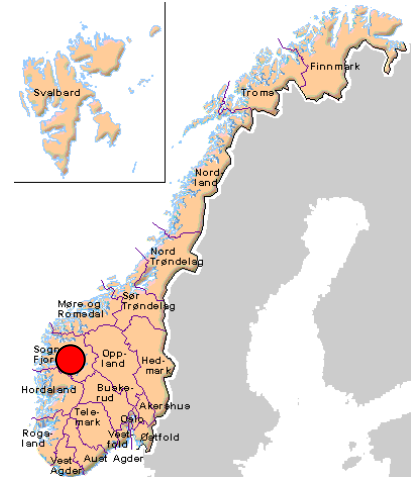


Animasjon of turbine & generator

Kaupanger 3 kraftverk Sogndal i Sogn Norge

Eier (client):
Kaupanger Energi AS

Eiere (owner) :
75% Kaupanger Hovedgård
25% Tyngdekraft AS.



Nøkkeldata (key figures):

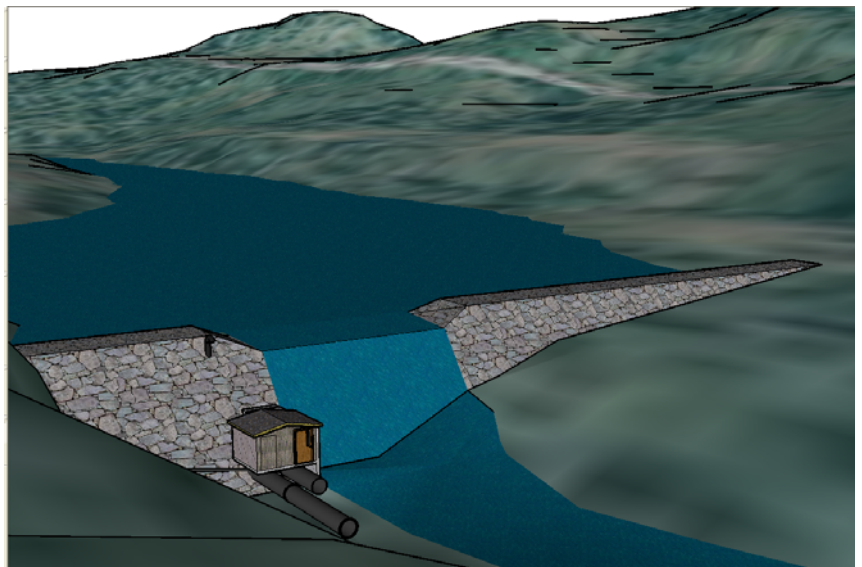
- H : 390 m
- Qm 0,65 m³/s
- Qt : 1,50 m³/s
- P : 4600 KW
- E : 11,6 GWh
- Kostnad (cost) – 33 mill kr
- Spes cost 2,65 Kr/GWh

Byggetid (construction time):
20 måneder (months)

Byggeår:
06/2008 – 12/2009

Idriftsettelse (commissioning):
12/2009

Finansiering (financing):
Sparebanken Vest



3D image av dam (3d image of dam)



Fundament (foundation base)



Pelton turbinhjul (Pelton runner)



3D image av kraftstasjon (3d image of power house)

Key figures

Kaupanger 3		Hoveddata	
TILSIG		Hovedalternativ	Alternativ 1
Nedbørsfelt	km ²	17.0	
Spesifikk avrenning	m ³ /s/km ²	0.036	
Middelvannføring	m ³ /s	0.603	
Årstilsig til inntaket	mill.m ³	19.0	
Alminnelig lavvannføring	m ³ /s	0.028	
5-persentil sommer (1/5-30/9)	m ³ /s	0.116	
5-persentil vinter (1/10-30/4)	m ³ /s	0.022	
Minstevannføring, sommer	m ³ /s	0.050	
Minstevannføring, vinter	m ³ /s	0.025	
KRAFTVERK			
Inntake kote	m.o.h	540.0	
Avløp kote	m.o.h	152.0	
Lengde på berørt elvestrekning	m	3 925	
Brutto fallhøyde	m	388.0	
Netto fallhøyde (i snitt)	m	384.7	
Netto fallhøyde (ved maks Q)	m	366.5	
Energiekvivalent (E)	kWh/m ³	0.913	
Slukeevne, maks	m ³ /s	1.479	
Slukeevne, min	m ³ /s	0.030	
Tilløpsrør, diameter	m.m.	800	
Tilløpsrør/tunnel lengde	m	3 568	
Installert effekt	kW	4.631	
Brukstid	timer/år	2 507	
MAGASIN			
Magasinvolum	mill.m ³ /s	-	
HRV	m.o.h.	540.0	
LRV	m.o.h.	538.0	
PRODUKSJON			
Produksjon, vinter (1/10-30/4)	GWh	2.8	
Produksjon, sommer (1/5-30/9)	GWh	8.8	
Produksjon, årlig middel	GWh	11.6	
ØKONOMI			
Utbyggingskostnad	mill kr	30.7	
Spesifikk utbyggingskostnad	kr/kWh	2.65	
ANDRE ELEMENT			
Besparelse av CO2 utslipp	tonn per år	11 600	
Nat. Hk. Vassdragsreguleringslover	nat. hk.	1	
Nat. Hk. Industrikonsesjonsloven	nat. hk.	78	

Brief project description

Sofienlund is the responsible engineer for the whole project comprising the following main key design elements: initial planning and concession application, conceptual design, detail design of intake dam and intake structure, penstock, powerhouse, tailrace channel, complete electro-mechanical works and high voltage 6,6/22kV transformer.

The project will be a run-of-the-river project and is located on the western part of Norway named Sogn og Fjordane county. The small creek Kaupangselvi has an average water flow of about 0,6 m³/sec. The turbine scaling will be $Q_t = 2,5 * Q_m \Rightarrow Q_t 1,5 \text{ m}^3/\text{sec}$. The plant is simulated to generate about 11,6 GWh annually with a residual water flow in the river equal to 5% of Q_m throughout the whole year.

The dam is a rockfill dam with a concrete tight plate at the waterfront. The intake is a steel structure anchored in the rock fill dam. The intake forms an integral part of the dam and reach a total height of about 6 meters to HRV and the crest length is about 80 meters.



The penstock is 3300 m with DN 900 and DN800 pipes of ductile cast iron as seen on the picture above. The total gross head is 380m. The slope is quite steep at an average of about 12 degrees, but the topography comprises moraine soil almost all the way and there will only be one anchor block along the penstock between the PE-pipe and the ductile cast iron pipe. The penstock will be buried with a minimum of 1 meter overburden to keep it steadily on place.

The powerhouse has a solid foundation of concrete and founded in soil and gravel. The volume of the foundation has to withstand the dynamic water forces from the penstock at 350 ton. The power house will also be a concrete construction.

The power grid is only 10 meters distant to the power house at 22 kV high voltage and the buried power cable will be routed into the switch gear.

Project team

Project manager	Einar Sofienlund,
Hydrology	Einar Sofienlund,
Civil engineer	Jann Biedilae and Einar Sofienlund,
Mechanical engineer	Bjorn Undrum and Einar Sofienlund,
Electrical engineer	Einar Sofienlund,
Construction supervisor	Dag Loftesnes

