

Questionnaire to prepare a quotation for your hydropower station

Contact details

Company name

Person in charge

Street

Country/Zip Code/City

Phone

Fax

E-Mail

General project data

1	Project name
2	Project location

Turbine design data

3	Gross head (elevation difference between upper water level (e.g. forebay/headpond/intake) and tailrace water level)	m
4	Net head (gross head minus penstock losses (due to friction) and other losses)	m
5	Distance between turbine axis and tailrace water level	m
6	Elevation of the turbine axis (meters above sea level)	m.a.s.l.
7	Available water flow (discharge)	
	Maximum flow:	m ³ /s during months/year
	Average flow:	m ³ /s during months/year
	Minimum flow:	m ³ /s during months/year
	➔ Please attach the flow duration curve or other river flow data	



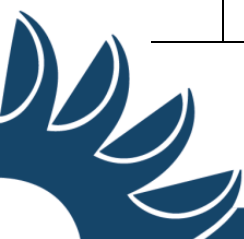
8	Total water discharge available for the turbinesm ³ /s
9	Flow rate (discharge) per each turbinem ³ /s
10	Requested number of turbine units
11	Preferred arrangement of turbine (if binding, otherwise WKV will quote the best solution)	<input type="checkbox"/> horizontal <input type="checkbox"/> vertical

Generator design data

12	Preferred voltage kV
13	Preferred speed rpm
14	Adjustable voltage range (e.g. $\pm 5\%$)
15	Power factor (cos phi)lag,lead
16	Preferred short circuit ratio (SCR)	
17	Cooling type	<input type="checkbox"/> air cooled (IC01) <input type="checkbox"/> water cooled (IC81W)
18	Temperature of	Air: Min:.....°C; Max:.....°C Water: Min:.....°C; Max:.....°C
19	Req. Inertia	J = kg·m ² ($GD^2 \triangleq 4 \cdot J$)

Waterways and Penstock

	Describe the waterway towards the turbine																																															
20	<ul style="list-style-type: none">Channel length and square area: width:m; depth:m; length:m➔ Please attach drawings of the channel (different sections)																																															
21	<ul style="list-style-type: none">Penstock data <table><thead><tr><td></td><td>Section I</td><td>Section II</td><td>Section III</td><td>Section IV</td><td>Section V</td></tr></thead><tbody><tr><td>• Penstock length</td><td>..... m</td><td>..... m</td><td>..... m</td><td>..... m</td><td>..... m</td></tr><tr><td>• Internal diameter (penstock)</td><td>..... mm</td><td>..... mm</td><td>..... mm</td><td>..... mm</td><td>..... mm</td></tr><tr><td>• Material</td><td>.....</td><td>.....</td><td>.....</td><td>.....</td><td>.....</td></tr><tr><td>• Wall thickness</td><td>..... mm</td><td>..... mm</td><td>..... mm</td><td>..... mm</td><td>..... mm</td></tr><tr><td>• Maximum allowed pressure surge In the penstock</td><td colspan="5">..... %</td></tr><tr><td colspan="6">➔ Please attach detailed drawings of the penstock (different sections)</td></tr></tbody></table>							Section I	Section II	Section III	Section IV	Section V	• Penstock length m m m m m	• Internal diameter (penstock) mm mm mm mm mm	• Material	• Wall thickness mm mm mm mm mm	• Maximum allowed pressure surge In the penstock %					➔ Please attach detailed drawings of the penstock (different sections)					
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22	<ul style="list-style-type: none">Is a surge tank provided? <input type="checkbox"/> yes <input type="checkbox"/> no➔ If a surge tank has been planned, please attach dimensions and drawings																																															



Mode of operation		
23	• The unit will feed a public grid (parallel operation only), which means that in case of grid failure, the consumers, e.g. a factory, cannot be supplied with power.	<input type="checkbox"/>
24	• The unit will be operated separately from the grid (isolated operation) and parallel to the national grid, which means that in case of grid failure, the consumers, e.g. a factory, can be supplied with power.	<input type="checkbox"/>
25	• The unit will be operated isolated from the national grid only.	<input type="checkbox"/>
➔ In case isolated operation is required, please fill out the additional questions on the last page		

Grid data	
26	Grid voltage kV
27	Grid frequency Hz
28	Auxiliary voltage (low-voltage level) V
29	Maximum allowed power output to the grid/consumers kW

Expected scope of supply			
Turbine	<input type="checkbox"/>	High-voltage switchgear	<input type="checkbox"/>
Governor	<input type="checkbox"/>	Transformer	<input type="checkbox"/>
Gearbox (if any)	<input type="checkbox"/>	Diesel Emergency Unit	<input type="checkbox"/>
Generator	<input type="checkbox"/>	Powerhouse crane	<input type="checkbox"/>
Low-voltage (control & protection)	<input type="checkbox"/>	Consulting service	<input type="checkbox"/>
Medium-voltage switchgear	<input type="checkbox"/>		

Attachments	
• Flow duration curve (FDC) or other river discharge data	<input type="checkbox"/>
• Please attach drawings of the channel (different sections)	<input type="checkbox"/>
• Please attach detailed drawings of the penstock (different sections)	<input type="checkbox"/>
• If a surge tank has been planned, please attach dimensions and drawings	<input type="checkbox"/>
• Electrical Single Line Diagram (SLD)	<input type="checkbox"/>
• In case of an already existing hydropower station, please attach design drawings and pictures.	<input type="checkbox"/>
• Also, if project drawings already exist, please attach these to your enquiry.	<input type="checkbox"/>

Please fill out the questionnaire as much as possible. Only with sufficient data can WKV prepare a quotation.



If isolated operation is required, please fill out the following

1	How many days per year is isolated operation required? days
2	What is the max. load of the local grid (e.g. 500 kW)? kW
3	<p>What is the type of the consumers / load? For example:</p> <ul style="list-style-type: none"> • Mostly households with fluorescent light, television, fridge, etc.? <input type="checkbox"/> • Small factories with motors or machinery? <input type="checkbox"/> • In case of Industry, what is the max. load (max. consume) and what type (e.g. motor, heater, stone breaker (washer))? 	<p>Type:</p> <p>..... kW</p>
4	What is the maximum load step (biggest load which will be switched on in one step?) E.g. heater with kW or motor with kW	<p>Type:</p> <p>..... kW</p>
5	<p>What is the powerfactor of the local grid, e.g.</p> <ul style="list-style-type: none"> • During night time 0, lag up to 0, lead • During day time 0, lag up to 0, lead 	
6	<p>Does the hydro operate in parallel with other small stations e.g. a diesel power station or any other type of power station? Please submit an overview of the grid (grid plan).</p> <p>Type of the other station (s)</p> <p>Output of the other station (s) kW</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
7	<p>What is the type of distribution lines?</p> <p>Typical 3 wire – single conductor overhead line? <input type="checkbox"/></p> <p>Insulated cables system <input type="checkbox"/></p>	
8	<p>In case of grid parallel and isolated operation, what is required?</p> <ul style="list-style-type: none"> • After grid failure, the powerhouse shuts-down and restarts to build-up the isolated network? <input type="checkbox"/> • Uninterruptable operation from grid parallel to isolated operation and once grid is available automatic back-synchronization? <input type="checkbox"/> 	

