

Small Scale Hydro Calculator

Name/Location of Watercourse:

Intake Elevation (m)	<input type="text" value="400"/>	Kinematic Viscosity	<input type="text" value="1.31E-06"/>
Turbine Elevation (m)	<input type="text" value="250"/>	Roughness Coef (mm)	<input type="text" value="0.003"/>
Head (m)	<input type="text" value="150"/>		
Pipe Length (m)	<input type="text" value="1200"/>		
Hydraulic Gradient	<input type="text" value="0.1250"/>		
Turbine Eff. (%)	<input type="text" value="80"/>		

Low Flows Summary

Annual	Monthly														
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec			
Annual mean flow	<input type="text" value="0.14"/>														
Annual Q95 (m³/s)	<input type="text" value="0.024"/>														
P (%)	Monthly mean Q95														
Q (m³/s)	P (%)														
1	5	0.439	5	0.23 m³/s	0.20 m³/s	0.18 m³/s	0.13 m³/s	0.093 m³/s	0.063 m³/s	0.055 m³/s	0.074 m³/s	0.10 m³/s	0.16 m³/s	0.20 m³/s	0.23 m³/s
2	10	0.315	10	0.099 m³/s	0.052 m³/s	0.05 m³/s	0.041 m³/s	0.031 m³/s	0.023 m³/s	0.018 m³/s	0.016 m³/s	0.018 m³/s	0.025 m³/s	0.045 m³/s	0.052 m³/s
3	20	0.208	20	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	Q (m³/s)	
4	30	0.152	30	0.616	0.693	0.505	0.335	0.265	0.151	0.154	0.23	0.311	0.478	0.573	0.645
5	40	0.117	40	0.491	0.453	0.388	0.255	0.189	0.118	0.098	0.156	0.227	0.35	0.425	0.5
6	50	0.091	50	0.353	0.289	0.273	0.182	0.119	0.085	0.064	0.1	0.15	0.231	0.291	0.34
7	60	0.072	60	0.266	0.214	0.21	0.142	0.09	0.067	0.05	0.073	0.109	0.18	0.215	0.252
8	70	0.056	70	0.215	0.169	0.169	0.116	0.074	0.055	0.042	0.054	0.08	0.141	0.175	0.2
9	80	0.043	80	0.18	0.136	0.136	0.098	0.063	0.046	0.037	0.042	0.062	0.111	0.143	0.162
10	90	0.031	90	0.147	0.11	0.111	0.083	0.054	0.04	0.033	0.035	0.048	0.086	0.116	0.131
11	95	0.024	95	0.12	0.09	0.092	0.071	0.047	0.035	0.029	0.029	0.039	0.067	0.093	0.11
12	99	0.016	99	0.095	0.075	0.077	0.061	0.041	0.031	0.025	0.024	0.031	0.05	0.074	0.089
				0.071	0.06	0.06	0.049	0.035	0.026	0.021	0.019	0.022	0.035	0.055	0.065
				0.069	0.052	0.051	0.041	0.031	0.023	0.018	0.016	0.018	0.025	0.045	0.052
				0.046	0.041	0.041	0.032	0.024	0.018	0.015	0.014	0.015	0.014	0.031	0.033

Cost of System

Sizing Turbine

Turbine Rating (kW)

Chosen Pipe Diameter (m)

Operational Range

Rated Flowrate (m³/s)

Cut in flow Cut out flow

Cost Breakdown

Est. Pipe Cost (per m)

Est. Cost of Pipe

Est. Cost of Turbine

Groundwork/Power House include the costs for powerhouse

Transmission Distance (km)

Overhead

Underground

Est. Transmission Cost

Est. CapEx

Est. OpEx

Feed-in Tariff

FTS Range	Generation Price (£)	Export	Total
< 15kW	0.199	0.03	0.229
>15 - 100 kW	0.178	0.03	0.208
>100kW - 2MW	0.11	0.03	0.14
>2MW - 5MW	0.045	0.03	0.075

Tariff Price

Revenue Forecast

Pipe Diameter (m)	Energy Generated per year (kWh)	Revenue per year (£)
0.1	0.0	£0.00
0.2	197130.97	£27,998.34
0.3	663870.67	£92,941.89
0.4	742261.53	£103,916.61
0.5	746431.01	£104,500.34
0.6	747651.98	£104,671.28
0.7	748106.81	£104,734.95
0.8	748302.84	£104,762.40
0.9	748398.96	£104,775.57
1	748446.07	£104,782.45

Energy Generated/Year Vs Pipe Diameter

Pipe Diameter (m)	Energy Generated (kWh)
0.1	0
0.2	197,131
0.3	663,871
0.4	742,262
0.5	746,431
0.6	747,652
0.7	748,107
0.8	748,303
0.9	748,399
1.0	748,446

Payback Period

Tax rate	<input type="text" value="35"/>	%	Turbine (kW)	<input type="text" value="231.00"/>
Long term interest rate	<input type="text" value="7"/>	%	Pipe Dia. (m)	<input type="text" value="0.40"/>
Long term inflation rate	<input type="text" value="2"/>	%		
% of profits to debt repayment	<input type="text" value="43"/>	%		

Year	Investment	Generation	Debt Interest	Annual OpEx	Total	Pre-Tax	Net	Cumulative	Debt Capital
	Balance	Income	Repayment		Outgoings	Profit/Loss	Profit/Loss	Profit/Loss	Repayment
1	£412,138	£103,917	£28,850	£21,020	£49,870	£54,047	£35,131	-£377,007	£15,106
2	£397,032	£105,995	£27,792	£21,440	£49,233	£56,762	£36,896	-£340,112	£15,865
3	£381,167	£108,116	£26,692	£21,869	£48,561	£59,564	£38,717	-£301,396	£16,648
4	£364,519	£110,277	£25,516	£22,307	£47,801	£62,454	£40,596	-£260,800	£17,456
5	£347,063	£112,463	£24,294	£22,753	£47,047	£65,436	£42,533	-£218,267	£18,289
6	£328,773	£114,732	£23,014	£23,208	£46,222	£68,510	£44,532	-£173,735	£19,149
7	£309,626	£117,097	£21,674	£23,674	£45,348	£71,681	£46,593	-£127,142	£20,035
8	£289,590	£119,561	£20,271	£24,145	£44,417	£74,951	£48,716	-£79,424	£20,949
9	£268,641	£121,755	£18,805	£24,628	£43,433	£78,322	£50,900	-£27,515	£21,891
10	£246,750	£124,190	£17,273	£25,121	£42,393	£81,797	£53,169	£25,653	£22,862
11	£223,884	£126,874	£15,674	£25,623	£41,299	£85,376	£55,499	£81,149	£23,863
12	£200,095	£129,207	£14,002	£26,136	£40,137	£89,070	£57,893	£139,044	£24,895
13	£175,130	£131,791	£12,259	£26,658	£38,918	£92,874	£60,368	£199,412	£25,958
14	£149,172	£134,427	£10,442	£27,192	£37,634	£96,794	£62,916	£262,328	£27,054
15	£122,118	£137,116	£8,568	£27,736	£36,293	£100,835	£65,541	£327,869	£28,183
16	£93,935	£139,858	£6,625	£28,290	£34,866	£104,992	£68,245	£396,114	£29,345
17	£64,590	£142,655	£4,621	£28,856	£33,377	£109,278	£71,031	£467,144	£30,543
18	£34,047	£145,508	£2,583	£29,433	£31,818	£113,692	£73,900	£541,044	£31,777
19	£7,270	£148,410	£1,150	£30,022	£30,191	£118,238	£76,851	£617,895	£33,047
20	£0	£151,367	£0	£30,622	£30,622	£122,765	£79,497	£696,396	£0