

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	0.14											
Annual Q95 (m³/s)	0.024											
P (%)	5	10	20	30	40	50	60	70	80	90	95	99
Q (m³/s)	0.439	0.315	0.208	0.152	0.117	0.091	0.072	0.056	0.043	0.031	0.024	0.016
Monthly mean Q95	0.23	0.20	0.18	0.13	0.093	0.063	0.055	0.074	0.10	0.16	0.20	0.23
Q (m³/s)	0.616	0.491	0.353	0.266	0.215	0.18	0.147	0.12	0.095	0.071	0.059	0.046
Q (m³/s)	0.693	0.453	0.289	0.214	0.169	0.136	0.11	0.09	0.075	0.06	0.052	0.041
Q (m³/s)	0.905	0.388	0.273	0.21	0.176	0.098	0.083	0.092	0.077	0.06	0.051	0.041
Q (m³/s)	0.335	0.255	0.182	0.142	0.116	0.063	0.054	0.047	0.041	0.035	0.031	0.032
Q (m³/s)	0.265	0.189	0.119	0.09	0.074	0.046	0.04	0.035	0.031	0.026	0.021	0.024
Q (m³/s)	0.151	0.118	0.085	0.067	0.055	0.037	0.033	0.029	0.024	0.019	0.016	0.015
Q (m³/s)	0.154	0.098	0.064	0.05	0.042	0.042	0.042	0.039	0.031	0.022	0.018	0.014
Q (m³/s)	0.23	0.156	0.1	0.073	0.054	0.042	0.035	0.029	0.024	0.019	0.016	0.014
Q (m³/s)	0.311	0.227	0.15	0.108	0.08	0.062	0.048	0.038	0.031	0.022	0.018	0.014
Q (m³/s)	0.478	0.35	0.231	0.18	0.141	0.111	0.088	0.067	0.05	0.035	0.025	0.02
Q (m³/s)	0.573	0.425	0.291	0.215	0.175	0.143	0.116	0.087	0.063	0.045	0.032	0.023
Q (m³/s)	0.645	0.465	0.34	0.252	0.2	0.162	0.131	0.093	0.068	0.05	0.035	0.023

Cost Of System

Sizing Turbine

Turbine Rating (kW)

Chosen Pipe Diameter (m)

Operational Range

Rated Flowrate (m³/s) 0.0849

Turbine Cut in flow 0.029731566 Cut out flow 0.1061842

Cost Breakdown

Est. Pipe Cost (per m) £113.22

Est. Cost of Pipe £136,858

Est. Cost of Turbine £133,400

Groundwork/Power House £50,000 (include the costs for powerhouse)

Transmission Distance (km) 11kV 33kV

Overhead Underground

Est. Transmission Cost £560,000.00

Est. CapEx £979,258

Est. OpEx £11,850

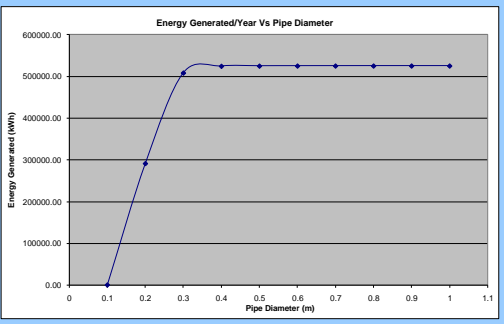
Feed-in Tariff

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

Tariff Price £0.208

Revenue Forecast

Pipe Diameter (m)	Energy Generated per year (kWh)	Revenue per year (£)
0.1	385.71	£80.23
0.2	291486.26	£60,629.14
0.3	508662.44	£106,801.79
0.4	524838.86	£109,166.48
0.5	525302.47	£109,262.91
0.6	525443.21	£109,252.19
0.7	525495.79	£109,303.12
0.8	525518.51	£109,307.85
0.9	525529.43	£109,310.12
1	525535.15	£109,311.31



Payback Period

Tax rate	<input type="text" value="35"/>	Turbine (kW)	100.00
Long term interest rate	<input type="text" value="7"/>	Pipe Dia. (m)	0.40
Long term inflation rate	<input type="text" value="2"/>		
% of profits to debt repayment	<input type="text" value="100"/>		

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	£979,258	£109,166	£81,548	£11,850	£73,398	£35,768	£23,249	-£856,009	£23,249
2	£856,009	£111,350	£59,921	£12,087	£72,008	£39,342	£25,572	-£830,436	£25,572
3	£830,436	£114,577	£58,131	£12,369	£70,468	£44,118	£28,026	-£802,410	£28,026
4	£802,410	£118,849	£56,169	£12,675	£68,744	£47,108	£26,616	-£771,794	£26,616
5	£771,792	£118,165	£54,025	£12,827	£66,852	£51,313	£33,353	-£738,438	£33,353
6	£738,438	£120,520	£51,691	£13,053	£64,774	£55,755	£36,240	-£702,198	£36,240
7	£702,198	£122,938	£49,154	£13,345	£62,458	£60,440	£38,268	-£664,912	£38,268
8	£664,912	£125,398	£46,404	£13,612	£60,314	£65,392	£40,498	-£626,413	£40,498
9	£626,413	£127,906	£43,429	£13,884	£57,313	£70,593	£42,885	-£587,528	£42,885
10	£574,528	£130,464	£40,217	£14,162	£54,379	£76,085	£45,455	-£548,072	£45,455
11	£526,074	£133,073	£36,754	£14,445	£51,490	£81,874	£48,219	-£507,853	£48,219
12	£471,855	£135,725	£33,030	£14,724	£47,751	£87,971	£51,181	-£464,674	£51,181
13	£414,674	£138,449	£29,027	£15,029	£44,056	£94,394	£54,356	-£419,318	£54,356
14	£353,318	£141,218	£24,732	£15,329	£40,061	£101,157	£57,752	-£372,566	£57,752
15	£287,566	£144,041	£20,130	£15,638	£35,782	£108,777	£62,380	-£324,186	£62,380
16	£217,186	£146,924	£15,203	£15,949	£31,159	£117,772	£68,252	-£274,934	£68,252
17	£141,934	£149,862	£9,935	£16,268	£26,203	£128,659	£75,379	-£225,555	£75,379
18	£81,555	£152,859	£4,309	£16,593	£20,902	£141,956	£83,773	-£176,773	£83,773
19	£0	£155,917	£0	£16,925	£15,001	£158,992	£93,341	-£114,662	£0
20	£0	£159,035	£0	£17,263	£11,263	£164,772	£92,152	-£206,714	£0