

### Small Scale Hydro Calculator

Name/Location of Watercourse:

Intake Elevation (m)  Kinematic Viscosity

Turbine Elevation (m)  Roughness Coef (mm)

Head (m)

Pipe Length (m)

Hydraulic Gradient

Turbine Eff. (%)

### Low Flows Summary

Annual	Monthly											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Annual mean flow	0.325											
Annual Q95 (m³/s)	0.104											
	Monthly mean Q95											
	0.086 m³/s	0.072 m³/s	0.068 m³/s	0.043 m³/s	0.027 m³/s	0.021 m³/s	0.024 m³/s	0.034 m³/s	0.048 m³/s	0.073 m³/s	0.076 m³/s	0.088 m³/s
	0.010 m³/s	0.008 m³/s	0.010 m³/s	0.007 m³/s	0.003 m³/s	0.002 m³/s	0.002 m³/s	0.002 m³/s	0.003 m³/s	0.007 m³/s	0.010 m³/s	0.010 m³/s
	P (%)											
	1	5	10	20	30	40	50	60	70	80	90	95
	Q (m³/s)											
	1	4.99	1.63	1.246	0.739	0.567	0.367	0.373	0.582	0.837	1.187	1.332
	2	1.446	1.046	0.925	0.592	0.399	0.271	0.251	0.399	0.586	0.893	0.996
	3	0.896	0.666	0.628	0.406	0.253	0.185	0.159	0.244	0.366	0.584	0.678
	4	0.327	0.266	0.469	0.476	0.312	0.19	0.145	0.112	0.168	0.256	0.442
	5	0.475	0.388	0.378	0.255	0.156	0.118	0.098	0.123	0.187	0.336	0.401
	6	0.389	0.311	0.301	0.216	0.133	0.098	0.084	0.095	0.143	0.265	0.315
	7	0.313	0.248	0.241	0.182	0.112	0.084	0.073	0.079	0.111	0.207	0.251
	8	0.253	0.153	0.165	0.154	0.097	0.073	0.063	0.065	0.088	0.158	0.201
	9	0.201	0.15	0.16	0.132	0.084	0.064	0.054	0.054	0.068	0.116	0.162
	10	0.152	0.118	0.126	0.106	0.071	0.054	0.045	0.042	0.05	0.084	0.122
	11	0.127	0.102	0.105	0.092	0.063	0.045	0.036	0.036	0.041	0.066	0.098
	12	0.1	0.083	0.083	0.075	0.051	0.037	0.032	0.032	0.034	0.047	0.073

### Cost of System

**Sizing Turbine**

Turbine Rating (kW)

Chosen Pipe Diameter (m)

**Operational Range**

Rated Flowrate (m³/s) 0.4842

Turbine Cut in flow 0.168469929

Out cut flow 0.6052497

**Cost Breakdown**

Est. Pipe Cost (per m) £131.99

Est. Cost of Pipe £693.00

Est. Cost of Turbine £367.000

Groundwork/Power House  include the costs for powerhouse

Transmission Distance (km) 11kV  33kV

Overhead  Underground

Est. Transmission Cost £560,000.00

Est. CapEx

Est. OpEx

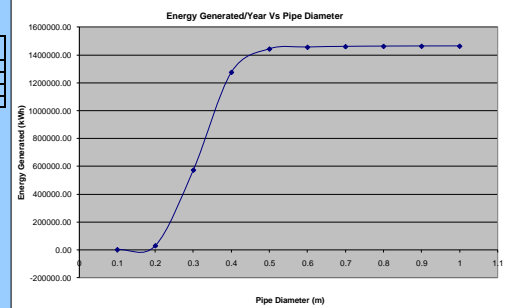
**Feed-in Tariff**

FITS 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 £0.140

**Revenue Forecast**

Pipe Diameter (m)	Energy Generated per year (kWh)	Revenue per year (£)
0.1	0.0	0.0
0.2	28121.21	£3,936.97
0.3	57285.27	£8,019.60
0.4	127603.76	£17,864.73
0.5	144412.94	£20,217.21
0.6	145654.81	£20,391.55
0.7	146156.09	£20,461.85
0.8	146310.05	£20,495.41
0.9	146366.85	£20,505.36
1	146442.98	£20,517.82



### Payback Period

Tax rate	<input type="text" value="35"/>	%	Turbine (kW)	570.00
Long term interest rate	<input type="text" value="7"/>	%	Pipe Dia. (m)	0.50
Long term inflation rate	<input type="text" value="2"/>	%		
% of profits to debt repayment	<input type="text" value="90"/>	%		

Year	Investment		Generation	Debt Interest	Annual OpEx	Total	Pre-Tax		Net		Cumulative	Debt Capital
	Balance	Income					Outgoings	Profit/Loss	Profit/Loss	Profit/Loss		
1	£1,417,985	£294,400	£99,269	£44,750	£144,009	£69,391	£30,254	£1,378,731	£36,329			
2	£1,387,656	£298,488	£96,786	£45,645	£147,431	£66,067	£29,937	£1,338,794	£38,643			
3	£1,344,013	£212,659	£94,081	£46,558	£140,639	£72,019	£46,812	£1,288,981	£42,131			
4	£1,301,982	£193,911	£91,132	£47,499	£138,621	£78,291	£59,861	£1,238,061	£46,800			
5	£1,266,082	£221,249	£87,926	£48,439	£136,365	£84,885	£56,176	£1,182,918	£49,657			
6	£1,236,426	£225,674	£84,450	£49,408	£133,867	£91,817	£59,681	£1,123,237	£53,713			
7	£1,192,712	£234,189	£80,690	£50,396	£131,068	£99,102	£64,416	£1,058,821	£57,975			
8	£1,124,737	£234,791	£76,932	£51,404	£128,035	£106,756	£69,391	£993,429	£62,452			
9	£1,032,885	£239,487	£72,260	£52,432	£124,692	£114,759	£74,617	£914,812	£67,156			
10	£985,129	£244,277	£67,599	£53,480	£121,039	£123,237	£80,104	£834,708	£72,094			
11	£983,055	£249,162	£62,512	£54,549	£117,082	£132,103	£85,865	£749,843	£77,278			
12	£915,757	£254,146	£57,103	£55,641	£112,744	£141,402	£91,911	£656,932	£82,720			
13	£733,037	£259,229	£51,313	£56,764	£108,066	£151,162	£98,255	£558,678	£88,430			
14	£544,807	£264,413	£45,122	£57,889	£103,011	£161,402	£104,911	£453,765	£94,420			
15	£550,187	£269,701	£38,513	£59,047	£97,460	£172,142	£111,892	£341,873	£100,703			
16	£445,484	£275,095	£31,464	£60,228	£91,692	£183,404	£119,213	£222,660	£107,291			
17	£342,193	£280,507	£23,953	£61,432	£86,389	£195,212	£126,888	£106,773	£114,199			
18	£227,994	£286,209	£15,960	£62,661	£78,620	£207,589	£134,933	£98,160	£121,444			
19	£106,554	£291,934	£7,458	£63,914	£71,303	£221,961	£143,364	£192,525	£128,029			
20	£0	£297,772	£0	£65,182	£65,182	£232,590	£151,177	£333,701	£0			
21	£0	£303,728	£0	£66,456	£66,456	£247,272	£154,200	£487,902	£0			
22	£0	£309,903	£0	£67,743	£67,743	£264,976	£157,284	£645,186	£0			
23	£0	£316,298	£0	£69,043	£69,043	£284,916	£160,430	£805,617	£0			
24	£0	£322,918	£0	£70,356	£70,356	£307,159	£163,639	£969,256	£0			
25	£0	£329,765	£0	£71,679	£71,679	£336,782	£166,912	£1,136,167	£0			
26	£0	£336,840	£0	£73,017	£73,017	£373,799	£170,250	£1,306,417	£0			
27	£0	£344,047	£0	£74,365	£74,365	£419,164	£173,655	£1,480,072	£0			
28	£0	£348,888	£0	£76,383	£76,383	£472,504	£177,128	£1,657,199	£0			
29	£0	£356,865	£0	£77,911	£77,911	£534,915	£180,670	£1,837,870	£0			
30	£0	£362,953	£0	£79,469	£79,469	£608,514	£184,284	£2,022,154	£0			
31	£0	£370,242	£0	£81,058	£81,058	£694,184	£187,970	£2,210,123	£0			
32	£0	£377,647	£0	£82,680	£82,680	£793,668	£191,729	£2,401,852	£0			
33	£0	£385,200	£0	£84,333	£84,333	£906,867	£195,563	£2,597,416	£0			
34	£0	£392,904	£0	£86,020	£86,020	£1,036,894	£199,475	£2,796,891	£0			
35	£0	£400,762	£0	£87,740	£87,740	£1,185,022	£203,464	£3,000,355	£0			
36	£0	£408,777	£0	£89,495	£89,495	£1,348,282	£207,534	£3,207,889	£0			
37	£0	£416,953	£0	£91,289	£91,289	£1,532,695	£211,684	£3,419,573	£0			
38	£0	£425,292	£0	£93,111	£93,111	£1,733,181	£215,919	£3,635,492	£0			
39	£0	£433,798	£0	£94,973	£94,973	£1,948,825	£220,236	£3,855,728	£0			
40	£0	£442,471	£0	£96,872	£96,872	£2,179,602	£224,641	£4,080,369	£0			
41	£0	£451,321	£0	£98,810	£98,810	£2,425,514	£229,134	£4,309,503	£0			
42	£0	£460,350	£0	£100,788	£100,788	£2,696,564	£233,716	£4,543,219	£0			
43	£0	£469,557	£0	£102,802	£102,802	£2,992,755	£238,391	£4,781,609	£0			
44	£0	£478,948	£0	£104,858	£104,858	£3,314,090	£243,159	£5,024,767	£0			
45	£0	£488,527	£0	£106,965	£106,965	£3,661,072	£248,022	£5,272,789	£0			
46	£0	£498,297	£0	£109,094	£109,094	£4,134,203	£252,982	£5,525,771	£0			
47	£0	£508,263	£0	£111,278	£111,278	£4,735,987	£258,042	£5,783,813	£0			
48	£0	£518,429	£0	£113,501	£113,501	£5,478,922	£263,208	£6,047,021	£0			
49	£0	£528,797	£0	£115,771	£115,771	£6,364,095	£268,467	£6,315,488	£0			
50	£0	£539,371	£0	£118,087	£118,087	£7,402,286	£273,836	£6,589,319	£0			