

REFERENCE LIST

SMALL TURBINES

Francis turbines

	Power plant	Country	Year	No. of Units	Unit power (kw)	H (m)	N (min-1)	D (mm)	
1	Lom	Slovenia	1982	1	160	54	1000	350	T
2	Belica	Macedonia	1984	1	237	47	1000	350	T,G
3	Reynolds	USA	1985	1	320	31	1200	500	T
4	Ravne	Slovenia	1990	1	800	105	750	550	T
5	Kališnik	Slovenia	1991	1	200	10	450	800	T
6	Streževo	Macedonia	1992	3	800	36	1000	600	T,G,E,C
7	Biološki min.	Macedonia	1993	1	130	70	1500	300	T,G,E,C
8	Žagar-Kosmač	Slovenia	1993	1	142	40	1000	400	T
9	Gugler	Austria	1993	1	490	40	1000	445	T
10	Mežica PE1/1	Slovenia	1997	1	1344	61	750	630	T,G,E,C
11	Mežica PE 2	Slovenia	1999	2	1500	86	750	550	T,G,E,C
12	Pol Koloo 1	Iran	2000	2	2050	155	1000	530	T,G,E,C
13	Agistrou 2	Greece	2000	1	600	41	750	560	T,G,E,C
14	Pol Koloo 2	Iran	2000	2	2.050	150	1000	560	T,G,E,C
15	Kokh Dan	Iran	2000	1	1000	100	1000	560	T,G,E,C
16	Isola del Cantone	Italy	2001	1	510	33	750	560	T
17	Lukar 1 ,2,3	Macedonia	2001	3	250	80	1500	340	T,G,E,C
18	Fulcheri	Italy	2002	1	340	14,5	428	780	T
19	Menegola	Italy	2002	1	480	18	500	780	T
20	Hulu Ganga	Sri Lanka	2003	2	1.500	89	1000	560	T,G,E,C
21	Germanasca	Italy	2003	1	2.550	94,5	750	670	T
22	Cafasse	Italy	2003	2	200	9,5	428	760	T
23	Landra	Italy	2004	1	75	20	1520	310	T
24	Siccardi big	Italy	2003	1	830	65	1000	470	T
25	Siccardi small	Italy	2003	1	420	65	1000	400	T
26	Forani	Italy	2003	2	3920	44,46	500	1150	T
27	Brugnetto	Italy	2003	1	520	45-61	1000	440	T
28	Monte Stella	Italy	2003	1	85	55	1520	265	T
29	Piceglie 2	Italy	2003	1	480	80	1010	400	T
23	Sarasino	Italy	2003	2	160	9,5	428	650	TR
30	Botun	Bosna	2004	1	1100	110	1000	460	T,G,E,C
31	Cutigliano 1	Italy	2004	1	980	41	750	650	T
32	Cutigliano 2	Italy	2004	1	1650	41	600	820	T
33	Krumpah	Slovenia	2005	1	400	63,6	1000	400	T,G,E,C
34	Val Maira	Italy	2004	2	500	67	1000	440	T

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35	Agistrov - 3	Greece	2005	1	200	20	1011	460	T
36	Bacci f.	Italy	2005	1	1000	125	1500	350	T
37	Kalupahana	Sri Lanka	2005	2	500	75	1000	400	T,G,E,C
38	Colombaro	Italy	2005	2	2050	39	500	970	T
39	Hulu Ganga 2	Sri Lanka	2005	2	1500	113	1000	490	T,G,E,C
40	Magal Ganga	Sri Lanka	2005	4	2500	67	750	760	T,G,E,C
41	Reggio Calabria	Italy	2005	1	650	70	750	490	T,G
42	Venasca	Italy	2006	1	1300	22	600	1060	T
43	Fibro	Italy	2006	2	1212	27,5	428	970	T
44	Brugnetto 2	Italy	2006	1	800	48	750	510	T,G
45	Mattie	Italy	2006	1	170	50	1000	320	T, G
46	Oliero	Italy	2006	2	880	14	375	960	T, R
47	Suoi Sap	India/Vietnam	2006	4	4315	163,3	1000	615	R
48	Hulu Ganga 2	Sri Lanka	2006	2	1500	113	1000	490	T, G, E,C
49	Lucchio	Italy	2006	2	3600	63	600	920	T
50	Magnaninis	Italy	2007	2	2400	154	1000	530	T,G
51	Lancia Superiore 1	Italy	2007	1	400	63,3	1000	400	T
52	Pol Koloo 2	Iran	2007	2	2.050	150	1.000	560	T,G,E,C
53	Kokh Dan	Iran	2007	1	1.000	100	1.000	560	T,G,E,C
54	Lancia Superiore 2	Italy	2007	1	1.135	63,3	1.000	540	T
55	Costa	Italy	2007	2	260	27	750	500	T
56	Borzonosca	Italy	2008	3	440	30	1000	500	T
57	Hatfield	USA	2008	1	470	26,5	600	620	T
58	Vignole Borbera	Italy	2008	1	755	25	600	760	T
59	Bessone	Italy	2008	1	760	63	1000	470	T

T – Turbine, G – Governing system, E – Electrical equipment, C – Control equipment

Pelton turbines

	Power plant	Country	Year	No. Of Units	Unit power (kW)	H (m)	N (min-1)	B (mm)	
1	Oslomej	Macedonia	1984	1	152	157	750	125	T,G,E
2	Ramne	Macedonia	1984	1	245	250	1500	130	T,G,E
3	Manty	USA	1987	1	1.000	620	1800	160	T
4	Tetovo	Macedonia	1992	4	1.200	230	750	230	T,G,E,C
5	Filternica	Macedonia	1996	1	460	150	1000	230	T,G,E,C
6	Dovleđik	Macedonia	1997	1	461	109	750	230	T,G,E,C
7	Sarantobrises	Greece	2000	1	570	134	750	215	T,G,E,C

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8	Debar	Macedonia	2001		95	73	750	150	T,G,E,C
9	Piazzone	Italy	2001	1	2.500	440	750	230	T
10	Sogno	Italy	2001	1	750	190	750	260	T
11	Lukar 4	Macedonia	2002	1	550	140	750	230	T,G,E,C
12	Pratilione	Italy	2002	1	570	290	1000	200	T
13	Turigliati	Italy	2002	1	570	285	1000	230	T
14	Oinussa	Greece	2003	1	1.520	180	600	300	T,G,E,C
15	Dionisyu	Greece	2003	1	100*	220	1500	90	T,G,E,C
16	Condove	Italy	2003	2	1.600	285	750	230	T
17	Carbonieri 1	Italy	2003	2	750	173	750	250	T
18	Brugnetto Pelton	Italy	2003	1	750	100	750	190	T
19	Croce di Cava	Italy	2004	1	270	128	750	230	T
20	Carbonieri 2	Italy	2004	2	1490	246	790	250	T
21	Piceglie 1	Italy	2004	1	420	163	750	250	T
22	Seda	Italy	2004	1	1700	110	500	300	T
23	Gravia	Italy	2004	1	1020	212	790	250	T
24	Jezernica	BiH	2005	1	1173	368	1000	250	T,G,E,C
25	Mujakovići	BiH	2005	1	1633	211,6	750	270	T,G,E,C
26	Majdan	BiH	2005	1	2800	309,8	1000	255	T,G,E,C
26	Klavžarica	Slovenia	2005	1	305	117	750	190	T,G,E,C
27	Bacci 2	Italy	2005	1	540	125	600	250	T
28	Alto Preit	Italy	2005	1	3100	415	1000	240	T
29	Castiglione	Italy	2005	2	2200	218	750	240	T,G
30	Calcinere 4	Italy	2005	1	5400	510	600	400	T
31	Dunsinane	Sri Lanka	2005	2	1500	177	600	300	T,G,A,E
32	Velta	Norway	2006	1	940	327	1500	150	T, G
33	RegnAna	Norway	2006	1	970	178	750	240	T,G
34	Calcinere 3	Italy	2006	1	9800	510	500	530	T
35	La Regine	Italy	2006	2	1320	190	600	300	T
36	Ponte Chianale	Italy	2006	2	1430	140	600	820	T
37	Popova Šapka	Makedonija	2006	4	1200	230	750	230	C
38	Zakučac	Croatia	2006	2	1250	225	750	300	T,G,E,C
39	Orbarina	Italy	2006	1	450	105	500	790	T
40	Calcinere 1	Italy	2007	2	9800	540	500	540	T
41	Calcinere 2	Italy	2007	2	9800	540	500	540	T
42	Fossmark	Norway	2006	1	2010	140	500	973	T
43	Vallanta	Italy	2007	1	1901	144	600	280	T
44	Beltramone	Italy	2007	1	1.298	210	750	250	T
45	Lancia Inferiore	Italy	2007	4	1.257	178	750	250	T
46	Castellar	Italy	2007	1	490	140	750	649	T
47	Trešanica	Bosnia	2008	1	1400	113	600	755	T,G,E,C

REFERENCE LIST

T – Turbine, G – Governing system, E – Electrical equipment, C – Control equipment

* Turbine output is limited

Bulb turbines

	Power plant	Country	Year	No. Of Units	Unit power (kW)	H (m)	N (min ⁻¹)	D	
1	Krušnica	Bosnia	1988	2	250	7,8	500	950	T,G,E,C
2	Prohor	Yugoslavia	1988	1	250	8,2	500	950	T,G,E,C
3	Oljarica	Slovenia	1991	1	250	9	500	950	T
4	Chisone Inf. 2	Italy	1998	1	660	15	600	920	T
5	Gaggiolo	Italy	2000	1	390	22	1000	580	T
6	Susa 3	Italy	2000	1	523	4,9	210	1650	T
7	Martina	Italy	2001	1	175	6	433	900	T
8	Lederplast	Italy	2002	1	640	12,5	500	1000	T
9	Battaglioti	Italy	2003	1	240	10	750	680	T
10	Rosiglione	Italy	2008	1	260	7,8	375	1000	T

T – Turbine, G – Governing system, E – Electrical equipment, C – Control equipment

Kaplan turbines

	Power plant	Country	Year	No. Of Units	Unit power (kW)	H (m)	N (min ⁻¹)	D (mm)	
1	Bihać	Bosnia	1989	1	160	3	150	1500	T
2	Monchiero	Italy	2000	2	370	6	284	1300	T
3	Masio	Italy	2001	1	650	4	130	2325	T
4	Monchiero 1	Italy	2002	1	510	3,5	130	2325	T
5	Ossola	Italy	2002	1	200	14	1000	585	T
6	3CI	Italy	2003	2	110	3,8	333	1000	T
7	Pont Canavese	Italy	2003/04	1	2.760	13,3	250	2100	T
8	Dompe1	Italy	2004	1	310	6,8	375	1100	T
9	Dompe2	Italy	2004	1	160	6,8	500	800	T
10	Toscanini	Italy	2004	1	550	9,1	375	1300	T, G
11	Schusser	Austria	2005	1	160	3,8	230	1300	T, G, E,
12	Montalto Dora	Italy	2004	1	1.810	10,1	300	1800	T, G
13	Consovero	Italy	2004	2	450	6,95	375	1185	

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14	Olifer	Italy	2004	3	520	5,5	230	1600	T, G
15	Villanovetta	Italy	2004	1	310	9,5	600	840	T
16	Bersana	Italy	2004	1	225	11,2	610	740	T, G
17	Ecolube	Italy	2005	1	110	3,8	375	1000	T,
18	Chisone Inf.1	Italy	2005	1	900	15	600	1060	T
19	Struge	Slovenia	2006	1	545	7,3	333	1300	T, G, E, C
20	Salto Brunenga	Italy	2005	1	400	7,9	428	1060	T
21	Venasca	Italy	2006	1	1300	22	600	1060	T
22	Ceretto	Italy	2006	1	400	4,4	221	1600	T,G
23	Vitez	BIH	2006	1	1210	8,58	300	1600	T;G;E;C
24	Crespi 2	Italy	2006	1	355	4,3	250	1480	T,G
25	Dente	Italy	2006	1	85	3	305	1000	T
26	Ponte	Italy	2006	1	85	3	305	1000	T
27	Rossi	Italy	2006	1	120	3,8	339	1000	T,G
28	Balangero	Italy	2006	1	460	10	500	1000	T,G
29	Santa Ana	Italy	2006	1	275	4	231	1450	T, G
30	Montalto Dora 2	Italy	2007	1	1810	10,1	300	1800	T, G
31	Ponte della Gobba	Italy	2007	1	400	2,1	80	2800	TR
32	Susa 2	Italy	2007	1	330	5,8	300	1.300	T,G
33	Crespi 5	Italy	2007	1	790	8,65	375	1300	T,G
34	Manda	Italy	2007	2	630	6,1	250	1.600	T
35	Vernante	Italy	2007	2	190	10	750	680	T
36	Torre Pelice	Italy	2007	1	500	16	600	860	T
37	Stražice	Italy	2007	1	1.860	6,5	167	2.560	T
38	Acquacorrente	Italy	2007	1	560	17,29	600	860	T
39	Sava 3	Slovenija	2008	1	1300	26,5	750	1000	T, G, E, C
40	Gindro	Italy	2008	1	250	10,7	600	700	T
41	Balangero 2	Italy	2008	1	160	5,5	350	1000	T

T – Turbine, G – Governing system, E – Electrical equipment, C – Control equipment

REFURBISHMENT

Francis turbines

	Power plant	Country	Year	No. of Units	Unit power (kw)	H (m)	N (min ⁻¹)	D (mm)	
1	Ravne, Tržič	Slovenia	1983	1	800	112	1000	500	TR
2	Trumau	Austria	1987	1	120	12	300	900	TR
3	Pristava	Slovenia	1989	2	150	8	280	550	TR
4	Kranjska Gora	Slovenia	1990	1	250	40	1000	450	TR
5	Mojstrana	Slovenia	1990	1	250	40	1000	450	TR
6	Kokra	Slovenia	1990	1	280	8,8	250	870	TR
7	Ravne	Slovenia	1990	1	800	105	750	550	TR
8	Trumau 2	Austria	1992	1	120	12	300	900	TR
9	Škofja Loka	Slovenia	1992	1	185	6,9	500	950	TR
10	Hubelj 1	Slovenia	1991,1993	1	1950	110	1000	530	TR,G,C
11	Hubelj 2	Slovenia	1993	1	750	110	1000	420	TR,G,C
12	Standard	Slovenia	1993	1	180	8	250	700	TR
13	Pristava	Slovenia	1993	1	150	8	250	600	TR
14	Podljubelj 1	Slovenia	1993	1	900	67	750	560	TR
15	Podljubelj 2	Slovenia	1996	1	520	67	750	440	TR
16	Cegelše 2	Slovenia	1996	1	1.600	105	750	500	TR
17	Špilje	Macedonia	1996-1998	3	32.650	85,2	300	1990	TR
18	Mežica PE 1/2	Slovenia	1997	1	600	60	750	520	TR,G,C
19	Condove	Italy	2000	1	320	75	1500	310	TR
20	Sussa 2	Italy	2000	1	220	5,6	190	890	TR
21	Fužine	Croatia	2002	1	3.900	40	375	1250	TR
22	Jaruga	Croatia	2003	2	3.800	24,5	375	1255	TR
23	Jimenoa	Dominican Republic	2003	1	8000	212	760	737	TR,G,C
24	Oliero	Italy	2005	2	880	14	375	940	TR
25	Serravalle Superiore	Italy	2008	3	570	16	375	950	T
26	Agnona	Italy	2008	1	600	20	428	850	T

TR – Turbine refurbishment, G – Governing system, C – Control equipment

Kaplan turbines

	Power plant	Country	Year	No. of Units	Unit power (kw)	H (m)	N (min ⁻¹)	D (mm)	
1	Agnona	Italy	2008	1	1020	20	500	1180	T
2	Giarola	Italy	2008	2	550	10	428	1186	T
3	Roccapietra1	Italy	2008	1	940	18	600	1000	T
4	Donaz	Italy	2008	1	1100	5	150	2420	T
5	Crespi 1	Italy	2008	1	641	6,5	300	1450	T
6	Crespi 3	Italy	2008	1	934	9,4	375	1380	T
7	Felizzano	Italy	2008	1	680	4	136,4	2325	T
8	Stražice	Italy	2008	2	1290	6,5	188	2100	T
9	Vobarno	Italy	2008	2	2000	7,5	272	1600	T
10	Serravele Inferiore	Italy	2008	2	390	7	375	1150	T

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Pelton turbines

	Power plant	Country	Year	No. of Units	Unit power (kw)	H (m)	N (min ⁻¹)	B (mm)	
1	Pečnik	Slovenia	1982	1	100	360	1500	85	TR
2	Cerkno	Slovenia	1983	1	500	125	1000	200	TR
3	Savica	Slovenia	1994	2	2.450	220	600	300	TR,G
4	Zakučac	Croatia	2002	2	1.250	225	750	300	TR,G,E,C

TR – Turbine refurbishment, G – Governing system, C – Control equipment

GOVERNOR AND CONTROL SYSTEM

	Power plant	Country	Year	No. of Units	Type	Unit power (kW)	H (m)	N (min ⁻¹)	
1	Streževo	Macedonia	1992	3	Francis	800	36	1000	G,C
2	Tetovo	Macedonia	1993	4	Pelton	1.200	230	750	T
3	Hubelj	Slovenia	1994	2	Francis	1.800	110	1000	T
4	Stracis	Italy	1995	3	Kaplan	1.800	6	187	T
5	Fužine	Croatia	1995	1	Francis	3.810	46	375	T
6	Filternica	Macedonia	1996	1	Pelton	460	150	1000	G,C
7	Dovledžik	Macedonia	1997	1	Pelton	461	109	750	G,C
8	Mežica PE 1	Slovenia	1997	2	Francis	3.200	80	750	G,C,S
9	Mežica PE 2	Slovenia	1998	2	Francis	800	62	750	G,C,S
10	St Paul	Greece	2000	1	Pelton	140	78	1500	G,C
11	Sarantobrises	Greece	2000	1	Pelton	570	134	750	G,C,S
12	Pol Kooloo 1	Iran	2000	2	Francis	2.050	150	1000	G,C
13	Pol Kooloo 2	Iran	2001	2	Francis	2.050	150	1000	G,C
14	Kockhdan	Iran	2001	1	Francis	900	94	1000	G,C
15	Ruzizi	Ruanda	2001	1	Francis	15.000	28	187	C
16	Jimenoa	Dominican Republic	2003	1	Francis	8.000	212	760	G
17	Lukar 1,2,3	Macedonia	2002	3	Francis	250	80	1500	G,C,S
18	Lukar 4	Macedonia	2002	1	Pelton	550	160	750	G,C,S
19	Zakućac	Croatia	2003	2	Pelton	1.250	225	750	C
20	Oinusa	Greece	2003	1	Pelton	1.500	180	600	G,C
21	Hula Ganga	Sri Lanka	2003	2	Francis	1.500	89	1000	G,C,S
22	Vrben	Macedonia	2003	2	Francis	6.400	185	750	G
23	Raven	Macedonia	2003	3	Francis	8.000	71.0	500	G
24	Tikveš	Macedonia	2003	4	Francis	29.900	93	300	G
25	Špilje	Macedonia	2003	3	Francis	27.500	85,2	300	G
26	Globočica	Macedonia	2003	2	Francis	21.000	97	300	G

G/C/S- supply of **G**(overnor) /**C**(ontrol system) /**S**(CADA remote control system)

WATER TO WIRE ENGINEERING

HPP with Francis turbines

	Power plant	Country	Year	No. of Units	Unit power (kw)	H (m)	N (min-1)	D (mm)	
1	Streževo	Macedonia	1992	3	800	36	1000	600	T,G,E,C
2	Biloški min.	Macedonia	1993	1	130	70	1500	300	T,G,E,C
3	Mežica PE1/1	Slovenia	1997	1	1344	6,1	750	630	T,G,E,C
4	Mežica PE 2	Slovenia	1999	2	1500	86	750	550	T,G,E,C
5	Pol Koloo 1	Iran	2000	2	2050	155	1000	530	T,G,E,C
6	Agjstrou 2	Greece	2000	1	600	41	750	560	T,G,E,C
7	Pol Koloo 2	Iran	2000	2	2.050	150	1000	560	T,G,E,C
8	Kokh Dan	Iran	2000	1	1000	100	1000	560	T,G,E,C
9	Lukar 1 ,2,3	Macedonia	2001	3	250	80	1500	340	T,G,E,C
10	Hulu Ganga	Sri Lanka	2003	2	1.500	89	1000	560	T,G,E,C
11	Botun	Bosna	2004	1	1100	110	1000	460	T,G,E,C
12	Krumpah	Slovenia	2005	1	400	63,6	1000	400	T,G,E,C
13	Kalupahana	Sri lanka	2005	2	500	75	1000	400	T,G,E,C
14	Hulu Ganga 2	Sri Lanka	2005	2	1500	113	1000	490	T,G,E,C
15	Magal Ganga	Sri Lanka	2005	4	2500	67	750	760	T,G,E,C
16	Hulu Ganga 2	Sri Lanka	2006	2	1500	113	1000	490	T, G, E,C
17	Pol Koloo 2	Iran	2007	2	2.050	150	1.000	560	T,G,E,C
18	Kokh Dan	Iran	2007	1	1.000	100	1.000	560	T,G,E,C
19	Poljanica2	BiH	2008	2	620	48	1000	470	T,G,E,C

T – Turbine, G – Governing system, E – Electrical equipment, C – Control equipment

HPP with Pelton turbines

	Power plant	Country	Year	No. Of Units	Unit power (kW)	H (m)	N (min-1)	B (mm)	
1	Oslomej	Macedonia	1984	1	152	157	750	125	T,G,E
2	Ramne	Macedonia	1984	1	245	250	1500	130	T,G,E
3	Tetovo	Macedonia	1992	4	1.200	230	750	230	T,G,E,C
4	Filternica	Macedonia	1996	1	460	150	1000	230	T,G,E,C
5	Dovleđik	Macedonia	1997	1	461	109	750	230	T,G,E,C

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6	Sarantobrises	Greece	2000	1	570	134	750	215	T,G,E,C
7	Debar	Macedonia	2001		95	73	750	150	T,G,E,C
8	Lukar 4	Macedonia	2002	1	550	140	750	230	T,G,E,C
9	Oinussa	Greece	2003	1	1.520	180	600	300	T,G,E,C
10	Dionisyu	Greece	2003	1	100*	220	1500	90	T,G,E,C
11	Jezernica	BiH	2005	1	1173	368	1000	250	T,G,E,C
12	Mujakovići	BiH	2005	1	1633	211,6	750	270	T,G,E,C
13	Majdan	BiH	2005	1	2800	309,8	1000	255	T,G,E,C
14	Klavžarica	Slovenia	2005	1	305	117	750	190	T,G,E,C
15	Dunsinane	Sri Lanka	2005	2	1500	177	600	300	T,G,E,C
16	Zakučac	Croatia	2006	2	1250	225	750	300	T,G,E,C
17	Trešanica	Croatia	2008	1	1400	113	600	755	T,G,E,C
19	Mujada	BiH	2008	1	1325	187	750	260	T,G,E,C
20	Podkozica	BiH	2008	1	684	193,7	1000	195	T,G,E,C
21	Poljanica1	BiH	2008	2	1500	198,7	750	260	T,G,E,C

T – Turbine, G – Governing system, E – Electrical equipment, C – Control equipment

HPP with bulb turbines

	Power plant	Country	Year	No. of Units	Unit power (kw)	H (m)	N (min ⁻¹)	D (mm)	
1	Krušnica	Bosnia	1988	2	250	7,8	500	950	T,G,E,C
2	Prohor	Yugoslavia	1988	1	250	8,2	500	950	T,G,E,C

T – Turbine, G – Governing system, E – Electrical equipment, C – Control equipment

HPP with Kaplan turbines

	Power plant	Country	Year	No. Of Units	Unit power (kw)	H (m)	N (min ⁻¹)	D (mm)	
11	Schusser	Austria	2005	1	160	3,8	230	1300	T,G,E
19	Struge	Slovenia	2006	1	545	7,3	333	1300	T,G,E,C
23	Vitez	BIH	2006	1	1210	8,58	300	1600	T,G,E,C