

Table S1: Summary of optimization-simulation results for Sunkoshi-3 reservoir project

Particulars	250 MW	300 MW	350 MW	<b>400 MW</b>	450 MW	500 MW	550 MW	600 MW	650 MW	700 MW	<b>750 MW</b>	800 MW	850 MW
Design Discharge, m <sup>3</sup> /s	186.0	213.8	249.4	<b>285.0</b>	320.6	356.27	391.90	427.52	463.14	498.77	<b>534.50</b>	570.02	605.65
Total annual Energy (MU)	1749.7	1905.4	2040.9	<b>2163.9</b>	2274.04	2379.9	2477.56	2562.20	2634.11	2695.75	<b>2746.3</b>	2766.7	2781.1
Dry Energy (MU)	734.76	744.03	748.54	<b>750.15</b>	751.71	753.18	754.55	755.87	755.87	755.87	<b>755.87</b>	755.87	755.87
Wet Energy(MU)	1014.9	1161.3	1292.5	<b>1413.73</b>	1522.33	1626.7	1723.01	1806.33	1878.24	1939.88	<b>1990.4</b>	2010.8	2025.3
Dry to total energy (%)	42.0	39.0	36.7	<b>35.2</b>	33.1	31.6	30.5	29.5	28.7	28.0	27.5	27.3	27.2
Rate Flag	3.00	3.00	3.00	<b>3.00</b>	2.00	2.00	2.00	1.00	1.00	1.00	<b>1.00</b>	1.00	1.00
Actual annual benefits(Mn Nrs)	16317	17471	18458	<b>19340</b>	15238	15749	16228	15017	15364.8	15660.7	<b>15903</b>	16001	16071
Spillage (MCM)	2695.9	2281.14	1911.5	<b>1567.9</b>	1257.5	953.62	668.72	410.80	172.47	51.03	<b>11.55</b>	5.20	0.08
Discharge Utilization Index	0.64	0.69	0.74	<b>0.80</b>	0.83	0.87	0.91	0.94	0.98	0.99	<b>0.99</b>	0.998	1.0
Capacity Inflow ratio(CIR)	0.20	0.20	0.20	<b>0.20</b>	0.20	0.20	0.20	0.20	0.20	0.20	<b>0.20</b>	0.20	0.20
Incremental Energy(MU)		155.66	135.64	<b>122.93</b>	110.11	105.89	97.64	84.64	71.91	61.64	50.51	20.46	14.40
Increment (%)		8.90	7.12	<b>6.02</b>	5.09	4.66	4.10	3.42	2.81	2.34	1.87	0.74	0.52

Incremental Energy per MW (MWhr)		3113.15	2712.8	<b>2458.60</b>	2202.22	2117.8	1952.86	1692.74	1438.22	1232.83	1010.2	409.19	287.97
Incremental benefits (Mn Nrs)		1154.28	986.97	<b>881.54</b>	-4134.3	543.64	478.62	-1210.5	347.55	295.88	<b>242.46</b>	98.21	69.11
Plant load factor	0.7989	0.7250	0.6657	<b>0.6176</b>	0.5769	0.5434	0.5142	0.4875	0.4626	0.4396	<b>0.4180</b>	0.3948	0.3750

Table S2: Summary of optimization-simulation results of SU-2 HPP under different installed capacity

Particulars	300 MW	450 MW	550 MW	600 MW	650 MW	700 MW	750 MW	800 MW	850 MW	900 MW	950 MW	1000 MW	1050 MW
Design Discharge, m <sup>3</sup> /s	334.67	502.01	613.6	669.35	725.13	780.91	836.69	892.50	948.2	1004.0	1059.8	1115.6	1171.1
Irrigation demand, m <sup>3</sup> /s	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1	67.1
Total annual Energy(MU)	1764.8	2220.8	2466.7	2565.0	2672.1	2789.0	2901.0	3001.6	3093.9	3184.9	3266.5	3316.3	3343.5
Dry Energy (MU)	635.5	671.6	683.6	687.5	688.9	688.6	685.5	683.8	681.1	678.2	674.4	672.2	669.0
Wet Energy (MU)	1129.3	1549.1	1783.2	1870.7	1983.2	2100.4	2215.5	2317.9	2412.8	2506.7	2592.1	2644.2	2674.4
Dry to total energy (%)	0.37	0.31	0.28	0.27	0.26	0.25	0.24	0.23	0.23	0.22	0.21	0.21	0.21
Rate Flag	3.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Actual annual benefits(Mn Nrs)	15898	14521	14301	14754	15306	15866	16393	16870	17302	17729	18107	18338	18457
Spillage (MCM)	6743.7	4982.2	4019.8	3658.7	3189.6	2699.9	2211.6	1768.2	1398.1	1028.9	607.9	383.6	203.8
Discharge Utilization Index	0.589	0.696	0.755	0.777	0.805	0.835	0.865	0.892	0.915	0.937	<b>0.963</b>	0.976	0.988

Capacity Inflow ratio(CIR)	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Incremental Energy(MU)	163.61	142.39	114.87	98.27	107.12	116.92	111.99	100.65	92.21	91.06	81.54	49.88	27.13
Increment (%)	10.22	6.85	4.88	3.98	4.18	4.38	4.02	3.47	3.07	2.94	2.56	1.53	0.82
Incremental Energy per MW (MW hr)	3272.2	2847.8	2297.5	1965.3	2142.5	2338.3	2239.8	2012.9	1844.1	1821.2	1630.8	997.57	542.69
Incremental benefits (Mn Nrs)	1273.3	725.28	565.81	453.45	551.50	560.33	526.48	476.72	432.96	426.58	377.78	231.42	119.01
Plant load factor	0.6715	0.5634	0.5120	0.4880	0.4693	0.4548	0.4416	0.4283	0.4155	0.4040	0.3925	0.3786	0.3635