Economic example of GSHPs and conventional new home mortgage

Consider a situation in which a ground source heat pump costs $10000 more than a conventional heating and cooling system. It is projected to save $800 per year in energy costs and $100 per year in maintenance costs. Thus, the simple payback is 11 years [=$10000 ÷ ($800+$100)]. However, a 30-year fixed rate mortgage at 6.75% APR is used to finance the new home. The energy inflation rate is 7%, the general inflation rate is 5%, and the maintenance inflation rate is 6%. Find the amount of time before the present worth will be positive for this investment.

Summary results: Although simple pay back periods for high efficiency equipment are not always attractive, they are often wise investments if the cost is rolled into a long term mortgage. In some case, energy savings can even exceed the added mortgage payment so the payback is immediate. As shown below, the GSHP has a two year payback (time for present worth to become positive). Furthermore, **SIMPLE** and well-designed systems have the advantage of requiring less maintenance than conventional equipment so economics is even more attractive.

Economic Analysis Using 30-Year Fixed Rate Loan with Inflation

Added Cost of ECO	Loan Interest Rate (%)	Energy Inflation Rate (%)	Main. Inflation Rate (%)	Gen. Inflation Rate -CPI (%)
10000	6.25	7	6	5
Year One Energy Savings	Year One Maint. Cost*		Added Annual Payment ($)	Added Monthly Payment ($)
600	-100		**746.03**	**62.17**

Year	Energy Savings	Maint. Cost*	Net Cash Flow	Disc. NCF	Pres. Worth
1	600.00	-100.00	-46.03	-46.03	-46.03
2	642.00	-106.00	1.97	1.88	-44.15
3	686.94	-112.36	53.27	48.32	4.17
4	735.03	-119.10	108.10	93.38	97.55
5	786.48	-126.25	166.70	137.14	234.69
6	841.53	-133.82	229.33	179.68	414.37
7	900.44	-141.85	296.26	221.08	635.45
8	963.47	-150.36	367.80	261.39	896.84
9	1030.91	-159.38	444.27	300.70	1197.54
10	1103.08	-168.95	526.00	339.06	1536.60
11	1180.29	-179.08	613.35	376.54	1913.14
12	1262.91	-189.83	706.71	413.20	2326.34
13	1351.31	-201.22	806.51	449.09	2775.43
14	1445.91	-213.29	913.17	484.27	3259.71
15	1547.12	-226.09	1027.18	518.80	3778.50
16	1655.42	-239.66	1149.05	552.71	4331.22
17	1771.30	-254.04	1279.31	586.06	4917.28
18	1895.29	-269.28	1418.54	618.90	5536.18
19	2027.96	-285.43	1567.36	651.27	6187.46
20	2169.92	-302.56	1726.45	683.21	6870.67
21	2321.81	-320.71	1896.50	714.77	7585.44
22	2484.34	-339.96	2078.27	745.98	8331.42
23	2658.24	-360.35	2272.57	776.88	9108.29
24	2844.32	-381.97	2480.26	807.50	9915.80
25	3043.42	-404.89	2702.29	837.89	10753.69
26	3256.46	-429.19	2939.62	868.08	11621.77
27	3484.41	-454.94	3193.32	898.09	12519.86
28	3728.32	-482.23	3464.53	927.97	13447.83
29	3989.30	-511.17	3754.44	957.73	14405.56
30	4268.55	-541.84	4064.36	987.42	15392.98

* If maintenance cost for alternative is greater than conventional system, year one maintenance cost is positive. If maintenance cost is less than for conventional, year one maintenance cost is negative.

The programs EcoLoan30 and EcoLoan15 are available to perform analysis for other costs and rates.