

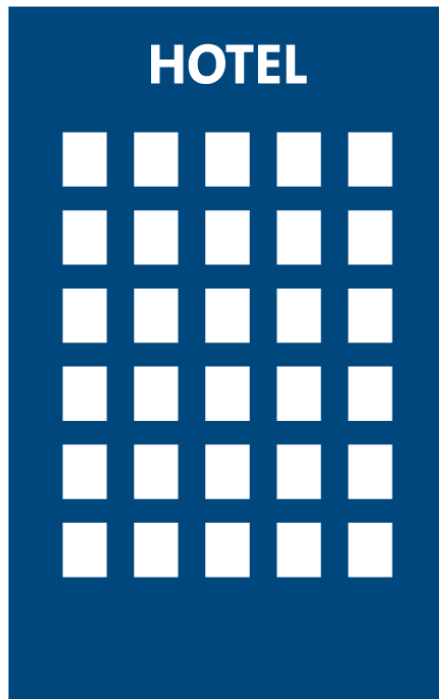


GRUNDFOS
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LIFE CYCLE COSTS

**CASE EXAMPLE:
NEW YORK HOTEL**

Hotel case story, New York



A 23 year old hotel in New York renovated its air conditioning system in order to achieve energy savings.

By changing 3-way control valves to 2-way control valves, the whole system was changed from a constant to a variable flow system making way for savings.

Four different solutions with very different life cycle costs

4 SOLUTIONS

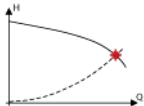
NUMBER OF PUMPS

PUMP CONTROL CURVE

SYSTEM FLOW/ PUMP SPEED

SOLUTION 1:

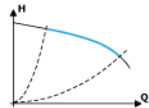
The old, not renovated system with constant flow and a single constant speed pump.



Constant/
Constant



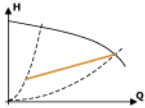

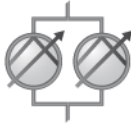
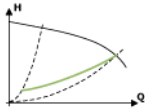
SOLUTION 2:

A variable flow system with a single constant speed pump.



Variable/
Constant

Four different solutions with very different life cycle costs



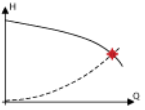


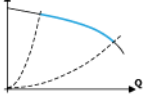


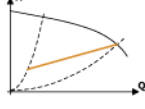

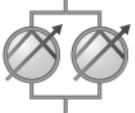
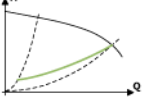
	NUMBER OF PUMPS	PUMP CONTROL CURVE	SYSTEM FLOW/ PUMP SPEED	
SOLUTION 3: A one pump system with variable flow and variable pump speed where the pump is put into calculated proportional differential pressure mode				Variable/ Variable
SOLUTION 4: A two pump system with variable flow and variable pump speed where the pumps are put into measured proportional differential pressure mode				Variable/ Variable

Life Cycle cost over a 20-year period

Here are the varying costs of the four different solutions.
Notice the initial prices compared to the total costs.



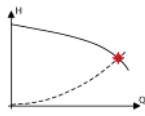


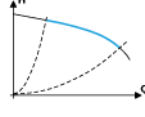


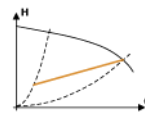

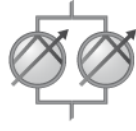
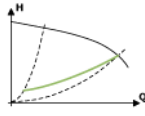


TOTAL

			INITIAL COST	MAINTNANCE COST	ENERGY COST	TOTAL
1				\$ 1,948	\$ 779	\$ 294,545 = \$ 297,273
2				\$ 1,948	\$ 779	\$ 230,309 = \$ 233,036
3				\$ 6,883	\$ 779	\$ 157,200 = \$ 164,862
4				\$ 7,922	\$ 1,039	\$ 91,418 = \$ 100,379

System comparison

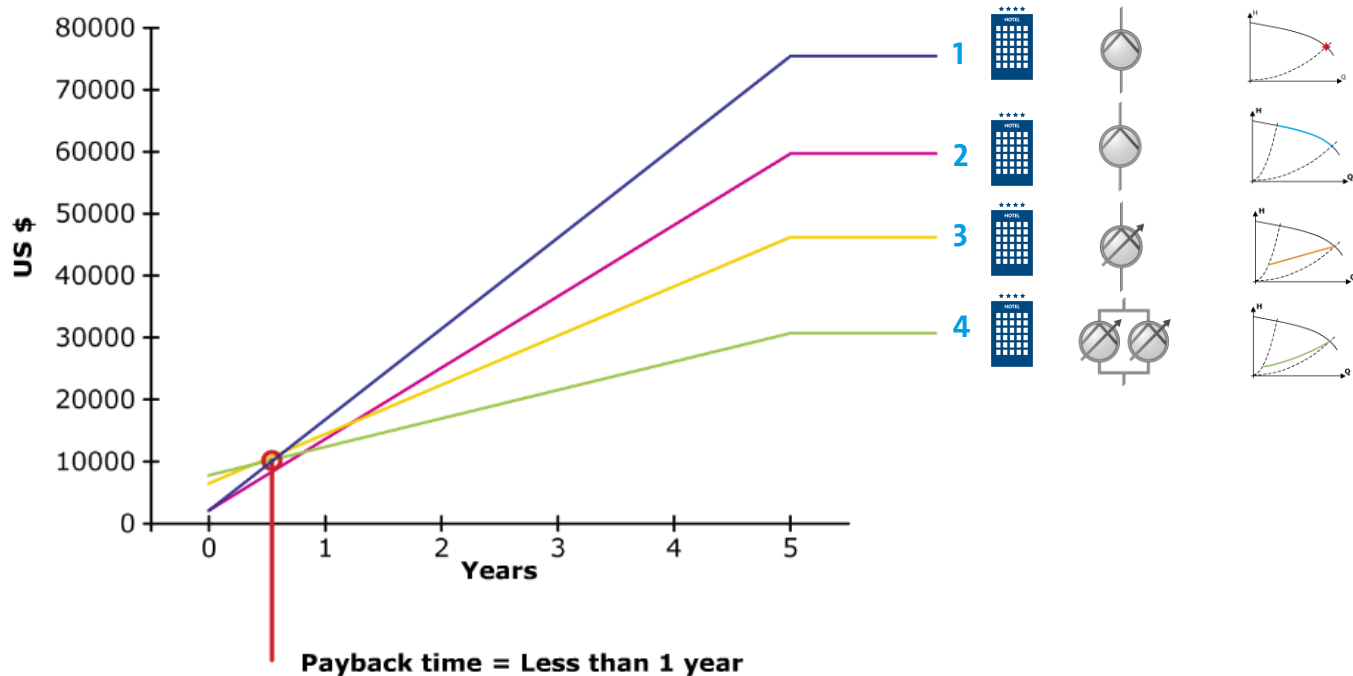
The most expensive system is system 1. The most economical system is system 4 – the two-pump system with variable flow and variable pump speed – even though this is the system with the highest initial price.

			TOTAL	SAVED IN \$	SAVED IN %	
1				\$ 297,273	\$ 0	0%
2				\$ 233,036	\$ 64,236	22%
3				\$ 164,862	\$ 132,410	45%
4				\$ 100,379	\$ 196,894	66%

Payback time

The payback time is the time it takes for the initial cost of a system to be earned back through energy savings.

In this case, the payback time is less than a year. On an average, the payback time of a system with variable speed pumps is 1-2 years.





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