

# [Finicial evaluation of techologies](https://assignbuster.com/finicial-evaluation-of-techologies/)

Analysis of two energy proposals Two electri supply technologies have the following characteristics:   Capital cost Annual operating cost Lifetime (years)
Salvage value (/cost) ($)
Annual electricity supplied (kWh)
Technology A (a sustainable energy option)
20 000
500
20
2000
25 000
Technology B (a fossil fuel option)
10 000
3000
10
-2000
25 000
1. Calculate the simple payback period for technology A relative to technology B.
Would a company that sets a two year maximum payback period for new investments spend the extra capital on technology A?
Project A
Project B
Initial Investment
$20, 000
$10, 000
Annual electricity supplied
$ 6, 000
$ 6, 000
Less: Maintenance cost
500
3, 000
Net annual benefit
5, 500
$ 3, 000
Payback period
3. 63 years
3. 3 years
\*Assume that the cost of electricity per kwh is 12cents –(In US)
In simple calculations, Proj. B has a shorter time frame of return on investments which is 3. 3 years as compared with 3. 6 years of Proj. A. None of the projects fall within the required 2 years time frame.
2. Calculate the internal rate of return for the additional investment in A compared to B over the assessment periods:
a. 5 years
b. 10 years
c. 20 years
Project A
Initial investment
Cash flows
PV 5%
NPV
-20, 000
5 yrs 0. 7815
30000
23, 445
3, 445
10 yrs. 0. 6139
60, 000
92, 085
72, 085
15 yrs. 0. 4810
90, 000
43, 290
23, 290
Project B
Initial Investment
Cash Flows
PV 5%
NPV
-10, 000
5 yrs 0. 7815
30, 000
23, 445
13, 445
10 yrs 0. 6139
60, 000
92, 085
82, 085
15 yrs. 0. 4810
90, 000
43, 290
33, 290
Both projects show positive PV and NPV at 5% rate of return. However TSech B has a higher PV and positive NPV. Between two positsive proposals, one that gives a higher value is acceptable.
In each case state whether the company would invest the extra capital in technology A if its minimum required real internal rate of return is 10%. (Be careful to take account of all replacements and salvage values during each assessment period. But in the case of a technology that still has a useful lifetime remaining at the end of a period, do not seek to estimate its residual value; that is, only count the salvage value at the end of a lifetime.)
Project A
Cash flows
PV 10%
0. 6209
NPV
Initial cost
20, 000
5 YEARS
30, 000
Less: Depn.
5, 000
Net of cash flows
25, 000
15, 522. 5
-4477. 50
PROJECT B
Initial Cost
10, 000
5 YEARS
30, 000
Less depreciation
5, 000
Net of cash flows
25, 000`
15, 522. 50
5, 552. 50
In both computation, Project B shows a higher positive NPV showing that “ B” is acceptable than “ A”. In this case, company should invest its excess capital to “ B” at 10% rate of return.
3. Calculate the Present Worth (that is, the Net Present Value [NPV] of total costs) for each of the technologies for the real discount rates and periods of assessment as specified in the following tables (please present results in this format):
Technology A
Assessment period
Discount rate

(years)
5%
10%
15%
20%
5
0. 7815
0. 6209
0. 497
0. 402
10
0. 6139
0. 3855
0. 247
0. 162
15
0. 4810
0. 2394
0. 123
0. 065
20
0. 3769
0. 1486
0. 061
0. 026
Technology B
Assessment period
Discount rate

(years)
5%
10%
15%
20%
5
0. 7815
0. 6209
0. 497
0. 402
10
0. 6139
0. 3855
0. 247
0. 162
15
0. 4810
0. 2394
0. 123
0. 065
20
0. 3769
0. 1486
0. 061
0. 026
Hence fill in the following table saying which technology would be selected for each of the cases on the basis of highest Present Worth (that is, NPV of lowest total cost):
Project A
Net Present Value
Assessment
Period
5%
10%
15%
20%
-20, 000
5
3445
-1, 373
-5090
-5090
10
17914
3130
-5180
-5180
15
23, 290
1546
-8980
-8980
20
25, 228
-2168
-12680
-12680
Project B
Net Present Value
Assessment
Period
5%
10%
15%
20%
5
22445
17627
4910
11060
10
26834
13130
4820
8720
15
33290
11545
1070
-4150
20
35228
7832
-2680
-7000
At different discount rates and number of years, NPV of Proj. B is higher than A.
4. Using your answers to question 3, what are the lifecycle costs of both technologies over one lifecycle of technology A at (a) a 5% real discount rate; and (b) a 20% real discount rate. Which technology is preferred on this lifecycle cost basis in each case
A
B
Initial investment
20, 000
10, 000
PV of Operating cost
3, 769
4, 860
Residual value
2, 000
0
Total life cycle cost
25, 769
14, 860
Initial cost of project
20, 000
10, 000, 00
LCC
5, 769
4, 860
Technology A has higher LCC than Tech. B and should be preferred.
(a) Calculate the average unit cost of the power in present value terms (in cents/kWh) supplied by each technology over a period of 20 years at a discount rate of 5%. Hint: use the answers from question 3 again to find the NPV of total costs for each technology over 20 years and then divide this amount by the total electricity supplied over this period.
NPV
kW/h supplied
Ave. Cost per unit
Project A
25, 228
25, 000
1. 10
Project B
35, 228
25, 000
1. 41
5. Discuss briefly some of points emerging from this analysis of relevance to the financial comparison of sustainable energy supply options (in particular renewable) and current fossil-fuel technologies.
New technologies are being developed to replace use of fossil fuels used for power generation. Studies about renewable energies are being done by the authorities if its cost will compensate its use against cost of fossil fuels. Fossil fuels like coal and gas are the most commonly used around the world for power generation.
This study looked at the cost of technology from fossil fuel and that of sustainable energy. A comparison of both presented important points in terms of capital and cost.
1. In terms of technology, the average cost per kWh is much higher in Technology B which is 1. 41 than 1. 10 of A which means fossil energy will be more costly to produce and will be a higher price to consumer to borne.
2. Technology B gives a higher NPV than Technology A for the same 20 year period. A high positive value is an acceptable project proposition, and between two proposals, one having a higher value is considered.
Annex
1. Payback calculation using simple payback method.
Payback A
Payback B
Initial investment
20, 000
10, 000
Annual electricity supplied
6, 000
6, 000
Less maintenance cost
500
3000
Net annual benefit
5, 500
3000
3. 63 yrs
3. 3 yrs.
\*Assume that the cost of electricity per kwh is 12cents –(In US)
Formula used:
Capital cost divided by net annual benefit
2. Discount rate factors solving for PV and NPV
Technology A
Assessment period
Discount rate

(years)
5%
10%
15%
20%
5
0. 7815
0. 6209
0. 497
0. 402
10
0. 6139
0. 3855
0. 247
0. 162
15
0. 4810
0. 2394
0. 123
0. 065
20
0. 3769
0. 1486
0. 061
0. 026
Assessment period
Discount rate

(years)
5%
10%
15%
20%
5
0. 7815
0. 6209
0. 497
0. 402
10
0. 6139
0. 3855
0. 247
0. 162
15
0. 4810
0. 2394
0. 123
0. 065
20
0. 3769
0. 1486
0. 061
0. 026
5%
Tech A
Cash Flow
PVFACTOR
PV
NPV

20, 000

5 yrs

30, 000
0. 7815
23445
3445
10

60000
0. 6319
37914
17914
15

90000
0. 481
43290
23, 290
20

120000
. 0. 3769
45228
25, 228

10%
20000
30, 000
0. 6209
18627
-1, 373
5

60000
0. 3855
23130
3130
10

90000
0. 2394
21546
1546
15

120000
0. 1486
17832
-2168
20

15%

5
20, 000
30, 000
0. 497
14910
-5090
10

60000
0. 247
14820
-5180
15

90000
0. 123
11070%
-8980
11070
20

120, 000
0. 061
7320%
-12680
7320

20%

5

30000
0. 402
4860
3860
10

60000
0. 162
9720
8720
15

90000%
0. 065
5850
4850
30

120000
0. 026
3000
-7000
TECHNOLOGY B
Tech B
CASH FLOW
FACTR
PV
NPV
10, 000

5%

5
30, 000
0. 7815
23445
22445
10
60000
0. 6139
36834
26834
15
90000
0. 4810
43290
33290
20
120, 000
0. 3769
45228
35228

10%

30, 000
0. 6209
18627
17627

60000
0. 3855
23130
13130

90000
0. 2394
21546
11545

120, 000
0. 1486
17832
7832

15%

30, 000
0. 497
14910
4910

60000
0. 247
14820
4820

90000
0. 123
11070
1070

120, 000
0. 061
7320
-2680

20%

30, 000
0. 402
12060
11060

60000
0. 162
9720
8720

90000
0. 065
5850
-4150

120, 000
0. 026
3000
-7000