**6 Appendix**

**6.1 Total process equipment and annual utility costs estimated for the production plant for scenario 1**

*Table 4: Associated process equipment costs*

|  |  |  |  |
| --- | --- | --- | --- |
| **AREA** | **PROCESS EQUIPMENT** | **No. of units** | **Total cost £** |
| Area 1 | Storage silo | 2 | 518 000 |
|  | Wheat tempering unit | 20 | 78 400 |
| Water pump | 1 | 3 000 |
| Air blower | 50 | 25 000 |
| Screw conveyor | 2 | 24 350 |
| Bucket elevator | 8 | 296 000 |
| Magnetic separator | 4 | 16 000 |
| Aspiration channel | 5 | 10 000 |
| Combi cleaner | 5 | 150 000 |
| Scourer | 5 | 100 000 |
| Breaker roller | 145 | 2 175 000 |
| Reduction roller | 145 | 1 450 000 |
| Cyclone separator | 50 | 88 250 |
| Rotary sifter | 290 | 3 100 |
|  |  | **SUB TOTAL** | **4.937.100** |
| Area 2 | Positive displacement pump | 4 | 129.015 |
|  | Mixing vessel | 1 | 114.800 |
| Mixing vessel | 1 | 149.240 |
|  |  | **SUB TOTAL** | **457.595** |
| Area 3 | Centrifugal pump | 4 | 57 007 |
|  | Centrifugal pump | 4 | 64 654 |
| Heat exchanger | 2 | 143 645 |
| Liquefaction reactors | 4 | 4 970 000 |
| Saccharification reactors | 16 | 14 400 000 |
|  |  | **SUB TOTAL** | **19 635 307** |
| Area 4 | Heat exchanger | 20 | 2 600 000 |
|  | Heat exchanger | 10 | 550 000 |
| Heat exchanger | 1 | 630 990 |
| Centrifugal pump | 21 | 121 730 |
| Fermenter reactors | 50 | 36 610 410 |
| Vessel | 6 | 1 584 370 |
| Separator decanter | 1 | 164 200 |
| Centrifuge | 5 | 1 166 500 |
|  |  | **SUB TOTAL =** | **43 428 200** |
| Area 5 | Centrifugal pump | 2 | 54 000 |
|  | Stirred tank mixer vessel | 1 | 38 000 |
| Continuous gravity decanter | 1 | 226 000 |
| Distillation column | 2 | 1 718 000 |
| Reboiler absorber column | 1 | 628 000 |
| Kettle reboiler | 3 | 524 000 |
| Condenser | 2 | 260 000 |
|  |  | **SUB TOTAL =** | **3 448 000** |
| Area 6 | Heat exchanger | 2 | 14 850 |
|  | Sieve plate column | 2 | 52 750 |
| Condenser | 2 | 21 100 |
| Reboiler | 2 | 79 300 |
| Centrifugal pump | 4 | 4 640 |
| Reflux drum | 2 | 12 800 |
| Acetone storage unit | 1 | 70 000 |
| Ethanol storage unit | 1 | 54 000 |
| Slop cut storage unit | 1 | 12 400 |
|  |  | **SUB TOTAL =** | **321 840** |
|  |  | **TOTAL = 72 228 042** | |

*Table 5: Associated utility costs per annum*

|  |  |  |
| --- | --- | --- |
| **AREA** | **UTILITY** | **ANNUAL COST £** |
| Area 1 | Towns water, 20 oC | 91.679 |
|  | Electricity | 13.581.228 |
|  | **SUB TOTAL =** | **13 672 907** |
| Area 2 | Towns water, 20 oC | 2 550 000 |
|  | LPS, 131 oC | 1.830.000 |
|  | Electricity | 29 100 000 |
|  | **SUB TOTAL =** | **33 480 000** |
| Area 3 | Towns water, 20 oC | 10 362 816 |
|  | Cooling water, 18 oC | 886.000 |
|  | LPS, 131 oC | 7 970 000 |
|  | Electricity | 28 458 900 |
|  | **SUB TOTAL =** | **47 677 716** |
| Area 4 | LPS, 131 oC | 1 728 000 |
|  | Nitrogen | 10 408 000 |
|  | Aqueous effluent disposal | 17 924 961 |
|  | Electricity | 9 450 127 |
|  | **SUB TOTAL =** | **39 511 088** |
| Area 5 | Cooling water, 18 oC | 30 240 |
|  | Electricity | 11 760 |
|  | IPS, 201 oC | 1 740 720 |
|  | LPS, 131 oC | 1 673 840 |
|  | Aqueous effluent disposal | 679 488 |
|  | **SUB TOTAL =** | **4 136 048** |
| Area 6 | Cooling water, 18 oC | 181 428 |
|  | LPS, 131 oC | 322 072 |
|  | Electricity | 3 412 |
|  | Nitrogen | 2 793 |
|  | Towns water, 20 oC | 260 |
|  | Compressed air | 5 |
|  | **SUB TOTAL =** | **509 970** |
|  | **TOTAL =** | **138 987 729** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **6.2 Total process equipment and annual utility costs estimated for the production plant for scenario 1**  *Table 6: Cash-flows, discounted cash flows and Net Present Value NPVt=0 for scenario 1 where, fnd represents the discount factor for the year at the relevant discount rate i*   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Scenario 1** | | ***i* = 5%** | | ***i* = 10%** | | | **Year n** | **Cash flow / million £** | **fnd** | **DCF / million £** | **fnd** | **DCF / million £** | | 0 | -215 | 1.000 | -215 | 1.000 | -215 | | 1 | -310 | 0.952 | -295 | 0.909 | -282 | | 2 | -268 | 0.907 | -243 | 0.866 | -232 | | 3 | -279 | 0.864 | -241 | 0.825 | -230 | | 4 | -290 | 0.823 | -239 | 0.785 | -228 | | 5 | -302 | 0.784 | -237 | 0.748 | -226 | | 6 | -314 | 0.746 | -235 | 0.712 | -224 | | 7 | -327 | 0.711 | -233 | 0.678 | -222 | | 8 | -341 | 0,677 | -231 | 0.646 | -220 | | 9 | -355 | 0.645 | -229 | 0.615 | -218 | | 10 | -369 | 0.614 | -227 | 0.586 | -216 | | 11 | -384 | 0.585 | -225 | 0.558 | -214 | | 12 | -400 | 0.557 | -223 | 0,532 | -213 | | 13 | -416 | 0.530 | -221 | 0.506 | -211 | | 14 | -433 | 0.505 | -219 | 0.482 | -209 | | 15 | -429 | 0.481 | -206 | 0.459 | -197 | | 16 | 56 | 0.458 | 26 | 0.437 | 24 | |  | | | | | | | **Total CF** | -5 376 | **NPVt=0** | -3 690 | **NPVt=0** | -3 532 | |  |  |

*Table 7: Cash-flows, discounted cash flows and Net Present Value NPVt=0 for scenario 2*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Scenario 2** | | ***i* = 5%** | | ***i* = 10%** | |
| **Year n** | **Cash flow / million £** | **fnd** | **DCF / million £** | **fnd** | **DCF / million £** |
| 0 | -180 | 1.000 | -180 | 1.000 | -180 |
| 1 | -259 | 0.952 | -246 | 0.909 | -235 |
| 2 | -232 | 0.907 | -211 | 0.866 | -201 |
| 3 | -242 | 0.864 | -209 | 0.825 | -199 |
| 4 | -252 | 0.823 | -207 | 0.785 | -198 |
| 5 | -262 | 0.784 | -205 | 0.748 | -196 |
| 6 | -272 | 0.746 | -203 | 0.712 | -194 |
| 7 | -283 | 0.711 | -201 | 0.678 | -192 |
| 8 | -295 | 0.677 | -199 | 0.646 | -190 |
| 9 | -307 | 0.645 | -198 | 0.615 | -189 |
| 10 | -319 | 0.614 | -196 | 0.586 | -187 |
| 11 | -332 | 0.585 | -194 | 0.558 | -185 |
| 12 | -345 | 0.557 | -192 | 0.532 | -183 |
| 13 | -359 | 0.530 | -190 | 0.506 | -182 |
| 14 | -373 | 0.505 | -188 | 0.482 | -180 |
| 15 | -379 | 0.481 | -182 | 0.459 | -174 |
| 16 | 38 | 0.458 | 18 | 0.437 | 17 |
|  |  |  |  |  |  |
| **Total CF** | -4 650 | **NPVt=0** | -3 184 | **NPVt=0** | -3 048 |

**6.3 Utilities and raw materials cost/area analysis for scenarios 1 & 2**

*Table 8: Utilities cost/area analysis for scenario 1*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref. no** | **UTILITIES - COST/AREA ANALYSIS** | **AREA 1** | **AREA 2** | **AREA 3** | **AREA 4** | **AREA 5** | **AREA 6** | **UTILITY TOTAL (£)** | **% OF PLANT TOTAL** |
| 1 | Towns water, 20 oC | 91 679 | 2 550 000 | 10 362 816 | 0 | 0 | 260 | 13 004 754 | 9% |
| 2 | Air | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| 3 | Electricity | 13 581 228 | 29 100 000 | 28 458 900 | 9 450 127 | 11 760 | 3 412 | 80 605 427 | 58% |
| 4 | LPS, 131 oC | 0 | 1 830 000 | 7 970 000 | 1 728 000 | 1 673 840 | 322 072 | 13 523 912 | 10% |
| 5 | Cooling water, 18 oC | 0 | 0 | 886 000 | 0 | 30 240 | 181 428 | 1 097 668 | 1% |
| 6 | IPS, 201 oC | 0 | 0 | 0 | 0 | 1 740 720 | 0 | 1 740 720 | 1% |
| 7 | Compressed air | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0% |
| 8 | Nitrogen | 0 | 0 | 0 | 10 408.000 | 0 | 2 793 | 10 410 793 | 7% |
| 9 | Aqueous effluent disposal | 0 | 0 | 0 | 17 924 961 | 679 488 | 0 | 18 604 449 | 13% |
| **AREA AND PLANT TOTALS** | | **13 672 907** | **33 480 000** | **47 677 716** | **39 511 088** | **4 136 048** | **509 970** | **138 987 729** | **100%** |

*Table 9: Raw materials cost/area analysis for scenario 1*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref. no** | **RAW MATERIAL-PLANT COSTS** | **AREA 1** | **AREA 2** | **AREA 3** | **AREA 4** | **AREA 5** | **AREA 6** | **RAW MATERIAL TOTAL (£)** | **% OF PLANT TOTAL** |
| 1 | Wheat | 158 041 600 | 0 | 0 | 0 | 0 | 0 | 158 041 600 | 96% |
| 2 | α-amylase | 0 | 0 | 60 960 | 0 | 0 | 0 | 60 960 | 0% |
| 3 | Glucoamylase | 0 | 0 | 2 910 800 | 0 | 0 | 0 | 2 910 800 | 2% |
| 4 | Sulfuric acid | 0 | 0 | 5 245 | 0 | 0 | 0 | 5 245 | 0% |
| 5 | Caustic soda | 0 | 0 |  | 3 415 854 | 0 | 0 | 3 415 854 | 2% |
| **AREA AND PLANT TOTALS** | | **158 041 600** | **0** | **2 977 005** | **3 415 854** | **0** | **0** | **164 434 458** | **100%** |

*Table 10: Utilities cost/area analysis for scenario 2*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref. no** | **UTILITIES - COST/AREA ANALYSIS** | **AREA 1** | **AREA 2** | **AREA 3** | **AREA 4** | **AREA 5** | **AREA 6** | **UTILITY**  **TOTAL (£)** | **% OF PLANT TOTAL** |
| 1 | Towns water, 20 oC | 91 679 | 2 550 000 | 10 362 816 | 0 | 0 | 260 | 13 004 754 | 11% |
| 2 | Air | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| 3 | Electricity | 13 581 228 | 20 370 000 | 18 498 285 | 9.450.127 | 11 760 | 3 412 | 61 914 812 | 52% |
| 4 | LPS, 131 oC | 0 | 1 830 000 | 5 770 000 | 1 728 000 | 1 673 840 | 322 072 | 11 323 912 | 10% |
| 5 | Cooling water, 18 oC | 0 | 0 | 886 000 | 0 | 30 240 | 181 428 | 1 097 668 | 1% |
| 6 | IPS, 201 oC | 0 | 0 | 0 | 0 | 1 740 720 | 0 | 1 740 720 | 1% |
| 7 | Compressed air | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0% |
| 8 | Nitrogen | 0 | 0 | 0 | 10 408 000 | 0 | 2 793 | 10 410 793 | 9% |
| 9 | Aqueous effluent disposal | 0 | 0 | 0 | 17 924 961 | 679 488 | 0 | 18 604 449 | 16% |
| **AREA AND PLANT TOTALS** | | **13 672 907** | **24 750 000** | **35 517 101** | **39 511 088** | **4 136 048** | **509 970** | **118 097 114** | **100%** |

*Table 11: Raw materials cost/area analysis for scenario 2*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ref. no** | **RAW MATERIAL COSTS** | **AREA 1** | **AREA 2** | **AREA 3** | **AREA 4** | **AREA 5** | **AREA 6** | **RAW MATERIAL**  **TOTAL (£)** | **% OF TOTAL** |
| 1 | Wheat | 158 041 600 | 0 | 0 | 0 | 0 | 0 | 158 041 600 | 96% |
| 2 | α-amylase | 0 | 0 | 60 960 | 0 | 0 | 0 | 60 960 | 0% |
| 3 | Glucoamylase | 0 | 0 | 2 910 800 | 0 | 0 | 0 | 2 910 800 | 2% |
| 4 | Sulfuric acid | 0 | 0 | 5 245 | 0 | 0 | 0 | 5 245 | 0% |
| 5 | Caustic soda | 0 | 0 | 0 | 3 415 854 | 0 | 0 | 3 415 854 | 2% |
| **AREA AND PLANT TOTALS** | | **158 041 600** | **0** | **2 977 005** | **3 415 854** | **0** | **0** | **164 434 458** | **100%** |

**6.4 Assumptions employed in completing the cost summaries for scenarios 1 & 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **FIXED CAPITAL INVESTMENT - Estimate** |  | **S1** |  | **S2** |
|  | **Lang factor (Fluids-Solids type processing plant) (Sinnott et al., 2005 p252)** | **Relevant Cost** |  | **Relevant Cost** |
| **A. DIRECT COSTS** |  | **£** |  | **£** |
| Equipment erection | 0.45 | 32 502 619 |  | 27 103 813 |
| Piping | 0.45 | 32 502 619 |  | 27 103 813 |
| Instrumentation | 0.15 | 10 834 206 |  | 9 034 604 |
| Electrical | 0.10 | 7 222 804 |  | 6 023 070 |
| Buildings | 0.10 | 7 222 804 |  | 6 023 070 |
| Land |  | 2 876 500 |  | 2 876 500 |
| Equipment |  | 72 228 042 |  | 60 230 697 |
|  |  |  |  |  |
| **SUB TOTAL** |  | **165 389 593** |  | **138 395 567** |
|  |  |  |  |  |
| **B. INDIRECT COSTS** |  |  |  |  |
| Design and engineering | 0.25 | 41 347 398 |  | 34 598 892 |
| Contractor’s fees | 0.05 | 8 269 480 |  | 6 919 778 |
| Contingency allowance (Incl. in working capital) | 0.10 | 16 538 959 |  | 13 839 557 |
| **SUB TOTAL** |  | **66 155 837** |  | **55 358 227** |
| **TOTAL FIXED CAPITAL INVESTMENT (A+B)** | 1.40 | **231 545 431** |  | **193 753 794** |
|  |  |  |  |  |
| **Notes:** |  |  |  |  |
| 1. Estimates made from total equipment cost | |  |  |  |
| 2. S1: Scenario 1 - Original estimates |  |  |  |  |
| 3. S2: Scenario 2 – Revised estimates following feasible cost reduction |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CAPEX** | **SCENARIO 1** |  |  | **SCENARIO 2** | **S2/S1** |
| **FIXED CAPITAL** | **£** |  | **Factor used %** | **£** | **%** |
| Equipment cost | 72 228 042 |  |  | 60 230 697 | 83.4% |
| Equipment erection and structural work | 32 502 619 |  |  | 27 103 813 | 83.4% |
| Piping insulation and painting | 32 502 619 |  |  | 27 103 813 | 83.4% |
| Instrumentation and control equipment | 10 834 206 |  |  | 9.034 604 | 83.4% |
| Electrical power and lighting | 7 222 804 |  |  | 6 023 070 | 83.4% |
| Process buildings and structures | 7 222 804 |  |  | 6 023 070 | 83.4% |
| Land | 2 876 500 |  |  | 2 876 500 | 100.0% |
| **SUB-TOTAL** | **165 389 593** |  |  | **138 395 567** | **83.7%** |
|  |  |  |  |  |  |
| Design & engineering costs | 41 347 398 |  |  | 34 598 892 | 83.7% |
| Contractor’s fees | 8 269 480 |  |  | 6 919 778 | 83.7% |
| **SUB-TOTAL** | **49 616 878** |  |  | **41 518 670** | **83.7%** |
|  |  |  |  |  |  |
| **TOTAL FIXED CAPITAL** | **215 006 471** |  |  | **179 914 237** | **83.7%** |
|  |  |  |  |  |  |
| **WORKING CAPITAL** | **£** |  |  | **£** | **%** |
| Start-up | 3 000 000 |  |  | 2 300 000 | 76.7% |
| Initial catalyst charges | 1 485 880 |  |  | 1 485 880 | 100.0% |
| Raw materials and intermediates in the process | 21 500 647 |  | 5% | 8 995 712 | 41.8% |
| Finished product inventories | 10 750 324 |  | 5% | 8 995 712 | 83.7% |
| Contingency allowance | 16 538 959 |  |  | 13 839 557 | 83.7% |
| Funds to cover outstanding accounts from customers | 0 |  | 0% | 0 |  |
| **TOTAL WORKING CAPITAL** | **53 275 810** |  | 20% | **35 616 860** | **66.9%** |
|  |  |  |  |  |  |
| **TOTAL CAPITAL INVESTMENT** | **268 282 282** |  |  | **215 531 098** | **80.3%** |
|  |  |  |  |  |  |
| **OPEX** | **£** |  | **%** | **£** | **%** |
| **VARIABLE COSTS** |  |  |  |  |  |
| Raw materials | 164 434 458 |  |  | 164 434 458 | 100.0% |
| Miscellaneous materials [10% (2)] | 1 505 045 |  | 10% | 899 571 | 59.8% |
| Utilities | 138 987 729 |  |  | 118 097 114 | 85.0% |
| **TOTAL VARIABLE COSTS** | **304 927 232** |  |  | **283 431 143** | **93.0%** |
|  |  |  |  |  |  |
| **FIXED COSTS** | **£** |  | **%** | **£** | **%** |
| Maintenance [5-10% (1)] used 7% | 15 050 453 |  | 5% | 8 995 712 | 59.8% |
| Operating labour [max 15% (3)] used 5% | 15 171 109 |  | 5% | 14 126 579 | 93.1% |
| Laboratory costs [20-30% (4)] used 20% | 3 034 222 |  | 20% | 2 825 316 | 93.1% |
| Supervision (estimated assuming personnel for 6 Areas) | 2 063 100 |  |  | 2 063 100 | 100.0% |
| Plant overheads [50-100% (3)] used 50% | 7 585 555 |  | 50% | 7 063 289 | 93.1% |
| Capital charges - Buildings | 722 280 |  | 10% | 602 307 | 83.4% |
| Capital charges - Equipment | 7 222 804 |  | 10% | 6 023 070 | 83.4% |
| Tax - Gaseous emissions | 232 480 |  | 10% | 232 480 | 100.0% |
| Tax – Corporation tax (19%) | 0 |  |  | 0 |  |
| **TOTAL FIXED COSTS** | **51 082 003** |  |  | **41 931 852** | **82.1%** |
|  |  |  |  |  |  |
| **TOTAL VARIABLE & FIXED COSTS** | **356 009 236** |  |  | **325 362 995** | **91.4%** |
|  |  |  |  |  |  |
| **INDIRECT [**20-30 % (5)] | **£** |  | **%** | **£** | **%** |
| Sales expense (5 % of indirect costs) | 15 246 362 |  | 3% | 8 502 934 | 55.8% |
| Insurance (2% of indirect costs) | 4 300 129 |  | 2% | 3 598 285 | 83.7% |
| Royalties and licence fees (2% of indirect costs) | 2 499 316 |  | 1% | 1 249 658 | 50.0% |
| General overheads (3% of indirect costs) | 9 147 817 |  | 3% | 8 502 934 | 93.0% |
| R&D \* | 0 |  | 0% | 0 |  |
| **TOTAL INDIRECT COSTS** | **31 193 624** |  |  | **21 853 811** | **70.1%** |
|  |  |  |  |  |  |
| **TOTAL OPEX** | **387 202 860** |  |  | **347 216 807** | **89.7%** |
|  |  |  |  |  |  |
| **Notes** (Sinnott et al., 2005 p 261-267): |  |  |  |  |  |
| (1) – of total fixed capital |  |  |  |  |  |
| (2) – of maintenance costs |  |  |  |  |  |
| (3) – of total operating costs |  |  |  |  |  |
| (4) – of total operating labour |  |  |  |  |  |
| (5) – of total direct production costs |  |  |  |  |  |
| (6) – of total sales |  |  |  |  |  |
| \* Assumed no R&D as royalties and fees are paid |  |  |  |  |  |

*Figure 5:* *Cost summary breakdown for scenarios 1 & 2 including key assumptions employed (Sinnott et al., 2005 p.261-267)*

**6.5 Cash flow statements for both scenarios 1 & 2 including discounted cash flow calculations at two different discount rates**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CASH-FLOW STATEMENT - PERIOD: 15 YEARS (SCENARIO 1)** | |  | **YR0** | **YR1** | **YR2** | **YR3** | **YR4** | **YR5** | **YR6** | **YR7** | **YR8** | **YR9** | **YR10** | **YR11** | **YR12** | **YR13** | | **YR14** | | **YR15** | | **YR16** | |
| **CURRENCY: £ Millions** | |  | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **2031** | **2032** | **2033** | | **2034** | | **2035** | | **2036** | |
| **1** | *ANNUAL INCREASE - estimate FOR VARIABLE COSTS* |  |  | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | | *104%* | | *104%* | | *104%* | |
| **1** | *ANNUAL INCREASE - estimate FOR FIXED COSTS* |  |  | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | | *106%* | | *106%* | | *106%* | |
| **1** | *ANNUAL INCREASE - estimate FOR SALES* |  |  | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | | *105%* | | *105%* | | *105%* | |
| **CASH OUTFLOW** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **FIXED CAPITAL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | EQUIPMENT COST |  | **72** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | EQUIPMENT ERECTION, FOUNDATIONS AND STRUCTURAL WORK |  | **33** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | PIPING INSULATION AND PAINTING |  | **33** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | INSTRUMENTATION AND CONTROL EQUIPMENT |  | **11** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | ELECTRICAL POWER AND LIGHTING |  | **7** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | PROCESS BUILDINGS AND STRUCTURES |  | **7** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | LAND |  | **3** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | DESIGN AND ENGINEERING COSTS |  | **41** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | CONTRACTOR'S FEES |  | **8** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **TOTAL CASH OUTFLOW FROM FIXED CAPITAL** |  | **215** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **2** | **WORKING CAPITAL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | START-UP |  |  | **3** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | INITIAL CATALYST CHARGES |  |  | **1** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | RAW MATERIALS FOR INTERMEDIATES IN THE PROCESS |  |  | **22** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | FINISHED PRODUCT INVENTORIES |  |  | **11** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | CONTIGENCY ALLOWANCE |  |  | **17** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | FUNDS TO COVER OUTSTANDING ACCOUNTS FROM CUSTOMERS |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | |
|  | **TOTAL CASH OUTFLOW FROM WORKING CAPITAL** |  | **0** | **53** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **OPEX** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **VARIABLE COSTS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | RAW MATERIALS |  |  | **171** | **178** | **185** | **192** | **200** | **208** | **216** | **225** | **234** | **243** | **253** | **263** | **274** | | **285** | | **274** | | **0** | |
|  | MISCELLANEOUS MATERIALS |  |  | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **3** | | **3** | | **3** | | **0** | |
|  | UTILITIES |  | **0** | **145** | **150** | **156** | **163** | **169** | **176** | **183** | **190** | **198** | **206** | **214** | **223** | **231** | | **241** | | **250** | | **0** | |
|  | **TOTAL CASH OUTFLOW VARIABLE COSTS** |  | **0** | **317** | **330** | **343** | **357** | **371** | **386** | **401** | **417** | **434** | **451** | **469** | **488** | **508** | | **528** | | **527** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **FIXED COSTS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | MAINTENANCE |  |  | **16** | **17** | **18** | **19** | **20** | **21** | **23** | **24** | **25** | **27** | **29** | **30** | **32** | | **34** | | **36** | |  | |
|  | OPERATING LABOUR |  |  | **16** | **17** | **18** | **19** | **20** | **22** | **23** | **24** | **26** | **27** | **29** | **31** | **32** | | **34** | | **36** | |  | |
|  | LABORATORY COSTS |  |  | **3** | **3** | **4** | **4** | **4** | **4** | **5** | **5** | **5** | **5** | **6** | **6** | **6** | | **7** | | **7** | |  | |
|  | SUPERVISION |  |  | **2** | **2** | **2** | **3** | **3** | **3** | **3** | **3** | **3** | **4** | **4** | **4** | **4** | | **5** | | **5** | |  | |
|  | PLANT OVERHEADS (65% OF LABOUR COSTS) |  |  | **8** | **9** | **9** | **10** | **10** | **11** | **11** | **12** | **13** | **14** | **14** | **15** | **16** | | **17** | | **18** | |  | |
|  | CAPITAL CHARGES - BUILDINGS |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | CAPITAL CHARGES - EQUIPMENT |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **3** | TAX - GASEOUS EMISSIONS |  |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **0** | |
| **4** | TAX - CORPORATION TAX |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **TOTAL FIXED COSTS** |  | **0** | **45** | **48** | **51** | **54** | **58** | **61** | **65** | **69** | **73** | **77** | **82** | **87** | **92** | | **97** | | **103** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **TOTAL VARIABLE & FIXED COSTS** |  | **0** | **363** | **378** | **394** | **411** | **429** | **447** | **466** | **486** | **507** | **528** | **551** | **575** | **599** | | **625** | | **630** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **INDIRECT** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | SALES EXPENSE 0,25 OF DIRECT PRODUCTION COST |  |  | **16** | **16** | **17** | **18** | **19** | **19** | **20** | **21** | **22** | **23** | **23** | **24** | **25** | | **26** | | **27** | |  | |
|  | GENERAL OVERHEADS |  |  | **10** | **10** | **10** | **11** | **11** | **12** | **12** | **13** | **13** | **14** | **14** | **15** | **15** | | **16** | | **16** | |  | |
|  | R&D |  |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | |  | |
|  | **TOTAL INDIRECT COSTS** |  | **0** | **25** | **26** | **27** | **29** | **30** | **31** | **32** | **33** | **35** | **36** | **38** | **39** | **41** | | **42** | | **44** | | **0** | |
|  | **TOTAL CASH OUTFLOW FROM OPEX** |  | **0** | **388** | **405** | **422** | **440** | **458** | **478** | **498** | **519** | **541** | **565** | **589** | **614** | **640** | | **668** | | **674** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **TOTAL CASH OUTFLOW** |  | **215** | **441** | **405** | **422** | **440** | **458** | **478** | **498** | **519** | **541** | **565** | **589** | **614** | **640** | | **668** | | **674** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **CASH INFLOW** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | BUTANOL |  |  | **107** | **112** | **118** | **124** | **130** | **137** | **144** | **151** | **158** | **166** | **174** | **183** | **192** | | **202** | | **212** | |  | |
|  | ETHANOL |  |  | **8** | **9** | **9** | **10** | **10** | **11** | **11** | **12** | **12** | **13** | **14** | **14** | **15** | | **16** | | **17** | |  | |
|  | ACETONE |  |  | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | | **15** | | **15** | |  | |
|  | HYDROGEN |  |  | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **2** | | **2** | | **2** | |  | |
|  | **TOTAL CASH INFLOW FROM SALES** |  | **0** | **131** | **137** | **143** | **150** | **156** | **163** | **171** | **179** | **187** | **195** | **204** | **214** | **224** | | **234** | | **245** | | **0** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | WORKING CAPITAL RELEASE |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **53** | |
|  | LAND REALEASE |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | | **0** | | **0** | | **3** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **TOTAL CASH INFLOW** |  | **0** | **131** | **137** | **143** | **150** | **156** | **163** | **171** | **179** | **187** | **195** | **204** | **214** | **224** | | **234** | | **245** | | **56** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **NET CASH INFLOW / -OUTFLOW** |  | **-215** | **-310** | **-268** | **-279** | **-290** | **-302** | **-314** | **-327** | **-341** | **-355** | **-369** | **-384** | **-400** | **-416** | | **-433** | | **-429** | | **56** | |
|  | **NET CASH INFLOW / -OUTFLOW CUMULATIVE** |  | **-215** | **-525** | **-793** | **-1 071** | **-1 361** | **-1 663** | **-1 978** | **-2 305** | **-2 646** | **-3 001** | **-3 370** | **-3 754** | **-4 154** | **-4 570** | | **-5 003** | | **-5 432** | | **-5 376** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **7** | **DISCOUNT RATE (*i*)** | **5%** |  | **105%** | **110%** | **116%** | **122%** | **128%** | **134%** | **141%** | **148%** | **155%** | **163%** | **171%** | **180%** | **189%** | | **198%** | | **208%** | | **218%** | |
|  | ***DISCOUNT FACTOR*** |  |  | ***0,952*** | ***0,907*** | ***0,864*** | ***0,823*** | ***0,784*** | ***0,746*** | ***0,711*** | ***0,677*** | ***0,645*** | ***0,614*** | ***0,585*** | ***0,557*** | ***0,530*** | | ***0,505*** | | ***0,481*** | | ***0,458*** | |
|  | **DCF** |  | **-215** | **-295** | **-243** | **-241** | **-239** | **-237** | **-235** | **-233** | **-231** | **-229** | **-227** | **-225** | **-223** | **-221** | | **-219** | | **-206** | | **26** | |
|  | **CUMULATIVE DCF** |  | **-215** | **-510** | **-753** | **-994** | **-1 232** | **-1 469** | **-1 704** | **-1 936** | **-2 167** | **-2 395** | **-2 622** | **-2 847** | **-3 070** | **-3 290** | | **-3 509** | | **-3 715** | | **-3 690** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **8** | **DISCOUNT RATE (*i*)** | **10%** |  | **110%** | **116%** | **121%** | **127%** | **134%** | **140%** | **147%** | **155%** | **163%** | **171%** | **179%** | **188%** | **198%** | | **207%** | | **218%** | | **229%** | |
|  | ***DISCOUNT FACTOR*** |  |  | ***0,909*** | ***0,866*** | ***0,825*** | ***0,785*** | ***0,748*** | ***0,712*** | ***0,678*** | ***0,646*** | ***0,615*** | ***0,586*** | ***0,558*** | ***0,532*** | ***0,506*** | | ***0,482*** | | ***0,459*** | | ***0,437*** | |
|  | **DCF** |  | **-215** | **-282** | **-232** | **-230** | **-228** | **-226** | **-224** | **-222** | **-220** | **-218** | **-216** | **-214** | **-213** | **-211** | | **-209** | | **-197** | | **24** | |
|  | **CUMULATIVE DCF** |  | **-215** | **-497** | **-729** | **-958** | **-1 186** | **-1 412** | **-1 636** | **-1 858** | **-2 078** | **-2 296** | **-2 513** | **-2 727** | **-2 940** | **-3 150** | | **-3 359** | | **-3 556** | | **-3 532** | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | **NOTES:** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **1** | **Estimated Inflation rate per year used as follows:** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | *ANNUAL INCREASE - estimate FOR VARIABLE COSTS* | 4% |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | *ANNUAL INCREASE - estimate FOR FIXED COSTS* | 6% |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | *ANNUAL INCREASE - estimate FOR SALES* | 5% |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **2** | **Working capital included in year 1 and not in year 0 as it is assumed that it will be incurred at the end of year 0 (Dec 2020) and after completion of construction of plant** | | | | | | | | | | | | | | | |  | |  | |  | |  | |
| **3** | **Emissions tax (Gaseous emissions) is paid 1 year in arrears** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **4** | **There is no corporation tax liability** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **5** | **VAT is ignored for simplicity** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **6** | **It is assumed that equipment/buildings have no scrap value at the end of the project** | | | |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **7** | **DISCOUNT RATE (*i*) %** | **5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | 1. INTEREST RATE | 3% |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | 2. INFLATION | 2% |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
| **8** | **DISCOUNT RATE (*i*) %** | **10** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | 1. INTEREST RATE | 8% |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |
|  | 2. INFLATION | 2% |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  | |  | |  | |

*Figure 6: Cash flow statement assuming 15-year operating life for plant, including DCF analysis for scenario 1*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CASH-FLOW STATEMENT - PERIOD: 15 YEARS (SCENARIO 2)** | | | **YR0** | **YR1** | **YR2** | **YR3** | **YR4** | **YR5** | **YR6** | **YR7** | **YR8** | **YR9** | **YR10** | **YR11** | **YR12** | **YR13** | **YR14** | **YR15** | **YR16** |
| **CURRENCY: £ Millions** | |  | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **2031** | **2032** | **2033** | **2034** | **2035** | **2036** |
|  | *ANNUAL INCREASE - estimate FOR VARIABLE COSTS* |  |  | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* |
|  | *ANNUAL INCREASE - estimate FOR FIXED COSTS* |  |  | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* |
|  | *ANNUAL INCREASE - estimate FOR SALES* |  |  | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* |
| **CASH OUTFLOW** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **FIXED CAPITAL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | EQUIPMENT COST |  | **60** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | EQUIPMENT ERECTION, FOUNDATIONS AND STRUCTURAL WORK |  | **27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | PIPING INSULATION AND PAINTING |  | **27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | INSTRUMENTATION AND CONTROL EQUIPMENT |  | **9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | ELECTRICAL POWER AND LIGHTING |  | **6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | PROCESS BUILDINGS AND STRUCTURES |  | **6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | LAND |  | **3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | DESIGN AND ENGINEERING COSTS |  | **35** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | CONTRACTOR'S FEES |  | **7** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL CASH OUTFLOW FROM FIXED CAPITAL** |  | **180** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **WORKING CAPITAL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | START-UP |  |  | **2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | INITIAL CATALYST CHARGES |  |  | **1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | RAW MATERIALS FOR INTERMEDIATES IN THE PROCESS |  |  | **9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | FINISHED PRODUCT INVENTORIES |  |  | **9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | CONTIGENCY ALLOWANCE |  |  | **14** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | FUNDS TO COVER OUTSTANDING ACCOUNTS FROM CUSTOMERS |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  | **TOTAL CASH OUTFLOW FROM WORKING CAPITAL** |  | **0** | **36** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **OPEX** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **VARIABLE COSTS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | RAW MATERIALS |  |  | **171** | **178** | **185** | **192** | **200** | **208** | **216** | **225** | **234** | **243** | **253** | **263** | **274** | **285** | **287** | **0** |
|  | MISCELLANEOUS MATERIALS |  |  | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **2** | **2** | **0** |
|  | UTILITIES |  | **0** | **123** | **128** | **133** | **138** | **144** | **149** | **155** | **162** | **168** | **175** | **182** | **189** | **197** | **205** | **213** | **0** |
|  | **TOTAL CASH OUTFLOW VARIABLE COSTS** |  | **0** | **295** | **307** | **319** | **332** | **345** | **359** | **373** | **388** | **403** | **420** | **436** | **454** | **472** | **491** | **501** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **FIXED COSTS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | MAINTENANCE |  |  | **10** | **10** | **11** | **11** | **12** | **13** | **14** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **22** |  |
|  | OPERATING LABOUR |  |  | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **23** | **24** | **25** | **27** | **28** | **30** | **32** | **34** |  |
|  | LABORATORY COSTS |  |  | **3** | **3** | **3** | **4** | **4** | **4** | **4** | **5** | **5** | **5** | **5** | **6** | **6** | **6** | **7** |  |
|  | SUPERVISION |  |  | **2** | **2** | **2** | **3** | **3** | **3** | **3** | **3** | **3** | **4** | **4** | **4** | **4** | **5** | **5** |  |
|  | PLANT OVERHEADS (65% OF LABOUR COSTS) |  |  | **7** | **7** | **8** | **8** | **9** | **9** | **10** | **11** | **11** | **12** | **13** | **13** | **14** | **15** | **16** |  |
|  | CAPITAL CHARGES - BUILDINGS |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | CAPITAL CHARGES - EQUIPMENT |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | TAX - GASEOUS EMISSIONS |  |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  | TAX - CORPORATION TAX |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL FIXED COSTS** |  | **0** | **37** | **39** | **42** | **44** | **47** | **49** | **52** | **55** | **59** | **62** | **66** | **70** | **74** | **79** | **83** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL VARIABLE & FIXED COSTS** |  | **0** | **332** | **346** | **360** | **376** | **391** | **408** | **425** | **443** | **462** | **482** | **502** | **524** | **546** | **569** | **584** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **INDIRECT** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | SALES EXPENSE 0,25 OF DIRECT PRODUCTION COST |  |  | **9** | **9** | **10** | **10** | **10** | **11** | **11** | **12** | **12** | **13** | **13** | **14** | **14** | **15** | **15** |  |
|  | INSURANCE |  |  | **4** | **4** | **4** | **4** | **4** | **5** | **5** | **5** | **5** | **5** | **6** | **6** | **6** | **6** | **6** |  |
|  | ROYALTIES & LICENSE FEES |  |  | **1** | **1** | **1** | **1** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** |  |
|  | GENERAL OVERHEADS |  |  | **9** | **9** | **10** | **10** | **10** | **11** | **11** | **12** | **12** | **13** | **13** | **14** | **14** | **15** | **15** |  |
|  | R&D |  |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |  |
|  | **TOTAL INDIRECT COSTS** |  | **0** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** | **31** | **32** | **34** | **35** | **36** | **38** | **39** | **0** |
|  | **TOTAL CASH OUTFLOW FROM OPEX** |  | **0** | **354** | **369** | **385** | **401** | **418** | **436** | **454** | **473** | **493** | **514** | **536** | **559** | **583** | **607** | **624** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL CASH OUTFLOW** |  | **180** | **390** | **369** | **385** | **401** | **418** | **436** | **454** | **473** | **493** | **514** | **536** | **559** | **583** | **607** | **624** | **0** |
| **CASH INFLOW** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | BUTANOL |  |  | **107** | **112** | **118** | **124** | **130** | **137** | **144** | **151** | **158** | **166** | **174** | **183** | **192** | **202** | **212** |  |
|  | ETHANOL |  |  | **8** | **9** | **9** | **10** | **10** | **11** | **11** | **12** | **12** | **13** | **14** | **14** | **15** | **16** | **17** |  |
|  | ACETONE |  |  | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** |  |
|  | HYDROGEN |  |  | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **2** | **2** | **2** |  |
|  | **TOTAL CASH INFLOW FROM SALES** |  | **0** | **131** | **137** | **143** | **150** | **156** | **163** | **171** | **179** | **187** | **195** | **204** | **214** | **224** | **234** | **245** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | WORKING CAPITAL RELEASE |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **36** |
|  | LAND REALEASE |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **3** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL CASH INFLOW** |  | **0** | **131** | **137** | **143** | **150** | **156** | **163** | **171** | **179** | **187** | **195** | **204** | **214** | **224** | **234** | **245** | **38** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **NET CASH INFLOW / -OUTFLOW** |  | **-180** | **-259** | **-232** | **-242** | **-252** | **-262** | **-272** | **-283** | **-295** | **-307** | **-319** | **-332** | **-345** | **-359** | **-373** | **-379** | **38** |
|  | **NET CASH INFLOW / -OUTFLOW CUMULATIVE** |  | **-180** | **-439** | **-671** | **-913** | **-1164** | **-1426** | **-1698** | **-1982** | **-2276** | **-2583** | **-2902** | **-3233** | **-3578** | **-3937** | **-4310** | **-4689** | **-4650** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **DISCOUNT RATE (*i*)** | **5%** |  | **105%** | **110%** | **116%** | **122%** | **128%** | **134%** | **141%** | **148%** | **155%** | **163%** | **171%** | **180%** | **189%** | **198%** | **208%** | **218%** |
|  | ***DISCOUNT FACTOR*** |  |  | ***0,952*** | ***0,907*** | ***0,864*** | ***0,823*** | ***0,784*** | ***0,746*** | ***0,711*** | ***0,677*** | ***0,645*** | ***0,614*** | ***0,585*** | ***0,557*** | ***0,530*** | ***0,505*** | ***0,481*** | ***0,458*** |
|  | **DCF** |  | **-180** | **-246** | **-211** | **-209** | **-207** | **-205** | **-203** | **-201** | **-199** | **-198** | **-196** | **-194** | **-192** | **-190** | **-188** | **-182** | **18** |
|  | **CUMULATIVE DCF** |  | **-180** | **-426** | **-637** | **-846** | **-1053** | **-1258** | **-1461** | **-1663** | **-1862** | **-2060** | **-2255** | **-2449** | **-2641** | **-2832** | **-3020** | **-3202** | **-3184** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **DISCOUNT RATE (*i*)** | **10%** |  | **110%** | **116%** | **121%** | **127%** | **134%** | **140%** | **147%** | **155%** | **163%** | **171%** | **179%** | **188%** | **198%** | **207%** | **218%** | **229%** |
|  | ***DISCOUNT FACTOR*** |  |  | ***0,909*** | ***0,866*** | ***0,825*** | ***0,785*** | ***0,748*** | ***0,712*** | ***0,678*** | ***0,646*** | ***0,615*** | ***0,586*** | ***0,558*** | ***0,532*** | ***0,506*** | ***0,482*** | ***0,459*** | ***0,437*** |
|  | **DCF** |  | **-180** | **-235** | **-201** | **-199** | **-198** | **-196** | **-194** | **-192** | **-190** | **-189** | **-187** | **-185** | **-183** | **-182** | **-180** | **-174** | **17** |
|  | **CUMULATIVE DCF** |  | **-180** | **-415** | **-616** | **-816** | **-1013** | **-1209** | **-1403** | **-1595** | **-1786** | **-1974** | **-2161** | **-2346** | **-2529** | **-2711** | **-2891** | **-3065** | **-3048** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **NOTES:** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Same as for Scenario 1 Cash Flow Statement** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

*Figure 7: Cash flow statement assuming 15-year operating life for plant, including DCF analysis for scenario 2*

**6.6 Cash flow statement for breakeven scenario including discounted cash flow calculations at two different discount rates**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CASH-FLOW STATEMENT - PERIOD: 15 YEARS (BREAKEVEN SCENARIO)** | | | **YR0** | **YR1** | **YR2** | **YR3** | **YR4** | **YR5** | **YR6** | **YR7** | **YR8** | **YR9** | **YR10** | **YR11** | **YR12** | **YR13** | **YR14** | **YR15** | **YR16** |
| **CURRENCY: £ Millions** | |  | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** | **2029** | **2030** | **2031** | **2032** | **2033** | **2034** | **2035** | **2036** |
|  | *ANNUALY INCREASE - estimate FOR VARIABLE COSTS* |  |  | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* | *104%* |
|  | *ANNUALY INCREASE - estimate FOR FIXED COSTS* |  |  | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* | *106%* |
|  | *ANNUALY INCREASE - estimate FOR SALES* |  |  | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* | *105%* |
| **CASH OUTFLOW** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **FIXED CAPITAL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | EQUIPMENT COST |  | **60** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | EQUIPMENT ERECTION, FOUNDATIONS AND STRUCTURAL WORK |  | **27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | PIPING INSULATION AND PAINTING |  | **27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | INSTRUMENTATION AND CONTROL EQUIPMENT |  | **9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | ELECTRICAL POWER AND LIGHTING |  | **6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | PROCESS BUILDINGS AND STRUCTURES |  | **6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | LAND |  | **3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | DESIGN AND ENGINEERING COSTS |  | **35** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | CONTRACTOR'S FEES |  | **7** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL CASH OUTFLOW FROM FIXED CAPITAL** |  | **180** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **WORKING CAPITAL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | START-UP |  |  | **2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | INITIAL CATALYST CHARGES |  |  | **1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | RAW MATERIALS FOR INTERMEDIATES IN THE PROCESS |  |  | **9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | FINISHED PRODUCT INVENTORIES |  |  | **9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | CONTIGENCY ALLOWANCE |  |  | **14** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | FUNDS TO COVER OUTSTANDING ACCOUNTS FROM CUSTOMERS |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  | **TOTAL CASH OUTFLOW FROM WORKING CAPITAL** |  | **0** | **36** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **OPEX** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **VARIABLE COSTS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | RAW MATERIALS |  |  | **171** | **178** | **185** | **192** | **200** | **208** | **216** | **225** | **234** | **243** | **253** | **263** | **274** | **285** | **287** | **0** |
|  | MISCELLANEOUS MATERIALS |  |  | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **2** | **2** | **0** |
|  | UTILITIES |  | **0** | **88** | **92** | **96** | **99** | **103** | **107** | **112** | **116** | **121** | **126** | **131** | **136** | **141** | **147** | **153** | **0** |
|  | **TOTAL CASH OUTFLOW VARIABLE COSTS** |  | **0** | **260** | **271** | **282** | **293** | **304** | **317** | **329** | **342** | **356** | **370** | **385** | **401** | **417** | **433** | **441** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **FIXED COSTS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | MAINTENANCE |  |  | **10** | **10** | **11** | **11** | **12** | **13** | **14** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **22** |  |
|  | OPERATING LABOUR |  |  | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **24** | **25** | **27** | **28** | **30** |  |
|  | LABORATORY COSTS |  |  | **3** | **3** | **3** | **3** | **3** | **4** | **4** | **4** | **4** | **4** | **5** | **5** | **5** | **6** | **6** |  |
|  | SUPERVISION |  |  | **2** | **2** | **2** | **3** | **3** | **3** | **3** | **3** | **3** | **4** | **4** | **4** | **4** | **5** | **5** |  |
|  | PLANT OVERHEADS (65% OF LABOUR COSTS) |  |  | **6** | **7** | **7** | **7** | **8** | **8** | **9** | **9** | **10** | **11** | **11** | **12** | **13** | **13** | **14** |  |
|  | CAPITAL CHARGES - BUILDINGS |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | CAPITAL CHARGES - EQUIPMENT |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | TAX - GASEOUS EMISSIONS |  |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  | TAX - CORPORATION TAX |  |  | **0** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL FIXED COSTS** |  | **0** | **34** | **36** | **38** | **41** | **43** | **45** | **48** | **51** | **54** | **57** | **61** | **64** | **68** | **72** | **77** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL VARIABLE & FIXED COSTS** |  | **0** | **294** | **307** | **320** | **333** | **347** | **362** | **378** | **394** | **410** | **428** | **446** | **465** | **485** | **506** | **518** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **INDIRECT** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | SALES EXPENSE 0,25 OF DIRECT PRODUCTION COST |  |  | **8** | **8** | **8** | **9** | **9** | **9** | **10** | **10** | **11** | **11** | **12** | **12** | **13** | **13** | **14** |  |
|  | INSURANCE |  |  | **4** | **4** | **4** | **4** | **4** | **5** | **5** | **5** | **5** | **5** | **6** | **6** | **6** | **6** | **6** |  |
|  | ROYALTIES & LICENSE FEES |  |  | **1** | **1** | **1** | **1** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** | **2** |  |
|  | GENERAL OVERHEADS |  |  | **8** | **8** | **8** | **9** | **9** | **9** | **10** | **10** | **11** | **11** | **12** | **12** | **13** | **13** | **14** |  |
|  | R&D |  |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |  |
|  | **TOTAL INDIRECT COSTS** |  | **0** | **21** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **31** | **32** | **33** | **34** | **36** | **0** |
|  | **TOTAL CASH OUTFLOW FROM OPEX** |  | **0** | **315** | **328** | **342** | **357** | **372** | **387** | **404** | **421** | **439** | **457** | **477** | **497** | **518** | **540** | **554** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL CASH OUTFLOW** |  | **180** | **350** | **328** | **342** | **357** | **372** | **387** | **404** | **421** | **439** | **457** | **477** | **497** | **518** | **540** | **554** | **0** |
| **CASH INFLOW** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | BUTANOL |  |  | **268** | **281** | **295** | **310** | **325** | **342** | **359** | **377** | **396** | **415** | **436** | **458** | **481** | **505** | **530** |  |
|  | ETHANOL |  |  | **21** | **22** | **23** | **24** | **26** | **27** | **28** | **30** | **31** | **33** | **34** | **36** | **38** | **40** | **42** |  |
|  | ACETONE |  |  | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** | **37** |  |
|  | HYDROGEN |  |  | **2** | **2** | **2** | **2** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **4** | **4** | **4** | **4** |  |
|  | **TOTAL CASH INFLOW FROM SALES** |  | **0** | **328** | **343** | **358** | **374** | **391** | **408** | **427** | **446** | **467** | **488** | **511** | **535** | **560** | **586** | **613** | **0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **WORKING CAPITAL RELEASE** |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **36** |
|  | **LAND REALEASE** |  | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **3** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **TOTAL CASH INFLOW** |  | **0** | **328** | **343** | **358** | **374** | **391** | **408** | **427** | **446** | **467** | **488** | **511** | **535** | **560** | **586** | **613** | **38** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **NET CASH INFLOW / -OUTFLOW** |  | **-180** | **-22** | **14** | **16** | **17** | **19** | **21** | **23** | **26** | **28** | **31** | **34** | **38** | **42** | **46** | **59** | **38** |
|  | **NET CASH INFLOW / -OUTFLOW CUMULATIVE** |  | **-180** | **-202** | **-188** | **-172** | **-155** | **-136** | **-114** | **-91** | **-65** | **-37** | **-6** | **28** | **66** | **108** | **153** | **213** | **251** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **DISCOUNT RATE (*i*)** | **5%** |  | **105%** | **110%** | **116%** | **122%** | **128%** | **134%** | **141%** | **148%** | **155%** | **163%** | **171%** | **180%** | **189%** | **198%** | **208%** | **218%** |
|  | ***DISCOUNT FACTOR*** |  |  | ***0,952*** | ***0,907*** | ***0,864*** | ***0,823*** | ***0,784*** | ***0,746*** | ***0,711*** | ***0,677*** | ***0,645*** | ***0,614*** | ***0,585*** | ***0,557*** | ***0,530*** | ***0,505*** | ***0,481*** | ***0,458*** |
|  | **DCF** |  | **-180** | **-21** | **13** | **14** | **14** | **15** | **16** | **17** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **29** | **18** |
|  | **CUMULATIVE DCF** |  | **-180** | **-201** | **-188** | **-175** | **-160** | **-145** | **-129** | **-113** | **-96** | **-77** | **-58** | **-38** | **-17** | **5** | **28** | **57** | **74** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **DISCOUNT RATE (*i*)** | **10%** |  | **110%** | **116%** | **121%** | **127%** | **134%** | **140%** | **147%** | **155%** | **163%** | **171%** | **179%** | **188%** | **198%** | **207%** | **218%** | **229%** |
|  | ***DISCOUNT FACTOR*** |  |  | ***0,909*** | ***0,866*** | ***0,825*** | ***0,785*** | ***0,748*** | ***0,712*** | ***0,678*** | ***0,646*** | ***0,615*** | ***0,586*** | ***0,558*** | ***0,532*** | ***0,506*** | ***0,482*** | ***0,459*** | ***0,437*** |
|  | **DCF** |  | **-180** | **-20** | **12** | **13** | **14** | **14** | **15** | **16** | **17** | **17** | **18** | **19** | **20** | **21** | **22** | **27** | **17** |
|  | **CUMULATIVE DCF** |  | **-180** | **-200** | **-188** | **-175** | **-161** | **-147** | **-132** | **-116** | **-99** | **-82** | **-64** | **-44** | **-24** | **-3** | **19** | **46** | **63** |

*Figure 8: Cash flow statement assuming 15-year operating life for plant, including DCF analysis for breakeven scenario*