

Dosicounts GmbH

Business Plan

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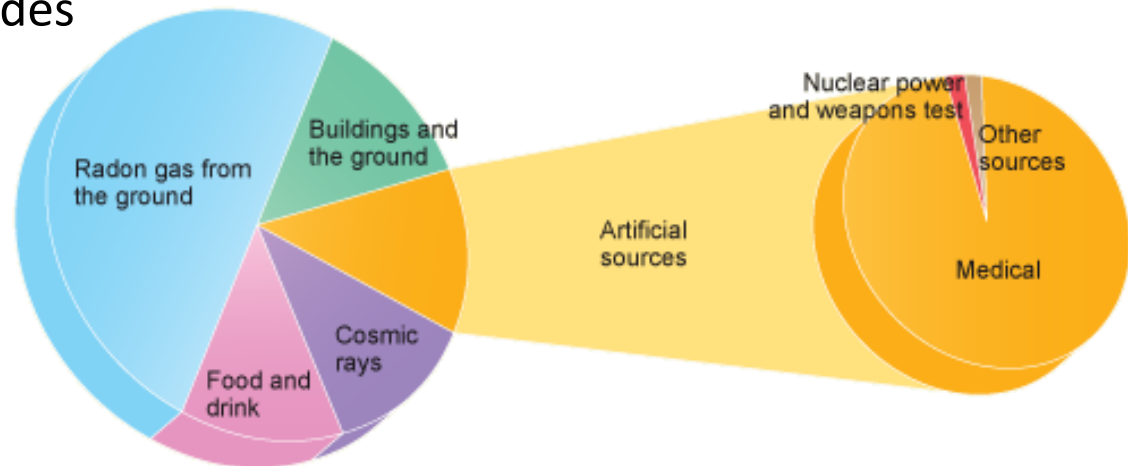
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Theoretical background

- Environmental radiation
 - Man-Made Radionuclides
 - Cosmic Radiation
 - Cosmogenic Radiation
 - Terrestrial Radiation
 - Non-Series Radionuclides
 - Series Radionuclides
- Dosimetry

Environmental radiation

- Present everywhere on the world in different quantities
 - Average: $1,5 \text{ mSv}\cdot\text{a}^{-1}$ to $3,5 \text{ mSv}\cdot\text{a}^{-1}$
 - Ramasari (Iran): Up to $480 \text{ mSv}\cdot\text{a}^{-1}$
 - Kerala (India): Up to $15 \text{ mSv}\cdot\text{a}^{-1}$ (about 140.000 inhabitants)
 - Minas-Gerais (Brazil): Up to $90 \text{ mSv}\cdot\text{a}^{-1}$
- Four main components:
 - Man-Made Radionuclides
 - Cosmic Radiation
 - Cosmogenic Radiation
 - Terrestrial Radiation



Man-Made Radionuclides

- Different sources of Man-Made Radionuclides in nature:
 - Nuclear fission reactors (operation/accidents)
 - Nuclear weapons (testing/usage)
 - Coal burning

Nuclide	Nuclear weapons [Bq]	Nuclear power [Bq]	Coal burning [Bq]
H-3	$7,40 \times 10^{16}$	$9,84 \times 10^{18}$	$5,55 \times 10^{16}$
C-14	$1,41 \times 10^{15}$	$6,29 \times 10^{15}$	$1,26 \times 10^{14}$
Cs-137	-	$2,59 \times 10^{16}$	$6,29 \times 10^{10}$
Pb-210	$1,81 \times 10^{16}$	$2,00 \times 10^{11}$	$7,40 \times 10^{12}$
Rn-222	$3,33 \times 10^{19}$	$4,07 \times 10^{14}$	$1,48 \times 10^{16}$
Ra-226	$2,44 \times 10^{14}$	$1,33 \times 10^9$	$5,18 \times 10^{10}$
U-235	$7,03 \times 10^{13}$	$6,29 \times 10^9$	$5,55 \times 10^9$
U-238	$1,48 \times 10^{14}$	$8,95 \times 10^9$	$1,11 \times 10^{11}$
Pu-239	-	$2,26 \times 10^{14}$	$3,48 \times 10^8$

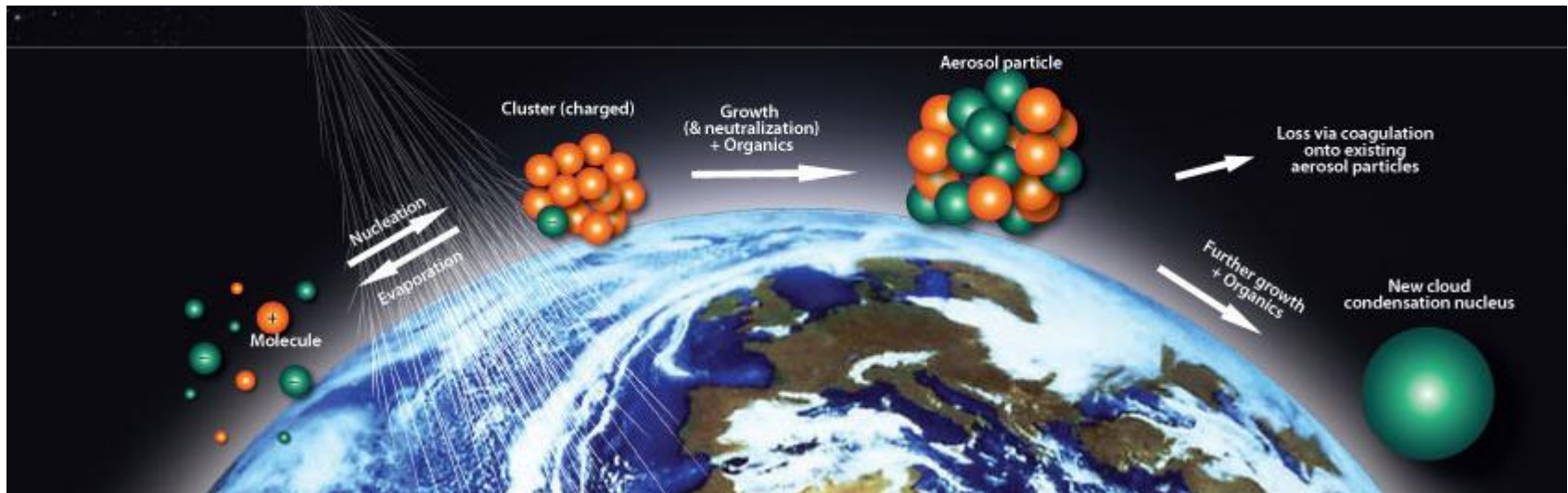
Cosmic Radiation

- Primary energetic particles striking earth's atmosphere
- Dose levels increase with increasing altitude

Altitude [m]	Dose Rate [mrem·a ⁻¹]	Example
0 (Sea level)	31	Los Angeles
1.525	55	Denver
3.050	137	Leadville, Colo.
9.140	1.900	Normal jetliner
15.240	8.750	Concorde
24.340	12.200	Spy plane

Cosmogenic Radiation

- Radionuclides produced in atmosphere
 - By interaction of cosmic radiation
- Most commonly radionuclide's
 - ^3H
 - ^7Be
 - ^{14}C
 - ^{22}Na



Terrestrial Radiation

- Radionuclides present in the ground
 - Half-life times longer than life-time of the Earth
- Two groups:
 - Series-Radionuclides
 - Present in decay chains (^{232}Th , ^{235}U and ^{238}U)
 - Non-Series Radionuclides
 - Decays directly to stable nuclide (eg. ^{40}K , ^{50}V , ^{87}Rb)

Material	$^{\text{nat}}\text{U}$ [mBq·g ⁻¹]	^{232}Th [mBq·g ⁻¹]	^{40}K [mBq·g ⁻¹]
Granite	63	8	1,184
Sandstone	6	7	414
Cement	46	21	237
Limestone concrete	31	8.5	89
Sandstone concrete	11	8.5	385
Natural gypsum	15	7.4	148
Wood	-	-	3.330
Clay Brick	111	44	666

Dosimetry

- Human senses can't detect ionizing radiation
- Low radiation doses increase the risk of cancer
- High radiation doses can have direct effects

Exposure [mSv]	Direct Health Effect	Time to Onset (without treatment)
50-100	changes in blood chemistry	Hours
500	nausea	
550	fatigue	
700	vomiting	
750	hair loss	2 - 3 weeks
900	diarrhea	
1.000	hemorrhage	
4.000	possible death	within 2 months
10.000	destruction of intestinal lining internal bleeding and death	1 - 2 weeks
20.000	damage to central nervous system	Minutes
	loss of consciousness and death	hours to days

Market Analysis

- Demonstrations after Fukushima accident

Region	Cologne	Berlin	Hamburg	Munich
Demonstration	40.000	100.000	50.000	40.000
Population	4.396.023	5.983.013	1.789.919	4.382.325
Relative	0,91 %	1,67 %	2,79 %	0,91 %

- Average relative population visiting demonstrations: 1,57 %
- Population Germany: 8,17 million
- Possible clients: 1,28 million

Market Analysis

- Exponential increase during first six years

Year of operation	Estimated number of contracts [a ⁻¹]
1	390
2	1.950
3	2.925
4	3.510
5	3.783
6	3.900
7	3.900
8	3.900
9	3.900
10	3.900

- About 32.000 contracts during the first ten years
 - 2,5 % of total possible clients

Cost Calculation

- Depreciation Costs
- Human Resources
- Utilities
- Financing
- Raw Materials
- Price Determination
- Income
- Cash-Flow and Dividend



Depreciation Cost

- ^{133}Ba source for storage
 - Activity of source: 37 kBq
 - Exemption level: 1 MBq

Device	Amount	Price	Depreciation [a]	Price [a^{-1}]
Harshaw 3500	1	€ 14.871,07	10	€ 1.487,11
^{133}Ba Source	1	€ 59,48	10	€ 5,95
PC	2	€ 608,00	4	€ 304,00
Printer/copier	1	€ 287,00	4	€ 71,75
Phone	1	€ 119,95	4	€ 29,99
Desk	2	€ 49,00	10	€ 9,80
Chair	2	€ 89,00	10	€ 17,80
Decoration	5	€ 20,00	10	€ 10,00
Lamp	4	€ 15,00	10	€ 60,00

Human Resources

- Administration
 - Measurements of dosimeters (2,17 hours)
 - 3900 contracts → 195 measurements/day
 - Printing and sending reports
- Bookkeeper
 - 2 Hours per week
- Director
 - Supervising and Management
 - Will be an investor holding

Person	Time [w ⁻¹]	Price [h ⁻¹]	Price [a ⁻¹]
Administration	40	€ 10,22	€ 54.843,08
Director(s)	4	€ -	€ -
Bookkeeper	2	€ 18,60	€ 1.941,68

Utilities

- The utilities were calculated with unit price

Unit	Amount [a ⁻¹]	Price/Unit	Price [a ⁻¹]
Electricity	3451 kWh	€ 0,23	€ 787,25
Water	2,610 m ³	€ 1,81	€ 4,72
Gas	898 l	€ 0,32	€ 291,33
Rent	50 m ²	€ 11,51	€ 6.906,00
Phone+internet	12 months·a ⁻¹	€ 29,90	€ 358,80
Insurance	12 months·a ⁻¹	€ 10,00	€ 120,00

Financing

- Total Investment € 166,666.67

Investment	€ 16.989,50
Human Recourses	€ 56.784,75
Utilities	€ 8.468,10
Unexpected	€ 83.424,31
Circulating capital	€ 1.000,00
Total investment	€ 166.666,67

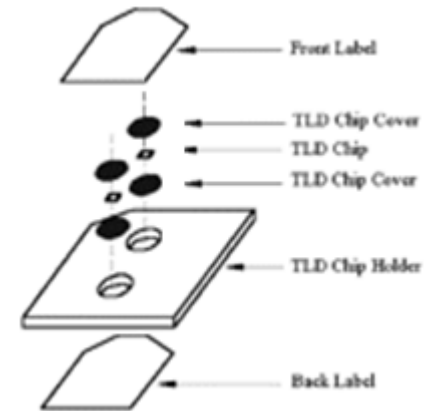
Financing

- Private investment € 66,666.67
- Loan € 100,000
- Total interest paid € 14,437.50

Year	Debt	Interest	Repayment
1	€ 100.000,00	€ 7.000,00	€ 10.000,00
2	€ 90.000,00	€ 6.300,00	€ 10.000,00
3	€ 80.000,00	€ 5.600,00	€ 10.000,00
4	€ 70.000,00	€ 4.900,00	€ 10.000,00
5	€ 60.000,00	€ 4.200,00	€ 10.000,00
6	€ 50.000,00	€ 3.500,00	€ 10.000,00
7	€ 40.000,00	€ 2.800,00	€ 10.000,00
8	€ 30.000,00	€ 2.100,00	€ 10.000,00
9	€ 20.000,00	€ 1.400,00	€ 10.000,00
10	€ 10.000,00	€ 700,00	€ 10.000,00

Raw Materials

- Dosimeter
 - Each dosimeter is responsibility of the customer
 - 1 dosimeter per contract
 - Each fifth contract additional dosimeter
 - For quality assurance (QA)
 - Each dosimeter contain 2 TLD – crystals
- Reports

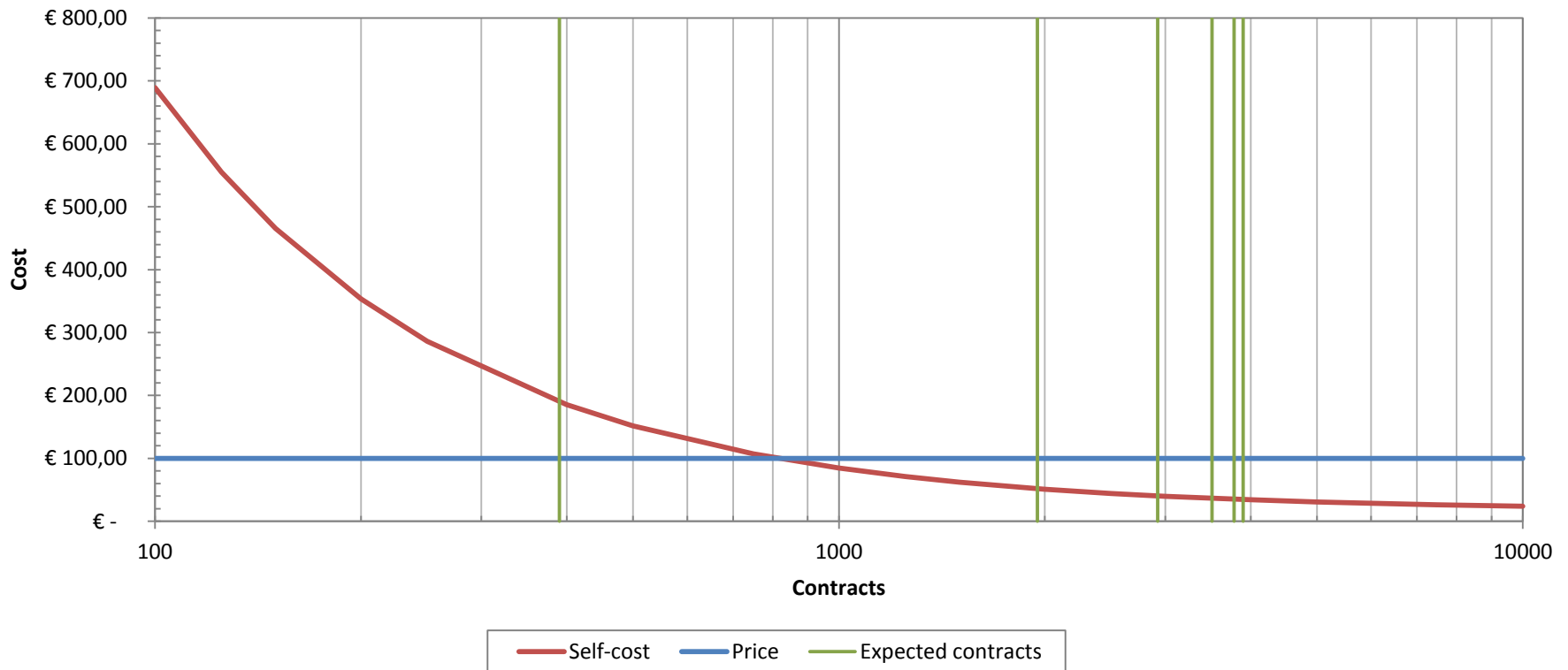


Material	Amount	Price per unit	Price per contract
Badge	1,2	€ 1,00	€ 1,20
TLD Crystal	2,2	€ 1,50	€ 3,30
Envelope	13	€ 0,20	€ 2,60
Post stamp	13	€ 0,70	€ 9,10
Phone	30	€ 0,04	€ 1,16

Price Determination

- Total fixed costs: € 67.195,25 (excl. Financing costs)
- Variable costs: € 17,36 per contract
- Price determined: € 100,00 per contracts

Price determination



Income

- Income based on € 100,00 per contract

Year	Contracts	Income
1	390	€ 39.000,00
2	1950	€ 195.000,00
3	2925	€ 292.500,00
4	3510	€ 351.000,00
5	3783	€ 378.300,00
6	3900	€ 390.000,00
7	3900	€ 390.000,00
8	3900	€ 390.000,00
9	3900	€ 390.000,00
10	3900	€ 390.000,00

Cash-Flow and Dividend

- Income based on € 100,00 per contract
- Loss during first year of operation
- Profit starting from second year of operation

Year	Costs	Income	Loss Carried Forward	Profit (before tax)
1	€ 80.966,04	€ 39.000,00	€ -	€ -41.966,04
2	€ 107.349,20	€ 195.000,00	€ 41.966,04	€ 45.684,77
3	€ 123.576,17	€ 292.500,00	€ -	€ 168.923,83
4	€ 133.032,36	€ 351.000,00	€ -	€ 217.967,64
5	€ 137.071,91	€ 378.300,00	€ -	€ 241.228,09
6	€ 138.403,15	€ 390.000,00	€ -	€ 251.596,85
7	€ 137.703,15	€ 390.000,00	€ -	€ 252.296,85
8	€ 137.003,15	€ 390.000,00	€ -	€ 252.996,85
9	€ 136.303,15	€ 390.000,00	€ -	€ 253.696,85
10	€ 135.603,15	€ 390.000,00	€ -	€ 254.396,85

Cash-Flow and Dividend

- 40 % tax paid over profit
- No tax paid during first year (loss)

Year	Profit (before tax)	Tax (40%)	Profit (after tax)
1	€ -41.966,04	€ -	€ -41.966,04
2	€ 45.684,77	€ 18.273,91	€ 27.410,86
3	€ 168.923,83	€ 67.569,53	€ 101.354,30
4	€ 217.967,64	€ 87.187,06	€ 130.780,59
5	€ 241.228,09	€ 96.491,24	€ 144.736,85
6	€ 251.596,85	€ 100.638,74	€ 150.958,11
7	€ 252.296,85	€ 100.918,74	€ 151.378,11
8	€ 252.996,85	€ 101.198,74	€ 151.798,11
9	€ 253.696,85	€ 101.478,74	€ 152.218,11
10	€ 254.396,85	€ 101.758,74	€ 152.638,11

Cash-Flow and Dividend

- Negative cash-flow during first year

Year	Depreciation	Profit	Cash-flow
1	€ 1.942,39	€ -41.966,04	€ -40.023,64
2	€ 1.942,39	€ 27.410,86	€ 29.353,25
3	€ 1.942,39	€ 101.354,30	€ 103.296,69
4	€ 1.942,39	€ 130.780,59	€ 132.722,98
5	€ 1.942,39	€ 144.736,85	€ 146.679,25
6	€ 1.942,39	€ 150.958,11	€ 152.900,50
7	€ 1.942,39	€ 151.378,11	€ 153.320,50
8	€ 1.942,39	€ 151.798,11	€ 153.740,50
9	€ 1.942,39	€ 152.218,11	€ 154.160,50
10	€ 1.942,39	€ 152.638,11	€ 154.580,50

Cash-Flow and Dividend

- Negative dividend after first year

Year	Cash-flow	Repayment credit	Dividend
1	€ -40.023,64	€ 10.000,00	€ -50.023,64
2	€ 29.353,25	€ 10.000,00	€ 19.353,25
3	€ 103.296,69	€ 10.000,00	€ 93.296,69
4	€ 132.722,98	€ 10.000,00	€ 122.722,98
5	€ 146.679,25	€ 10.000,00	€ 136.679,25
6	€ 152.900,50	€ 10.000,00	€ 142.900,50
7	€ 153.320,50	€ 10.000,00	€ 143.320,50
8	€ 153.740,50	€ 10.000,00	€ 143.740,50
9	€ 154.160,50	€ 10.000,00	€ 144.160,50
10	€ 154.580,50	€ 10.000,00	€ 144.580,50

Cash-Flow and Dividend

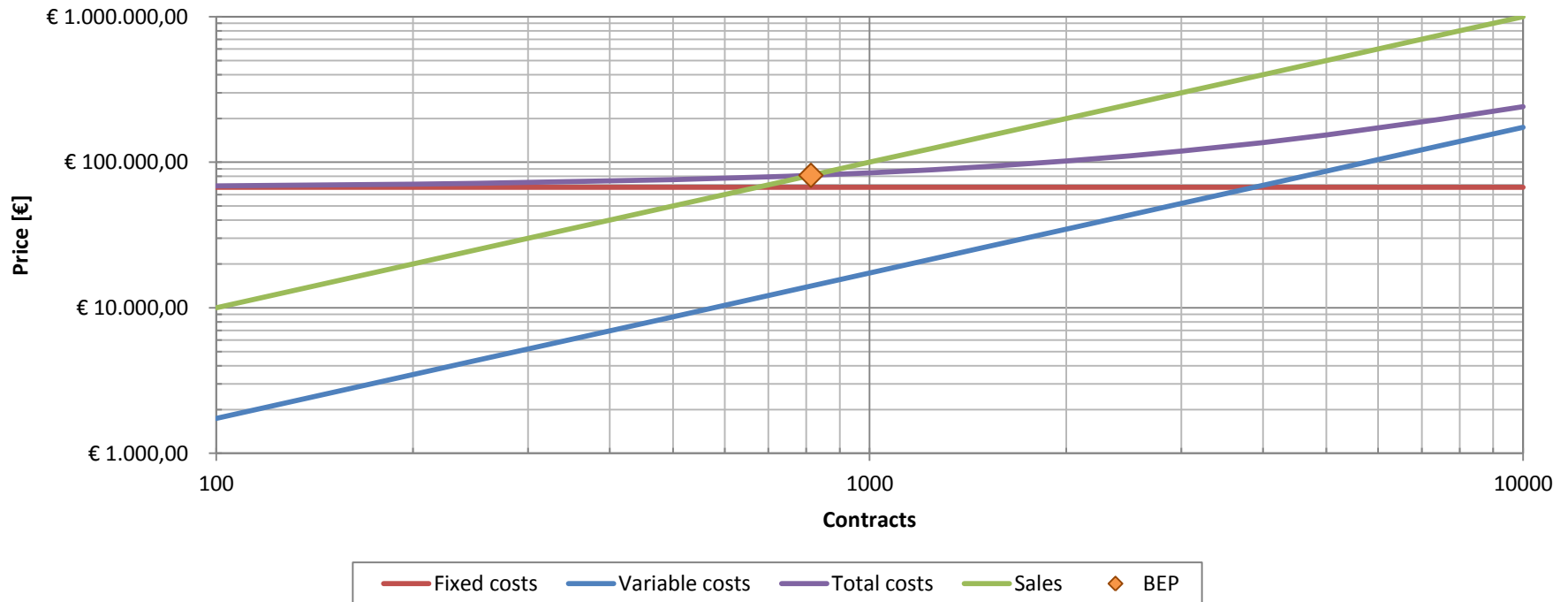
- Negative total dividend after first two years
 - Covered by unexpected costs (€ 83.424,31)

Year	Dividend	Total dividend	Equity interest
1	€ -50.023,64	€ -50.023,64	-75 %
2	€ 19.353,25	€ -30.670,39	-46 %
3	€ 93.296,69	€ 62.626,30	94 %
4	€ 122.722,98	€ 185.349,28	278 %
5	€ 136.679,25	€ 322.028,52	483 %
6	€ 142.900,50	€ 464.929,03	697 %
7	€ 143.320,50	€ 608.249,53	912 %
8	€ 143.740,50	€ 751.990,04	1.128 %
9	€ 144.160,50	€ 896.150,54	1.344 %
10	€ 144.580,50	€ 1.040.731,04	1.561 %

Cash-Flow and Dividend

- Total dividend after ten years: € 1.040.731,04
- Equity interest after ten years: 1.561 %
- Return of Investment (ROI): 3,04 years
- Break-Even Point (BEP): 814 contracts per year

Break-Even Point



Conclusion

- Dosicounts GmbH will offer TLD-dosimetry service to the German population
- Total investment of € 166.666,67
 - Loan (7 % interest, 10 years duration): € 100.000,00
 - Private investment: € 66.666,67
- € 100,00 per contract (profitable from 814 contracts)
- Return of Investment (ROI): 3,04 years
- Total dividend after ten years: € 1.040.7731,04
- Equity interest (after ten years): 1.561 %

Dosicounts GmbH

Business Plan

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