

Calculation of electricity generation costs

1. Year 2007

The average electricity price in 2007 according to the public trader data was 41 EUR/MWh.

- Hydro power plants (hereinafter – HPP).

	Position of costs	Installed power MWe		
		0,15	0,4	0,6
1	Electricity price (EUR/MWh)	41	41	41
2	Produced electricity in year (MWh/year)	450	1 200	1 800
3	Annual depreciation expenses (EUR/year)	38 400	99 200	144 000
4	PMT (IRR=12%) in year	67 962	175 568	254 857
5	Annual total incomes from electricity selling at the market price (EUR/year) [1-2]	18 450	49 200	73 800
6	Total average production costs without depreciation (EUR/year)	11 520	29 760	43 200
7	Total average production costs without depreciation (EUR/MWh _a) [6/2]	26	25	24
8	Electricity costs without depreciation exceeded over market price (EUR/year) [6-5]	-6 930	-19 440	-30 600
9	Electricity costs without depreciation exceeded over market price (EUR/MWh) [7-1]	-15	-16	-17
10	Total average production costs with depreciation but without cost of capital (EUR/year) [3+6]	49 920	128 960	187 200
11	Total average production costs with depreciation but without cost of capital (EUR/MWh _a) [10/2]	111	107	104
12	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [10-5]	31 470	79 760	113 400
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [11-1]	70	66	63
14	Total average production costs with depreciation and cost of capital (EUR/year) [4+6]	79 482	205 328	298 057
15	Total average production costs with depreciation and cost of capital (EUR/MWh _a) [14/2]	177	171	166
16	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [14-5]	61 032	156 128	224 257
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [15-1]	136	130	125
18	Total average production costs without depreciation but with cost of capital (EUR/year) [14-3]	41 082	106 128	154 057
19	Total average production costs without depreciation but with cost of capital (EUR/MWh _a) [18/2]	91	88	86
20	Price of MP (EUR/MWh)	124,64	114,51	109,96

We can conclude that the electricity production in HPP and selling it at market price was economically reasonable only after payback period of investment. Thus the

mandatory procurement (hereinafter – MP) of electricity encouraged the merchants to start the electricity production in HPP.

- Wind power plants.

	Position of costs	Installed power MWe		
		0,2	1	2
1	Electricity price (EUR/MWh)	41	41	41
2	Produced electricity in year (MWh/year)	400	2 000	4 000
3	Annual depreciation expenses (EUR/year)	40 000	180 000	320 000
4	PMT (IRR=12%) in year	70 794	318 571	566 349
5	Annual total incomes from electricity selling at the market price (EUR/year) [1-2]	16 400	82 000	164 000
6	Total average production costs without depreciation (EUR/year)	10 000	45 000	80 000
7	Total average production costs without depreciation (EUR/MWh _{el}) [6/2]	25	23	20
8	Electricity costs without depreciation exceeded over market price (EUR/year) [6-5]	-6 400	-37 000	-84 000
9	Electricity costs without depreciation exceeded over market price (EUR/MWh) [7-1]	-16	-19	-21
10	Total average production costs with depreciation but without cost of capital (EUR/year) [6+3]	50 000	225 000	400 000
11	Total average production costs with depreciation but without cost of capital (EUR/MWh _{el}) [10/2]	125	113	100
12	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [10-5]	33 600	143 000	236 000
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [11-1]	84	72	59
14	Total average production costs with depreciation and cost of capital (EUR/year) [6+4]	80 794	363 571	646 349
15	Total average production costs with depreciation and cost of capital (EUR/MWh _{el}) [14/2]	202	182	162
16	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [14-5]	64 394	281 571	482 349
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [15-1]	161	141	121
18	Total average production costs without depreciation but with cost of capital (EUR/year) [14-3]	40 794	183 571	326 349
19	Total average production costs without depreciation but with cost of capital (EUR/MWh _{el}) [18/2]	102	92	82
20	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	112,09	100*
		Electricity from RES after 10 year	83,27	100*

*Starting price of electricity sale in tender (the tender was suspended and no MP rights were issued for such power plants)

We can conclude that the electricity production in wind power plants and selling it at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in wind power plants.

- Biogas cogeneration plants

	Position of costs	Installed power MWe		
		0,5	1	2
1	Electricity price (EUR/MWh)	41	41	41
2	Raw material price (equivalents of corn silage) (EUR/MWh)	34	34	34
3	Produced electricity in year without self-use (MWh/year)	3 680	7 360	14 720
4	Annual depreciation expenses (EUR/year)	162 500	325 000	650 000
5	PMT (IRR=12%) in year	287 599	575 199	1 150 397
6	Annual total incomes from electricity selling at the market price (EUR/year) [1-3]	150 880	301 760	603 520
7	Heat price (EUR/MWh)	41	41	41
8	Annual incomes from heat selling (EUR/year)	65 707	131 414	262 829
9	Annual total incomes from the market (EUR/year) [6+8]	216 587	433 174	866 349
10	Total average production costs without depreciation (EUR/year)	491 763	983 526	1 967 053
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWhel) [(10-8)/3]	116	116	116
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	275 176	550 352	1 100 704
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	75	75	75
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	654 263	1 308 526	2 617 053
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWhel) [(14-8)/3]	160	160	160
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	437 676	875 352	1 750 704
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]	119	119	119
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]	779 362	1 558 725	3 117 450
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWhel) [(18-8)/3]	194	194	194
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]	562 775	1 125 550	2 251 101
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]	153	153	153
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]	616 862	1 233 725	2 467 450

23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _a) [(22-8)/3]		150	150	150
24	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	130,21	128,53	120,86
		Electricity from RES after 10 year	98,38	97,12	91,32

We can conclude that electricity production in biogas cogeneration plants and selling at market price wasn't economically viable without the support. The production costs of electricity without the depreciation and the cost of capital were significantly higher than the electricity market price. Thus the operating aid during all lifecycle of such power plants was needed.

- Biomass cogeneration plants.

	Position of costs	Installed power MWe		
		0,4	1	2
1	Electricity price (EUR/MWh)	41	41	41
2	Raw material price (wood chips) (EUR/MWh)	10	10	10
3	Produced electricity in year without self-use (MWh/year)	2 200	5 500	11 000
4	Annual depreciation expenses (EUR/year)	100 000	250 000	500 000
5	PMT (IRR=12%) in year	176 984	442 460	884 921
6	Annual total incomes from electricity selling at the market price (EUR/year) [1·3]	90 200	225 500	451 000
7	Heat price (EUR/MWh)	12	12	12
8	Annual incomes from heat selling (EUR/year)	111 223	255 814	491 950
9	Annual total incomes from the market (EUR/year) [6+8]	201 423	481 314	942 950
10	Total average production costs without depreciation (EUR/year)	171 667	351 974	675 000
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWh _{el}) [(10-8)/3]	27	17	17
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	-29 757	-129 340	-267 950
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	-14	-24	-24
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	271 667	601 974	1 175 000
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(14-8)/3]	73	63	62
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	70 243	120 660	232 050

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17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]		32	22	21
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]		348 651	794 434	1 559 921
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh) [(18-8)/3]		108	98	97
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]		147 227	313 120	616 971
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]		67	57	56
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]		248 651	544 434	1 059 921
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh) [(22-8)/3]		62	52	52
24	Price of MP (EUR/MWh)		130	129	121
24	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	135,61	128,53	120,86
		Electricity from RES after 10 year	102,46	97,12	91,32

We can conclude that the electricity production in biomass cogeneration plants and selling at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in biomass cogeneration plants.

- Natural gas high efficient cogeneration

	Position of costs	Installed power MWe		
		0,2	1	4
1	Electricity price (EUR/MWh)	41	41	41
2	Raw material price (natural gas) (EUR/MWh)	26,64	26,64	25,72
3	Produced electricity in year without self-use (MWh/year)	1 100	5 500	22 000
4	Annual depreciation expenses (EUR/year)	16 000	80 000	320 000
5	PMT (IRR=12%) in year	28 317	141 587	566 349
6	Annual total incomes from electricity selling at the market price (EUR/year) [1·3]	45 100	225 500	902 000
7	Heat price (EUR/MWh)	29	29	28
8	Annual incomes from heat selling (EUR/year)	35 398	176 989	683 422
9	Annual total incomes from the market (EUR/year) [6+8]	80 498	402 489	1 585 422
10	Total average production costs without depreciation (EUR/year)	81 130	405 649	1 494 683

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11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWhel) [(10-8)/3]	42	42	37
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	632	3 160	-90 739
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	1	1	-4
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	97 130	485 649	1 814 683
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWh _a) [(14-8)/3]	56	56	51
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	16 632	83 160	229 261
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]	15	15	10
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]	109 447	547 236	2 061 032
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh _a) [(18-8)/3]	67	67	63
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]	28 950	144 748	475 610
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]	26	26	22
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]	93 447	467 236	1 741 032
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _a) [(22-8)/3]	53	53	48
24	Price of MP (EUR/MWh)	108,89	97,12	84,39

We can conclude that electricity production in natural gas cogeneration plants and selling at the market price wasn't economically viable without the support. Thus the MP of electricity encouraged merchants to make investments and to start the electricity production in natural gas cogeneration plants.

2. Year 2009

The average electricity price in 2007 according to the public trader data was 40 EUR/MWh.

• HPP

	Position of costs	Installed power MWe		
		0,15	0,4	0,6
1	Electricity price (EUR/MWh)	40	40	40
2	Produced electricity in year (MWh/year)	450	1 200	1 800
3	Annual depreciation expenses (EUR/year)	38 400	99 200	144 000
4	PMT (IRR=12%) in year	67 962	175 568	254 857
5	Annual total incomes from electricity selling at the market price (EUR/year) [1·2]	18 000	48 000	72 000
6	Total average production costs without depreciation (EUR/year)	11 520	29 760	43 200
7	Total average production costs without depreciation (EUR/MWh _a) [6/2]	26	25	24
8	Electricity costs without depreciation exceeded over market price (EUR/year) [6-5]	-6 480	-18 240	-28 800
9	Electricity costs without depreciation exceeded over market price (EUR/MWh) [7-1]	-14	-15	-16
10	Total average production costs with depreciation but without cost of capital (EUR/year) [3+6]	49 920	128 960	187 200
11	Total average production costs with depreciation but without cost of capital (EUR/MWh _a) [10/2]	111	107	104
12	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [10-5]	31 920	80 960	115 200
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [11-1]	71	67	64
14	Total average production costs with depreciation and cost of capital (EUR/year) [4+6]	79 482	205 328	298 057
15	Total average production costs with depreciation and cost of capital (EUR/MWh _a) [14/2]	177	171	166
16	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [14-5]	61 482	157 328	226 057
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [15-1]	137	131	126
18	Total average production costs without depreciation but with cost of capital (EUR/year) [14-3]	41 082	106 128	154 057
19	Total average production costs without depreciation but with cost of capital (EUR/MWh _a) [18/2]	91	88	86
20	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	195,73	179,83
		Electricity from RES after 10 year	156,58	143,86

We can conclude that the electricity production in HPP and selling it at market price was economically reasonable only after payback period of investment. Thus the mandatory procurement (hereinafter – MP) of electricity encouraged the merchants to start the electricity production in HPP.

- Wind power plants.

	Position of costs	Installed power MWe		
		0,2	1	2
1	Electricity price (EUR/MWh)	40	40	40
2	Produced electricity in year (MWh/year)	400	2 000	4 000
3	Annual depreciation expenses (EUR/year)	40 000	180 000	320 000
4	PMT (IRR=12%) in year	70 794	318 571	566 349
5	Annual total incomes from electricity selling at the market price (EUR/year) [1·2]	16 000	80 000	160 000
6	Total average production costs without depreciation (EUR/year)	10 000	45 000	80 000
7	Total average production costs without depreciation (EUR/MWh _a) [6/2]	25	23	20
8	Electricity costs without depreciation exceeded over market price (EUR/year) [6-5]	-6 000	-35 000	-80 000
9	Electricity costs without depreciation exceeded over market price (EUR/MWh) [7-1]	-15	-18	-20
10	Total average production costs with depreciation but without cost of capital (EUR/year) [6+3]	50 000	225 000	400 000
11	Total average production costs with depreciation but without cost of capital (EUR/MWh _a) [10/2]	125	113	100
12	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [10-5]	34 000	145 000	240 000
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [11-1]	85	73	60
14	Total average production costs with depreciation and cost of capital (EUR/year) [6+4]	80 794	363 571	646 349
15	Total average production costs with depreciation and cost of capital (EUR/MWh _a) [14/2]	202	182	162
16	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [14-5]	64 794	283 571	486 349
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [15-1]	162	142	122
18	Total average production costs without depreciation but with cost of capital (EUR/year) [14-3]	40 794	183 571	326 349
19	Total average production costs without depreciation but with cost of capital (EUR/MWh _a) [18/2]	102	92	82
20	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	176,79	128,64
		Electricity from RES after 10 year	106,02	77,18
			120,96	72,58

We can conclude that the electricity production in wind power plants and selling it at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in wind power plants.

- Biogas cogeneration plants.

	Position of costs	Installed power MWe		
		0,5	1	2
1	Electricity price (EUR/MWh)	40	40	40
2	Raw material price (equivalents of corn silage) (EUR/MWh)	34	34	34
3	Produced electricity in year without self-use (MWh/year)	3 680	7 360	14 720
4	Annual depreciation expenses (EUR/year)	162 500	325 000	650 000
5	PMT (IRR=12%) in year	287 599	575 199	1 150 397
6	Annual total incomes from electricity selling at the market price (EUR/year) [1-3]	147 200	294 400	588 800
7	Heat price (EUR/MWh)	41	41	41
8	Annual incomes from heat selling (EUR/year)	65 707	131 414	262 829
9	Annual total incomes from the market (EUR/year) [6+8]	212 907	425 814	851 629
10	Total average production costs without depreciation (EUR/year)	491 763	983 526	1 967 053
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWh) [(10-8)/3]	116	116	116
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	278 856	557 712	1 115 424
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	76	76	76
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	654 263	1 308 526	2 617 053
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWh) [(14-8)/3]	160	160	160
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	441 356	882 712	1 765 424
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]	120	120	120
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]	779 362	1 558 725	3 117 450

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19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(18-8)/3]		194	194	194
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]		566 455	1 132 910	2 265 821
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]		154	154	154
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]		616 862	1 233 725	2 467 450
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(22-8)/3]		150	150	150
24	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	204,17	201,54	190,84
		Electricity from RES after 10 year	163,33	161,23	144,19

We can conclude that electricity production in biogas cogeneration plants and selling at market price wasn't economically viable without the support. The production costs of electricity without the depreciation and the cost of capital were significantly higher than the electricity market price. Thus the operating aid during all lifecycle of such power plants was needed.

- Biomass cogeneration plants.

	Position of costs	Installed power MWe		
		0,5	1	2
1	Electricity price (EUR/MWh)	40	40	40
2	Raw material price (wood chips) (EUR/MWh)	15	15	15
3	Produced electricity in year without self-use (MWh/year)	2 200	5 500	11 000
4	Annual depreciation expenses (EUR/year)	100 000	250 000	500 000
5	PMT (IRR=12%) in year	176 984	442 460	884 921
6	Annual total incomes from electricity selling at the market price (EUR/year) [1-3]	88 000	220 000	440 000
7	Heat price (EUR/MWh)	17	17	17
8	Annual incomes from heat selling (EUR/year)	166 835	383 721	737 925
9	Annual total incomes from the market (EUR/year) [6+8]	254 835	603 721	1 177 925
10	Total average production costs without depreciation (EUR/year)	245 000	496 711	950 000
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWh _{el}) [(10-8)/3]	36	21	19

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12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	-9 835	-107 010	-227 925
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	-4	-19	-21
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	345 000	746 711	1 450 000
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWh _a) [(14-8)/3]	81	66	65
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	90 165	142 990	272 075
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]	41	26	25
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]	421 984	939 171	1 834 921
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh _a) [(18-8)/3]	116	101	100
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]	167 149	335 450	656 996
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]	76	61	60
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]	321 984	689 171	1 334 921
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _a) [(22-8)/3]	71	56	54
24	Price of MP (EUR/MWh)	206	203	191
24	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	214,13	202,96
		Electricity from RES after 10 year	161,79	153,35
			190,84	144,19

We can conclude that the electricity production in biomass cogeneration plants and selling at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in biomass cogeneration plants.

3. 2013.

The average electricity price in 2013 according to the public trader data was 52 EUR/MWh.

• HPP

	Position of costs		Installed power MWe		
			0,15	0,4	0,6
1	Electricity price (EUR/MWh)		52	52	52
2	Produced electricity in year (MWh/year)		450	1 200	1 800
3	Annual depreciation expenses (EUR/year)		34 452	55 706	95 078
4	PMT (IRR=12%) in year		60 974	98 590	168 274
5	Annual total incomes from electricity selling at the market price (EUR/year) [1·2]		23 358	62 288	93 432
6	Total average production costs without depreciation (EUR/year)		10 885	29 027	43 540
7	Total average production costs without depreciation (EUR/MWh _a) [6/2]		24	24	24
8	Electricity costs without depreciation exceeded over market price (EUR/year) [6-5]		-12 473	-33 261	-49 892
9	Electricity costs without depreciation exceeded over market price (EUR/MWh) [7-1]		-28	-28	-28
10	Total average production costs with depreciation but without cost of capital (EUR/year) [3+6]		45 337	84 732	138 618
11	Total average production costs with depreciation but without cost of capital (EUR/MWh _a) [10/2]		101	71	77
12	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [10-5]		21 979	22 444	45 186
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [11-1]		49	19	25
14	Total average production costs with depreciation and cost of capital (EUR/year) [4+6]		71 859	127 617	211 813
15	Total average production costs with depreciation and cost of capital (EUR/MWh _a) [14/2]		160	106	118
16	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [14-5]		48 501	65 329	118 381
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [15-1]		108	54	66
18	Total average production costs without depreciation but with cost of capital (EUR/year) [14-3]		37 407	71 911	116 735
19	Total average production costs without depreciation but with cost of capital (EUR/MWh _a) [18/2]		83	60	65
20	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	195,73	179,83	172,67
		Electricity from RES after 10 year	156,58	143,86	138,14
21	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity from RES till 10 year starting from operation	166,37	152,85	146,77
		Electricity from RES after 10 year	133,10	122,28	117,42

We can conclude that the electricity production in HPP and selling it at market price was economically reasonable only after payback period of investment. Thus the mandatory procurement (hereinafter – MP) of electricity encouraged the merchants to start the electricity production in HPP.

- Wind power plants.

	Position of costs	Installed power MWe		
		0,2	1	2
1	Electricity price (EUR/MWh)	52	52	52
2	Produced electricity in year (MWh/year)	400	2 000	4 000
3	Annual depreciation expenses (EUR/year)	43 198	189 242	327 261
4	PMT (IRR=12%) in year	76 454	334 928	579 199
5	Annual total incomes from electricity selling at the market price (EUR/year) [1-2]	20 763	103 813	207 627
6	Total average production costs without depreciation (EUR/year)	6 830	34 149	68 298
7	Total average production costs without depreciation (EUR/MWh _a) [6/2]	17	17	17
8	Electricity costs without depreciation exceeded over market price (EUR/year) [6-5]	-13 933	-69 664	-139 329
9	Electricity costs without depreciation exceeded over market price (EUR/MWh) [7-1]	-35	-35	-35
10	Total average production costs with depreciation but without cost of capital (EUR/year) [6+3]	50 028	223 391	395 558
11	Total average production costs with depreciation but without cost of capital (EUR/MWh _a) [10/2]	125	112	99
12	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [10-5]	29 266	119 578	187 932
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [11-1]	73	60	47
14	Total average production costs with depreciation and cost of capital (EUR/year) [6+4]	83 284	369 077	647 497
15	Total average production costs with depreciation and cost of capital (EUR/MWh _a) [14/2]	208	185	162
16	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [14-5]	62 521	265 264	439 870
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [15-1]	156	133	110
18	Total average production costs without depreciation but with cost of capital (EUR/year) [14-3]	40 086	179 835	320 236
19	Total average production costs without depreciation but with cost of capital (EUR/MWh _a) [18/2]	100	90	80
20	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	176,69	126,60
		Electricity from RES after 10 year	106,02	75,96
21	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity from RES till 10 year starting from operation	150,19	107,61
		Electricity from RES after 10 year	90,11	64,57

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We can conclude that the electricity production in wind power plants and selling it at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in wind power plants.

- Biogas cogeneration plants.

	Position of costs	Installed power MWe		
		0,5	1	2
1	Electricity price (EUR/MWh)	52	52	52
2	Raw material price (equivalents of corn silage) (EUR/t)	36	36	36
3	Produced electricity in year without self-use (MWh/year)	3 680	7 360	14 720
4	Annual depreciation expenses (EUR/year)	187 819	324 415	512 234
5	PMT (IRR=12%) in year	332 410	574 163	906 573
6	Annual total incomes from electricity selling at the market price (EUR/year) [1·3]	191 017	382 033	764 066
7	Heat price (EUR/MWh)	28	28	28
8	Annual incomes from heat selling (EUR/year)	45 757	91 513	183 026
9	Annual total incomes from the market (EUR/year) [6+8]	236 773	473 546	947 092
10	Total average production costs without depreciation (EUR/year)	553 890	1 097 536	2 167 753
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWhel) [(10-8)/3]	138	137	135
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	317 117	623 990	1 220 661
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	86	85	83
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	741 710	1 421 951	2 679 987
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWhel) [(14-8)/3]	189	181	170
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	504 936	948 405	1 732 895
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]	137	129	118
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]	886 300	1 671 699	3 074 326

19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh _a) [(18-8)/3]		228	215	196
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]		649 527	1 198 153	2 127 234
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]		177	163	145
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]		698 481	1 347 284	2 562 092
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _a) [(22-8)/3]		177	171	162
24	Price of MP (EUR/MWh)	Electricity in cogeneration	194,39	188,84	170,79
		Electricity from RES till 10 year starting from operation	204,17	198,34	170,79
		Electricity from RES after 10 year	163,33	158,67	129,04
25	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity in cogeneration	165,23	160,52	145,17
		Electricity from RES till 10 year starting from operation	173,54	168,59	145,17
		Electricity from RES after 10 year	138,83	134,87	109,69

We can conclude that electricity production in biogas cogeneration plants and selling at the market price wasn't economically without the support. The production costs of electricity without the depreciation and the cost of capital were significantly higher than the electricity market price. Thus the operating aid during all lifecycle of such power plants was needed.

- Biomass cogeneration plants.

	Position of costs	Installed power MWe		
		0,4	1	2
1	Electricity price (EUR/MWh)	52	52	52
2	Raw material price (wood chips) (EUR/m ³ loose)	11	11	11
3	Produced electricity in year without self-use (MWh/year)	2 200	5 500	11 000
4	Annual depreciation expenses (EUR/year)	320 975	498 290	694 986

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5	PMT (IRR=12%) in year		568 074	881 894	1 230 016
6	Annual total incomes from electricity selling at the market price (EUR/year) [1-3]		114 195	285 487	570 973
7	Heat price (EUR/MWh)		17	17	17
8	Annual incomes from heat selling (EUR/year)		155 551	363 990	699 982
9	Annual total incomes from the market (EUR/year) [6+8]		269 746	649 477	1 270 955
10	Total average production costs without depreciation (EUR/year)		364 812	674 293	1 159 728
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWhel) [(10-8)/3]		95	56	42
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]		95 066	24 816	-111 227
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]		43	5	-10
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]		685 787	1 172 583	1 854 715
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWha) [(14-8)/3]		241	147	105
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]		416 041	523 105	583 760
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]		189	95	53
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]		932 887	1 556 187	2 389 744
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWha) [(18-8)/3]		353	217	154
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]		663 140	906 710	1 118 789
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]		301	165	102
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]		611 912	1 057 897	1 694 758
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWha) [(22-8)/3]		207	126	90
24	Price of MP (EUR/MWh)	Electricity in cogeneration	202,45	188,84	170,79
		Electricity from RES till 10 year starting from operation	202,45	188,84	170,79

		Electricity from RES after 10 year	152,96	142,68	129,04
25	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity in cogeneration	172,08	160,52	145,17
		Electricity from RES till 10 year starting from operation	172,08	160,52	145,17
		Electricity from RES after 10 year	130,02	121,28	109,69

We can conclude that electricity production in biomass cogeneration plants and selling at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in biomass cogeneration plants.

- Natural gas high efficient cogeneration

	Position of costs	Installed power MWe		
		0,2	1	4
1	Electricity price (EUR/MWh)	52	52	52
2	Raw material price (natural gas) (EUR/MWh)	43,91	43,91	41,78
3	Produced electricity in year without self-use (MWh/year)	1 100	5 500	22 000
4	Annual depreciation expenses (EUR/year)	31 303	85 372	341 489
5	PMT (IRR=12%) in year	55 402	151 095	604 382
6	Annual total incomes from electricity selling at the market price (EUR/year) [1·3]	57 097	285 487	1 141 947
7	Heat price (EUR/MWh)	48	48	45
8	Annual incomes from heat selling (EUR/year)	58 333	291 663	1 110 189
9	Annual total incomes from the market (EUR/year) [6+8]	115 430	577 150	2 252 136
10	Total average production costs without depreciation (EUR/year)	151 862	742 661	2 623 644
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWhel) [(10-8)/3]	85	82	69
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	36 432	165 511	371 508
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	33	30	17
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	183 165	828 034	2 965 133
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWhel) [(14-8)/3]	113	98	84

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16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	67 735	250 884	712 998
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]	62	46	32
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]	207 263	893 757	3 228 026
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(18-8)/3]	135	109	96
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]	91 833	316 607	975 890
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]	83	58	44
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]	175 960	808 385	2 886 537
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(22-8)/3]	107	94	81
24	Price of MP (EUR/MWh)	162,56	142,68	123,54
25	Average revenue from selling electricity within MP, taking into account 15% of subsidized energy tax (EUR/MWh)	138	121	105

We can conclude that electricity production in natural gas cogeneration plants and selling at the market price wasn't economically reasonable without the support. The production costs of electricity without the depreciation and the cost of capital were significantly higher than the electricity market price. Thus the operating aid during all lifecycle of such power plants was needed.

4. 2014.

The average electricity price in 2013 according to the public trader data was 49,20 EUR/MWh.

There were no significant changes in energy production costs in wind, biomass and biogas plants. They stayed at the level of year 2013.

• HPP

	Position of costs		Installed power MWe		
			0,15	0,4	0,6
1	Electricity price (EUR/MWh)		49,20	49,20	49,20
2	Produced electricity in year (MWh/year)		450	1 200	1 800
3	Annual depreciation expenses (EUR/year)		34 452	55 706	95 078
4	Average natural resource tax* (Eur/MWh)		12	7	6
5	PMT (IRR=12%) in year		60 974	98 590	168 274
6	Annual total incomes from electricity selling at the market price (EUR/year) [1-2]		22 140	59 040	88 560
7	Total average production costs without depreciation (EUR/year)		16 285	37 427	54 340
8	Total average production costs without depreciation (EUR/Mwhel) [7/2]		36,19	31,19	30,19
9	Electricity costs without depreciation exceeded over market price (EUR/year) [7-6]		-5 855	-21 613	-34 220
10	Electricity costs without depreciation exceeded over market price (EUR/MWh) [8-1]		-13,01	-18,01	-19,01
11	Total average production costs with depreciation but without cost of capital (EUR/year) [3+7]		50 737	93 132	149 418
12	Total average production costs with depreciation but without cost of capital (EUR/Mwhel) [11/2]		112,75	77,61	83,01
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [11-6]		28 597	34 092	60 858
14	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [12-1]		63,55	28,41	33,81
15	Total average production costs with depreciation and cost of capital (EUR/year) [5+7]		77 259	136 017	222 613
16	Total average production costs with depreciation and cost of capital (EUR/Mwhel) [15/2]		171,69	106,35	117,67
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [15-6]		55 119	76 977	134 053
18	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [16-1]		122,49	64,15	74,47
19	Total average production costs without depreciation but with cost of capital (EUR/year) [15-3]		42 807	80 311	127 535
20	Total average production costs without depreciation but with cost of capital (EUR/MWha) [19/2]		95,13	66,93	70,85
21	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	195,73	179,83	172,67
		Electricity from RES after 10 year	156,58	143,86	138,14
22	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity from RES till 10 year starting from operation	166,37	152,85	146,77
		Electricity from RES after 10 year	133,10	122,28	117,42

* Since January 1, 2014 owners of hydropower plants with total installed capacity of the plant under 2 MW have to pay the natural resources tax. The tax rate is EUR 0,00853 per 100 cubic meters of the water that has flown through the hydrotechnical structure. And the tax is included in the calculation.

We can conclude that the electricity production in HPP and selling it at market price was economically reasonable only after payback period of investment. Thus the mandatory procurement (hereinafter – MP) of electricity encouraged the merchants to start the electricity production in HPP.

- Wind power plants.

	Position of costs	Installed power MWe		
		0,2	1	2
1	Electricity price (EUR/MWh)	49,20	49,20	49,20
2	Produced electricity in year (MWh/year)	400	2 000	4 000
3	Annual depreciation expenses (EUR/year)	43 198	189 242	327 261
4	PMT (IRR=12%) in year	76 454	334 928	579 199
5	Annual total incomes from electricity selling at the market price (EUR/year) [1·2]	19 680	98 400	196 800
6	Total average production costs without depreciation (EUR/year)	6 830	34 149	68 298
7	Total average production costs without depreciation (EUR/MWh ₀) [6/2]	17,07	17,07	17,07
8	Electricity costs without depreciation exceeded over market price (EUR/year) [6-5]	-12 850	-64 251	-128 502
9	Electricity costs without depreciation exceeded over market price (EUR/MWh) [7-1]	-32,13	-32,13	-32,13
10	Total average production costs with depreciation but without cost of capital (EUR/year) [6+3]	50 028	223 391	395 558
11	Total average production costs with depreciation but without cost of capital (EUR/MWh ₀) [10/2]	125,07	111,70	98,89
12	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [10-5]	30 348	124 991	198 758
13	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [11-1]	75,87	62,50	49,69
14	Total average production costs with depreciation and cost of capital (EUR/year) [6+4]	83 284	369 077	647 497
15	Total average production costs with depreciation and cost of capital (EUR/MWh ₀) [14/2]	208,21	184,54	161,87
16	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [14-5]	63 604	270 677	450 697
17	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [15-1]	159,01	135,34	112,67
18	Total average production costs without depreciation but with cost of capital (EUR/year) [14-3]	40 086	179 835	320 236

19	Total average production costs without depreciation but with cost of capital (EUR/MWh) [18/2]		100,07	89,92	80,06
20	Price of MP (EUR/MWh)	Electricity from RES till 10 year starting from operation	176,69	126,60	120,96
		Electricity from RES after 10 year	106,02	75,96	72,58
21	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity from RES till 10 year starting from operation	150,19	107,61	102,82
		Electricity from RES after 10 year	90,11	64,57	61,69

We can conclude that the electricity production in wind power plants and selling it at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in wind power plants.

- Biogas cogeneration plants.

	Position of costs	Installed power MWe		
		0,5	1	2
1	Electricity price (EUR/MWh)	49,20	49,20	49,20
2	Raw material price (equivalents of corn silage) (EUR/t)	35,57	35,57	35,57
3	Produced electricity in year without self-use (MWh/year)	3 680	7 360	14 720
4	Annual depreciation expenses (EUR/year)	187 819	324 415	512 234
5	PMT (IRR=12%) in year	332 410	574 163	906 573
6	Annual total incomes from electricity selling at the market price (EUR/year) [1·3]	181 056	362 112	724 224
7	Heat price (EUR/MWh)	28	28	28
8	Annual incomes from heat selling (EUR/year)	45 757	91 513	183 026
9	Annual total incomes from the market (EUR/year) [6+8]	226 813	453 625	907 250
10	Total average production costs without depreciation (EUR/year)	553 890	1 097 536	2 167 753
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWh) [(10-8)/3]	138,08	136,69	134,83
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	327 078	643 911	1 260 503
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	88,88	87,49	85,63
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	741 710	1 421 951	2 679 987
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWh) [(14-8)/3]	189,12	180,77	169,63
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	514 897	968 326	1 772 737

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17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]		139,92	131,57	120,43
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]		886 300	1 671 699	3 074 326
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh _a) [(18-8)/3]		228,41	214,70	196,42
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]		659 488	1 218 074	2 167 076
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]		179,21	165,50	147,22
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]		698 481	1 347 284	2 562 092
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _a) [(22-8)/3]		177,37	170,62	161,62
24	Price of MP (EUR/MWh)	Electricity in cogeneration	198,13	192,48	174,26
		Electricity from RES till 10 year starting from operation	204,17	198,34	170,79
		Electricity from RES after 10 year	163,33	158,67	129,04
25	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity in cogeneration	178,32	173,23	156,83
		Electricity from RES till 10 year starting from operation	183,75	178,51	153,71
		Electricity from RES after 10 year	147,00	142,80	116,14

We can conclude that electricity production in biogas cogeneration plants and selling at the market price wasn't economically without the support. The production costs of electricity without the depreciation and the cost of capital were significantly higher than the electricity market price. Thus the operating aid during all lifecycle of such power plants was needed.

- Biomass cogeneration plants.

	Position of costs	Installed power MWe		
		0,4	1	2
1	Electricity price (EUR/MWh)	49,20	49,20	49,20
2	Raw material price (wood chips) (EUR/m ³ loose)	10,67	10,67	10,67
3	Produced electricity in year without self-use (MWh/year)	2 200	5 500	11 000
4	Annual depreciation expenses (EUR/year)	320 975	498 290	694 986
5	PMT (IRR=12%) in year	568 074	881 894	1 230 016
6	Annual total incomes from electricity selling at the market price (EUR/year) [1+3]	108 240	270 600	541 200
7	Heat price (EUR/MWh)	17	17	17
8	Annual incomes from heat selling (EUR/year)	155 551	363 990	699 982
9	Annual total incomes from the market (EUR/year) [6+8]	263 791	634 590	1 241 182

Annex IV

10	Total average production costs without depreciation (EUR/year)		364 812	674 293	1 159 728
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWh) [(10-8)/3]		95,12	56,42	41,80
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]		101 021	39 702	-81 453
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]		45,92	7,22	-7,40
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]		685 787	1 172 583	1 854 715
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWh) [(14-8)/3]		241,02	147,02	104,98
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]		421 995	537 992	613 533
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]		191,82	97,82	55,78
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]		932 887	1 556 187	2 389 744
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh) [(18-8)/3]		353,33	216,76	153,61
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]		669 095	921 596	1 148 563
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]		304,13	167,56	104,41
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]		611 912	1 057 897	1 694 758
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh) [(22-8)/3]		207,44	126,16	90,43
24	Price of MP (EUR/MWh)	Electricity in cogeneration	206,34	192,48	174,26
		Electricity from RES till 10 year starting from operation	206,34	192,48	183,90
		Electricity from RES after 10 year	155,90	145,43	138,95
25	Average revenue from selling electricity within MP taking into account 10% of subsidized energy tax (EUR/MWh)	Electricity in cogeneration	185,71	173,23	156,83
		Electricity from RES till 10 year starting from operation	185,71	173,23	165,51
		Electricity from RES after 10 year	140,31	130,89	125,05

We can conclude that electricity production in biomass cogeneration plants and selling at market price was economically reasonable only after payback period of investment. Thus the MP of electricity encouraged the merchants to start the electricity production in biomass cogeneration plants.

- Natural gas high efficient cogeneration plants.

	Position of costs	Installed power MWe		
		0,2	1	4
1	Electricity price (EUR/MWh)	49,20	49,20	49,20
2	Raw material price (natural gas) (EUR/MWh)	40,54	40,54	38,42
3	Produced electricity in year without self-use (MWh/year)	1 100	5 500	22 000
4	Annual depreciation expenses (EUR/year)	31 303	85 372	341 489
5	PMT (IRR=12%) in year	55 402	151 095	604 382
6	Annual total incomes from electricity selling at the market price (EUR/year) [1-3]	54 120	270 600	1 082 400
7	Heat price (EUR/MWh)	44,07	44,07	41,76
8	Annual incomes from heat selling (EUR/year)	58 333	291 663	1 110 189
9	Annual total incomes from the market (EUR/year) [6+8]	112 453	562 263	2 192 589
10	Total average production costs without depreciation (EUR/year)	151 862	742 661	2 623 644
11	Total average production costs for electricity without depreciation taking into account the income from heat selling (EUR/MWh _{el}) [(10-8)/3]	85,03	82,00	68,79
12	Electricity costs without depreciation exceeded over market price (EUR/year) [10-9]	39 409	180 398	431 055
13	Electricity costs without depreciation exceeded over market price (EUR/MWh) [11-1]	35,83	32,80	19,59
14	Total average production costs with depreciation but without cost of capital (EUR/year) [10+4]	183 165	828 034	2 965 133
15	Total average production costs for electricity with depreciation but without cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(14-8)/3]	113,48	97,52	84,32
16	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/year) [14-9]	70 712	265 770	772 544
17	Electricity costs with depreciation but without cost of capital exceeded over market price (EUR/MWh) [15-1]	64,28	48,32	35,12
18	Total average production costs with depreciation and cost of capital (EUR/year) [10+5]	207 263	893 757	3 228 026
19	Total average production costs for electricity with depreciation and cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(18-8)/3]	135,39	109,47	96,27
20	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/year) [18-9]	94 811	331 494	1 035 437
21	Electricity costs with depreciation and cost of capital exceeded over market price (EUR/MWh) [19-1]	86,19	60,27	47,07
22	Total average production costs without depreciation but with cost of capital (EUR/year) [18-4]	175 960	808 385	2 886 537
23	Total average production costs without depreciation but with cost of capital taking into account the income from heat selling (EUR/MWh _{el}) [(22-8)/3]	106,93	93,95	80,74
24	Price of MP (EUR/MWh)	165,69	145,43	126,05
25	Average revenue from selling electricity within MP, taking into account 15% of subsidized energy tax (EUR/MWh)	140,84	123,61	107,14

We can conclude that electricity production in natural gas cogeneration plants and selling at the market price wasn't economically reasonable without the support. The

production costs of electricity without the depreciation and the cost of capital were significantly higher than the electricity market price. Thus the operating aid during all lifecycle of such power plants was needed.

The information about the solar technologies isn't included because there are no working solar power plants in Latvia that sell electricity under MP and there are no valid rights for solar power plants that are not implemented yet to sell electricity under MP. There is no possibility to receive new rights to sell electricity under MP in Latvia. Taking into account that fact it would be premature to calculate the compensation for that technology.

5. Explanation regarding the cost calculation

The data on the average business cases for companies willing to invest in biomass, biogas, wind and hydro production technologies were collected within a study „Evaluation of the support and proposals for the improvement of the support for electricity produced from renewable energy sources and in cogeneration”¹ in 2013.

The study was done on the basis of market research. Market research has been carried out to determine the necessary intensity of the support for the 5 following groups:

- wind power plants,
- small HPP (with installed capacity till 5 MW),
- biogas power plants,
- biomass cogeneration plants,
- high efficient natural gas cogeneration plants.

The basic data for market research were collected from the following sources of information:

- the equipment manufacturers and suppliers in the Baltic region;
- the electricity producers;
- the raw materials and fuel suppliers;
- the Central Statistical Bureau;
- the Procurement Monitoring Bureau;

¹ Accessible at the Ministry of Economics website:
(http://www.em.gov.lv/images/modules/items/SIA_Ekodoma_ataskaite.pdf)

- the Latvian commercial banks;
- the international studies with the EU reference values that describe good practices in Europe;
- the consultation with industry;
- the assessment of experts.

The capital investments were determined on the basis of the information provided by the equipment suppliers and developers. To identify the specific local capital investment it was interviewed at least five of the equipment manufacturers, the suppliers and the dealers in the Baltic region about the total capital investment depending on the capacity. The capital investments were collected also from the website of the Procurement Monitoring Bureau.

The operating costs of the power plants were collected from the electricity producers and the suppliers of equipment (the cost of equipment maintenance). 5 - 20 local electricity producers were surveyed in every group of plants. These data were compared with similar projects in the EU.

The electricity price is equal to the average electricity wholesale price in Latvian bidding area in the Nord Pool Spot market in given year.

The total production costs in tables do not include a rate of return on investment and do not include a discount rate.

According to above mentioned study and the practice of other EU Member States, a reasonable rate of return on investment for these types of investments is at least 12%. And Latvia had considered that at least 12% would be the reasonable for such investment's type.

According to a study a recommended discount rate is 6,4%. The discount rate used in the financial calculations is usually treated as a capital cost. In many EU Member States the Regulators determine the recommended amount of weighted average cost of capital (WACC) for the regulated industry. The weighted average cost of capital is determined by the following equation:

$$WACC = E * Ce + D * Cd(1 - Nien), \%$$

were

E – share of equity capital, 30%;

D – share of leverage capital, 70%;

Ce – equity capital price, %;

Cd – leverage capital price, %;

Nien – enterprise income tax, 15%.

Equity capital price is determined by the equation:

$$C_e = BT * (TP1 - BR) + BR + SBBI = 9,3 \%,$$

were

BT – Beta of energy sector enterprises– European average indicator, 0,66;

TP1 – the average market return on equity capital in the European stock market, 9,75% (European MSCI index average annual growth over the last four years)

BR – risk-free rate, 2,89%;

SBBI – size factor, 1,88%.

Leverage capital price is determined by the equation:

$$C_d = SWAP + TP2 = 6,07 \%,$$

were

SWAP – 10 year EUR SWAP rate, 1,57% ;

TP2 – the amount of market premium for leverage capital, expert evaluation is in the range from 3 to 4,5%.

The calculation result shows that the average cost of capital for energy projects in Latvia is

$$WACC = 0,3 * 9,3 + 0,7 * 6,07 * (1 - 0,15) = 6,40 \%$$

Regarding the depreciation by given technologies the specific calculations are been included in the tables. The total costs in the first 10 years are shown in the row "Total average production costs with depreciation (EUR/MWhel)", whereas total costs in the last 10 years are shown in the row "Total average production costs without depreciation (EUR/MWhel)".