

Efficiency of the ANew-B1 Wind Turbine.

A. From May to October 2018, the ANew-B1 was pre-optimized at wind speeds from 3.2 m/s to 6.5 m/s. Experiments and studies were carried out in various wind conditions - stable, gusty, with low and high turbulence intensity, as well as at different temperatures and air humidity. In the tables below we show typical episodes of ANew-B1 work in the specified conditions.

Episode 30.06.2018

The wind is stable with low turbulence intensity.

Air temperature + 28 ° C

Air density 1.1954 kg / m³

Wind speed - at the height of the center of the turbine.

The turbine begins to rotate at a wind speed of 3.2 m / s.

At a speed of rotation of the turbine 5.2 RPM ANew-B1 begins to pass electricity to the network.

Losses of power - energy consumption by wind turbines own sub-systems.

Time (12 minutes)	Time of Action	Average wind speed	RPM of turbine	Power of wind	Power from generator	Power to net	Losses of power	Coefficient of conversion generator / grid
18:57:26 – 18:58:25	1 m. 00 s.	5.56 m/s	7.35	174.65 kW	100.18 kW	79.32 kW	20.86 kW	57.36 % / 45.42 %
18:58:26 – 18:59:25	1 m. 00 s.	5.77 m/s	7.82	195.19 kW	130.75 kW	106.60 kW	24.15 kW	66.99 % / 54.61 %
18:59:26 – 19:00:25	1 m. 00 s.	5.81 m/s	7.38	199.28 kW	103.81 kW	82.48 kW	21.33 kW	52.09 % / 41.39 %
19:00:26 – 19:01:25	1 m. 00 s.	5.90 m/s	7.68	208.68 kW	124.30 kW	100.54 kW	23.76 kW	59.56 % / 48.18 %
19:01:26 – 19:02:25	1 m. 00 s.	5.87 m/s	7.62	205.52 kW	117.43 kW	94.94 kW	22.49 kW	57.14 % / 47.47 %
19:02:26 – 19:03:25	1 m. 00 s.	6.45 m/s	8.27	272.65 kW	167.55 kW	138.84 kW	28.71 kW	61.45 % / 50.92 %
19:03:26 – 19:04:25	1 m. 00 s.	5.61 m/s	7.40	179.40 kW	104.69 kW	83.47 kW	21.22 kW	58.36 % / 46.53 %
19:04:26 – 19:05:25	1 m. 00 s.	4.80 m/s	6.91	112.37 kW	76.95 kW	59.55 kW	17.40 kW	68.48 % / 53.00 %
19:05:26 – 19:06:25	1 m. 00 s.	5.45 m/s	7.62	164.48 kW	121.66 kW	98.41 kW	23.25 kW	73.97 % / 59.83 %
19:06:26 – 19:07:25	1 m. 00 s.	6.26 m/s	7.81	249.26 kW	131.82 kW	106.66 kW	25.16 kW	52.88 % / 43.84 %
19:07:26 – 19:08:25	1 m. 00 s.	4.03 m/s	5.88	66.31 kW	36.52 kW	23.00 kW	13.52 kW	55.07 % / 34.69 %
19:08:26 – 19:09:25	1 m. 00 s.	3.87 m/s	5.71	58.90 kW	31.73 kW	18.73 kW	13.00 kW	53.87 % / 31.80 %
Average for 12 minutes		5.45 m/s	7.29	173.89 kW	103.95 kW	82.71 kW	21.24 kW	59.76 % / 46.47%

Episode 13.08.2018

The wind is stable with a high intensity of turbulence.

Air temperature is +32 ° C,

Air density $\approx 1.1574\text{kg} / \text{m}^3$.

Wind speed - at the height of the center of the turbine.

The turbine begins to rotate at a wind speed of 3.2 m / s.

At the speed of rotation of the turbine 5.2 RPM ANew-B1 begins to supply electricity to the network.

Losses of power - energy consumption by wind turbines own sub-systems.

Time (12 minutes)	Time of Action	Average wind speed	RPM of turbine	Power of wind	Power from generator	Power to net	Losses of power	Coefficient of conversion generator / grid
14:04:35 – 14:05:34	1 m. 00 s.	4.24 m/s	5.84	74.99 kW	37.73 kW	24.07 kW	13.66 kW	50.31 % / 32.10 %
14:05:35 – 14:06:34	1 m. 00 s.	6.61 m/s	8.01	284.10 kW	151.49 kW	124.63 kW	26.86 kW	53.32 % / 43.87 %
14:06:35 – 14:07:34	1 m. 00 s.	4.76 m/s	6.45	106.10 kW	59.63 kW	42.78 kW	16.85 kW	56.20 % / 40.32 %
14:07:35 – 14:08:34	1 m. 00 s.	4.32 m/s	6.24	79.31 kW	48.74 kW	34.13 kW	14.61 kW	61.46 % / 43.04 %
14:08:35 – 14:09:34	1 m. 00 s.	5.12 m/s	6.36	132.04 kW	55.00 kW	38.98 kW	16.02 kW	41.65 % / 29.52 %
14:09:35 – 14:10:34	1 m. 00 s.	7.80 m/s	8.55	466.86 kW	207.82 kW	174.70 kW	33.12 kW	44.51 % / 37.42 %
14:10:35 – 14:11:34	1 m. 00 s.	7.30 m/s	8.11	382.71 kW	157.60 kW	130.00 kW	27.60 kW	41.18 % / 33.97 %
14:11:35 – 14:12:34	1 m. 00 s.	7.00 m/s	7.96	337.44 kW	141.85 kW	115.92 kW	25.93 kW	42.04 % / 34.35 %
14:12:35 – 14:13:34	1 m. 00 s.	5.27 m/s	6.74	144.00 kW	70.86 kW	52.83 kW	18.03 kW	49.21 % / 36.69 %
14:13:35 – 14:14:34	1 m. 00 s.	4.32 m/s	6.22	79.31 kW	49.66 kW	33.87 kW	15.79 kW	62.62 % / 42.79 %
14:14:35 – 14:15:34	1 m. 00 s.	3.34 m/s	5.68	36.66 kW	30.28 kW	18.28 kW	12.00 kW	82.60 % / 49.86 %
14:15:35 – 14:16:34	1 m. 00 s.	3.32 m/s	5.29	36.24 kW	21.77 kW	9.98 kW	11.79 kW	60.07 % / 27.54 %
Average for 12 minutes		5.28 m/s	6.79	179.98 kW	86.04 kW	66.68 kW	19.36 kW	53.77 % / 37.62 %

Episode 12.09.2018.

Wind gusty with high intensity of turbulence.

Air temperature is + 30 ° C

Air density $\approx 1.165\text{kg} / \text{m}^3$.

Wind speed - at the height of the center of the turbine.

The turbine begins to rotate at a wind speed of 3.2 m / s.

Losses of power - energy consumption by wind turbines own sub-systems.

Time (23 minutes)	Time of Action	Average wind speed	RPM of turbine	Power of wind	Power from generator	Power to net	Losses of power	Coefficient of conversion generator / grid
13:42:00 – 13:42:59	1 m. 00 s.	4.73 m/s	6.29	104.79 kW	54.41 kW	39.04 kW	15.37 kW	51.92 % / 37.26 %
13:43:00 – 13:43:59	1 m. 00 s.	6.14 m/s	7.65	229.22 kW	140.67 kW	115.42 kW	25.25 kW	61.37 % / 50.35 %
13:44:00 – 13:44:59	1 m. 00 s.	7.00 m/s	7.89	339.66 kW	161.53 kW	132.53 kW	29.00 kW	47.56 % / 39.02 %
13:45:00 – 13:45:59	1 m. 00 s.	5.68 m/s	7.08	181.46 kW	99.29 kW	77.85 kW	21.44 kW	54.72 % / 42.90 %
13:46:00 – 13:46:59	1 m. 00 s.	4.57 m/s	6.51	94.51 kW	65.98 kW	49.19 kW	16.79 kW	69.81 % / 52.05 %
13:47:00 – 13:47:59	1 m. 00 s.	4.09 m/s	5.95	67.75 kW	41.40 kW	25.05 kW	16.44 kW	61.24 % / 36.97 %
13:48:00 – 13:48:59	1 m. 00 s.	5.52 m/s	7.05	166.56 kW	97.11 kW	75.79 kW	21.32 kW	58.30 % / 45.50 %
13:49:00 – 13:49:59	1 m. 00 s.	8.00 m/s	9.36	507.00 kW	236.75 kW	200.00 kW	36.75 kW	46.70 % / 39.45 %
13:50:00 – 13:50:59	1 m. 00 s.	5.13 m/s	7.00	133.68 kW	95.51 kW	74.54 kW	20.97 kW	71.45 % / 55.76 %
13:51:00 – 13:51:59	1 m. 00 s.	4.84 m/s	6.72	112.27 kW	78.35 kW	59.37 kW	18.98 kW	69.79 % / 52.88 %
13:52:00 – 13:52:59	1 m. 00 s.	4.88 m/s	6.65	115.10 kW	74.36 kW	55.46 kW	18.92 kW	64.60 % / 48.17 %
13:53:00 – 13:53:59	1 m. 00 s.	5.75 m/s	7.01	188.26 kW	95.07 kW	74.20 kW	20.87 kW	50.50 % / 39.41 %
13:54:00 – 13:54:59	1 m. 00 s.	7.03 m/s	7.74	344.04 kW	167.70 kW	137.60 kW	30.10 kW	48.74 % / 40.00 %
13:55:00 – 13:55:59	1 m. 00 s.	5.23 m/s	6.92	141.66 kW	90.75 kW	70.83 kW	19.92 kW	64.06 % / 50.00 %
13:56:00 – 13:56:59	1 m. 00 s.	4.83 m/s	6.63	111.58 kW	72.97 kW	54.40 kW	18.57 kW	65.40 % / 48.75 %
13:57:00 – 13:57:59	1 m. 00 s.	5.61 m/s	6.82	174.84 kW	84.54 kW	65.34 kW	19.20 kW	48.35 % / 37.37 %
13:58:00 – 13:58:59	1 m. 00 s.	4.44 m/s	6.17	86.67 kW	50.21 kW	33.90 kW	16.31 kW	57.93 % / 39.11 %
13:59:00 – 13:59:59	1 m. 00 s.	5.33 m/s	6.77	149.94 kW	80.73 kW	61.80 kW	18.93 kW	53.84 % / 41.22 %
14:00:00 – 14:00:59	1 m. 00 s.	4.12 m/s	5.92	69.25 kW	42.91 kW	25.91 kW	17.00 kW	61.96 % / 37.42 %
14:01:00 – 14:01:59	1 m. 00 s.	6.04 m/s	7.23	218.20 kW	111.24 kW	89.14 kW	22.10 kW	50.98 % / 40.85 %
14:02:00 – 14:02:59	1 m. 00 s.	4.44 m/s	6.16	86.67 kW	49.92 kW	33.70 kW	16.22 kW	57.60 % / 38.88 %
14:03:00 – 14:03:59	1 m. 00 s.	5.25 m/s	6.70	143.29 kW	76.91 kW	58.88 kW	18.03 kW	53.67 % / 41.09 %
14:04:00 – 14:04:59	1 m. 00 s.	4.37 m/s	6.51	82.64 kW	65.98 kW	49.19 kW	16.79 kW	79.84 % / 59.52 %
Average for 23 minutes		5.35 m/s	6.90	167.35 kW	92.80 kW	72.14 kW	20.66 kW	58.71 % / 44.08 %

Episode 23.10.2018

The wind is stable with a high intensity of turbulence.

Air temperature is + 8 ° C, drizzle.

Air density is ≈ 1.256 kg / m³.

Wind speed - at the height of the center of the turbine.

The turbine begins to rotate at a wind speed of 3.2 m / s.

At a speed of rotation of the turbine 6.0 RPM ANew-B1 begins to supply electricity to the network.

Losses of power - energy consumption by wind turbines own sub-systems.

Time (13 minutes)	Time of Action	Average wind speed	RPM of turbine	Power of wind	Power from generator	Power to net	Losses of power	Coefficient of conversion generator / grid
09:41:39 – 09:42:38	1 m. 00 s.	3.78 m/s	6.23	57.66 kW	51.78 kW	36.49 kW	15.29 kW	89.80 % / 63.28 %
09:42:39 – 09:43:38	1 m. 00 s.	4.86 m/s	6.38	122.55 kW	55.30 kW	39.68 kW	15.62 kW	45.12 % / 32.38 %
09:43:39 – 09:44:38	1 m. 00 s.	4.29 m/s	6.28	84.29 kW	54.05 kW	38.50 kW	15.55 kW	64.12 % / 45.68 %
09:44:39 – 09:45:38	1 m. 00 s.	4.58 m/s	6.32	102.57 kW	53.44 kW	37.96 kW	15.48 kW	52.10 % / 37.00 %
09:45:39 – 09:46:38	1 m. 00 s.	5.55 m/s	6.80	182.51 kW	75.79 kW	57.67 kW	18.12 kW	41.53 % / 31.60 %
09:46:39 – 09:47:38	1 m. 00 s.	5.20 m/s	6.70	150.11 kW	75.06 kW	57.03 kW	18.03 kW	50.00 % / 38.00 %
09:47:39 – 09:48:38	1 m. 00 s.	5.71 m/s	6.96	198.75 kW	91.22 kW	71.20 kW	20.02 kW	45.90 % / 35.82 %
09:48:39 – 09:49:38	1 m. 00 s.	6.10 m/s	7.33	242.32 kW	116.37 kW	93.59 kW	22.78 kW	48.02 % / 38.62 %
09:49:39 – 09:50:38	1 m. 00 s.	6.33 m/s	7.42	270.78 kW	111.19 kW	89.10 kW	22,09 kW	41.06 % / 32.91 %
09:50:39 – 09:51:38	1 m. 00 s.	4.23 m/s	6.68	80.80 kW	77.73 kW	59.51 kW	18.22 kW	96.20 % / 73.65 %
09:51:39 – 09:52:38	1 m. 00 s.	4.53 m/s	6.26	99.05 kW	52.91 kW	37.49 kW	15.42 kW	53.42 % / 37.85 %
09:52:39 – 09:53:38	1 m. 00 s.	6.25 m/s	7.41	260.64 kW	122.65 kW	99.21 kW	23.44 kW	47.06 % / 38.06 %
09:53:39 – 09:54:38	1 m. 00 s.	6.91 m/s	8.07	352.24 kW	172.06 kW	142.64 kW	29.42 kW	48.85 % / 40.50 %
Average for 13 minutes		5.26 m/s	6.83	169.56 kW	85.35 kW	66.16 kW	19.19 kW	55.63 % / 41.95 %

B. From August to October 2018, the initial stage of preliminary optimization of the ANew-B1 operation was conducted at wind speeds from 6.5 m / s to 10 m / s.

Episode 24.08.2018.

Wind gusty with high intensity of turbulence.

Air temperature is + 30 ° C

Air density \approx 1.165kg / m³.

Wind speed - at the height of the center of the turbine.

The turbine begins to rotate at a wind speed of 3.2 m / s.

At a speed of rotation of the turbine 5.5 RPM ANew-B1 begins to pass electricity to the network.

Losses of power - energy consumption by wind turbines own sub-systems.

Time (13 minutes)	Time of Action	Average wind speed	RPM of turbine	Power of wind	Power from generator	Power to net	Losses of power	Coefficient of conversion generator / grid
11:56:42 – 11:57:41	1 m. 00 s.	7.05 m/s	8.55	347.00 kW	150.76 kW	123.85 kW	26.91 kW	43.45 % / 35.69 %
11:57:42 – 11:58:41	1 m. 00 s.	7.32 m/s	8.78	388.40 kW	160.15 kW	132.14 kW	28.01 kW	41.23 % / 34.02 %
11:58:42 – 11:59:41	1 m. 00 s.	6.54 m/s	8.54	277.00 kW	138.56 kW	113.23 kW	25.33 kW	50.02 % / 40.88 %
11:59:42 – 12:00:41	1 m. 00 s.	6.95 m/s	8.80	332.43 kW	161.91 kW	133.84 kW	28.07 kW	48.70 % / 40.26 %
11:00:42 – 11:01:41	1 m. 00 s.	7.00 m/s	8.60	339.65 kW	143.45 kW	117.71 kW	25.74 kW	42.23 % / 34.66 %
11:01:42 – 11:02:41	1 m. 00 s.	8.56 m/s	9.62	621.10 kW	274.96 kW	233.05 kW	41.91 kW	44.27 % / 37.52 %
11:02:42 – 11:03:41	1 m. 00 s.	8.66 m/s	9.38	643.13 kW	266.16 kW	225.50 kW	40.56 kW	41.39 % / 35.08 %
11:03:42 – 11:04:41	1 m. 00 s.	10.0 m/s	10.31	990.25 kW	384.94 kW	330.73 kW	54.21 kW	38.87 % / 33.40 %
11:04:42 – 11:05:41	1 m. 00 s.	9.22 m/s	9.72	776.14 kW	380,00 kW	326.46 kW	53.54 kW	48.96 % / 42.06 %
11:05:42 – 11:06:41	1 m. 00 s.	9.21 m/s	10.01	773.61 kW	371.33 kW	319.01 kW	52.32 kW	48.00 % / 41.24 %
11:06:42 – 11:07:41	1 m. 00 s.	6.55 m/s	8.69	278.27 kW	153.15 kW	125.62 kW	27.53 kW	55.04 % / 45.14 %
11:07:42 – 11:08:41	1 m. 00 s.	7.45 m/s	9.06	409.46 kW	190.66 kW	159.30 kW	31.36 kW	46.56 % / 38.90 %
11:08:42 – 11:09:41	1 m. 00 s.	9.05 m/s	9.55	630.03 kW	254.39 kW	215.57 kW	40.38 kW	40.38 % / 34.22 %
Average for 13 minutes		7.97 m/s	9.20	523.57 kW	233.11 kW	196.62 kW	36.49 kW	45.32 % / 37.93 %

Episode 12.09.2018.

The wind is stable with low turbulence intensity.

Air temperature is + 30 ° C

Air density $\approx 1.165\text{kg} / \text{m}^3$.

Wind speed - at the height of the center of the turbine.

The turbine begins to rotate at a wind speed of 3.2 m / s.

At a turbine speed of 5.5 RPM, the ANew-B1 begins to supply electricity to the network.

Losses of power - energy consumption by wind turbines own sub-systems.

Time (9 minutes)	Time of Action	Average wind speed	RPM of turbine	Power of wind	Power from generator	Power to net	Losses of power	Coefficient of conversion generator / grid
14:28:40 – 14:29:39	1 m. 00 s.	6.78 m/s	7.53	308.63 kW	131.14 kW	106.64 kW	24.50 kW	42.49 % / 34.55 %
14:29:40 – 14:30:39	1 m. 00 s.	7.00 m/s	7.82	339.66 kW	152.29 kW	125.34 kW	26.95 kW	44.84 % / 36.90 %
14:30:40 – 14:31:39	1 m. 00 s.	7.29 m/s	7.82	383.64 kW	154.24 kW	127.06 kW	27.18 kW	40.20 % / 33.12 %
14:31:40 – 14:32:39	1 m. 00 s.	7.24 m/s	7.84	375.80 kW	159.19 kW	131.44 kW	27.75 kW	42.36 % / 34.98 %
14:32:40 – 14:33:39	1 m. 00 s.	7.41 m/s	7.92	402.90 kW	162.45 kW	133.29 kW	29.16 kW	40.32 % / 33.08 %
14:33:40 – 14:34:39	1 m. 00 s.	7.24 m/s	7.67	375.80 kW	153.64 kW	126.07 kW	27.57 kW	40.86 % / 33.55 %
14:34:40 – 14:35:39	1 m. 00 s.	7.03 m/s	7.74	344.04 kW	167.70 kW	137.60 kW	30.10 kW	48.74 % / 40.00 %
14:35:40 – 14:36:39	1 m. 00 s.	7.85 m/s	7.87	479.00 kW	200.60 kW	168.00 kW	32.55 kW	41.87 % / 35.07 %
14:36:40 – 14:37:39	1 m. 00 s.	7.00 m/s	7.89	339.66 kW	161.53 kW	132.53 kW	29.00 kW	47.56 % / 39.02 %
Average for 9 minutes		7.20 m/s	7.79	372.13 kW	160.31 kW	132.00 kW	28.31 kW	43.25 % / 35.59 %

Episode 23.10.2018

The wind is stable with low turbulence intensity.

Air temperature is + 8 ° C.

Air density is ≈ 1.256 kg / m³.

Wind speed - at the height of the center of the turbine.

The turbine begins to rotate at a wind speed of 3.2 m / s.

At a speed of rotation of the turbine 6.0 RPM ANew-B1 begins to supply electricity to the network.

Losses of power - energy consumption by wind turbines own sub-systems.

Time (5 minutes)	Time of Action	Average wind speed	RPM of turbine	Power of wind	Power from generator	Power to net	Losses of power	Coefficient of conversion generator / grid
10:17:21 – 10:18:20	1 m. 00 s.	6.79 m/s	7.58	334.21 kW	145.46 kW	114.46 kW	25.52 kW	43.52 % / 34.25 %
10:18:21 – 10:19:20	1 m. 00 s.	6.25 m/s	7.41	260.64 kW	122.65 kW	99.21 kW	23.44 kW	48.06 % / 38.06 %
10:19:21 – 10:20:20	1 m. 00 s.	6.92 m/s	8.08	353.77 kW	172.80 kW	143.26 kW	29.55 kW	48.85 % / 40.50 %
10:20:21 – 10:21:20	1 m. 00 s.	6.81 m/s	8.17	339.59 kW	209.80 kW	176.18 kW	33.62 kW	61.78 % / 51.88 %
10:21:21 – 10:22:20	1 m. 00 s.	6.80 m/s	8.14	335.69 kW	181.42 kW	151.10 kW	30.32 kW	54.04 % / 45.01 %
Average for 5 minutes		6.71 m/s	7.88	325.50 kW	166.43 kW	136.84 kW	29.59 kW	51.25 % / 41.94 %