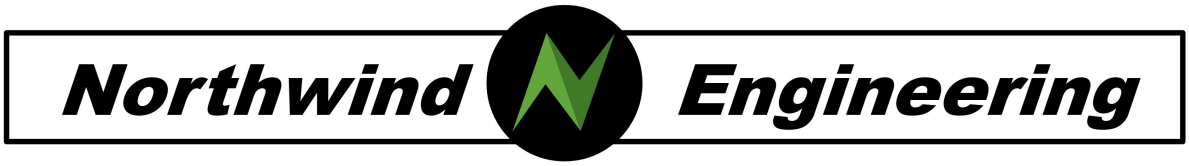

NREL 5MW Aeroelastic Model

- Power Curve Report -

Date: 2024.09.20
Document number: NE-029-01
Report Revision: 1
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Checked by: Drew Gertz
Released by: Drew Gertz

Revision history

Revision	Date	Description	Contributor(s)
1	2024.09.20	DLC12 (normal production) according to IEC 61400-1	Drew Gertz

Post-processing details

Simulation type	fast
Mean wind speed [m/s]	8.5
Turbulence intensity @ 15 m/s [%]	16
Weibull shape factor	2
Cut-in wind speed [m/s]	3
Cut-out wind speed [m/s]	25
Availability [%]	95
Rotor diameter [m]	126.0
Gearbox efficiency [%]	100.0
Generator efficiency [%]	94.4
Inverter efficiency [%]	100.0
Converter efficiency [%]	100.0
Parasitic loss [kWh/yr]	0.0

DLC details

Design load case	Number of simulations	Simulation length [s]	Initial period disregarded [s]
DLC12	216	620.0	20.0

Channel descriptions

Name	Units	Description
BlPitch1	deg	Blade 1 pitch angle (position)
GenTq	kN-m	Electrical generator torque
GridPwr	kW	Grid Power
LSShftFxa	kN	Low-speed shaft thrust force (this is constant along the shaft and is equivalent to the rotor thrust force)
LSShftMxa	kN-m	Low-speed shaft torque (this is constant along the shaft and is equivalent to the rotor torque)
RotPwr	kW	Rotor power (this is equivalent to the low-speed shaft power)
RotSpeed	rpm	Rotor azimuth angular speed
RtAeroCp	-	Rotor aerodynamic/hydrodynamic power coefficient
RtAeroCq	-	Rotor aerodynamic/hydrodynamic torque coefficient
RtAeroCt	-	Rotor aerodynamic/hydrodynamic thrust coefficient
RtElCp	-	Electrical Power Coefficient
RtTSR	-	Rotor tip-speed ratio

Power curve table

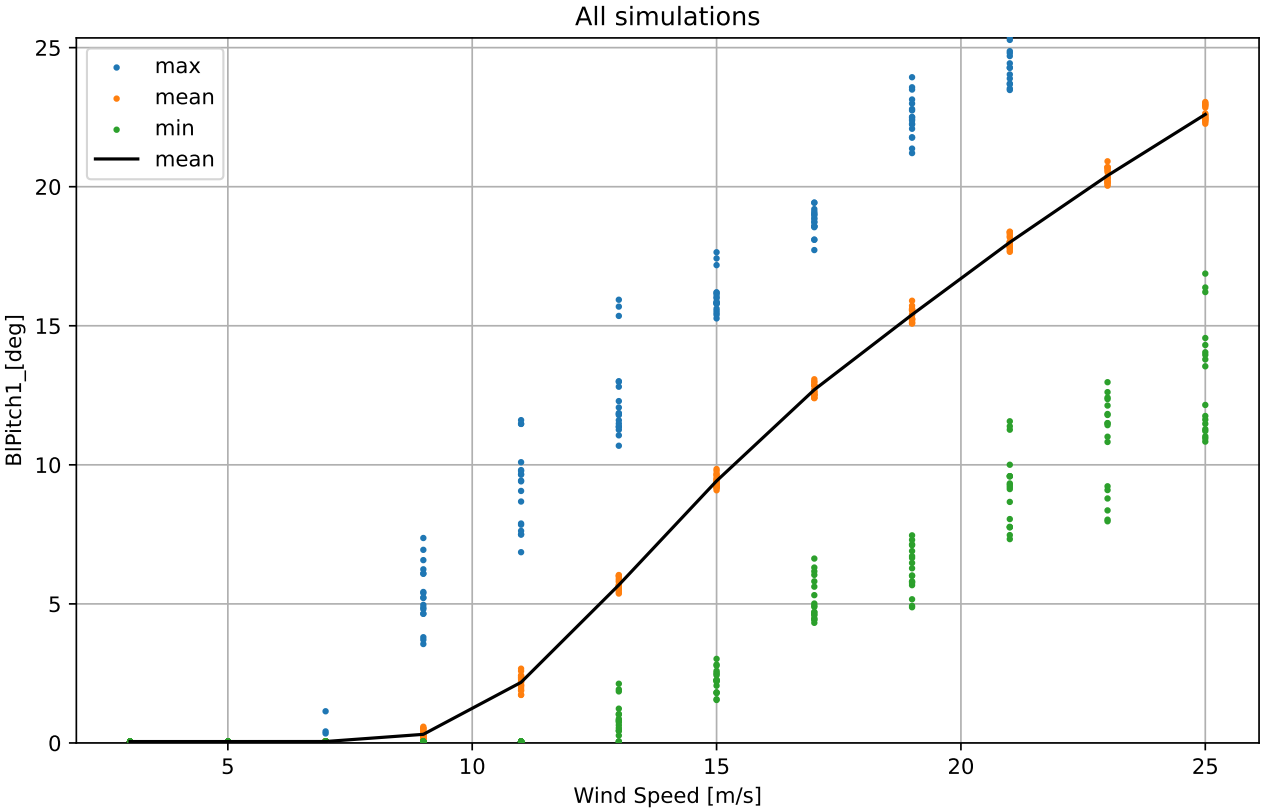
WndSpd	BlPitch1	GenTq	GridPwr	LSShftFxa	LSShftMxa	RotPwr
m/s	deg	kN-m	kW	kN	kN-m	kW
3.0	5.04e-02	2.74e+00	1.04e+02	1.47e+02	2.66e+02	1.10e+02
5.0	5.04e-02	7.61e+00	4.47e+02	2.35e+02	7.37e+02	4.74e+02
7.0	5.18e-02	1.47e+01	1.17e+03	3.72e+02	1.42e+03	1.24e+03
9.0	3.10e-01	2.39e+01	2.40e+03	5.33e+02	2.32e+03	2.55e+03
11.0	2.18e+00	3.41e+01	3.84e+03	6.25e+02	3.31e+03	4.07e+03
13.0	5.68e+00	4.10e+01	4.72e+03	5.93e+02	3.97e+03	5.00e+03
15.0	9.42e+00	4.25e+01	4.92e+03	5.15e+02	4.12e+03	5.21e+03
17.0	1.27e+01	4.31e+01	4.99e+03	4.55e+02	4.18e+03	5.29e+03
19.0	1.54e+01	4.31e+01	4.99e+03	4.17e+02	4.18e+03	5.29e+03
21.0	1.80e+01	4.31e+01	5.00e+03	3.88e+02	4.18e+03	5.29e+03
23.0	2.04e+01	4.31e+01	5.00e+03	3.66e+02	4.19e+03	5.29e+03
25.0	2.26e+01	4.31e+01	4.99e+03	3.49e+02	4.18e+03	5.29e+03

WndSpd	RotSpeed	RtAeroCp	RtAeroCq	RtAeroCt	RtElCp	RtTSR
m/s	rpm	-	-	-	-	-
3.0	3.77e+00	5.33e-01	6.13e-02	2.14e+00	5.03e-01	8.28e+00
5.0	5.69e+00	4.96e-01	6.13e-02	1.23e+00	4.69e-01	7.50e+00
7.0	7.98e+00	4.74e-01	6.04e-02	9.93e-01	4.48e-01	7.52e+00
9.0	1.01e+01	4.57e-01	5.95e-02	8.62e-01	4.32e-01	7.42e+00
11.0	1.16e+01	4.00e-01	5.69e-02	6.77e-01	3.78e-01	6.97e+00
13.0	1.20e+01	2.98e-01	4.89e-02	4.59e-01	2.81e-01	6.09e+00
15.0	1.21e+01	2.02e-01	3.81e-02	3.00e-01	1.91e-01	5.30e+00
17.0	1.21e+01	1.41e-01	3.00e-02	2.06e-01	1.33e-01	4.69e+00
19.0	1.21e+01	1.01e-01	2.41e-02	1.51e-01	9.53e-02	4.20e+00
21.0	1.21e+01	7.48e-02	1.97e-02	1.15e-01	7.06e-02	3.80e+00
23.0	1.21e+01	5.69e-02	1.64e-02	9.07e-02	5.38e-02	3.47e+00
25.0	1.21e+01	4.43e-02	1.39e-02	7.31e-02	4.18e-02	3.19e+00

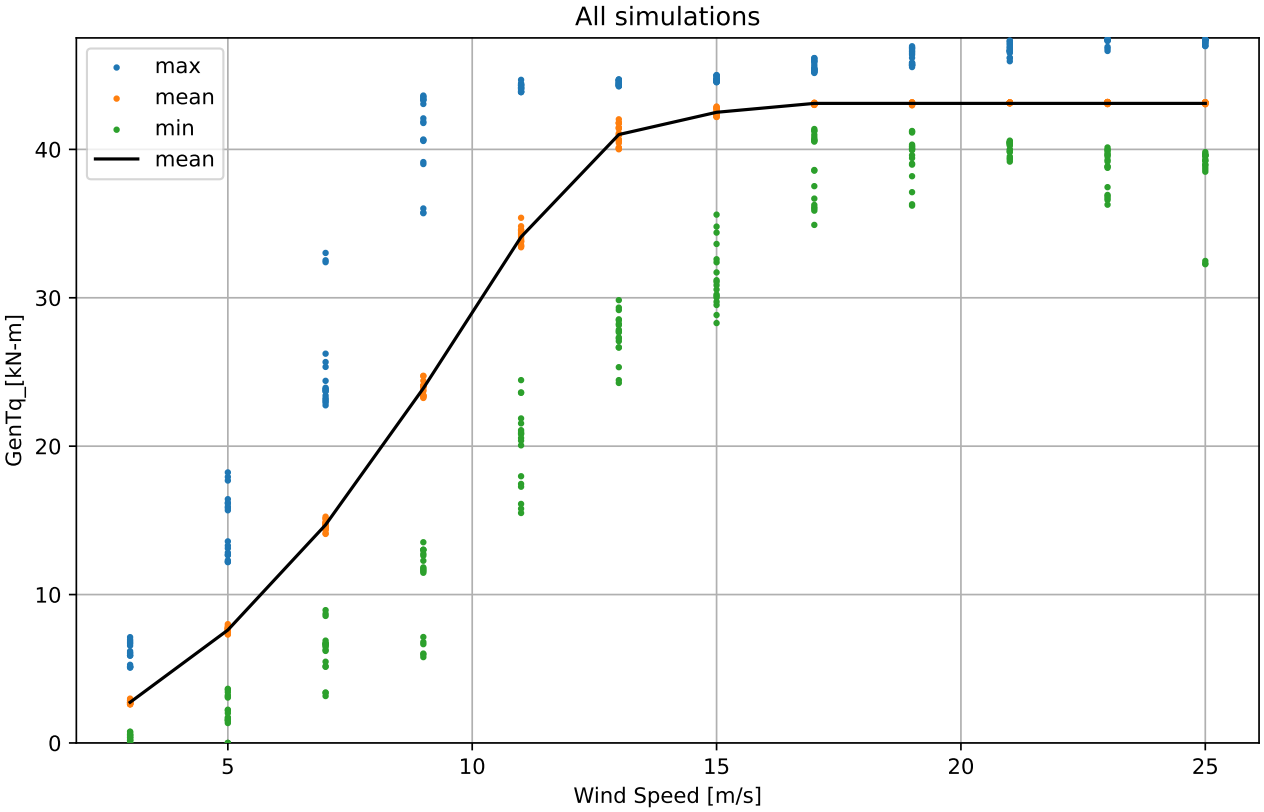
Annual energy production table

Wind Speed [m/s]	AEP [MWh]
3.5	2.61e+03
4.0	3.77e+03
4.5	5.15e+03
5.0	6.74e+03
5.5	8.47e+03
6.0	1.03e+04
6.5	1.21e+04
7.0	1.40e+04
7.5	1.58e+04
8.0	1.75e+04
8.5	1.91e+04
9.0	2.07e+04
9.5	2.20e+04
10.0	2.33e+04

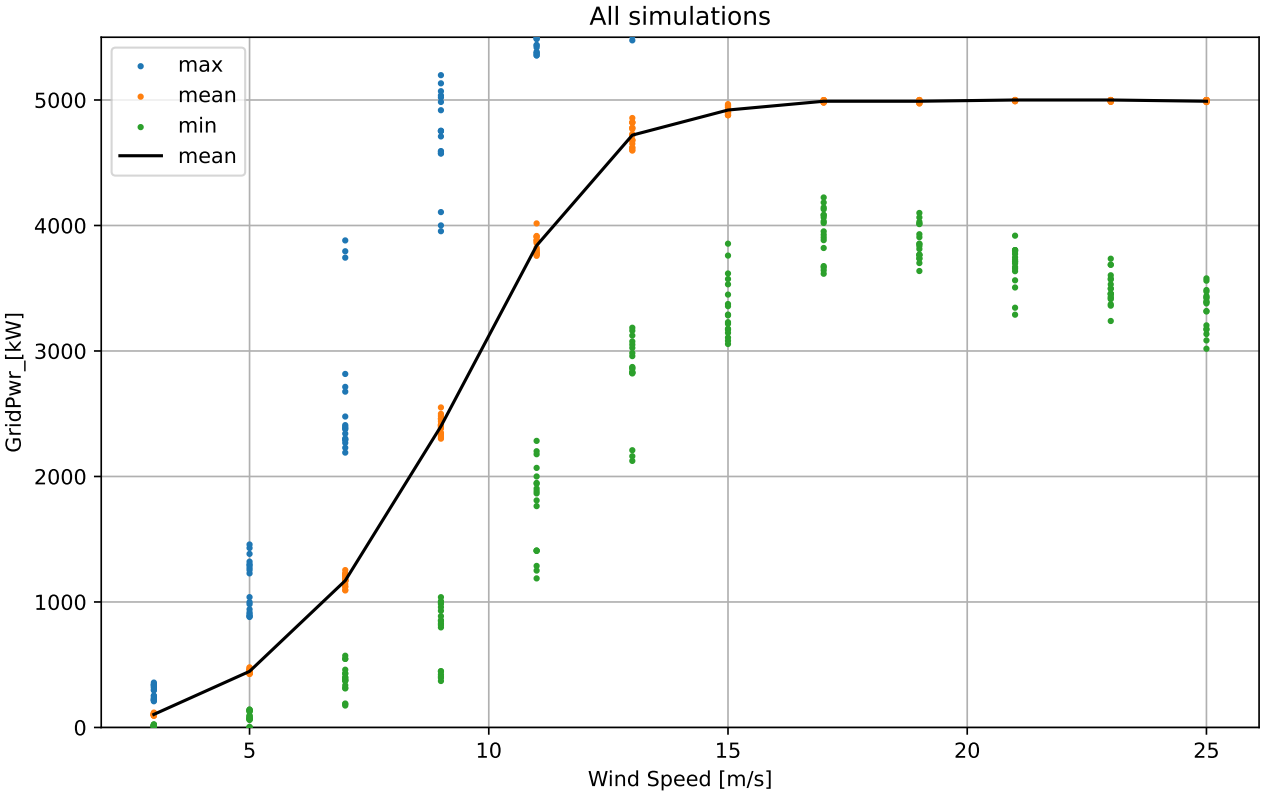
BlPitch1_[deg]



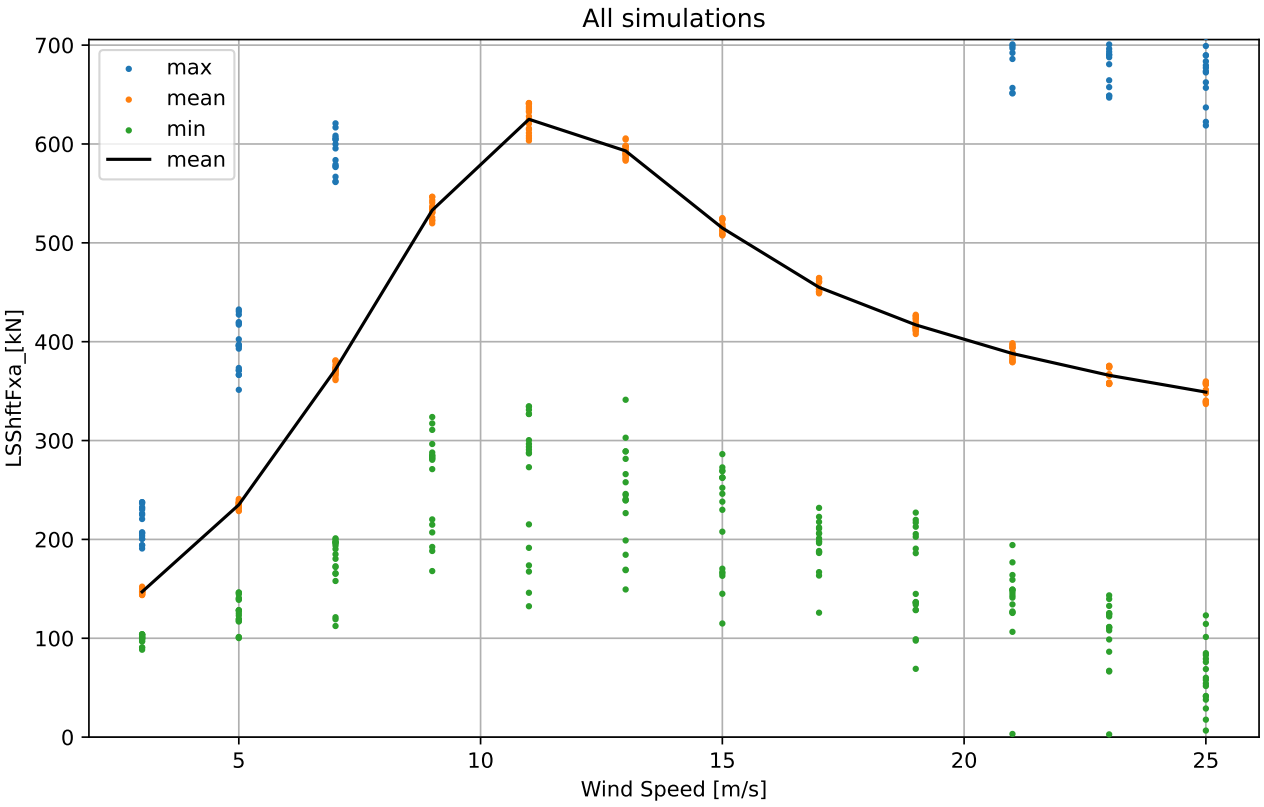
GenTq_[kN-m]


All simulations
max
mean
min
mean
GenTq_[kN-m]
0
10
20
30
40
5
10
15
20
25
Wind Speed [m/s]

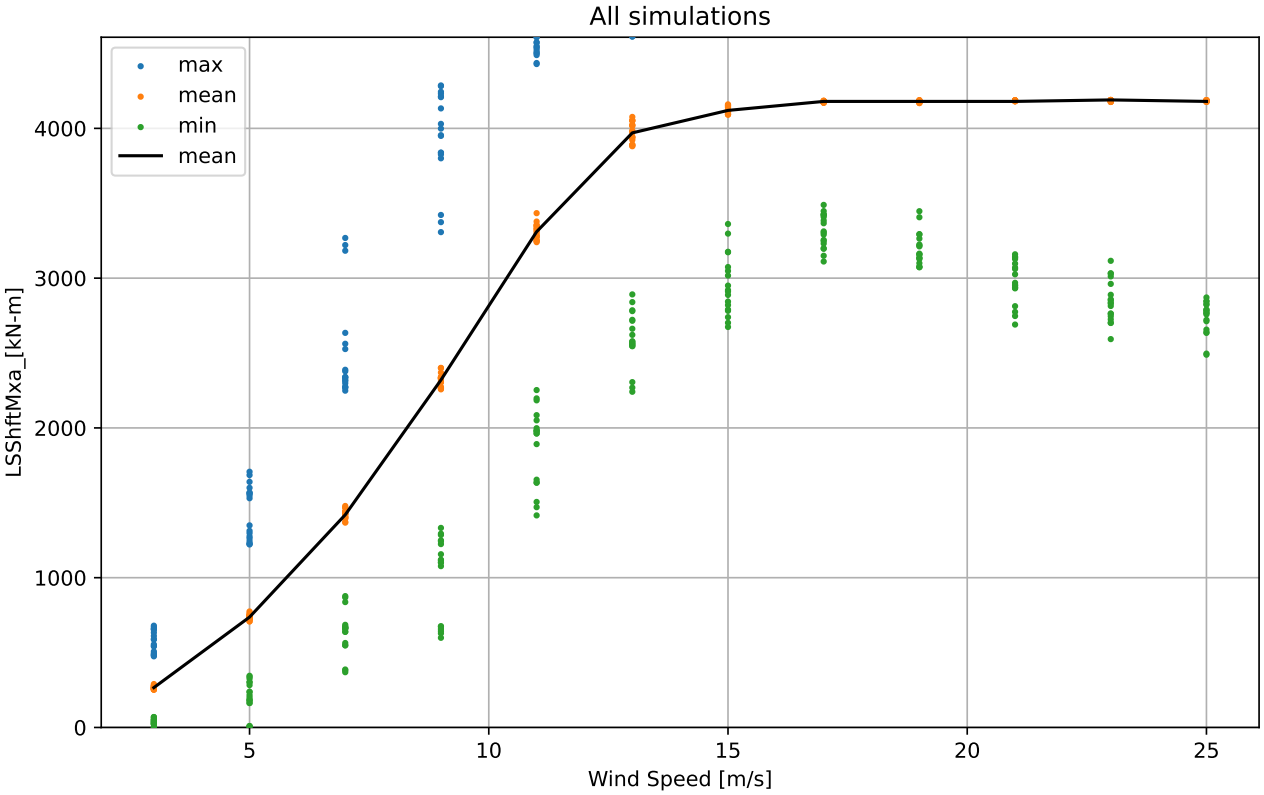
GridPwr_[kW]


All simulations
max
mean
min
mean
GridPwr_[kW]
0
1000
2000
3000
4000
5000
5
10
15
20
25
Wind Speed [m/s]

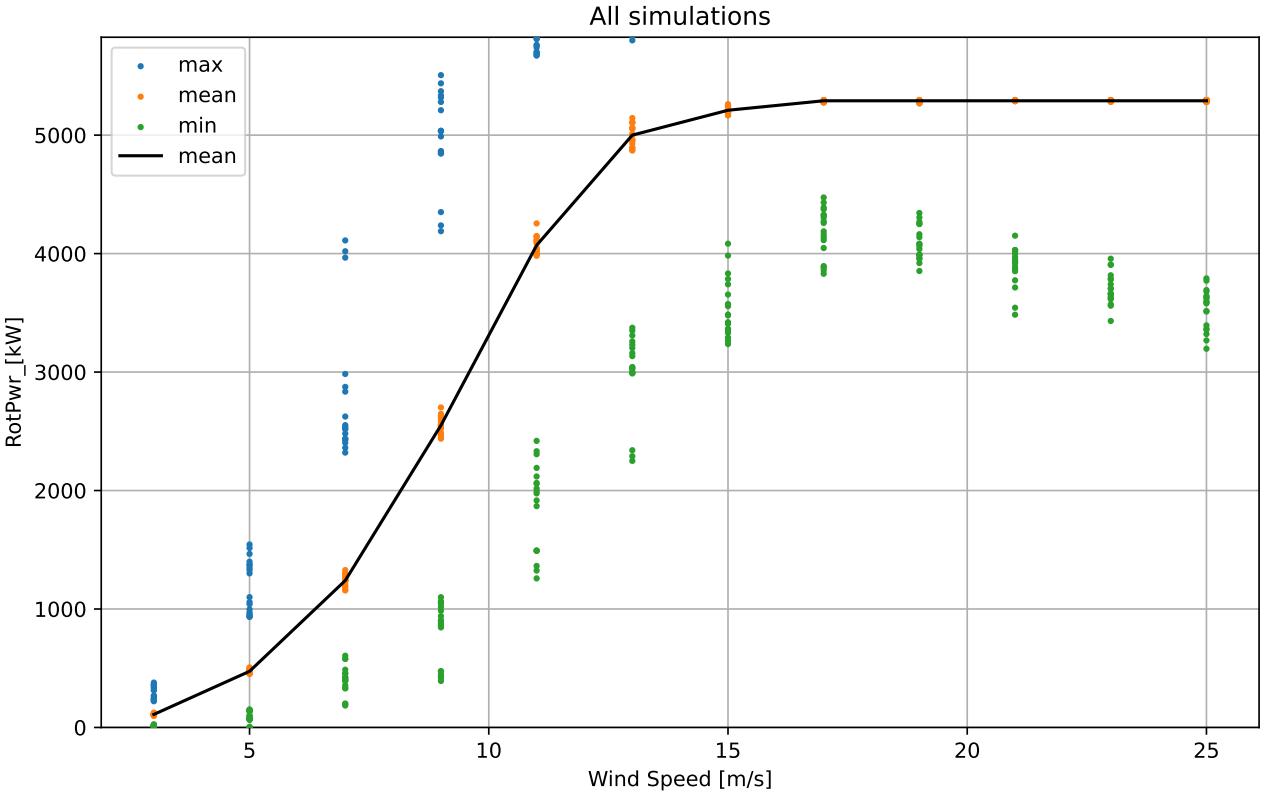
LSShftFxa_[kN]



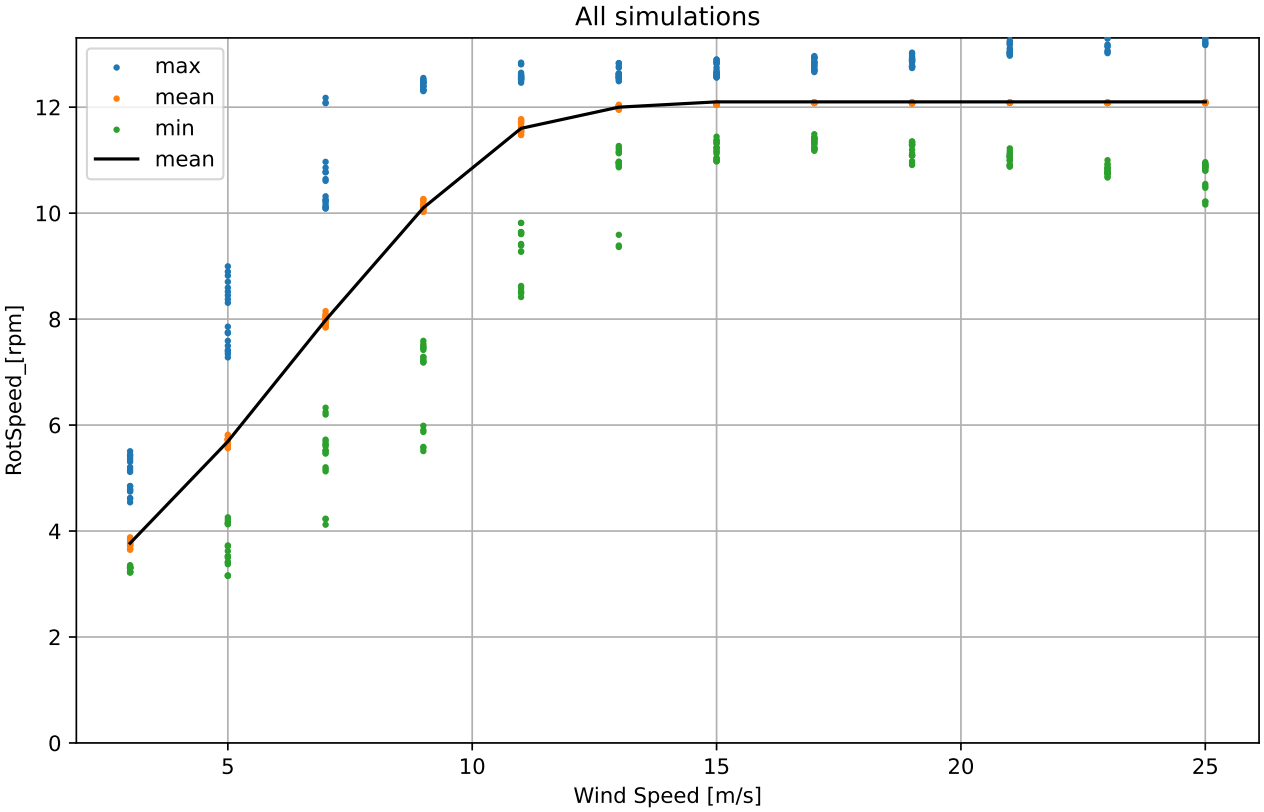
LSShftMxa_[kN-m]



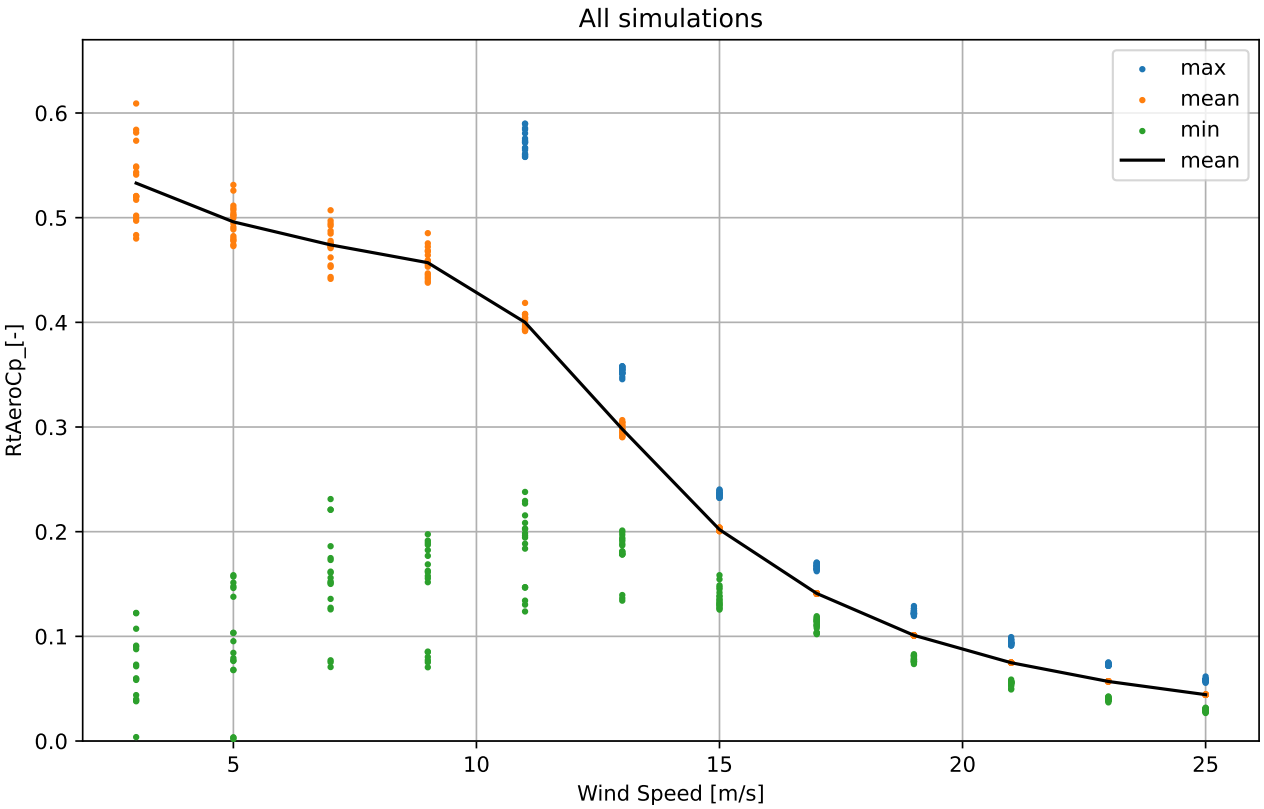
RotPwr_[kW]


All simulations
max
mean
min
mean
RotPwr_[kW]
0
1000
2000
3000
4000
5000
5
10
15
20
25
Wind Speed [m/s]

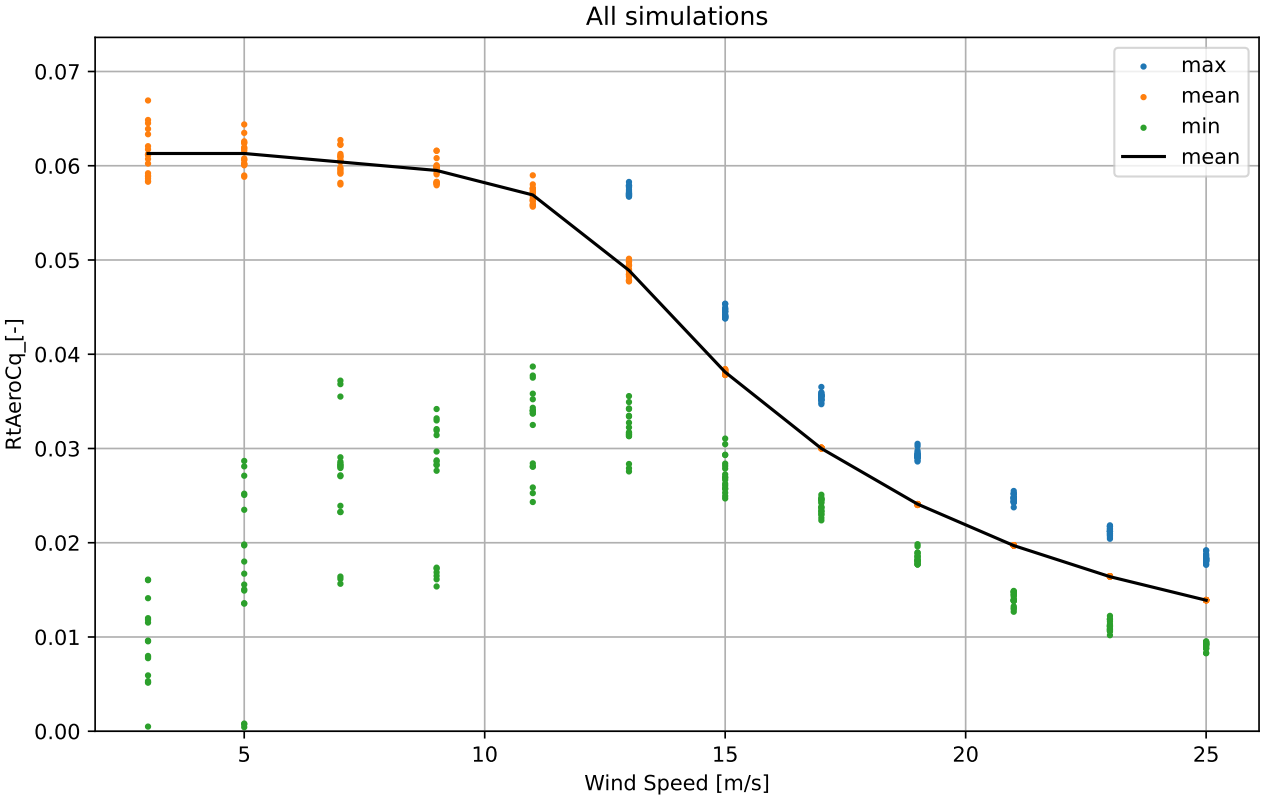
RotSpeed_[rpm]



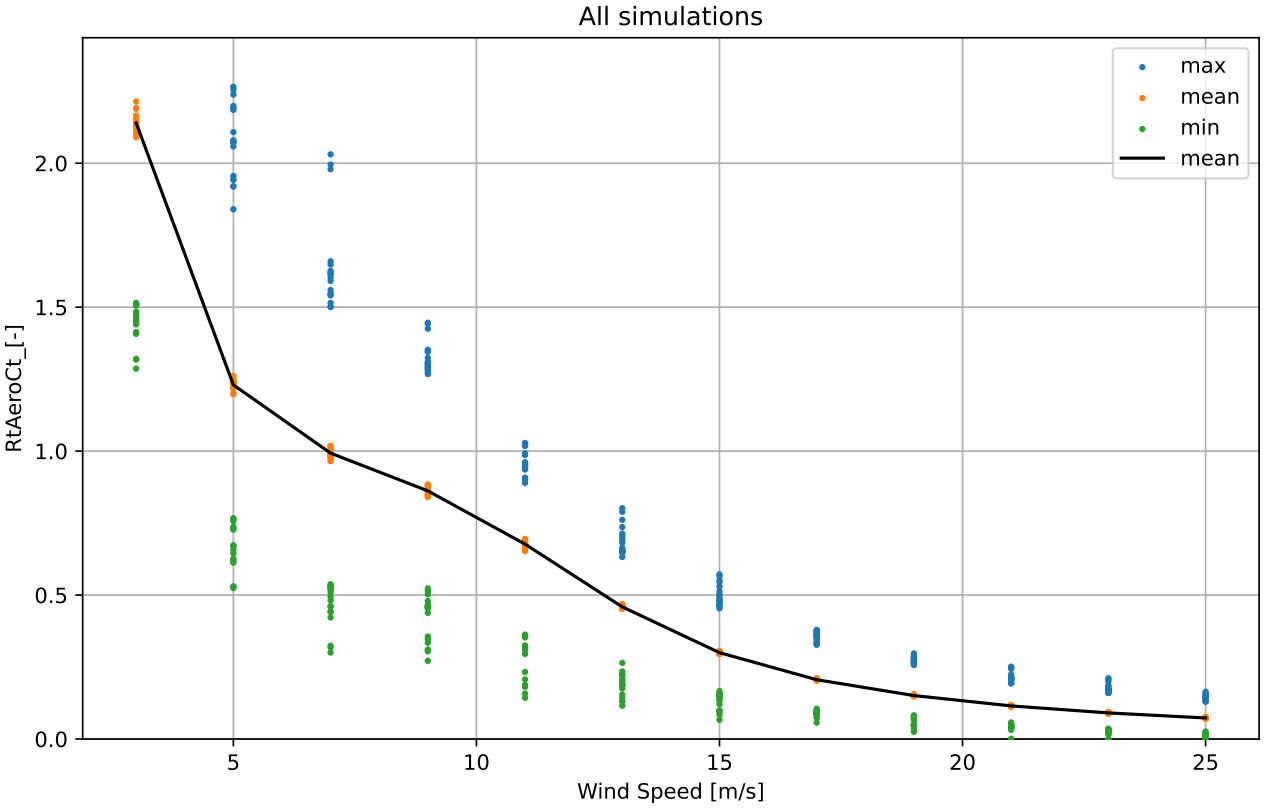
RtAeroCp_ [-]


All simulations
max
mean
min
mean
RtAeroCp_[-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
5
10
15
20
25
Wind Speed [m/s]

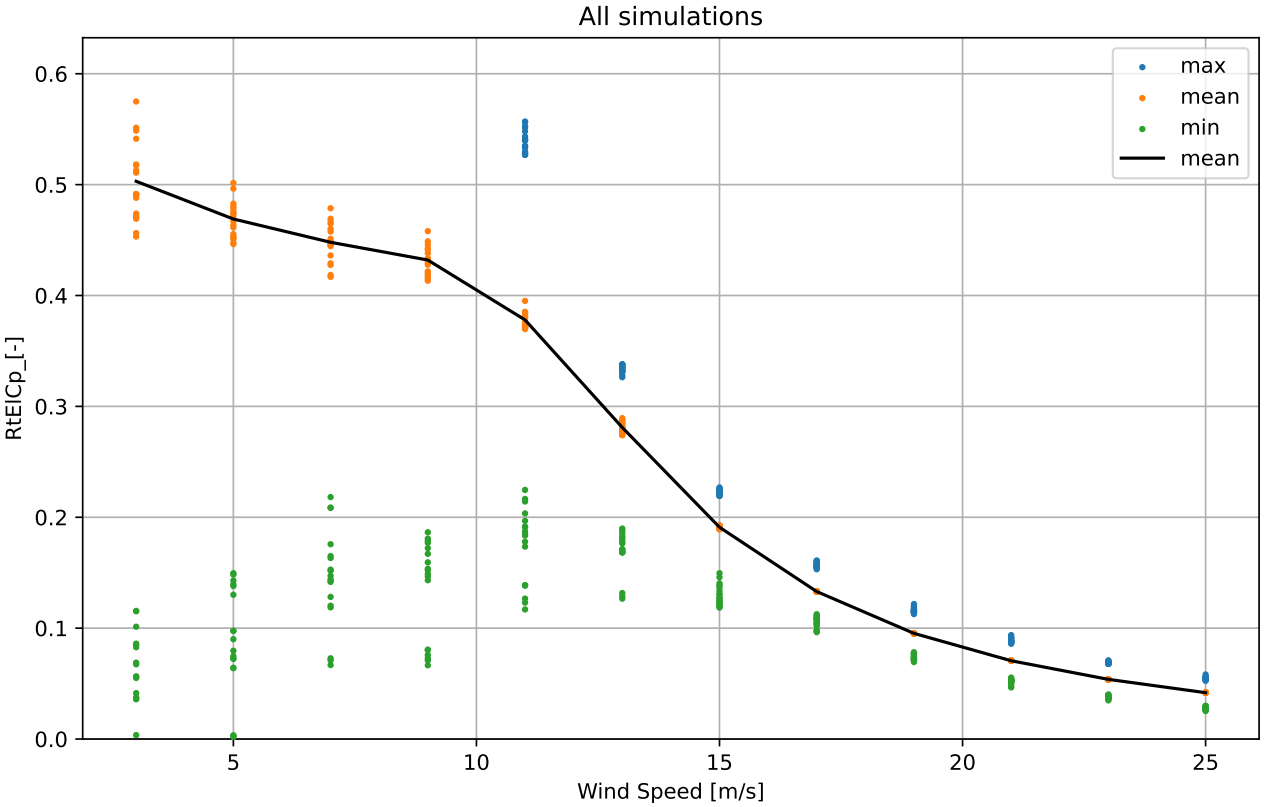
RtAeroCq_[-]


All simulations
max
mean
min
mean
RtAeroCq_[-]
Wind Speed [m/s]
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
5
10
15
20
25

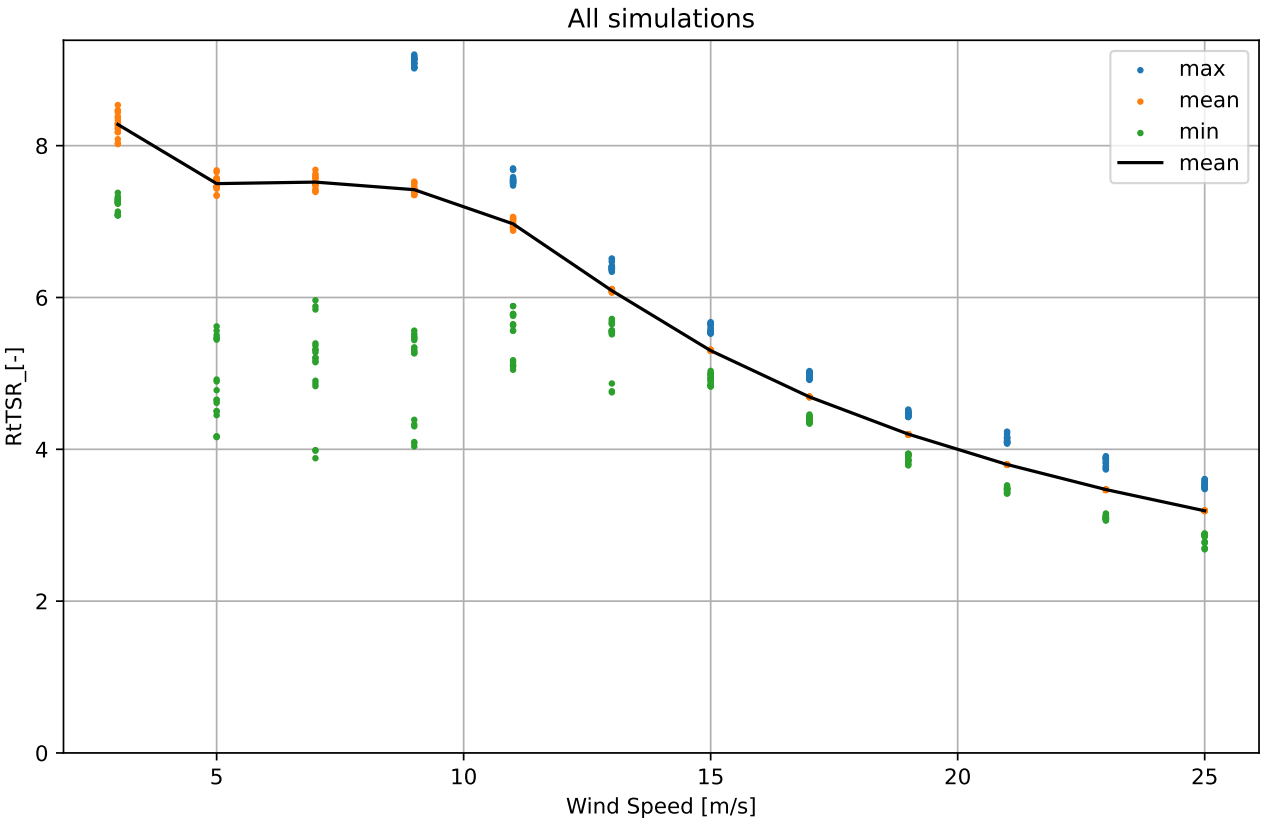
RtAeroCt_[-]


All simulations
max
mean
min
mean
RtAeroCt_[-]
Wind Speed [m/s]
0.0
0.5
1.0
1.5
2.0
5
10
15
20
25

RtElCp_[-]


All simulations
max
mean
min
mean
RtElCp_[-]
Wind Speed [m/s]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
5
10
15
20
25

RtTSR_[-]


All simulations
max
mean
min
mean
RtTSR_[-]
Wind Speed [m/s]
0
2
4
6
8
5
10
15
20
25