

2020Q4

(TABLES, METRICS)

To construct a wind turbine, One Energy lifts and installs components using a crane. The crane used is designed for installing wind turbines and is chosen to have sufficient height and load capacity for the task. One of the heaviest components is the generator, which weighs 101,200 lb.

L1: The load chart for the specific model crane that One Energy uses is shown on the next page. For a given lift configuration (radius, boom angle, tip height), the lifting capacity of the crane is shown in the right-hand column. Assuming that the rigging and other components used to lift the generator weigh 18,000 lb, what is the maximum radius that could be used while lifting the generator? Assume theoretical conditions and no geometry issues.

L2: Certain lifting operations (picks) in the installation process are what One Energy deems critical picks. Critical picks are planned in writing, with more detail required for a higher level of critical pick. The criteria for the critical pick levels are shown in the table below. If any metric in the row for a pick level is true, the pick is at least that level. (i.e., a tandem pick, in which two cranes are used to lift the component, is always a Level 3 Critical Pick.)

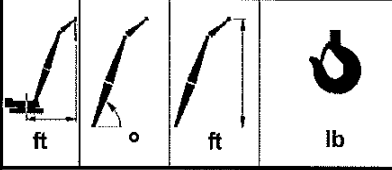
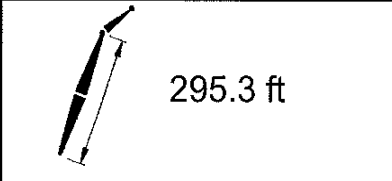
Level	Tandem Pick?	Load Dollar Value	Total Load Weight (lb)	% of Lifting Capacity Used
Level 1	Y	≥\$50,000	≥30,000	≥50%
Level 2	Y	≥\$100,000	≥75,000	≥75%
Level 3	Y	≥\$500,000	≥150,000	≥90%

Assume that the value of the generator is \$230,000. If the load from the L1 question is lifted with a radius of 70 ft, is this a critical pick? If so, which level critical pick is it, and what metrics cause it to be a critical pick? A picture of the lift is shown below. Assume theoretical conditions and no geometry issues.



The crane's load chart.

Radius	Boom Angle	Tip Height	Lifting Capacity
--------	------------	------------	------------------

			
			
60	82.5	321.5	168,600 *
65	81.6	320.5	165,000 *
70	80.7	319.5	161,500 *
75	79.8	318.5	158,200 *
80	78.8	317.3	153,200
85	77.9	316.0	139,700
90	77.0	314.7	127,900
95	76.0	313.2	117,500
100	75.1	311.7	108,300
105	74.1	310.1	100,200
110	73.2	308.4	92,800
115	72.2	306.6	86,200
120	71.3	304.7	80,100
125	70.3	302.7	74,600
130	69.3	300.6	69,600
135	68.3	298.4	65,000
140	67.3	296.1	60,700
145	66.3	293.7	56,800
150	65.3	291.2	53,100
155	64.3	288.6	49,700
160	63.3	285.9	46,500
165	62.2	283.0	43,600
170	61.2	280.0	40,800
175	60.1	276.9	38,200
180	59.1	273.7	35,700
185	58.0	270.3	33,400
190	56.9	266.8	31,200
195	55.7	263.1	29,100
200	54.6	259.3	27,100
205	53.5	255.4	25,300
210	52.3	251.2	23,500
215	51.1	246.9	21,800
220	49.9	242.4	20,200
225	48.6	237.7	18,700
230	47.4	232.8	17,200
235	46.1	227.6	15,800
240	44.8	222.3	14,400
245	43.4	216.6	13,100
250	42.0	210.7	11,900
255	40.6	204.5	10,700
260	39.1	197.9	9,500
265	37.5	191.0	8,400
270	35.9	183.6	7,400