

Table 4.7.A. U.S. Transmission Circuit Automatic Outage Counts by Cause Code and by NERC Region, 2010

	Contiguous U.S.								Contiguous U.S.									
	FRCC	MRO	NPCC	RFC	SERC	SPP	TRE	WECC										
	AC & DC Circuit Outage Counts								Percent									
<b>Momentary Outage Causes</b>																		
Weather, excluding lightning	-	55	-	32	22	27	1	47	184	-	39.6	-	13.9	7.8	23.5	0.8	10.2	12.5
Lightning	14	32	4	85	99	42	22	81	379	14.6	23.0	11.4	36.8	35.2	36.5	18.2	17.6	25.7
Environmental	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Contamination	5	-	1	4	24	1	36	11	82	5.2	-	2.9	1.7	8.5	0.9	29.8	2.4	5.6
Foreign Interference	21	1	-	4	18	1	25	22	92	21.9	0.7	-	1.7	6.4	0.9	20.7	4.8	6.2
Fire	-	-	1	1	1	-	1	1	5	-	-	2.9	0.4	0.4	-	0.8	0.2	0.3
Vandalism, Terrorism, or Malicious Acts	-	-	-	1	-	-	-	1	2	-	-	-	0.4	-	-	-	0.2	0.1
Failed AC Substation Equipment	2	1	2	8	11	3	4	25	56	2.1	0.7	5.7	3.5	3.9	2.6	3.3	5.4	3.8
Failed AC/DC Terminal Equipment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Failed Protection System Equipment	5	7	7	32	26	2	2	1	82	5.2	5.0	20.0	13.9	9.3	1.7	1.7	0.2	5.6
Failed AC Circuit Equipment	7	1	4	18	7	4	2	10	53	7.3	0.7	11.4	7.8	2.5	3.5	1.7	2.2	3.6
Failed DC Circuit Equipment	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	0.2	0.1
Vegetation	-	-	1	-	2	-	-	-	3	-	-	2.9	-	0.7	-	-	-	0.2
Power System Condition	-	-	-	2	-	-	-	3	5	-	-	-	0.9	-	-	-	0.7	0.3
Human Error	3	2	3	16	22	2	-	8	56	3.1	1.4	8.6	6.9	7.8	1.7	-	1.7	3.8
Unknown	38	38	12	28	48	31	28	239	462	39.6	27.3	34.3	12.1	17.1	27.0	23.1	52.1	31.3
Other	1	2	-	-	1	2	-	9	15	1.0	1.4	-	-	0.4	1.7	-	2.0	1.0
<b>TOTAL</b>	<b>96</b>	<b>139</b>	<b>35</b>	<b>231</b>	<b>281</b>	<b>115</b>	<b>121</b>	<b>459</b>	<b>1,477</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Sustained Outage Causes</b>																		
Weather, excluding lightning	-	83	2	23	18	40	4	142	312	-	34.6	2.8	8.4	5.6	31.3	5.6	16.5	14.8
Lightning	8	24	1	10	65	18	14	94	234	5.9	10.0	1.4	3.6	20.3	14.1	19.7	10.9	11.1
Environmental	-	1	-	2	1	-	-	4	8	-	0.4	-	0.7	0.3	-	-	0.5	0.4
Contamination	3	5	1	-	30	7	2	20	68	2.2	2.1	1.4	-	9.4	5.5	2.8	2.3	3.2
Foreign Interference	27	1	2	9	20	-	6	15	80	19.9	0.4	2.8	3.3	6.3	-	8.5	1.7	3.8
Fire	2	-	4	1	4	2	1	55	69	1.5	-	5.6	0.4	1.3	1.6	1.4	6.4	3.3
Vandalism, Terrorism, or Malicious Acts	-	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-	0.3	0.1
Failed AC Substation Equipment	17	15	20	71	18	9	19	54	223	12.5	6.3	27.8	25.8	5.6	7.0	26.8	6.3	10.6
Failed AC/DC Terminal Equipment	-	4	-	11	-	-	-	3	18	-	1.7	-	4.0	-	-	-	0.3	0.9
Failed Protection System Equipment	8	13	9	28	33	6	10	40	147	5.9	5.4	12.5	10.2	10.3	4.7	14.1	4.6	7.0
Failed AC Circuit Equipment	32	22	4	31	43	12	6	57	207	23.5	9.2	5.6	11.3	13.4	9.4	8.5	6.6	9.8
Failed DC Circuit Equipment	-	2	1	-	-	-	-	3	6	-	0.8	1.4	-	-	-	-	0.3	0.3
Vegetation	-	-	2	1	9	1	-	8	21	-	-	2.8	0.4	2.8	0.8	-	0.9	1.0
Power System Condition	2	7	3	11	-	-	-	29	52	1.5	2.9	4.2	4.0	-	-	-	3.4	2.5
Human Error	9	35	17	35	37	4	4	103	244	6.6	14.6	23.6	12.7	11.6	3.1	5.6	11.9	11.6
Unknown	24	23	1	28	32	24	4	197	333	17.6	9.6	1.4	10.2	10.0	18.8	5.6	22.8	15.8
Other	4	5	5	14	10	5	1	36	80	2.9	2.1	6.9	5.1	3.1	3.9	1.4	4.2	3.8
<b>TOTAL</b>	<b>136</b>	<b>240</b>	<b>72</b>	<b>275</b>	<b>320</b>	<b>128</b>	<b>71</b>	<b>863</b>	<b>2,105</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Notes:

- Detailed information on the Transmission Availability Data System outage causes is available at:

<http://www.nerc.com/docs/pc/tadswg/Appendix%207%2020101202a%20clean.pdf>

Source: U.S. Energy Information Administration, Form EIA-411, "Coordinated Bulk Power Supply Program Report."