

Indiana Utility Regulatory Commission

Electric Utility Reliability Report: 2002 – 2015

Each investor-owned electric utility (IOU) in Indiana is required to file a reliability report annually with the Indiana Utility Regulatory Commission (IURC) in compliance with 170 IAC 4-1-23(e). This document serves as a compilation of the reports filed for 2015 and provides historical data beginning in 2002. The data is provided in summary tables early in the report and in complete tables at the end. Also included is a written summary and graph for each IOU illustrating the trends from 2002 to 2015.

The utilities provide the following three reliability indices in their reports:

- System Average Interruption Frequency Index (SAIFI): the average number of interruptions per customer. It is calculated by dividing the total number of customer interruptions by the total number of customers.
- System Average Interruption Duration Index (SAIDI): the average minutes of interruption per customer. It is calculated by dividing the sum of all customer interruption durations (in minutes) by the total number of customers.
- Customer Average Interruption Duration Index (CAIDI): the average duration of interruptions or the time to restore service to interrupted customers. It is calculated by dividing SAIDI by SAIFI.

Each utility reports its indices with and without major events. Major events are weather-related storms that are more destructive than normal weather-related storm patterns. It is important to note that the same definition of “major event” is not used by all utilities. However, Indiana IOUs define a major event day (MED) using a standard provided by the Institute of Electrical and Electronics Engineers (IEEE Standard 1366). It involves the calculation of a threshold in terms of SAIDI minutes based on data from the previous five years. Any day the threshold is exceeded is a MED. The provision of indices that exclude major events normalizes the data by eliminating interruptions over which the utilities have little or no control. In addition, there can be great variation in major events (e.g., tornadoes, floods, ice storms), the resulting damage, and the time necessary to make repairs.

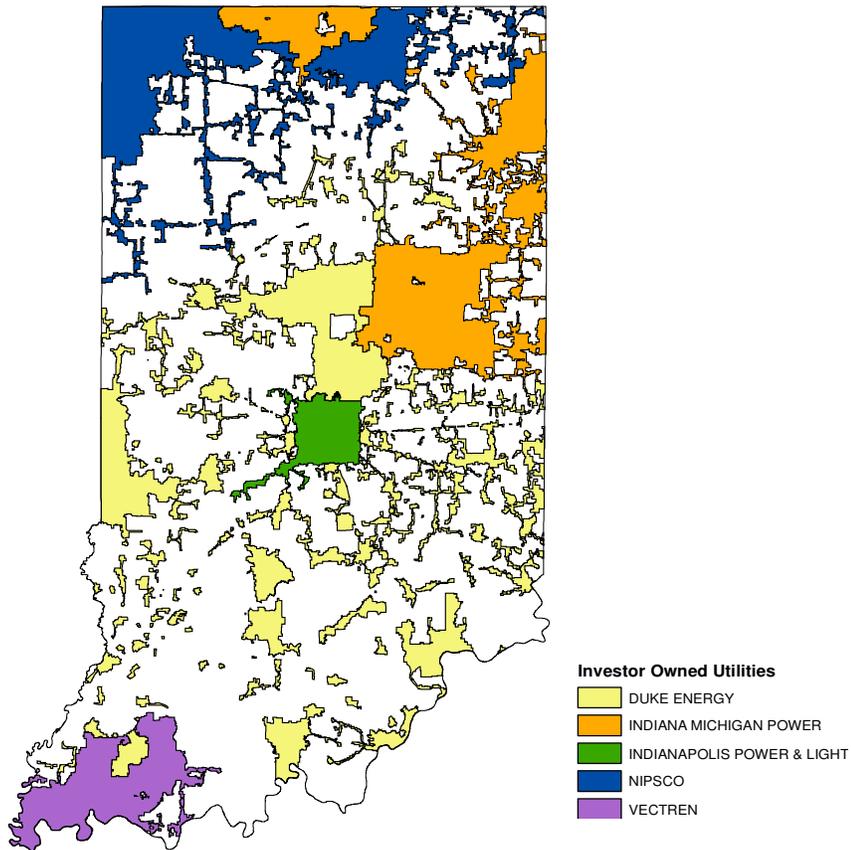
The following table summarizes the number of major event days each IOU reported for 2015. Although not required, four of the IOUs also provided the number of major events. This demonstrates how one weather-related storm can potentially cause multiple major event days.

Utility Company	Major Event Days	Major Events
Duke Energy Indiana	6	5
Indiana Michigan Power	4	4
Indianapolis Power & Light	6	not provided
NIPSCO	10	4
Vectren	2	1

Causes of interruptions other than MEDs can include equipment failures, accidents, and weather events that do not meet the MED threshold. As an example, NIPSCO stated it experienced an additional 76 severe weather events; however, they did not meet the MED threshold.

The reliability indices should only be used to evaluate the performance of an individual utility company over time. Direct comparisons of the utilities' indices should be avoided. The size and geography of service territories and the distribution of customers within them can vary greatly among the utilities, complicating direct comparison of the indices. A map showing the service territories of the Indiana IOUs is shown below. All other factors being equal, IOUs with compact service areas like Vectren and Indianapolis Power and Light (IPL) should be able to respond to interruptions faster and restore a greater number of customers at a time. This may partially explain Vectren's and IPL's lower numbers for the duration of the SAIDI and CAIDI indices.

Service Territories of Indiana Investor Owned Utilities



The following tables provide the 2015 reliability indices for the Indiana IOUs and a comparison of the 2015 indices with their averages for the years 2002 through 2014. Details for 2002 through 2014 are provided in the tables on pages 6 and 7.

Comparison of 2015 Indices to 2002-2014 Average Indices (With Major Events)				
	2015	2002-2014 Avg	Variance 2015 - Avg	% Variance 2015 - Avg
Duke				
SAIFI	1.27	1.66	-0.39	-23%
SAIDI	211	289	-78	-27%
CAIDI	166.1	166.31	0	0%
I&M				
SAIFI	1.243	1.26	-0.02	-1%
SAIDI	390.3	543	-153	-28%
CAIDI	313.9	407.67	-94	-23%
IPL				
SAIFI	0.94	0.99	-0.05	-5%
SAIDI	219.45	123	97	79%
CAIDI	233.12	117.77	115	98%
NIPSCO*				
SAIFI	1.16	1.47	-0.31	-21%
SAIDI	248	496	-248	-50%
CAIDI	214	320.81	-107	-33%
Vectren				
SAIFI	0.9	1.68	-0.78	-46%
SAIDI	81.3	535	-454	-85%
CAIDI	90.6	251.68	-161	-64%

*NIPSCO's 2007 report updated values for 2004-2006 based on accepted industry standard IEEE Std 1366. The averages above reflect those revisions.

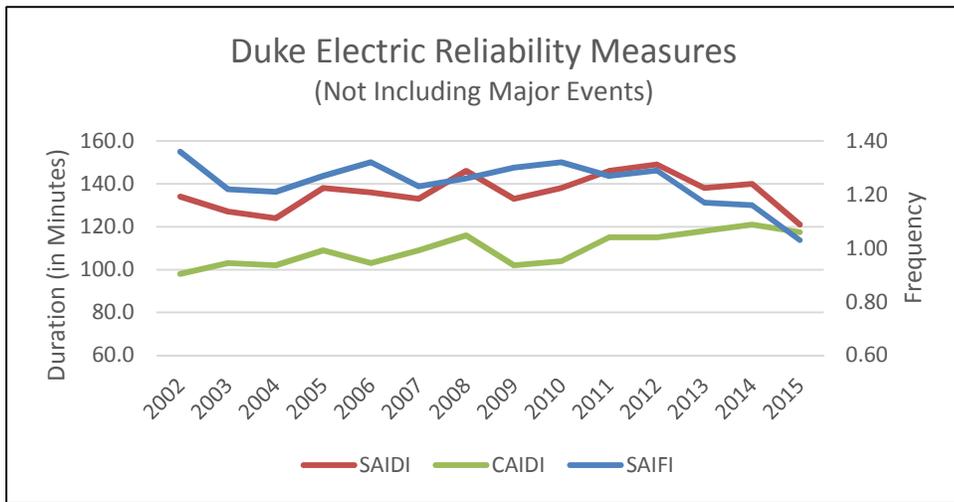
Comparison of 2015 Indices to 2002-2014 Average Indices (Without Major Events)				
	2015	2002-2014 Avg	Variance 2015 - Avg	% Variance 2015 - Avg
Duke				
SAIFI	1.03	1.24	-0.21	-17%
SAIDI	121	136	-15	-11%
CAIDI	118	109	8	7%
I&M				
SAIFI	1.05	0.98	0.07	7%
SAIDI	160	143	18	12%
CAIDI	153	146	7	4%
IPL				
SAIFI	0.66	0.85	-0.19	-22%
SAIDI	49	66	-18	-27%
CAIDI	74	78	-4	-5%
NIPSCO*				
SAIFI	0.87	1.03	-0.16	-15%
SAIDI	110	165	-55	-33%
CAIDI	127	155	-28	-18%
Vectren				
SAIFI	0.85	1.21	-0.36	-30%
SAIDI	71	107	-36	-34%
CAIDI	83	87	-4	-4%

*NIPSCO's 2007 report updated values for 2004-2006 based on accepted industry standard IEEE Std 1366. The averages above reflect those revisions.

The individual IOU summaries for the indices without major events follow.

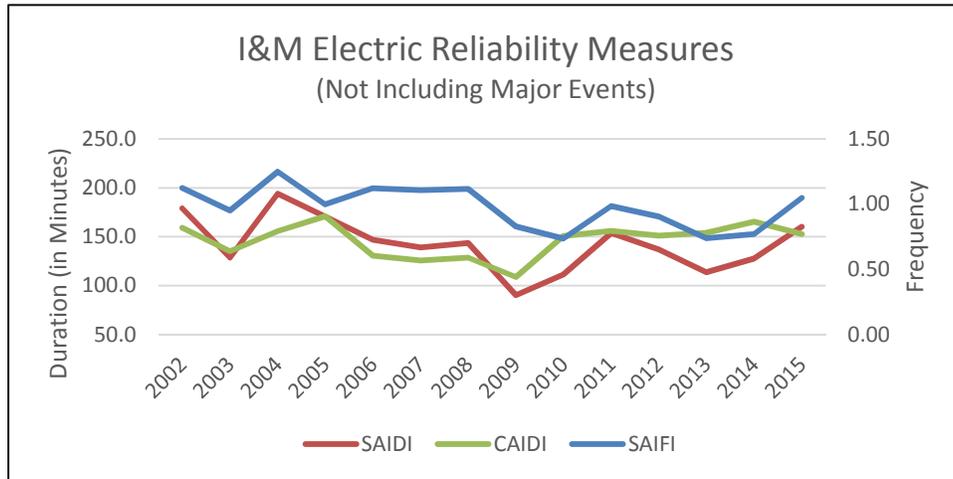
Duke Energy Indiana (Duke)

Duke's interruptions per customer (SAIFI) and length of interruption per customer (SAIDI) were both lower in 2015 compared to the 2002-2014 averages. Since 2012, the trend for both indices has been downward. Duke's 2015 average interruption length (CAIDI) was slightly higher than the 2002-2014 average, but its trend has been relatively flat since 2011.



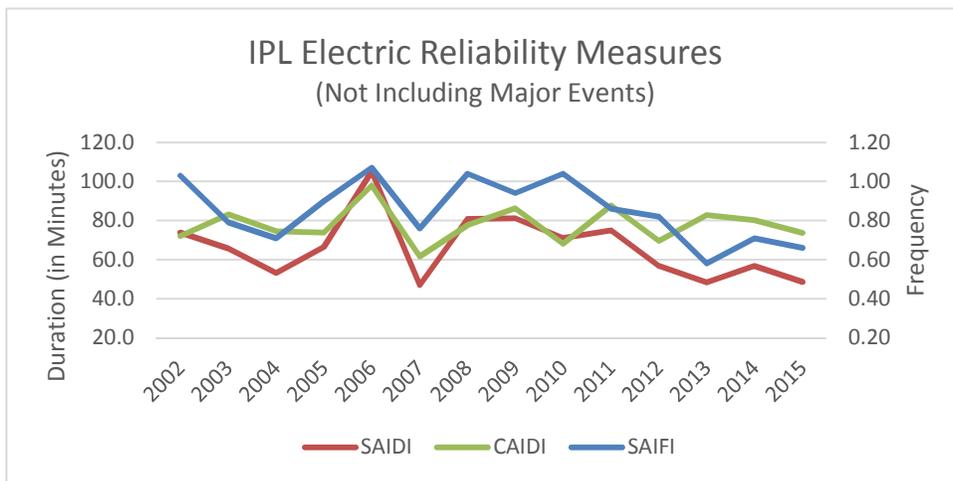
Indiana Michigan Power (I&M)

All 2015 measures for I&M were above their respective 2002-2014 averages. The number of interruptions per customer (SAIFI) and duration of interruption per customer (SAIDI) exhibited a downward trend through 2013, but both have increased in the last two years. The average interruption duration (CAIDI) has remained relatively steady during the entire period.



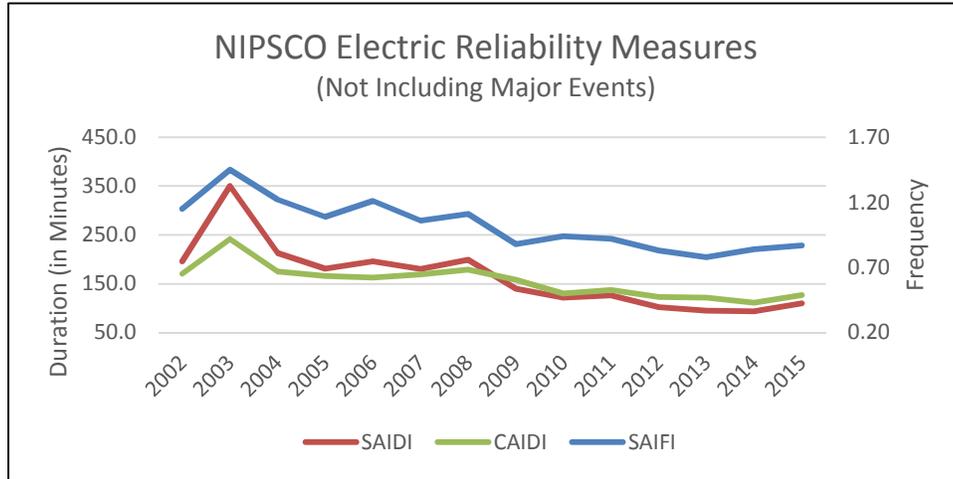
Indianapolis Power and Light (IPL)

IPL's 2015 measures were all below their 2002-2014 averages, with the number (SAIFI) and duration of interruptions per customer (SAIDI) 22% and 27% below their averages, respectively. These two particular per-customer measures have trended downward since 2008. The average interruption duration (CAIDI) has been relatively flat since 2007.



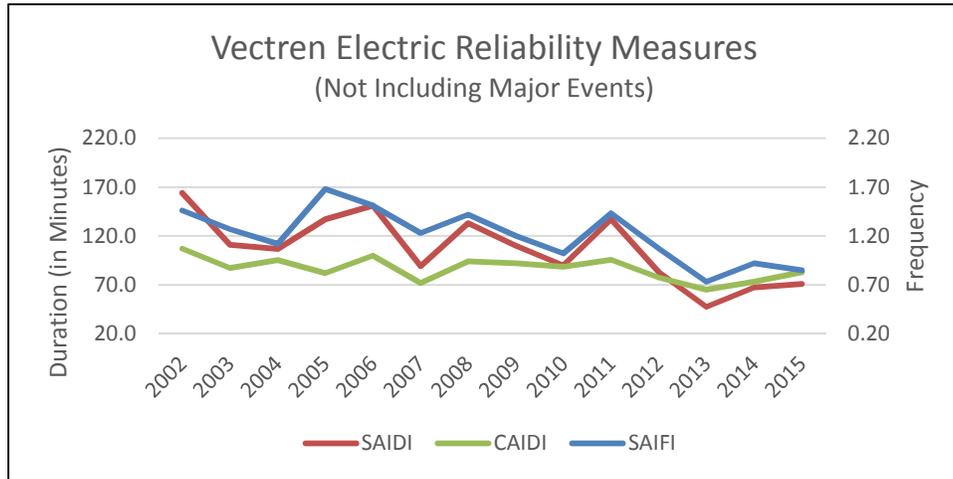
Northern Indiana Public Service Company (NIPSCO)

All 2015 measures for NIPSCO were below their 2002-2014 averages, with duration of interruption per customer (SAIDI) 33% below average. An overall downward trend has been experienced for all three measures since 2003; however, since 2013 trending is slightly upward.



Vectren Energy Delivery of Indiana (Vectren)

The three measures for Vectren in 2015 were all below their 2002-2014 averages. The number (SAIFI) and duration of interruptions per customer (SAIDI) were 30% and 34% below their averages, respectively. Those two measures show a downward trend for the period while the average interruption duration remains relatively flat.



Electric Reliability Not Including Major Events*														
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Duke														
SAIFI	1.36	1.22	1.21	1.27	1.32	1.23	1.26	1.3	1.32	1.27	1.29	1.17	1.16	1.03
SAIDI	134.0	127.0	124.0	138.0	136.0	133	146	133	138	146	149	138	140	121
CAIDI	98.0	103.0	102.0	109.0	103.0	109	116	102	104	115	115	118	121	117.5
i&M														
SAIFI	1.12	0.95	1.25	1.00	1.123	1.107	1.117	0.83	0.74	0.99	0.91	0.739	0.771	1.049
SAIDI	179.1	128.5	194.1	170.7	146.7	139.1	143.7	90	111	154	137	113.7	127.5	160.1
CAIDI	159.3	135.0	155.6	171.1	130.6	125.6	128.6	109	151	156	151	154	165.4	152.6
IPL														
SAIFI	1.03	0.79	0.71	0.90	1.07	0.76	1.04	0.94	1.04	0.86	0.82	0.58	0.71	0.66
SAIDI	73.8	65.7	53.2	66.5	105.2	46.99	80.84	81	71	75	57	48.33	56.71	48.7
CAIDI	72.0	83.2	74.5	73.9	98.0	61.7	77.68	86	68	88	70	82.78	80.24	73.7
NIPSCO														
SAIFI	1.15	1.45	1.22	1.09	1.21	1.06	1.11	0.88	0.94	0.92	0.83	0.78	0.84	0.87
SAIDI	196.2	350.4	213	181	196	180	199	140	122	126	102	95	94	110
CAIDI	170.6	241.7	175	166	163	169	179	158	130	137	123	122	111	127
Vectren														
SAIFI	1.46	1.27	1.12	1.68	1.51	1.23	1.42	1.2	1.02	1.43	1.07	0.73	0.92	0.85
SAIDI	164.0	111.0	106.8	137.0	151.0	89	133	110	90	137	83	47.5	67.2	70.9
CAIDI	107.0	87.0	95.4	82.0	100.0	72	94	92	88	96	78	65.1	73	82.9
Notes	<p>SAIFI: System Average Interruption Frequency Index; (# of customers w ho experience outages) / (total # of customers)</p> <p>SAIDI: System Average Interruption Duration Index; (duration or time of service interruptions) / (total # of customers)</p> <p>CAIDI: Customer Average Interruption Duration Index; (SAIDI) / (SAIFI)</p> <p>*Major events are storms or w eather events that are more destructive than normal storm patterns. The same definition of "major event" is not used by all utilities.</p> <p>**NIPSCO's 2007 report updated values for 2004-2006 based on accepted industry standard IEEE Std 1366 - how ever, the above values reflect the original reports.</p>													

Electric Reliability Including Major Events*														
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Duke														
SAIFI	1.57	1.58	1.66	1.59	1.63	1.41	2.48	1.76	1.58	2.07	1.520	1.38	1.31	1.27
SAIDI	170.0	201.0	255.0	282.0	203.0	178	689	293	195	630	216.000	257	186	211
CAIDI	109.0	128.0	153.0	177.0	125.0	126	278	166	124	304	143.000	187	142	166.1
i&M														
SAIFI	1.68	1.56	1.42	1.31	1.242	1.237	1.633	0.91	0.98	1.12	1.387	0.955	0.963	1.243
SAIDI	930.6	594.2	291.4	1,131.6	222.0	199.4	1164.3	122	392	258	1071.200	374.5	305.9	390.3
CAIDI	553.5	380.2	204.7	863.0	178.7	161.2	712.8	133	400	230	772.500	392	317.8	313.9
IPL														
SAIFI	1.17	0.90	0.81	0.90	1.07	0.76	1.54	1.1	1.04	0.86	1.040	0.71	0.96	0.94
SAIDI	132.9	98.0	76.7	66.5	105.2	46.99	358.98	158	71	75	124.920	92.3	189.98	219.45
CAIDI	113.3	108.4	94.1	73.9	98.0	61.7	232.96	145	68	88	119.660	130.01	198.63	233.12
NIPSCO														
SAIFI	1.41	1.65	1.38	1.24	1.40	2.23	1.8	0.88	1.36	1.38	1.440	1.45	1.53	1.16
SAIDI	542.4	498.0	317	258	317	1073	882	140	505	371	428.000	520	603	248
CAIDI	384.7	301.8	229	208	227	480	490	158	372	269	297.000	359	395	214
Vectren														
SAIFI	1.46	1.27	2.36	2.05	1.87	1.23	2.33	2.56	1.02	2.16	1.240	0.78	1.47	0.9
SAIDI	164.0	111.0	932.4	376.0	241.0	89	859	2,889	90	711	117.300	60.1	314.3	81.3
CAIDI	107.0	87.0	394.7	185.0	128.0	72	369	1,126	88	330	94.900	76.6	213.5	90.6
Notes	<p>SAIFI: System Average Interruption Frequency Index; (# of customers w ho experience outages) / (total # of customers)</p> <p>SAIDI: System Average Interruption Duration Index; (duration or time of service interruptions) / (total # of customers)</p> <p>CAIDI: Customer Average Interruption Duration Index; (SAIDI) / (SAIFI)</p> <p>*Major events are storms or w weather events that are more destructive than normal storm patterns. The same definition of "major event" is not used by all utilities.</p> <p>**NIPSCO's 2007 report updated values for 2004-2006 based on accepted industry standard IEEE Std 1366 - how ever, the above values reflect the original reports.</p>													