West Virginia Smart Grid Implementation Plan (WV SGIP) Project

APERC Report on Customer Complaints to WV PSC about Electric Power Service

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Introduction

APERC has appreciated that one of the most important sources for data on the consumer perspective of the current electric power grid in West Virginia would be the WV Public Service Commission (WV PSC). Thus, an email request was sent on December 19, 2008 to Byron Harris at the WV PSC to request any advice or approaches to determine customer and regulatory perspectives of the current electric power grid in WV.

Customer Complaint Data

Bryon Harris was able to provide a spreadsheet of customer complaints in West Virginia for the past ten years. This data was tabulated as shown in Table1 below. The table shows the number of informal complaints received by the WV PSC. These informal complaints were coded by WV PSC staff.

Table 1. Electricity Service Problems in West Virginia
Reported to WV Public Service Commission (WV PSC**)**

	POOR QUALITY OF PRODUCT		UTILITY OUTAGE		TOTAL COMPLAINTS
Year	Inadequate or Excessive Voltage Problems	Telephone Reception or Transmission Problems	Customer Reported Problems	Utility Reported Problems	
1998	24	2	21	0	47
1999	39	1	25	0	65
2000	19	0	33	1	53
2001	38	0	20	0	58
2002	37	0	37	2	76
2003	34	0	33	1	68
2004	42	1	37	0	80
2005	32	0	14	0	46
2006	35	0	13	1	49
2007	65	0	35	1	101
2008	55	2	52	8	117
Avg	38.2	0.5	29.1	1.3	69.1
Totals	420	6	320	14	760
Percent	55%	1%	42%	2%	

A chart of the tabulated WV PSC data for electricity service problems in WV is shown in Figure 1 below. The graphs are for the data in columns 2, 4 and 6 of Table 1 above.

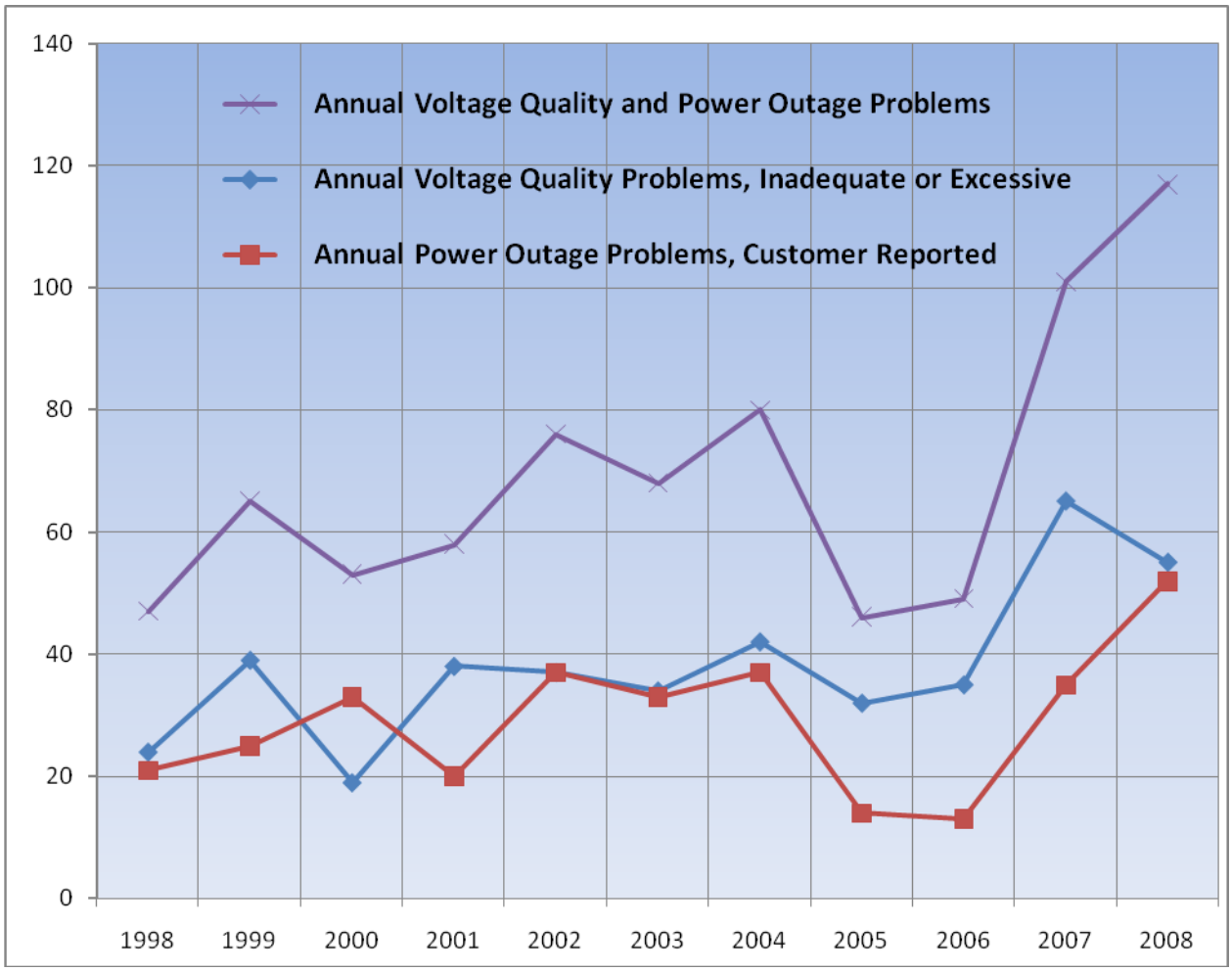

Figure 1. Chart of Electricity Service Problems in WV. Source: WV PSC.

It can be observed from the data in Table 1 and the graphs shown in Figure 2 that the total of customer reported problems for voltage quality and power outages have approximately doubled in the past ten years. The number of customer reported power outages has increased to over 50 per year, which is more than double the number for ten years ago.

In order to assess the potential impact that implementation of smart grid technologies could have on reducing electricity service problems, this data must be extended into the future.

Extrapolation of Customer Complaint Data

Polynomial trend lines were added to the three graphs of electricity service problems in Figure 1. These trend lines and their second order polynomial equations are shown in Figure 2.

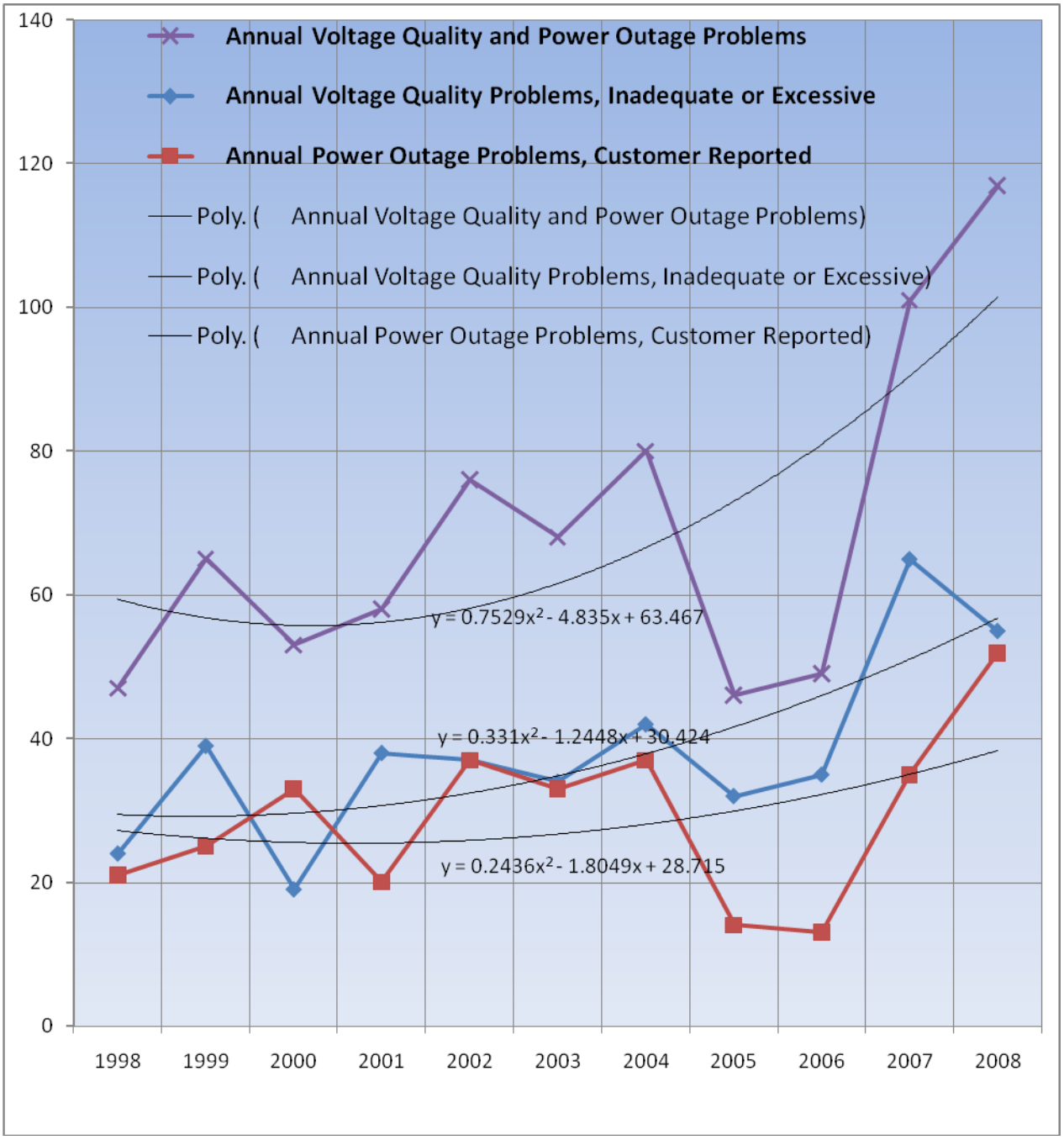

Figure 2. Trend Lines for Customer Complaint Data

These three polynomial equations were used to compute to the year 2030 the total number of annual power outage complaints, voltage quality complaints and total complaints before Smart Grid, as shown in Column 2, Column 3 and Column 4 in Table 2. The Extrapolated Total Complaints data for Column 4 in Table 2 is shown plotted as the top curve in Figure 3.

Table 2. Numbers of Complaints before and after Smart Grid

Year	Power Outage Complaints before Smart Grid	Voltage Quality Complaints before Smart Grid	Extrapolated Total Complaints before Smart Grid	Revised Total Complaints before Smart Grid	Projected Total Complaints after Smart Grid
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
1998	27	30	59	59	59
1999	26	29	57	57	57
2000	25	30	56	56	56
2001	25	31	56	56	56
2002	26	32	58	58	58
2003	27	35	62	62	62
2004	28	38	67	67	67
2005	30	42	73	73	73
2006	32	46	81	81	81
2007	35	51	90	90	90
2008	38	57	101	101	101
2009	42	63	114	114	114
2010	46	70	128	128	128
2011	51	78	143	143	134
2012	56	86	160	158	137
2013	62	95	179	173	139
2014	68	105	199	188	139
2015	75	115	220	204	138
2016	82	126	243	219	136
2017	90	138	268	234	134
2018	98	150	294	249	131
2019	107	163	322	263	128
2020	116	177	351	277	125
2021	126	191	381	291	122
2022	136	206	413	304	119
2023	146	222	447	317	116
2024	158	238	482	330	114
2025	169	255	518	342	111
2026	181	273	556	354	109
2027	194	291	596	365	107
2028	207	310	637	376	105
2029	220	330	680	386	103
2030	234	350	724	396	102

The extrapolated curve for complaints before the Smart Grid was considered to show a growth in total complaints that was not realistic into the future. Thus, the data in Column 5 of

Table 2 was generated as a revised Total Complaints before Smart Grid column. This Revised Total Complaints data is shown plotted as the middle graph in Figure 3.

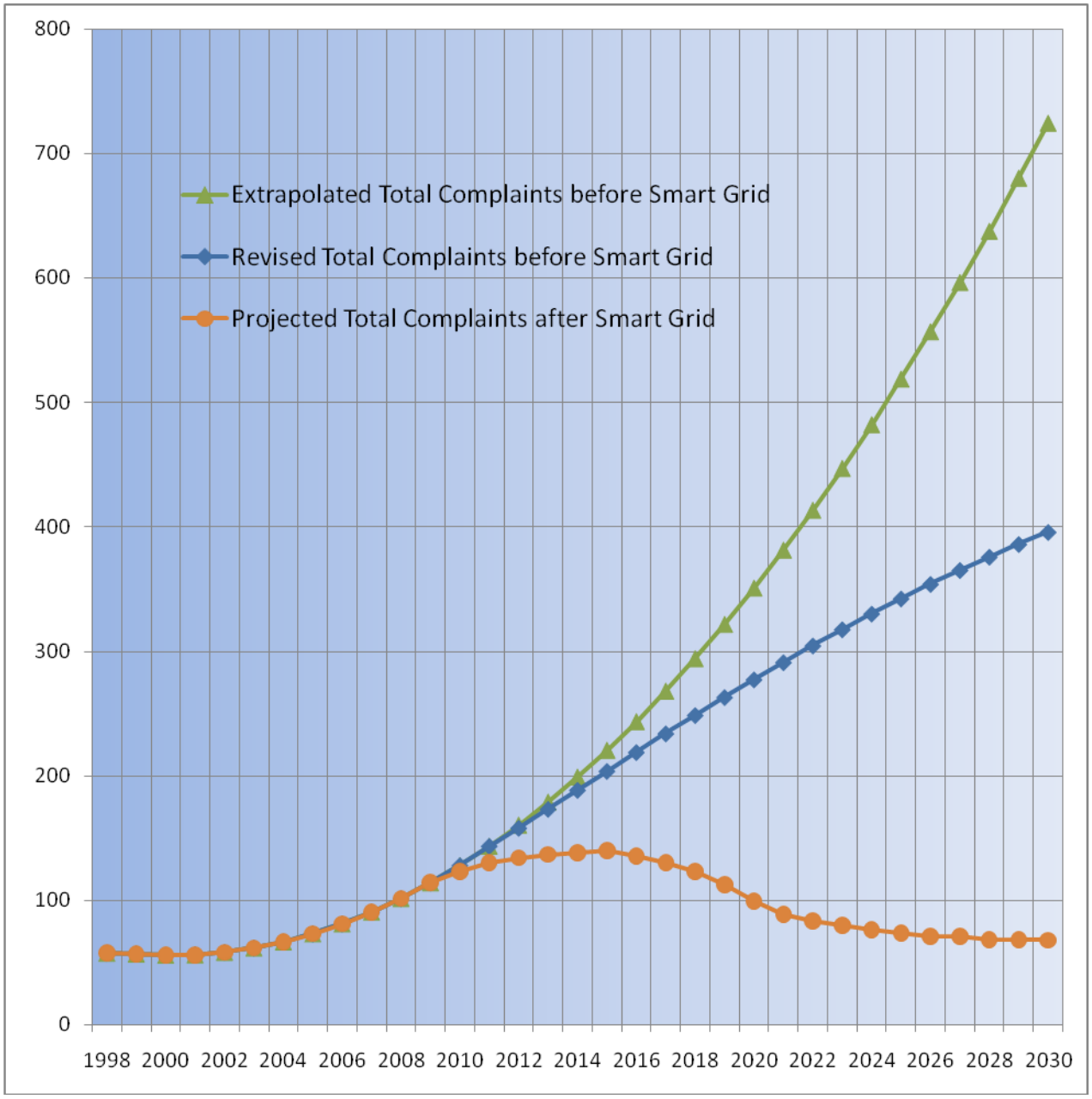

Figure 3. Chart of Total Customer Complaints before and after Smart Grid

Projected Total Complaints after Smart Grid

A 'Business Case' model has been developed as part of the WV SGIP Project. This electric power grid model permits one to compute both the benefits for a 'business as usual' case as

well as to compute the specific benefits for implementing various smart grid solutions to the grid in West Virginia.

The three most important ways to assess whether customer complaints will be reduced after implementation of smart grid technologies is to consider 1) the distinct benefits to customers relative to the specific utility and the general society, 2) the benefits to customers from implementation of specific smart grid technologies (AMI, DA, DG, DR, …, and Storage) in the grid and 3) the benefits to customers with respect to the specific time phases (first, second, …, and later) for implementing the smart grid.

First, a February 13, 2009 computation of the benefits from implementing the proposed smart grid on the WV grid indicates that about 36% of the benefits will serve the customers, about 29% of the benefits will serve society and about 35% of the benefits will serve the power utility company. Thus, it can be projected that at least two-thirds of the smart grid solutions when implemented will serve to lower customer complaints.

Second, these computations for February 2009 also indicated that about 37% of the computed benefits would result from installation of DA (Distribution Automation), about 25% from installation of AMI (Advanced Meter Infrastructure), about 11% from PHEV (Plug-in Hybrid Electric Vehicles), about 10% from installation of DG (Distributed Generation), about 7% from Advanced Storage, about 5% from DG (Distributed Generation) and about 5% from others. Hence, it can be projected that the installation of at least 75% of these solutions will serve to lower customer complaints.

Third, it is also shown by the February 13, 2009 computations that if initiation is begun for the four specified phases of implementation between 2010 and 2015, then by 2025 those implemented solutions that benefit the customer as mentioned in the above two paragraphs can be projected to lower customer complaints.

An idealized outcome of this smart grid implementation plan project for West Virginia would be that the number of customer complaints after the project were completed would be zero. However, based on the business case explanation described in the above three paragraphs, it could be proposed that when implemented, the computed benefits from this project would perhaps lower the total number complaints made by customers of electric power to the WV PSC by about 70%.

However, for this project, a realistic projection of the total number of customer complaints to the WV PSC will be that the total number of complaints will increase from about 130 per year in 2010 to about 140 per year in 2015, and then will gradually decrease by about 50% to around 70 complaints per year in 2030. This result is shown plotted as the bottom graph in Figure 3.

Summary

In summary, it is projected that implementation of the smart grid in West Virginia will potentially improve the service of electric power to customers in 2030 by decreasing the number of complaints from a projected total of about 400 per year to about 70 per year, which is an 83% reduction, or is a 570% improvement.