City of San Antonio

Community Emergency Preparedness Committee Report

A Response to the February 2021 Winter Storm

Dated:

June 24, 2021

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I. INTRODUCTION

In early February 2021, millions of people in Texas were affected by extreme winter weather that came with the arrival of Winter Storm Uri[1]. Several days of unusually low temperatures, ranging within single digits across the state[2], combined with snowfall and ice, resulted in, among other things, calls from the Electric Reliability Council of Texas (ERCOT) to shed electric power by initiating rolling power outages on Monday, February 15, 2021[3]. This severe weather left millions of people across the state, and hundreds of thousands of people in San Antonio, without power for several days in freezing temperatures.

The residents of the City of San Antonio (City) experienced one of the worst weather-related crises to ever hit the San Antonio community when several inches of snow and extreme cold led to widespread, prolonged power and water outages, closures of roads and businesses, and burst pipes throughout the City of San Antonio. For the first time, residents across the City, and in the City's utilities service area, found themselves without power, heat, or a safe place to go. These unprecedented weather conditions, accompanied by an already stressed city confronting a global pandemic, resulted in a citywide disaster[4]. Winter Storm Uri (Uri) is accredited with causing a cascade of events including citywide power and water outages, limited availability of essential healthcare, technology, dangerous roadway conditions, burst pipes and failure of other essential infrastructure.

Before, during, and in the immediate aftermath of the storm, City, County, community leaders, and concerned neighbors from across San Antonio organized emergency relief efforts to protect the most vulnerable residents in the community. They organized food and water distributions, delivered hot meals and blankets to senior living communities, and provided direct cash assistance to families through mutual aid funds. In many cases, community-based groups were the first to identify and respond to emergency situations involving our elderly, homebound, homeless, and digitally disconnected residents. However, the winter storm, which lasted for ten (10) days, compounded the conditions that San Antonio' most vulnerable residents were already living in, including a global pandemic, high unemployment, a housing crisis, and the daily challenges that accompany poverty. The residents, who stepped up to help their neighbors, demonstrated courage, selflessness, and a deep commitment to San Antonio's collective well-being.

In addition to the winter storm's immediate impact, the City and municipally owned utilities were unable to adequately respond, provide timely information, and quickly mobilize resources in a time of need. Consequently, the community has brought calls for transparency and accountability from those entrusted

[1] National Oceanic and Atmospheric Administration and National Weather Service Austin/San Antonio Weather Forecast Office Weather Event Summary, "February 2021 Historical Winter Storm Event South-Central Texas", 10-18 February 2021, https://www.weather.gov/media/ewx/wxevents/ewx-20210218.pdf

[2] See Figure 1 Feb. 2021 Daily Temp vs. Historidal 11-YR Ave Temp in San Antonio, TX.

[3] "Timeline: How the Historic Winter Storm, Texas Blackout Cold-Stunned the San Antonio Area." KSAT. KSAT San Antonio, March 1, 2021. https://www.ksat.com/news/local/2021/02/25/timeline-how-the-historic-winter-storm-texas-blackout-cold-stunned-the-san-antonio-area/.

[4]Nirenberg, Ron, and Nelson Wolff. "Joint Declaration of Disaster." City of San Antonio and Bexar County, February 13, 2021. https://www.sanantonio.gov/DesktopModules/EasyDNNNews/DocumentDownload.ashx?portalid=0&moduleid=24373&articleid=20111&documentid=678

with protecting San Antonio residents. While frustrations continued to grow in the community and news spread of a near catastrophic failure of Texas' energy grid managed by ERCOT, it became clear that communities across the entire state need to take steps to better ensure that their utilities are more resilient in cold weather.

At the request of Mayor Ron Nirenberg, a Community Emergency Preparedness Committee was established to better understand what happened during the winter storm with respect to the emergency communications and service delivery efforts of the City of San Antonio's Emergency Operations Center (EOC), the San Antonio Water System (SAWS), and CPS Energy. The severe and extended cold led to a power shortage across the State of Texas causing power utilities to conserve or reduce power to meet the needs of the residents of the State. San Antonio's power provider, CPS Energy, in its efforts to meet the City's demands, was challenged with load-shed orders, equipment failures, and managing rolling outages. The outages led to challenges for the City's water utility, San Antonio Water System. Pumping stations shut down due to a lack of power. SAWS was unable to provide water to most locations. When water was able to flow, delivery of water was complicated by frozen and damaged supply lines. The Emergency Operations Center, the base for City operations during an emergency, is charged with coordination of City efforts related to (1) ascertaining accurate information on the emergency situation, (2) determining and prioritizing emergency services and coordinating them, (3) providing resource support, (4) organizing and activating mass care operations and (5) warning and informing the public. There were challenges within the EOC. A lack of situational awareness made gathering of information and sharing information with the public more difficult and less effective.

In order to reduce or eliminate the compounding of complications in the future, Mayor Ron Nirenberg appointed seven members to the Committee on Emergency Preparedness (CEP or Committee) to execute this charge. The primary purpose of this investigation is to understand (1) what caused the problems that resulted in interruptions to utility services, leading to severe community impacts under dangerous winter weather conditions, (2) why were the communications to the community during the winter weather event so ineffective and inefficient, and (3) what City and Utility leadership can do to better prepare and respond to future significant emergency events with changing conditions and cascading impacts. The Committee was tasked to produce a report of the results of its investigation to the Mayor upon completion.

II. METHODOLOGY

The CEP, in fulfilling its charge to delve into the issues and provide recommendations on a pathway forward, embraced two tenets: transparency and inclusiveness. Transparency is a vital component of good government and strong communities. All Committee meetings were live-streamed which provided the opportunity to view CEP proceedings in real time. The Committee placed all the information it gathered on-line, striving to ensure the information was posted in an understandable and easy to use format, to the Emergency Preparedness Committee website, https://www.sanantonio.gov/emergency-preparedness/. This information on the website is provided in both English and Spanish so that it is accessible to the largest number of community members.

Inclusiveness is another component of good government and strong communities. With this in mind, the Committee developed various community input options which were made available on its website and through other mediums. As part of its work, the CEP invited the public to (1) submit comments, questions, and concerns through a survey, 311, an email contact form[5], and their respective City Council offices, (2) observe the open Committee meetings, and (3) review content generated from the work of the Committee. More than 250 comments and questions were received from the community, and a summary of this feedback is available in a separate document on the Committee's website.

The Approach

The Committee's approach involved four mechanisms: the subdivision of areas of focus, a question and response approach to gathering information, the analysis of information, and the formulation of recommendations. Given the three areas of investigation, the Committee determined that the most comprehensive way to complete its work was to divide the task into three separate, but related, parts: the preparedness and response of CPS Energy, San Antonio Water System (SAWS), and the San Antonio Emergency Operations Center (EOC). The CPS Energy subcommittee consisted of Reed Williams and Ana Sandoval, the SAWS subcommittee consisted of Manny Pelaez and Clayton Perry, and the EOC subcommittee consisted of Gen. Edward Rice, USAF (Ret.), Lisa Tatum, and Dr. Adriana Rocha Garcia. Although each subcommittee began their work independently, all questions and responses were ultimately reviewed and analyzed by all Committee members and all analysis and recommendations were a product of the entire Committee's deliberations.

The Committee determined early on that the most effective and efficient way to gather and assess the required information was to develop a detailed set of questions for each entity (CPS, SAWS, and the EOC). These questions included input from the public through the various avenues made available during this investigation. Over one hundred (100) Requests for Information (RFI's) were submitted to the three entities and the Committee was satisfied that the responses enabled them to adequately understand and evaluate what happened before, during, and after the winter storm event. The information gathered afforded the CEP the ability to develop a timeline and more comprehensively understand the sequence of events[6]. All RFI's and responses are found on the Committee's website www.sanantonio.gov/emergency-preparedness.

The CEP was not only charged with gathering information about the preparedness and response to Winter Storm Uri, but with analyzing what went wrong and why. This analysis was derived from a combination of "lessons learned" from the three entities, an outside expert review conducted by Black and Veatch, and individual committee member experience and expertise. After a thorough review of what went wrong during Winter Storm Uri and why, the Committee developed a set of recommendations. The Committee's analysis recommendations are found in Section III of this report.

[5] https://www.sanantonio.gov/emergency-preparedness/Contact-Us
[6] The Timeline (Exhibit A)

III. Analysis and Recommendations

In order to more clearly understand what happened and why, the Committee looked at three seemingly distinct but, in this case, interrelated entities and the sequence of events these entities faced and navigated through during the course of the winter storm. What follows are three discussions, based upon the CEP's analysis, of the circumstances and responses of three entities: CPS Energy, SAWS and the City of San Antonio Emergency Operations Center. It is the expectation of this Committee that as each discussion transitions to the other, the overlap of the timeline becomes more evident, revealing more precisely the cascading of events and the resulting challenges these entities faced over time. The fourth discussion is focused on the San Antonio community and how the weather affected residents, touching upon the most frequently mentioned impacts. The circumstances and cascading of events have led the Committee to draw certain conclusions and to propose recommendations.

A. CPS Energy

The Failure of Deregulation

Deregulation of electric power in Texas by the Legislature has degraded the resiliency and reduced the reliability of the Electric Regulatory Council of Texas (ERCOT) grid over the last twenty years; subjecting CPS Energy customers to a greater risk of extended power outages during a crisis.

Historically all electric power producers in Texas served customers in a certificated area and were economically regulated by a government entity. Since 2001, the Texas Legislature allowed areas of Texas not to be economically regulated. In these areas, customers are allowed to select an electric power provider competing with other providers in the same service area. The Texas Legislature spawned an unregulated industry of electric power producers and marketers to increase competition expecting increased competition would reduce the cost of power to Texans.

The new legislation did increase competition. Large industrial and commercial purchasers who can manage their own demand and supplement their demand with backup generation have been able to reduce power costs. However, the legislation only requires the customer to pay for the electric power supplied, which is referred to as an "energy only" market. The customer does not pay the power marketer or electric generator to install and maintain reserve generation capacity. Reserve generation capacity increases resilience during disruptive and destructive events such as the recent winter storm.

Before deregulation, all utilities included the costs of installing and maintaining reserve capacity in their cost of service and recovered those costs in the rates approved by the economic regulator for the utility. Since deregulation, all providers, including "energy only" providers, are no longer required to hold reserve generation capacity. Municipal utilities and rural electric cooperatives now competing with "energy only" marketers have had a history of investing in reserve capacity to maintain reliability for their customers. Today, these regulated utilities are either competing directly with "energy only" marketers or supporting the ERCOT grid, facilitating the business of the "energy only" marketers.

The utilities competing with the "energy only" marketers are at an economic disadvantage if they invest in reserve generation capacity. The rate payers to municipal utilities and rural electric cooperatives have been paying to maintain existing reserve generation capacity. Unfortunately, the reserve generation

capacity is aging, and many plants built during the period of regulation are past their replacement dates. For the last twenty years ERCOT has relied on these aging investments to provide reliability and resilience to the grid.

Under the current regulatory scheme, the Public Utility Commission of Texas cannot compel any generator to invest in and maintain a prescribed amount of reserved capacity. Customers of CPS Energy have been paying to maintain aging generation plants. However, it is doubtful that CPS Energy customers will be willing to pay for new generation capacity when ERCOT can command CPS Energy to withdraw power from their customers and support "energy only" marketers on the grid. CPS Energy customers subsidizing "energy only" marketers is simply not equitable.

On May 6, 2021, ERCOT issued their report on the Capacity, Demand and Reserves (CDR) for the ERCOT grid from 2022 through 2026. In the CDR, the firm peak load demand is projected to be only 61,821 MW for the 2021/2022 winter season. For the same period, the operational generation capacity is 81,452 MW and with planned expansions the capacity is projected to be 87,813 MW. A reserve capacity of 42% appears reassuring. However, the current generation capacity includes 6,932 MW of renewables and the planned expansions that might not occur with 67% of the expansion being renewables.

ERCOT also issued a Seasonal Assessment of Resource Adequacy (SARA) for the Fall of 2021 on May 6, 2021. The SARA report estimates the total resources to be 91,301 MW compared to an adjusted peak demand of only 62,662 MW, which is an even better reserve margin. Since the recent winter storm, ERCOT started including risk scenarios in the SARA. The risk scenario most similar to the recent winter storm indicates a shortage of generation capacity of 13,359 MW. This projection is better than the 20,000 MW peak load shed during the storm, but is highly dependent on approximately 11,000 MW of existing and planned renewables operating as expected.

If we encounter another winter storm similar to that experienced in February of 2021, then Texans will experience similar local impacts from forced outages as a result of load shed demands by ERCOT. In the February 24, 2021 ERCOT Board of Directors meeting, staff estimated the peak load without load shed would have been 76,819 MW. The estimated maximum load requirement during the winter storm without using load shedding actually exceeds the previous record load requirement, which was 74,820 MW on August 12, 2019. To avoid a repeat of this disastrous event, new base-load plants, dispatchable generation, and new storage capacity technologies must be installed. ERCOT plans to double reserve margin in the next few years as illustrated in the CDR. A large majority of the increased capacity is planned to be in renewables. Electricity generated by wind and solar can drive down real time ERCOT prices and is good for all consumers when operating. Unfortunately, the low prices for renewables disincentivizes investments in new reserve capacity required to respond to a crisis, such as base load power plants, dispatchable generation units, and new storge technologies.

CPS Recommendation 1: CPS Energy and the City of San Antonio join with other cities, municipal utilities, and rural electric cooperatives to develop and propose legislation in the 2023 legislative session to accomplish the following:

1.A require all generators and marketers on the ERCOT grid to maintain a prescribed level of reserve capacity from base load plants, dispatchable plants or energy storage facilities

with direct ownership of generation capacity or firm contractual agreements with generators,

1.B require the State of Texas to make the investment to connect the ERCOT grid to the larger grids east and west of Texas, and

1.C require the State of Texas to guarantee loans for all generators, transporters or marketers on the ERCOT grid to build or contract for required capacity which can supply firm dispatchable supplies from generation plants or energy storage facilities to the ERCOT grid during a natural disaster or extreme weather conditions.

Interference in the Free Market

The Public Utility Commission of Texas (PUCT) manipulated the electric power price on the ERCOT grid artificially inflating the cost of electric power, signaling the natural gas markets to excessively increase the cost of natural gas and irresponsibly costing the residents of Texas billions of dollars.

Approaching Valentine's Day of 2021, Texas faced a historic winter storm. The daily high temperatures were compressing on the daily low temperatures, which were near freezing. From the February 14 until the end of the storm the low temperatures remained below freezing and the high temperatures did not rise above freezing until February 17 as illustrated in the following graph, Figure 1, which plots the daily average high and low temperatures compared to the average daily high and low temperatures for the previous eleven years in San Antonio, Texas, as recorded by Weather Underground[7].

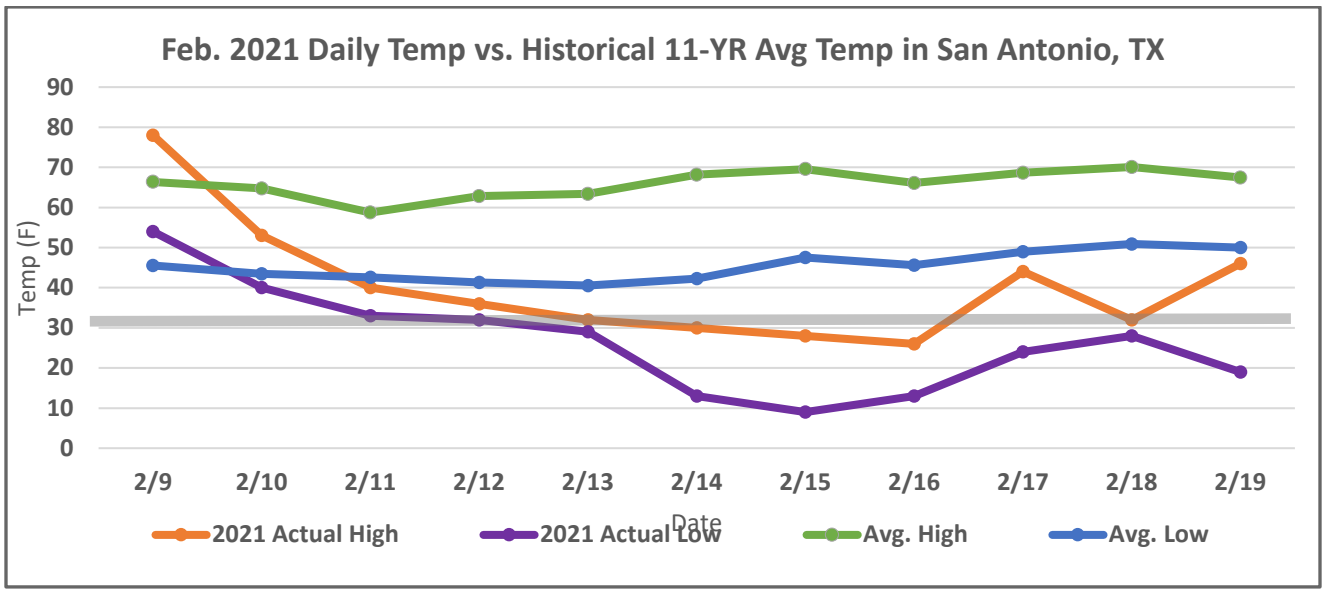

Figure 1

ERCOT, who operates the electric grid in most of Texas declared Emergency Operation Level 3 (EEA 3) at 1:20 AM on February 15th. In the next 50 minutes, ERCOT ordered grid participants to reduce distribution to their customers by 10,500 MW which is termed load shedding. The load-shedding was

[7]"San Antonio, TX Weather History | Weather Underground". 2021. *Wunderground.Com.* https://www.wunderground.com/history/monthly/us/tx/san-antonio/KSAT/date/2021-2.

required because in the early hours of February 15th approximately 20,000 MW of electric power generation capacity failed.

To put the severity of the problem in perspective, the total installed capacity on the ERCOT grid is 107,514 MW. Prior to the February 15, slightly under 30,000 MW of capacity was already out of service, which included 14,000 MW of renewables and 2,800 MW of scheduled outages for maintenance. In the early morning of February 15, approximately 20,000 MW of generation capacity failed. Around 1:53 AM, ERCOT came within seconds of a system wide failure when the grid frequency dropped below 59.4 Hz. The ordered load-shed of 10,500 MW was sufficient to stabilize the grid. The maximum amount of generation loss reached 52,277 MW, which is 48.6% of the installed generation capacity on the ERCOT grid. The loss of generation capacity remained in the 50,000 MW range until the morning of February 17th, when the temperatures started to moderate.

During the day of February 15, ERCOT was faced with massive failures at the generation plants and frustration with the market price for ERCOT power, as determined by the bid and ask prices reflected in the 15-minute real time free market. The actual real time price paid or received by CPS Energy for power in 15-minute increments is plotted in the following chart (Figure 2).

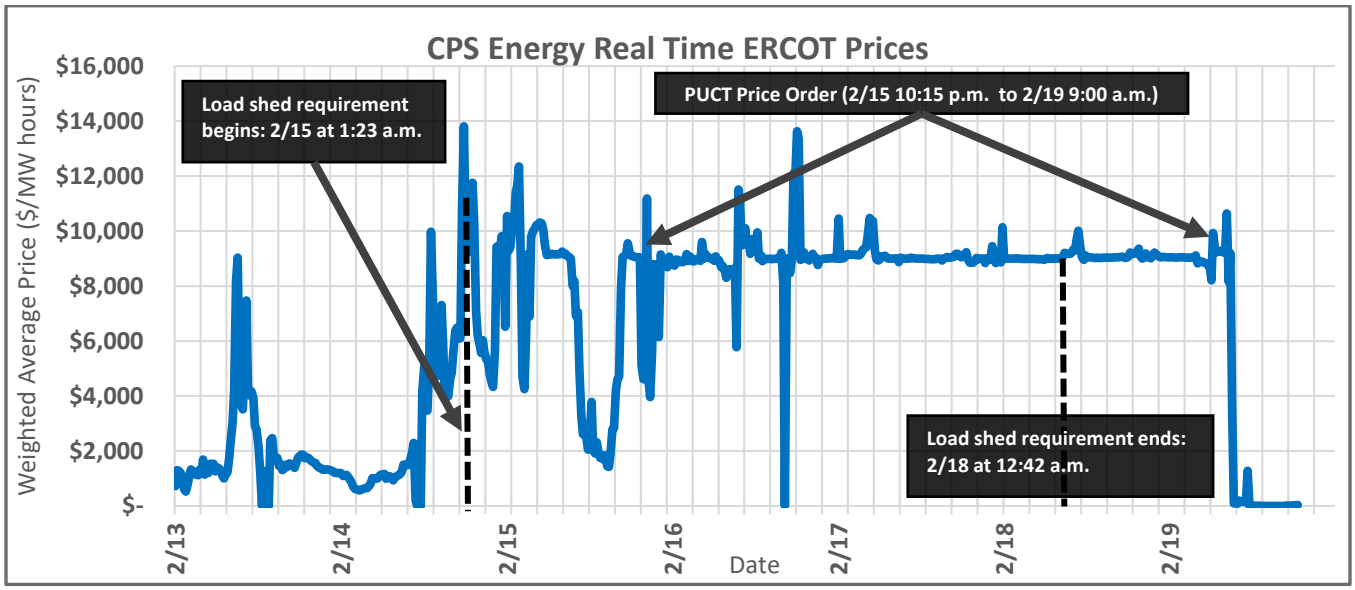

Figure 2

Due to the ERCOT command to load-shed their customers, power producers were offering power for sale into the ERCOT grid. This free market activity is reflected in the 15-minute real time pricing during the day on the 15th of February. As expected, the pricing is volatile and at times drops below the $2,000 per MWh range.

Public Utility Commission of Texas (PUCT), which oversees ERCOT, subsequently issued an order declaring the free market prices being recorded on their system to be incorrect and inconsistent with the fundamental design of the ERCOT market. In support for their intervention in the free market, PUCT states in order No. 51617 the following. “Energy prices should reflect scarcity of the supply. If customer load is being shed, scarcity is at its maximum, and the market price for the energy needed to serve that

load should also be at its highest." At 10:15 PM on February 15th, PUCT ignored the free market prices and raised the price of power to $9,000 per MWh, which is the maximum allowed. PUCT held the real time price at $9,000 per MWh until 9:00 AM on Friday, February 19, 2021, even though ERCOT discontinued load-shed orders at 12:42 AM on Thursday, February 18, 2021.

Price manipulation by the PUCT did not incentivize more electricity generation, as the amount of generation capacity out of service remained in the 50,000 MW range until midday on Wednesday, February 17, 2021. Immediate price signals can only be effective if an entity can quickly scale up generation. Electricity producers did not have that option during the storm. While the PUCT understood the tremendous demand for electricity that was taking place during the storm, the PUCT misunderstood the simultaneous limitations on electricity production during that time. In a winter storm as severe as what was experienced, manipulated price signals simply could not make up inadequate reserve capacity, shortage of natural gas, and improperly winterized facilities.

The artificial setting of price of electric power at $9,000 per MWh by the PUCT and executed by ERCOT during the winter storm was economically devastating to CPS Energy and its customers. The table below, Figure 3, details the ERCOT expenses by day for the event and similar ancillary services provided directly from third parties.

Winter Event Transactions										
Revenue (Cost)	In Thousands									
Day	Real Time Market Energy	Day Ahead Market Energy	ERCOT Ancillary Services	Subtotal	Bilateral Ancillary Services	Reliability Deployment / Revenue Neutrality	Resiliency Settlements (3rd Party)	Subtotal	Short Pays & Other	Total Disclosed in Material Event Notices
9-Feb	583	460	(18)	1,025	(12)	16	(18)	1,011		
10-Feb	795	90	(22)	863	(12)	(53)	(3)	795		
11-Feb	3,024	272	(74)	3,222	(28)	(352)	(314)	2,528		
12-Feb	5,749	58	(160)	5,647	(79)	(96)	(142)	5,330		
13-Feb	18,605	-	(2,313)	16,292	(1,658)	63	(1,109)	13,588		
14-Feb	(47,258)	-	(3,679)	(50,937)	(10,776)	446	(1,244)	(62,511)		
15-Feb	(129,152)	-	405	(128,747)	(16,132)	6,269	(2,206)	(140,816)		
16-Feb	(1,164)	(17,932)	(14,184)	(33,280)	(24,180)	29,281	(2,218)	(30,397)		
17-Feb	83,195	-	(24,739)	58,456	(28,016)	12,819	(2,423)	40,836		
18-Feb	(103,451)	-	34,483	(68,968)	(27,916)	(944)	(3,197)	(101,025)		
19-Feb	(16,388)	-	32,296	15,908	(21,248)	(5,251)	(1,362)	(11,953)		
20-Feb	-	-	-	-	(11,558)	10	-	(11,548)		
Total	(185,462)	(17,052)	21,995	(180,519)	(141,615)	42,208	(14,236)	(294,162)	(70,838)	(365,000)

Figure 3[8]

As reflected in figure 3, these transactions could have a $365 million negative impact on CPS Energy. Unfortunately, the indirect effect on natural gas prices when PUCT artificially set the electric power price at $9,000 per MWh inflicted even greater economic harm on CPS Energy.

The manipulated price for electricity is reflected in the inflated market price for natural gas. The chart below, Figure 4, details by day the average prices charged to CPS Energy for natural gas and the total daily charges for natural gas during the storm. By February 17, 2021, CPS Energy was charged an average

[8] RFI 22A and 23A

price of $386 per MMBtu, which is 100 times the prevailing price before the storm. During the storm CPS Energy was charged over $685 million for natural gas.

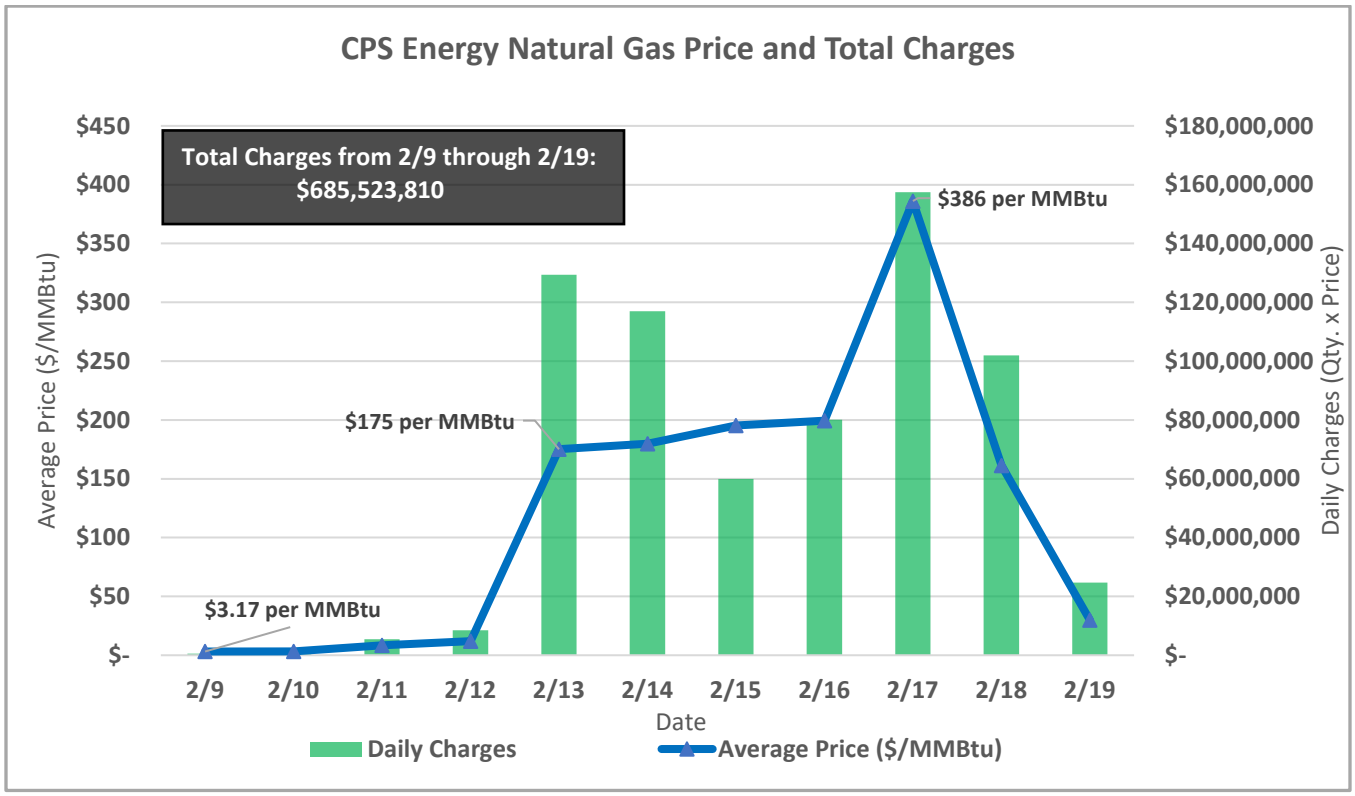

Figure 4

CPS Recommendation 2: CPS Energy reevaluate their strategies and procedures for purchasing and transporting natural gas to assure adequate supplies of natural gas are available to their natural gas generation units critical for firming capacity during a crisis and for natural gas distribution to customers for heating.

CPS Recommendation 3: CPS Energy and the City of San Antonio join with other cities, municipal utilities, and rural electric cooperatives to develop and pass legislation in the 2023 legislative session to eliminate the ability for the PUCT through ERCOT to artificially manipulate the price of electric power and ancillary services on the grid and only allow ERCOT to have administrative and "clearing" authority over next day prices, real-time prices, and ancillary services on the grid.

Power Plant Operating Problems

The baseload coal, and nuclear generation plants did not perform as required during the winter storm and the dispatchable natural gas generating plants did not operate sufficiently to make up for the lost production.

Since the freeze of February 2011, CPS Energy conducted plant studies to identify vulnerabilities, installed heat tracing on sensitive tubing, upgraded insulation and implemented numerous other weather readiness improvements on its plants. CPS Energy conducted its regular winter readiness procedures beginning September of 2020 and submitted a declaration of winter readiness to ERCOT on November 30, 2020. Further, the utility carried out additional actions beginning February 4, 2021 to prepare for the winter storm. These actions are summarized in the responses to RFI 8. However, the extensive weatherization actions taken were insufficient to account for either the demand experienced during the storm or the damage the storm would have on vulnerable plant equipment, as identified in the response to RFI 13.

Immediately after the winter storm, many political office holders declared the failure of the renewable sources of power to be the problem. Based on the prior 3 year average, February daily renewable production CPS Energy could expect renewables to provide only 7.8 % of their generation capacity during the winter storm as indicated in the response to RFI 6. CPS Energy actually received 3.2% of their generation from renewables during the storm. The actual generation received from wind and solar is compared to the average production received in February for prior three years is presented in the following chart (Figure 5).

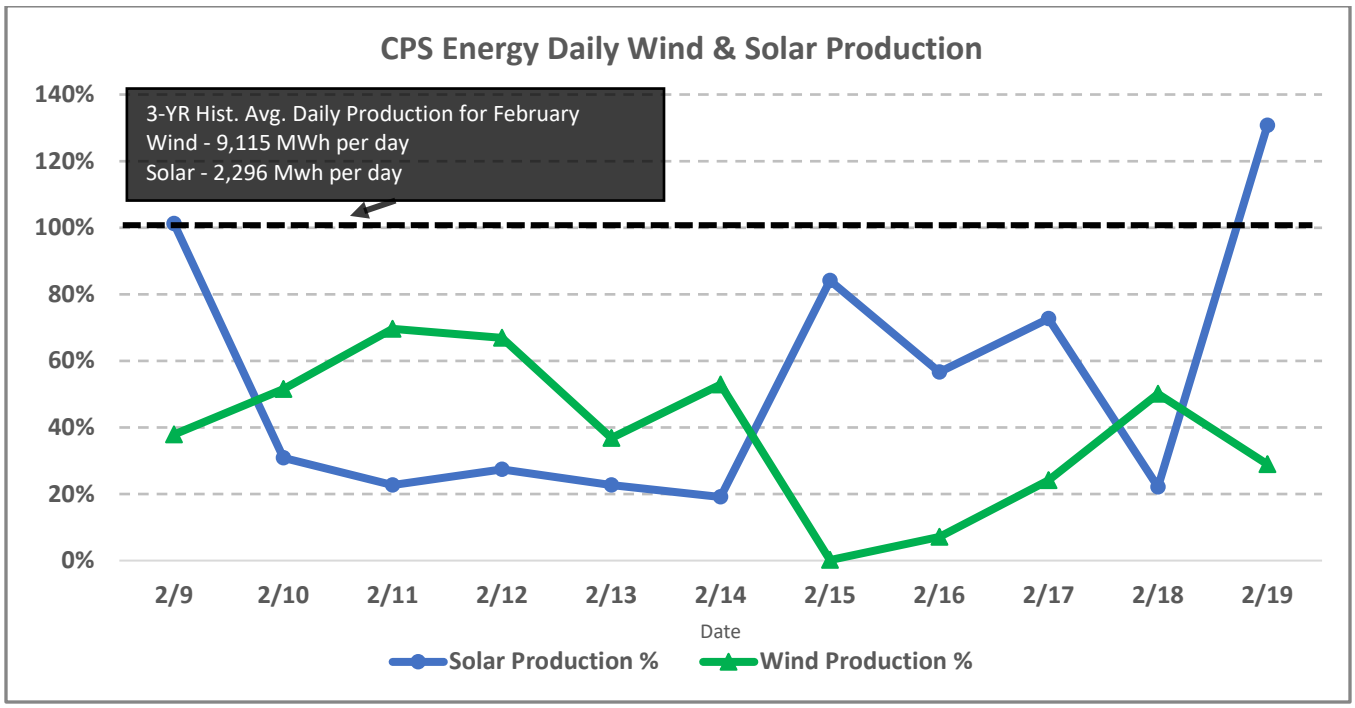

Figure 5

The solar generation enters the storm period at about the three-year average. While it drops quickly with the snow, it recovers almost to the three-year average, except on Thursday, February 18, 2021. The power received from the wind contracts during the event is especially affected during the extremely cold days.

Clearly, CPS Energy was not depending on their renewable contracts to provide a significant portion of their generation during the storm. During a winter crisis CPS Energy must depend on the base load plants,

such as the nuclear plant and the coal fired plants, and the dispatchable plants fueled by natural gas, as detailed in the following graph (Figure 6).

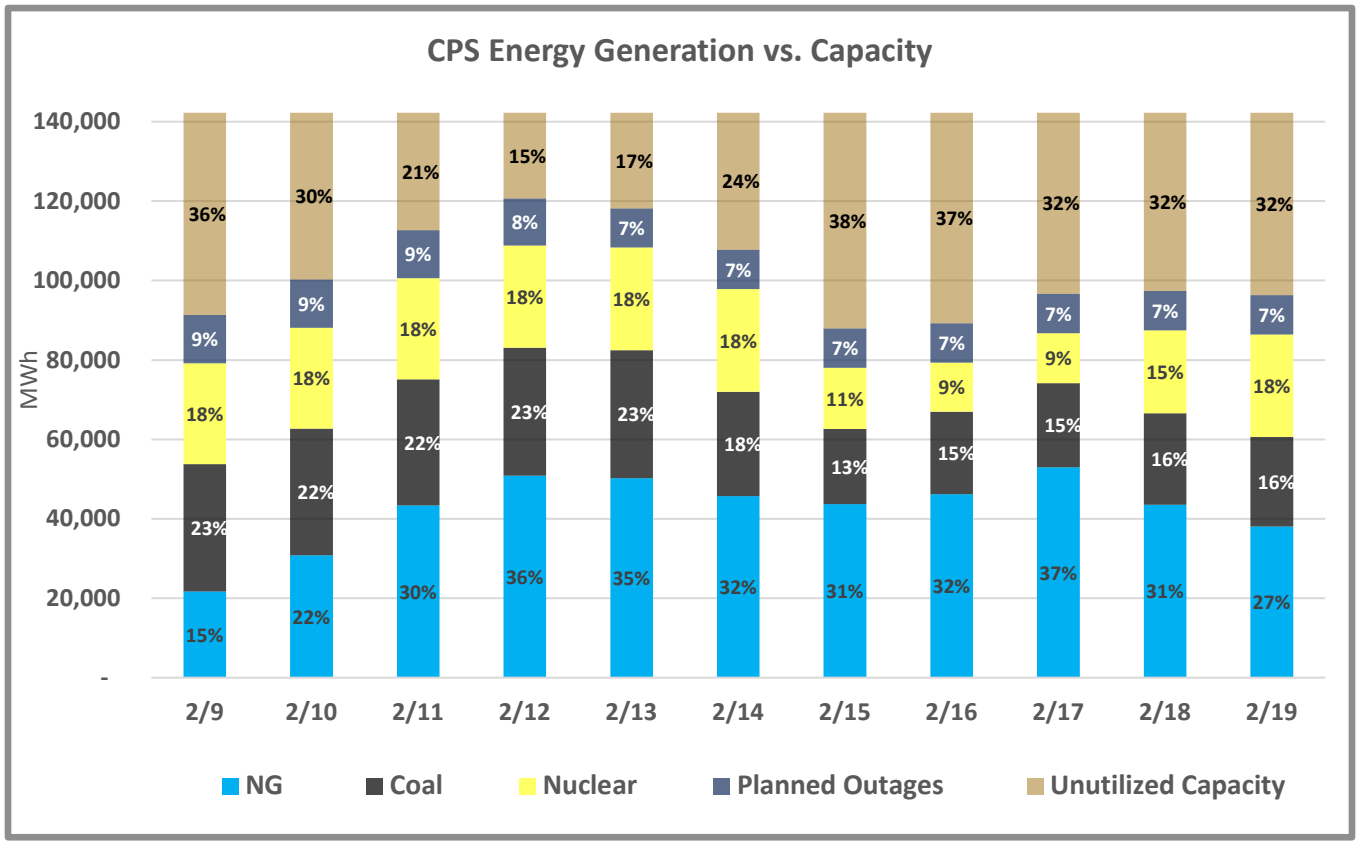

Figure 6

The chart in Figure 6 displays all generation sources other than renewables to provide a complete picture of all expected operating contribution from the base-load and dispatchable plants and unexpected capacity from units scheduled down for maintenance. CPS Energy successfully reduced the unutilized capacity to 15%, by the 12th of February, before the lowest temperatures of the storm arrived. CPS Energy was able to accomplish this by ramping up natural gas fired units and retuning a unit down from scheduled maintenance early. CPS Energy was able to hold that level of utilization through the next day.

On Sunday, February 14, 2021, unutilized capacity started to increase due to the first of two major failures. The first failure was loss of control of the forced air fan feeding the firebox of Spruce 1. The initial forced air fan problem precipitated other problems detailed in the response to RFI 13, leading to a complete shutdown on Monday, February 15, 2021. Spruce 1 was returned to limited capacity by firing the boiler with natural gas but was not returned to full capacity until after the winter event, as illustrated in the following chart (Figure 7).

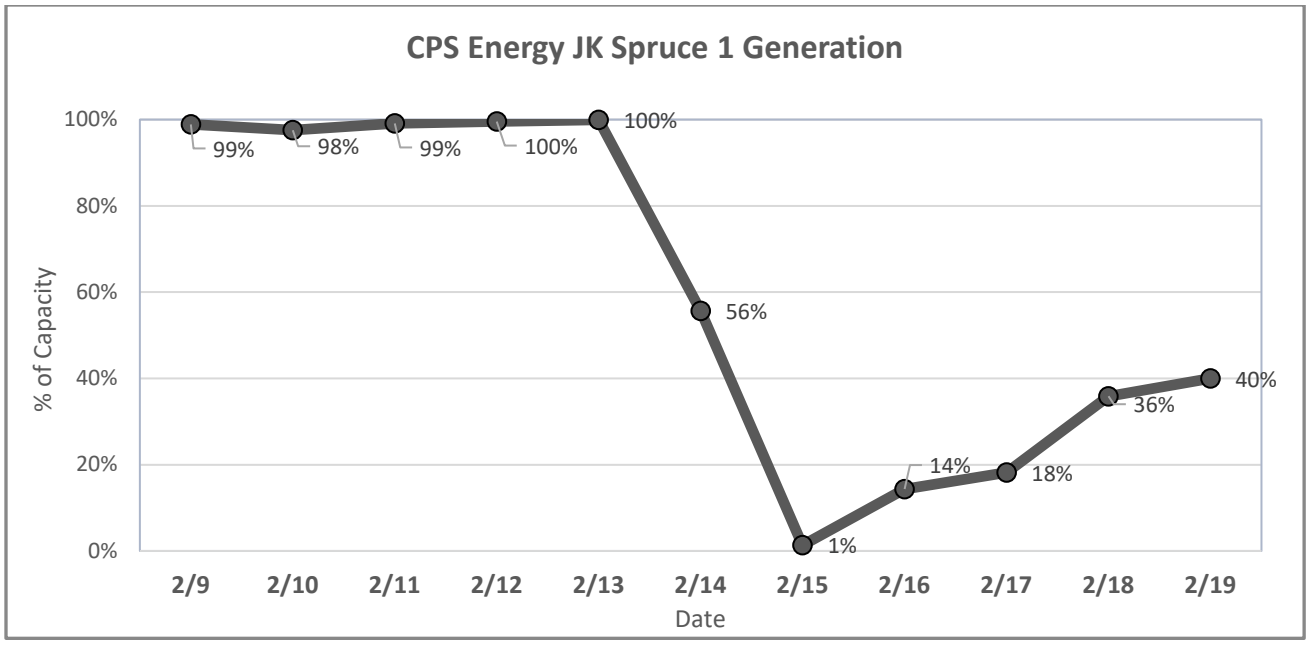

Figure 7

Due to the extended failure, from Sunday the 14th of February through the end of the event on Friday the 19th of February, Spruce 1 lost 58,418 MW hours of production. ERCOT continued to artificially hold the grid power price at $9,000/MWh until 9:00 AM on Friday, February 19, 2021. During that period, CPS Energy could have sold power into the ERCOT grid for $9,000/MWh or avoided purchasing power from the ERCOT grid for $9,000/MWh, powering community homes. Thus, the opportunity cost to CPS Energy for 58,418 MWh at $9,000/MWh is approximately $500 million.

The following day, on Monday, February 15, 2021, as Spruce 1 was shutting down, another major failure occurred at South Texas Nuclear Project 1 (STP 1). An uninsulated water pressure sensor line froze at STP 1. The line was used to monitor the inlet water pressure on the feed pumps to the steam generator. This necessitated the shutdown of STP 1, as represented in the following graph (Figure 8). The line was insulated, and the unit was restarted on Thursday, February18, 2021, and attained full capacity by the next day.

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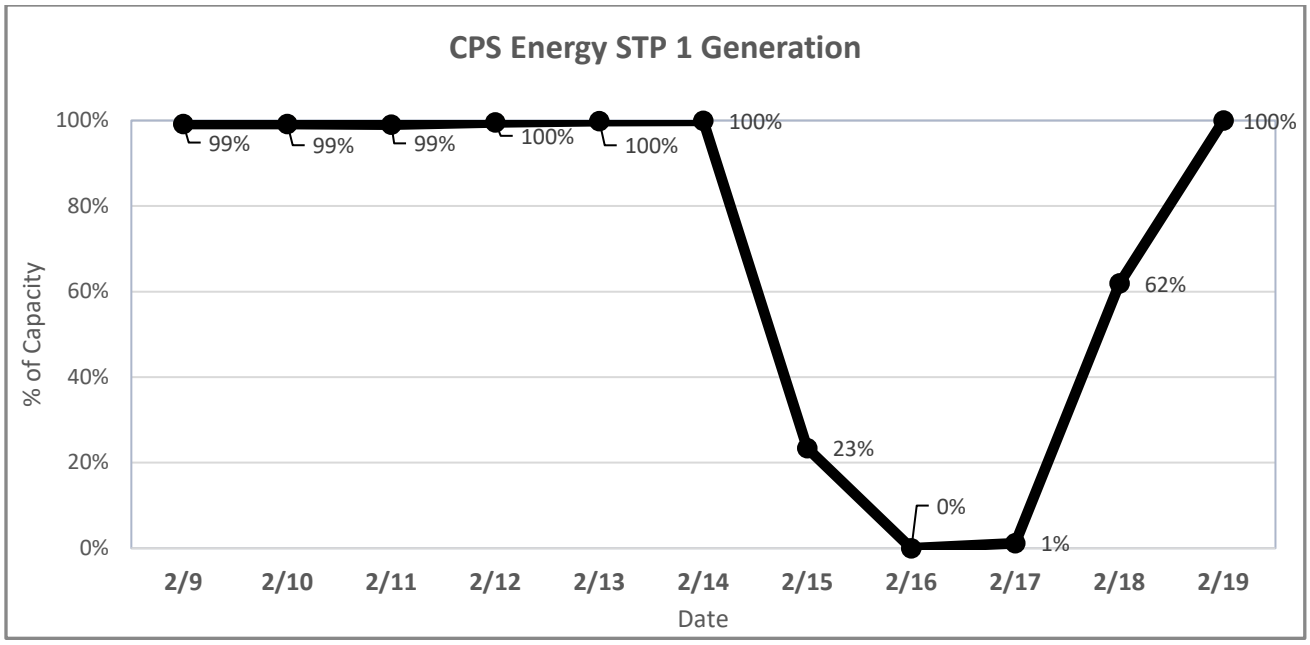

Figure 8

Due to this failure, CPS Energy's portion of the production loss at STP 1 was 40,711 MWh. The loss of capacity was during the period when ERCOT maintained the price at $9,000/MWh. CPS Energy suffered an additional opportunity cost of approximately $350 million. The two failures in critical baseload plants increase the unutilized capacity to 38% on Monday the 15th of February and only recovered to 32% for the remainder of the winter event. The total loss of power due to these two failures was 100,224 MW hours with an associated opportunity cost of approximately $850 million.

During an emergency, it is critical to have natural gas fired generation units available to start up and compensate for lost capacity from renewables and failures at baseload plants. The chart below, Figure 9, shows how CPS Energy successfully ramped up natural gas fired generation capacity from 26% on Tuesday, February 9, 2021, to 61% just before the storm hit on Friday, February 12, 2021. CPS Energy was able to hold the natural gas fired generation between 52% and 63% until Friday, February 19, 2021, when it decreased to 45%. Unfortunately, that the natural gas fired generators were unable to get above 63% utilization of the total natural gas fired generation.

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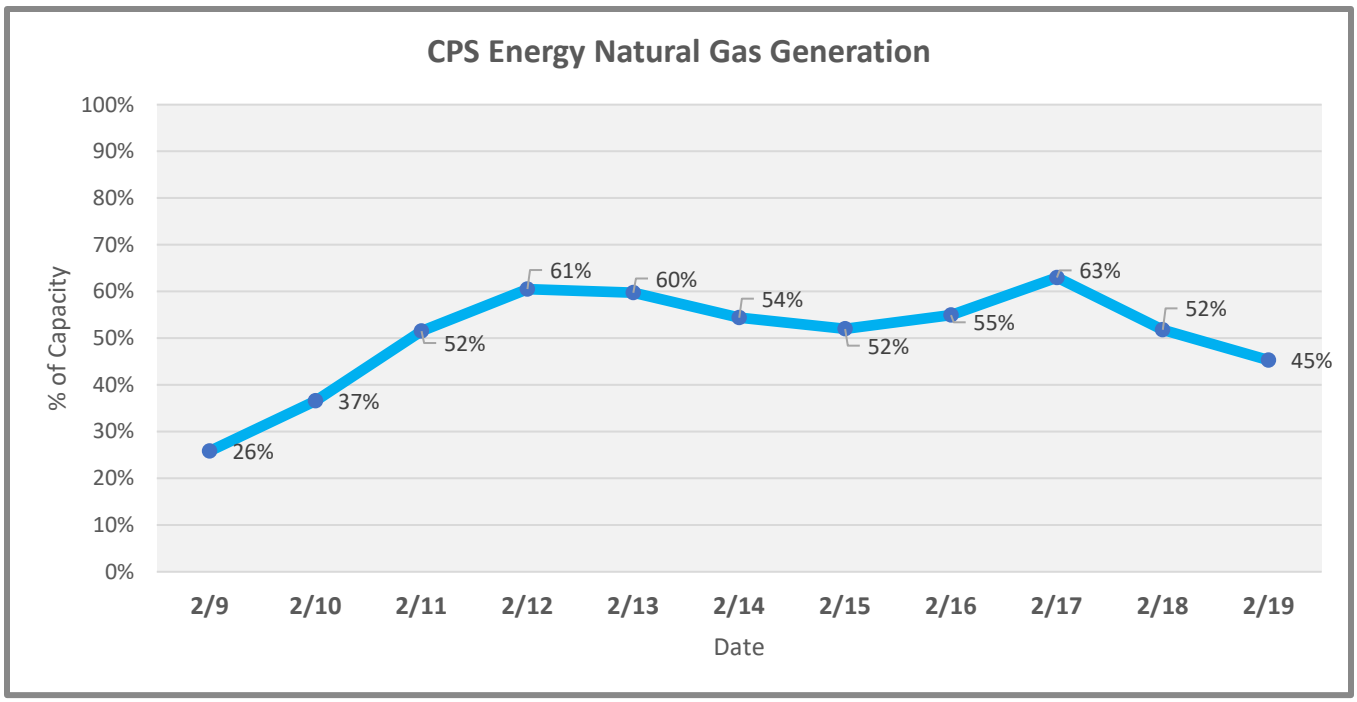
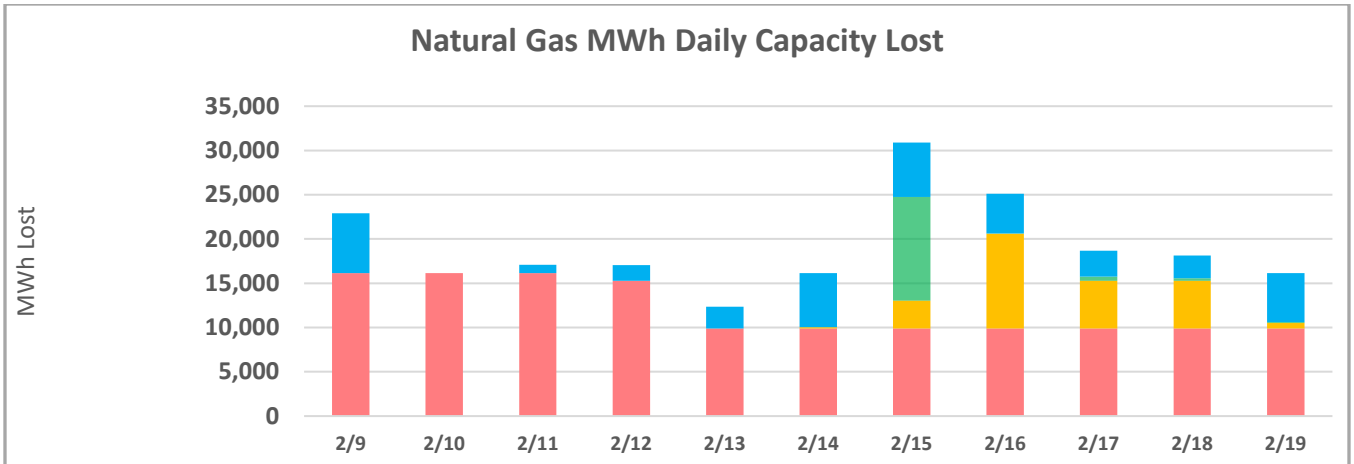


Figure 9

The natural gas fired generation plants lost capacity during the winter event for several reasons, detailed in the chart below (Figure 10). The first reason was planned maintenance. CPS Energy was able to return 6,264 MWh of daily capacity down for maintenance to operation prior to the winter event, but 9,888 MWh of daily capacity continued to be down during the winter event. February is the lowest demand month of the year, but also has the lowest average temperatures. While it might have been reasonable to schedule maintenance in the lowest demand month, perhaps scheduling maintenance according to weather risk might be more prudent in the future.

The critical impact was experienced on Monday, February 15, 2021, when 11,706 MWh of daily capacity was lost to weather events and an additional 6,167 MWh of daily capacity was lost to controls and mechanical. Clearly, controls and mechanical failures were impacted by the extreme weather conditions. To lose a total of 17,873 MWh of daily capacity on the most critical day from the most dispatchable generation source of power is economically and operationally devastating.

On the following day, Tuesday, February 16, 2021, the shortage of natural gas became a major curtailment on generation capacity from natural gas generation units. CPS Energy lost over 25,000 MWh of generation capacity due to the lack of fuel during the winter event.



	2/9	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19
Controls & Mechanical	6,753	-	930	1,763	2,472	6,106	6,167	4,484	2,927	2,572	5,562
Weather	-	-	-	-	-	-	11,706	35	447	306	81
Fuel Supply	-	-	-	-	-	143	3,144	10,695	5,400	5,375	633
Planned Outage	16,152	16,152	16,152	15,291	9,888	9,888	9,888	9,888	9,888	9,888	9,888

Figure 10

CPS Recommendation 4: CPS Energy should emphasize and refocus on their long and distinguished history of operational excellence. From the outside, one can see how the historical winter storm exposed numerous operational problems across the fleet. However, it is the job of the Board of Trustees and the CPS Energy management to build the team to control what they can control, which is the generation, transmission, and distribution of electric power, and the purchase and distribution of natural gas.

Unequal Distribution of Power Outages

Given the numerous plant problems and the extent of the load-shed required, CPS Energy was not able to manage outages efficiently and equitably among the interruptible circuits.

Late Monday night, February 15, 2021, the ERCOT load-shed demand reached a peak of 20,000 MW. According to the ERCOT report, CPS Energy provided 6.79% of the total load-shed ordered by ERCOT or approximately 1,358 MW. The installed capacity for CPS Energy is 5,943 MW, not including renewables. To put the requirement in perspective, 1,358 MW of baseload and dispatchable capacity is 22.9% of CPS Energy's installed capacity, not including renewables. Since CPS Energy had so many operational problems, it was very difficult for CPS Energy to accommodate the ERCOT demands and serve their customers.

A total of 274 interruptible circuits including a few low frequency circuits were utilized to distribute the load-shed required by ERCOT across the CPS Energy customers. The map below, Figure 11, plots the total time during the event that circuits serving customers were interrupted. The circuits are color coded by the total number of hours that the circuits were not energized due to the load-shed requirements from ERCOT during the winter storm. The total hours of outage by color is detailed in the explanation box in Figure 11. A quick inspection of the map shows that not all interruptible circuits were interrupted on an

equal basis. If all circuits had been interrupted on a equal basis the map would not have such a diversity of colors. The white areas represent a combination of critical circuits and low frequency circuits, which were not affected by the load-shed required by ERCOT. The gray areas represent military instillations.

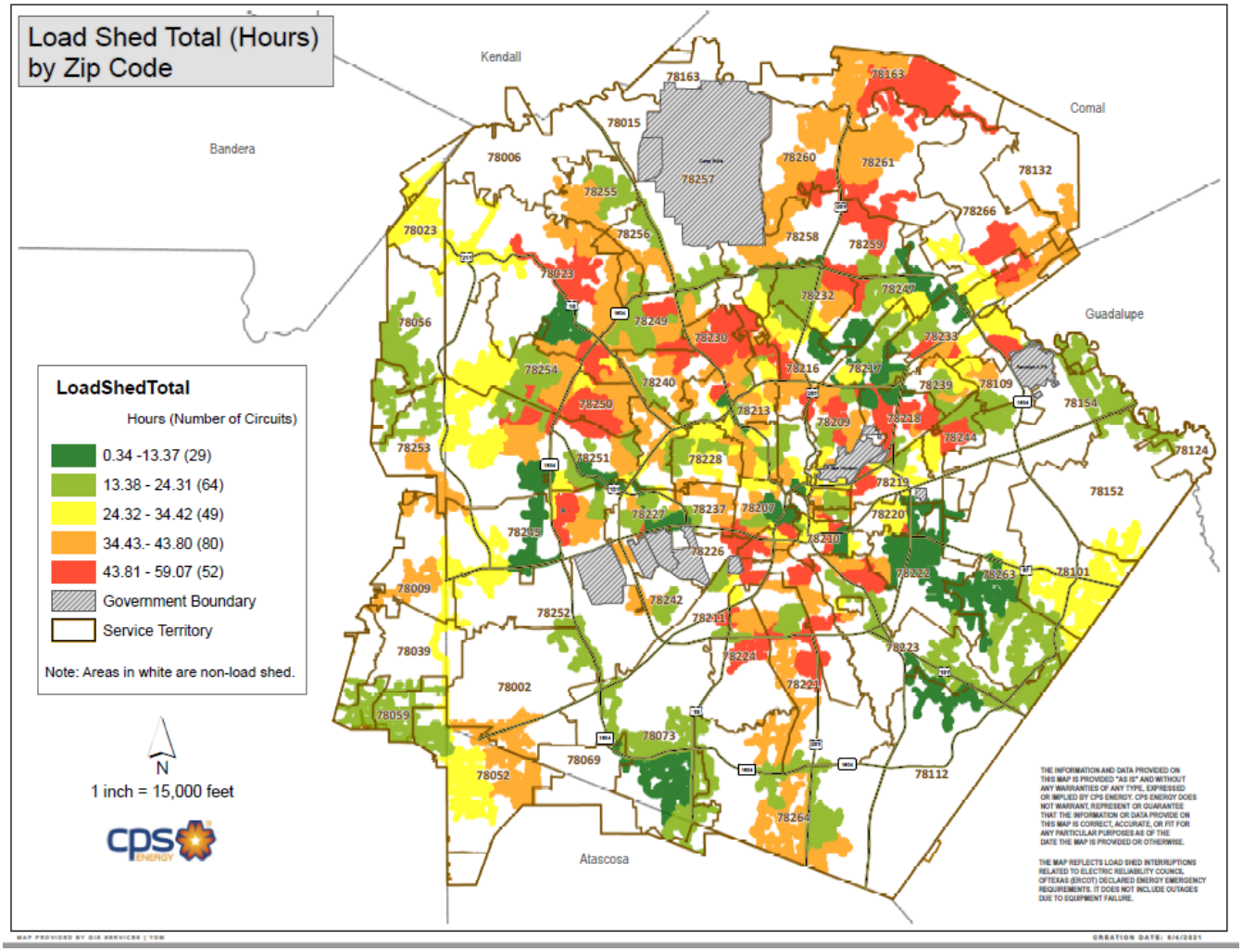


Figure 11

Early in the process of rotating the outages among the interruptible circuits, CPS Energy utilized an automated system. Unfortunately, it did not work because when a circuit was energized, the demand on the circuit exceeded the supply to the circuit, which tripped the circuit. Later in the event, CPS Energy energized the circuits manually with more success.

Immediately after the winter event a great deal of concern was expressed by customers, members of the San Antonio City Council, and groups advocating for social justice that customers in socially and economically disadvantaged areas suffered longer periods of interruption than more affluent zip codes. From a review of the map, it is hard to support that premise. In addition, the more disadvantaged areas contain large areas in white, which represent a combination of uninterruptible and low frequency circuits. The white areas were not affected by the ERCOT load-shed requirements.While the northern and

northwestern service areas appear to have had longer and more widespread outages, other areas did experience long total hours of outages as well. Residents in lower income or hipoc areas who potentially experienced comparatively shorter outages may still have experienced significant impacts. Housing stock in these areas is often older, less well insulated, and residents may have less resources to contend with the storm and outages, all of which would make the impact, even of a shorter outage, disproportionately great.

CPS Recommendation 5: CPS Energy should revisit and upgrade the automated rotating outages program so that it is capable of handling larger load shed requirements.

CPS Recommendation 6: CPS Energy should review the options to reduce the size of critical circuits, shift non-critical customers into interruptible circuits, and increase the number of interruptible circuits by reducing the size of non-interruptible circuits. This review of critical circuit load should be undertaken regularly and in coordination with other major critical service providers, such as fire departments, SAWS, and emergency shelter providers.

CPS Recommendation 7: CPS Energy should review opportunities to supply power to SAWS pump stations and other critical infrastructure where critical circuits are not available or to feed these locations from dual circuits.

Communication Problems

Communications before the event did not prepare customers for the potential outages nor the duration of the outages.

On February 10th, 11th, and part of the 12th, prior to ERCOT's call for conservation on that day, CPS issued over ten social media messages and one media release[9]. These messages were informational, marketing oriented, and some were a call-to-action. Informational and marketing-oriented messages informed customers of ensuing coming cold weather and stated that CPS Energy was prepared to handle demand and any outages. The call-to-action messages focused on safe driving during hazardous weather and offered a link for more safety tips.

On the evening of Friday, February 12, 2021, CPS Energy issued two conservation messages and a winter storm warning. These conservation messages were followed by calls to action for safe driving and blood donations.

On Saturday, February 13, 2021, CPS Energy transitioned its messaging, sending calls to action around heater safety, outage reporting, emergency preparedness, and energy conservation. The following day, Sunday, February 14, 2021, CPS Energy moved customer outreach into high gear, issuing over 15 social media messages regarding breakers, road safety, heater safety, and conservation. It also sent automated calls to customers in English and Spanish calling for conservation.

Emergency alert social media messages regarding load shed and rolling outages began after midnight on February 15, 2021.

[9]See CPS Energy RFI 24 https://www.sanantonio.gov/emergency-preparedness/Question-Lists.

ERCOT issued the EEA1 level notification at 12:15 AM on February 15, 2021, and slightly more than an hour had elevated that notification to EEA3, the notification which triggers load shed requirements. Further, the first notification occurred after midnight, after most customers had gone to bed and would not have had a chance to take precautions.

The potential for planned or rolling outages was not communicated by CPS Energy in any of the social media posts or media alerts presented in RFI 24. However, the potential for planned and rolling outages was shared by CPS Energy with the Emergency Operations Center on February 13 and 14 (RFI 24 page. 27). However, that potential was not explicitly communicated to the public by CPS Energy or the EOC.

The seriousness of the conservation message was not conveyed to customers until the day before the outages, which likely limited the reach and effectiveness of the messaging. In addition, the conservation message was issued with multiple messages, many of which were also important to storm preparation, however, some were not. It is also possible that CPS Energy's messaging in the days prior, regarding its preparedness to meet demand during the upcoming cold weather, limited the potential effectiveness of the ensuing conservation requests.

Conflicting messaging along with the lack of advance notice of outages cumulatively had an adverse effect on the credibility of subsequent messaging by CPS Energy during the outages and in their aftermath.

The load shed event was unprecedented in the history of CPS Energy and the City. The lack of power, social distancing practices due to COVID, dangerous road conditions, and extreme cold cumulatively made coordination and collaboration among the City and CPS Energy truly difficult.

CPS Energy did have staff stationed at the EOC during the event. However, based on the communication from CPS Energy during the outages, it appeared that CPS Energy did not effectively communicate with the EOC or SAWS during the emergency. While only CPS Energy employees can restore downed lines and purchase electricity, the emergency itself was felt by the entire community. Therefore, it would have made sense for City and County leadership to have participated in delivering of critical messages, as opposed to leaving that communication only up to CPS Energy.

An emergency of this magnitude requires a widely recognized and trusted messenger for effective communications. A unified front representing the utility, local government and emergency partners is beneficial in that it number one, encourages a coordinated message, making it less likely that the public will receive conflicting or confusing messages; and two, serves to expand the reach of the message as multiple entities combined have a larger audience; and three, in that the appearance of collaboration increases the impression of reliability of the message, making it more likely that the public will listen, share and implement these messages.

CPS Energy and partners should regularly update the emergency communication protocol, as digital communication preferences change quickly relative to how frequently we can expect similar storms. The emergency communication protocols should be developed with contributions from local communication professionals, such as the San Antonio chapters of the Public Relations Society of America and the American Marketing Association. The communications practices should also integrate best practices in crisis communications.

CPS Recommendation 8: Develop a cohesive, comprehensive, and clear emergency communications protocol in collaboration with the City of San Antonio Emergency Operations Center with input from community professionals. In developing the protocol, CPS Energy should consider:

- **8.A Tailoring messaging to what is most critical for the customer's service and safety and focus on what is most relevant to the organization's mission.**
- **8.B Evaluating the effectiveness of calls for conservation and consider how effectiveness can be enhanced, by modifying timing, communication methods, and perhaps even reporting real time progress on conservation.**
- **8.C Issuing an advance notification process to contact each customer when there is a risk of mandatory load shed and rolling outages. These notifications should:**
  1) **Be coordinated with the emergency operations center;**
  2) **Be provided with a reasonable advance notice to prepare and make alternative arrangements;**
  3) **Indicate if customer is on a circuit that is NOT critical and may lose power if rolling outages occur (only possible if notifications are personalized by account); and**
  4) **Advise what the customer should do if they lose power, such as places they can go or whom to call for assistance.**

CPS Recommendation 9: In concert with City and other local agencies develop and implement an emergency readiness year-round campaign, building out the framework of Ready South Texas. The aim should be that residents know how to prepare for an emergency as well as they know the number 911.

B. San Antonio Water System

The arrival of Winter Storm Uri and SAWS' Preparedness

Before Uri's arrival, SAWS was aware of adverse weather predictions, yet, like many organizations throughout the state, did not anticipate the severity or prolonged duration of the extreme weather event. Without knowledge of the storm's severity, SAWS deployed typical cold weather messaging information to its ratepayers - to protect the 3 Ps from freezing: pets, plants, and pipes. In advance of what was believed to be a typical cold weather event, SAWS had staff stationed at key facilities in case a weather-related issue arose, repositioned crews and equipment, stocked up on chemicals and fuel, acquired additional thermal heaters, and provided additional insulation and heat elements on exposed systems.

In the year prior to the storm, SAWS had taken other steps regarding general emergency preparedness. In February 2020, SAWS conducted a Resilience and Risk Assessment (RRA), similar to the City of San Antonio Hazard Mitigation Action Plan, discussed later in Section III.C. The RRA is an all-hazards risk assessment of relevant threats and hazards (malevolent, natural, accidental) to mission critical facilities and assets. Risk results were ranked and evaluated regarding potential mitigation options anticipated to reduce or eliminate risk levels.

In August 2020, SAWS developed an Emergency Response Plan (ERP) to support the findings of the RRA. The Emergency Response Plan incorporates the National Incident Management/Incident Command System (NIMS/ICS) framework. The ERP identifies specific response actions to be taken during an

emergency to maintain SAWS' operations, protect employees, minimize disruption to the public, minimize environmental impact, and preserve property. SAWS leadership has communicated that all protocols in the ERP and frameworks were implemented. However, water service was still impeded as a result of the power reliability issues that arose from ERCOT's load shedding requirement and CPS Energy's automatic load shedding program. This is not to imply that SAWS did not have vulnerabilities exposed or major areas of improvements that must be made to ensure the viability of water service in weater-related crises.

Over the years, SAWS made some improvements due to information gathered from a similar freeze event that occurred in El Paso on Tuesday, February 1st, 2011[10]. However, Winter Storm Uri proved to be more significant and damaging than the preparations SAWS made due to the lessons learned from the El Paso storm.

According to SAWS, heat tracing is the best way to keep small diameter pipes from freezing. However, SAWS did not anticipate that its systems would be without power for extended periods of time, so heat tracing provided no benefit and some of the small diameter pipe quickly froze due to the extreme cold. SAWS failed to have draining ports installed in its above-ground piping which led to water freezing in those pipes. It was reported that the below-ground piping throughout SAWS' system had no issues throughout the event regardless of the availability of electrical service. The above-ground piping was at risk and this winter storm event will require weatherization changes to that infrastructure.

The Cascading of Events – Resulting SAWS Service Outages

On Monday, February 15, 2021, at 1:23 AM, the Electric Reliability Council of Texas (ERCOT) issued a load shedding requirement to utilities throughout the state, including CPS Energy, in an attempt to stave off a catastrophic grid-wide failure. SAWS is the largest consumer of CPS' energy. Given the challenges posed to the statewide electricity grid due to heightened demand and diminished generation of electricity, ERCOT demanded that CPS Energy reduce power city-wide via rolling outages. To carry out this request, CPS Energy initiated load shedding by rotating power to interruptible circuits which unintentionally took circuits offline that supply SAWS facilities for pumping and distribution.

SAWS did not have prior notice from CPS Energy that rotating outages would occur. Prior to this winter storm, SAWS had not prepared for the potential threats of widespread grid outages to water pumping stations. Previously evaluated threats, as referenced in the 2015 Hazard Mitigation Plan, were for winter storms far less severe than Uri, to localized or single circuit electrical outages only. Without this forewarning, SAWS could not have adequately informed the community of impending water and sewer service disruptions, and these crisis scenarios were, erroneously, not considered possible..

As a result of the outages at SAWS pumping stations, both equipment for pumping and weatherization tools, such as heat strips, lost power and failed. Consequently, pressure sensors along with above-ground

[10] Hardiman, Mike. "Intense Cold Wave of February 2011." National Weather Service El Paso, TX/Santa Teresa, NM https://www.weather.gov/media/epz/Storm_Reports/Cold11/Feb2011ColdWx.pdf

pipes and ancillary equipment froze, impeding the ability of SAWS operators to assess water quantities in SAWS storage tanks and pipeline pressures at points across the system.

By Tuesday, February 16, 2021, it became evident to SAWS leadership that the effects of the winter storm would be much more prolonged than anticipated. With an inability to determine water pressure due to damaged sensors and gauges, SAWS had to move from automatic to manual operation. Without automated pressure information, crews were dispatched to manually measure pressures at points across the system.

Due of the freezing conditions and the threat of additional load shedding, SAWS made the decision to support the CPS Energy requests to allow rotating power outages at select SAWS pumping stations.

SAWS followed the emergency response protocols outlined in their Emergency Response Plan and the National Incident Management System guidelines. Despite prior preparations, SAWS equipment was vulnerable to the extended loss of electric power and the severe freezing temperatures. SAWS water service is dependent on CPS Energy electrical service. SAWS followed the guidelines established for power outages in SAWS' Emergency Plans, but without power, these plans were not fully effective.

The Cascading of Events – Impact on SAWS Service Delivery

Rolling outages and frozen above-ground pioes were the major factors leading to the ultimate service disruptions of the SAWS system. Operation of the SAWS' system depends on level and pressure monitoring devices. Power failures required staff to be dispatched to stations in order to manually determine level and pressure information. Water service disruptions expanded in the area as ERCOT required additional load shedding by CPS Energy and above-ground pipes froze.

On February 15, 2021, SAWS contacted CPS Energy and requested that their infrastructure be prioritized for electricity service restoration. SAWS had included the University Pumping Station on the CPS Energy list of critical assets but power to the station was disrupted which further exacerbated the water service failures. While many areas began to have their water restored by Thursday, February 18, 2021, the higher elevation neighborhoods north of 1604 did not have their water restored until Sunday, February 21, 2021.

On Wednesday, February 17, 2021 SAWS issued a system-wide boil water notice (BWN) in compliance with TCEQ guidelines. These TCEQ guidelines require the issuance of a BWN in cases where water pressure in a Public Water System drops below a set threshold and a risk of contamination to the water supply arises. SAWS also began planning and setting up bulk water delivery at the more reliable pumping stations and coordinated with the City for bottled water distributions.

By Thursday, February 18, 2021, when most CPS Energy customers had their power restored, SAWS began restoring water for those customers who had lost water service. By Friday, February 19, 2021, bulk water and bottled water distribution sites were up and running. The bottled water for bulk distribution was eligible to be reimbursed by FEMA with the local match funded by SAWS, and the sites were operated by the City of San Antonio. There were widespread concerns among the community that the efforts to initiate bulk water and bottled water distribution were not initiated in a timely manner and unreasonably delayed. On Sunday, February 21, 2021, SAWS restored pressure for all customers. Remaining water issues after this time were not due to problems with SAWS infrastructure, but rather primarily due to frozen or burst pipes and pipelines.

The Impact on Residents Affected by the Outages

Some areas of the City were more impacted longer or more frequently by service outages than other areas. The difference is due to the physical geography of the service area and the design of the SAWS system itself (See Exhibit B for maps of SAWS' service outages). The service area has a 1,400-foot elevation difference from southeast to northwest. A number of external water supplies, such as Vista Ridge, Canyon Lake, Trinity Aquifer Suppliers, serve the northern sectors of the service area. Early in the storm event, the external water supplies in operation experienced power disruptions and were taken offline. Consequently, SAWS shifted water supplies exclusively to Edwards Aquifer water. This shift in supply required SAWS to pump water from the lower-central portion of the service area into higher elevations to the north and west.

SAWS utilized a "ladder climbing" technique to pump water from station to station to move water to higher areas while maintaining a sufficient water pressure level. SAWS' University Pumping Station was the base of this ladder pumping system. When rolling power outages disrupted power to the SAWS' University Pumping Station at UTSA and 1604 every pumping station up the chain was impacted and lost water service capability. This chain of events led to prolonged delays, as SAWS was required to go station by station restoring pumping stations and pressure zones until the whole chain of pumping stations could operate sufficiently. As a result, elevated communities on the Northside experienced the longest delays in water service restoration.

Most of the SAWS stations do not have large generators capable of supplying sufficient power to operate the large pumps moving water. Many SAWS pump stations have small generators for the security, lighting, and for communication infrastructure, but one of the most frequently discussed issues concerning the SAWS service disruptions was the possibility of providing large generators capable of moving water at pump stations. Installing large generators at all stations would be extremely expensive and also requires expansion of the stations, acquisition of real estate, installation of electrical switchgear upgrades, and storage of massive quantities of fuel. SAWS estimates that a generator (or system of generators) for one pump station would cost approximately $10 million, not including fuel storage and additional electrical upgrades. Black and Veatch estimated it would cost $200 million not including the H2Oaks station or fuel storage to add generators (or a system of generators) across the city. Neither of these estimates takes into consideration the costs to provide power to the wastewater treatment plants.

SAWS has indicated that this type of generator (or system of generators) would have potentially been used only one other time in the past 30 years. However, there may be opportunities for SAWS and CPS Energy to partner on this large generator (or generator system) concept building out distributed energy in San Antonio and helping with demand management periods in the summer as well. A distributed energy strategy would obviate the need for generators to sit idle for extremely long periods of time. SAWS and CPS Energy could consider this as a cost sharing opportunity, to include the use and benefit of the generators. This concept must be explored further.

Based on weather forecasts, SAWS expected severe cold and precipitation. However, the cold was much more intense than anticipated. In advance of the storm, SAWS positioned members of their team at critical locations throughout their system. They set up their Operations Control Center in person, transitioning it from a remote center.

As with all systems, unexpected events highlight areas for improvement, and Winter Storm Uri provided that realization to SAWS. SAWS provided a tremendous amount of information to the public via television and social media; however, many homes were without power, so the television messages were not necessarily received.[11] When residents charged their phones in their cars, they often accessed social media as well as the SAWS website to obtain information. SAWS issued over 200 social media posts and dedicated part of their website to information regarding the storm. Robo calls were also used to automatically call as many customers as possible to provide status updates.

Staffing issues arose early on as many customer service operators were working from home, and they too were experiencing rolling power outages. They were imtermittently unable to receive calls or access the internet to respond to online inquiries. In addition to the limited ability to communicate with customers, operators could not get complete and current status information from operational staff concerning the status of the water restoration progress.

As water outages spread throughout the service area, SAWS did not communicate with the EOC. SAWS and CPS Energy maintained constant communications at the leadership level. SAWS did not have personnel at the City's Emergency Operations Center (EOC). Significant announcements, such as the citywide boil water notice, were shared with the EOC after SAWS made decisions and at approximately the same time as the public was notified of those decisions. This did not allow for any coordinated planning or messaging. SAWS had not previously coordinated with the EOC to provide community-wide text alerts to the customers.

In the wake of Winter Storm Uri, SAWS committed to assessing what went wrong, developing recommendations to make infrastructure more resilient and staff more prepared to manage severe weather emergencies. Additionally, SAWS has committed to updating communications, staffing, and equipment protocols to ensure better resiliency. As per this commitment, SAWS leadership conducted an internal audit and commissioned Black and Veatch to assess system vulnerabilities and develop recommendations for improvement.

Additionally, in this vein, SAWS leadership has provided answers to all questions asked by the Emergency Preparedness Committee and made staff available to support our inquiries.

SAWS Recommendation 1: Implement recommendations in the Black and Veatch report.

SAWS Recommendation 2: In conjunction with CPS Energy, identify and place infrastructure required to maintain water and sewer operations to critical facilities on uninterruptible circuits in order to avoid service interruptions.

SAWS Recommendation 3: Coordinate with CPS to determine which SAWS locations must have power generators and/or fuel storage for load reduction events and consider shared uses for generators.

SAWS Recommendation 4: Improve the resilience of current infrastructure with additional weatherization and emergency response equipment as follows:

[11] SAWS RFI 11 - https://www.sanantonio.gov/emergency-preparedness/Question-Lists

4.A Heat strips, hot air blowing tools, additional insulation on large diameter piping – any other similar technology to help with weatherization efforts.

4.B Draining ports for above ground piping. Draining ports would allow SAWS to remove water from its piper prior to them freezing. These are currently being installed.

4.C Software and communication tools to provide real time messages to the City and the public.

SAWS Recommendation 5: Perform routine disaster scenarios with CPS Energy and with the City EOC, such as natural disaster and terrorist attack response simulations. In addition to tabletop exercises, conduct in-person field exercises. The exercises should include City Councilmembers and their staff when appropriate.

SAWS Recommendation 6: Plan and acquire all necessary equipment for emergency water filling locations (bulk water distribution) around the city that can be set up rapidly in times of emergency, and establish messaging to rapidly inform the community of their locations when needed.

6.A Develop procedures with the City of San Antonio and increase joint readiness for bottled water distribution. SAWS and the City should invest in a stockpile of 10-year shelf-life water that can be distributed in emergency situations and rotated out every 8 years to ensure it remains potable.

SAWS Recommendation 7: Consider enclosing select above-ground facilities and infrastructure to protect them from freezing events.

SAWS Recommendation 8: Develop systems and protocols to have one coordinated messaging channel between EOC, SAWS, and CPS Energy for emergencies.

SAWS Recommendation 9: Assign a team to assess, implement, and track the progress of the current recommendations from the Emergency Preparedness Plan and update the plan regularly.

SAWS Recommendation 10: Provide updates to Council offices on a timely basis and establish a singular SAWS point of contact to act as a council liaison during emergency situations.

SAWS Recommendation 11: Update SAWS organizational chart and place online for easy reference.

SAWS Recommendation 12: Increase the number of agents available to take calls during an emergency in lieu of automated machines. Identify critical staff to communicate with the public.

12.A Consider 3rd party live chat services that can be provided critical messaging and provide base intake tasks for customer concerns.

12.B Consider how 311 operators can be integrated with this solution.

12.C Develop a contingency plan for instances when outages disrupt local customer service. Consider 3rd party services based outside of San Antonio being activated in case of emergency.

SAWS Recommendation 13: Create a dashboard that reflects real time outages, infrastructure failures, water pressure issues, and areas under boil water notice with the ability to filter by Council District.

SAWS Recommendation 14: Integrate a SAWS decision maker fully into the EOC with direct and immediate access to SAWS Chief Operating Officer for centralized control/decentralized execution.

SAWS Recommendation 15: Provide relevant emergency preparation information to community members. Assure the information is available and accessible in an emergency (social media, billing inserts, digital bill attachment). Create an Emergency Preparedness Community Guides, including the production of videos instructing residents on topics such as how to turn off water at the meter and store water to flush your toilet when water is not available. (Videos should be on the SAWS website in English, Spanish and ASL)

SAWS Recommendation 16: SAWS and CPS Energy should meet to discuss CPS Energy's compliance with Chapter 25 Subsection C (Infrastructure and Reliability) of the Public Utility Commission's Electric Substantive Rules and discuss the role of SAWS in respect to these compliance measures.

C. City of San Antonio Emergency Operations Center

The Arrival of Winter Storm Uri and City of San Antonio's Preparedness

The City of San Antonio (COSA) is exposed to many hazards, all of which have the potential for disrupting the community, causing casualties, and damaging or destroying public or private property. While it is impossible to prevent a hazard event from occurring, the impact of hazards can be lessened in terms of their effect on people and property through effective hazard mitigation planning and implementation and effective management of emergency activities. To these ends, the COSA developed two plans: The City of San Antonio Emergency Management Basic Plan[12] and The City of San Antonio Hazard Mitigation Plan[13].

The Emergency Management Basic Plan

The Emergency Management Basic Plan outlines the COSA's approach to emergency operations. It provides general guidance for emergency management activities and an overview of COSA methods on mitigation, preparedness, response, and recovery. The plan describes the COSA emergency response organization and assigns responsibilities for various emergency tasks. The objectives of the COSA

[12] "Basic Plan." City of San Antonio, September 2016. https://www.saoemprepare.com/Portals/16/Files/Plans/BasicPlan.pdf.

[13] "Hazard Mitigation Plan." City of San Antonio, 2015. https://www.saoemprepare.com/Plans#:~:text=The%20goal%20of%20the%202015,Mitigation%20Action%20Plan%20(HMAP).

Emergency Management Program are to protect public health and safety and preserve public and private property.

The plan addresses emergency actions that are conducted during all four phases of emergency management: mitigation, preparedness, response, and recovery. Mitigation is intended to eliminate hazards, reduce the probability of hazards causing an emergency situation, or lessen the consequences of unavoidable hazards. See Hazard Mitigation Action Plan discussion below.

Preparedness activities are intended to develop the response capabilities needed in the event of an emergency. Among the preparedness activities included in the emergency management program are:

1. Providing emergency equipment and facilities.
2. Emergency planning; including maintaining this plan, its annexes, and appropriate procedures.
3. Conducting or arranging appropriate training for emergency responders, emergency management personnel, other local officials, and volunteer groups who assist COSA during emergencies.
4. Conducting periodic drills and exercises to test COSA plans and training.
5. Conducting citizen preparedness activities and education in the community.

The focus on the Emergency Management Basic Plan is on planning for the response to emergencies. Response operations are intended to resolve an emergency situation while minimizing casualties and property damage. Response activities include EOC activation, warning, emergency medical services, fire-fighting, law enforcement operations, evacuation, shelter and mass care, emergency public information, search and rescue, as well as other associated functions. If a disaster occurs, COSA will carry out a recovery program that involves both short-term and long-term efforts. Short-term operations seek to restore vital services to the community and provide for the basic needs of the public. Long-term recovery focuses on restoring the community to its normal state.

The Hazard Mitigation Action Plan

The Hazard Mitigation Action Plan provides an opportunity for the city to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss. The Federal Emergency Management Agency (FEMA) defines mitigation as, "any sustained action taken to reduce or eliminate the long-term risk to life and property from hazards."[14] Mitigation differs from emergency preparedness and protective measures, which focus on activities designed to make communities more prepared to take appropriate action in a disaster with emergency response and equipment. Mitigation activities involve alteration of physical environments to reduce risks and vulnerabilities to hazards and make it more cost-effective to respond to, and recover from, disasters.

The focus of the Plan is to mitigate those hazards selected from the State Hazard Mitigation Plan which are deemed to pose a risk to the planning area. In developing the Plan, the City of San Antonio identified thirteen (13) hazards to be addressed in developing mitigation projects. These hazards were identified

[14] "Lesson Overview." Popup: IS-318 Mitigation Planning for Local and Tribal Communities, n.d. https://emilms.fema.gov/IS318/MP0101010t.htm. https://emilms.fema.gov/IS318/MP0101010t.htm

through an extensive process using input from planning team members, and a review of the current State of Texas Hazard Mitigation Plan.

For each of the hazards selected, a detailed risk assessment was conducted as part of the hazard mitigation planning process. The risk assessment enables the City to prioritize mitigation actions based on hazards that pose the greatest risk to lives and property. The risk assessment includes four general parameters that are described for each hazard; frequency of return (how often the hazard occurs), approximate annualized losses, a description of general vulnerability, and a statement of the hazard's impact. Once loss estimates and vulnerability were known, an impact statement was applied to relate the potential impact of the hazard on the assets within the area of impact. Frequency of return is rated from Highly Likely (probable occurrence in the next year) to Unlikely (probable occurrence in the next 10 years). Impact assessments range from Substantial (multiple deaths, or complete shutdown of facilities for 30 days or more, or more than fifty (50) percent of property destroyed or with major damage) to Limited (injuries and/or illnesses are treatable with first aid, minor quality of life lost, or shutdown of critical facilities and services for twenty-four (24) hours or less, or less than ten (10) percent of property destroyed or with major damage).

One of the hazards identified through the planning process is a winter storm. Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life. The risk assessment for a winter storm event was Highly Likely with Minor impact (Injuries and/or illnesses do not result in permanent disability or complete shutdown of critical facilities for more than one week, or more than ten (10) percent of property destroyed or with major damage). This risk assessment also served as a basis for the development of City of San Antonio Emergency Management Basic Plan.

The Operation of the EOC - Direction and Control During an Emergency

Concerning direction and control during an emergency, the Mayor is responsible for establishing objectives and policies for emergency management and providing general guidance for disaster response and recovery operations. The City Manager or designee will provide overall direction of the response activities of all COSA departments. When major emergencies and disasters have occurred or appear imminent, COSA may activate the EOC. The general responsibilities of the EOC are to:

1. Assemble accurate information on the emergency situation and current resource data to allow local officials to make informed decisions on the proper courses of action.
2. Work with representatives of emergency services to determine and prioritize required response actions and coordinate their implementation.
3. Provide resource support for emergency operations.
4. Suspend or curtail government services, recommend the closure of schools and businesses, and cancellation of public events.
5. Organize and activate large-scale evacuation and mass care operations.
6. Coordinate emergency warning and information to the public.

The COSA Emergency Management Coordinator manages the Emergency Operations Center (EOC).

The Arrival of Winter Storm Uri and EOC Operations

The Emergency Management Basic Plan (EMBP) and the Hazard Mitigation Plan (HAP) are designed to help COSA mitigate, prepare for, respond to, and recover from an emergency situation. While the City has successfully negotiated past winter storm events, the event of February 2021 was significantly outside the planning factors that served as the basis for the management and mitigation plans. As a result, mitigation, preparedness, and response actions were insufficient to optimally manage the crisis. The difficulties faced by COSA fall into four major areas: planning, training and exercising, communications, and coordination with public utilities.

Planning provides structure to ill-structured problems and leads to effective action toward efficiently resolving incidents, accidents and emergencies. The current Hazard Mitigation Plan and Emergency Management Basic Plan do not address an event with the intensity and duration of the February 2021 winter storm. This omission resulted in deficiencies in the COSA's mitigation and preparedness actions prior to Uri's arrival and additional deficiencies in response actions during the storm.

COSA Recommendation 1: Update the HAP to include planning for a prolonged winter storm event, prolonged power outages, prolonged water outages, and a combination of the previous three events.

COSA Recommendation 2: Identify backup devices to cellphones and other mobile devices. 4G towers are more reliable than 5G towers, which will fail during major power outages. Be familiar with the plan with COSA telephone and data service providers for the transition to emergency services in the event of provider outages.

COSA Recommendation 3: Prioritize the purchase of generators to ensure key city facilities are able to operate during a major winter or heat event.

COSA Recommendation 4: Evaluate the need to procure tires/chains and other related accessories (light bars, spot lights, etc.) for first responder vehicles.

COSA Recommendation 5: Ensure key city facilities have appropriate inventory of food and water supply for extended emergency events.

COSA Recommendation 6: Develop a plan for emergency housing and lodging for essential employees required to work on site during severe weather events.

COSA Recommendation 7: Establish a hotline for families of essential employees who are working on site needing assistance during the emergency.

COSA Recommendation 8: Identify contingency plans for catastrophic incidents where a significant percentage of workers are not able to work remotely due to power outages.

COSA Recommendation 9: Review utilization of Wireless Emergency Alerts (WEA) to determine if more frequent use is warranted during an emergency. Consider alternative communication for when outages render wireless communication ineffective.

While effective planning forms the basis for successful management of an incident, accident, or emergency, a relevant and challenging training and exercise program is also essential to achieving the

desired results. Because the planning documents did not anticipate an event of the intensity and duration of the February storm, the training and exercise programs for key personnel were insufficient to prepare EOC to optimally respond.

COSA Recommendation 10: Develop specific planning, training, and exercises focusing on long term power and water loss due to unforeseen events or scenarios.

COSA Recommendation 11: Enhance city-wide cross-department and cross-discipline emergency response training.

COSA Recommendation 12: Create an annual emergency response table top exercise that includes elected officials, executive leadership for the City, County and Utilities.

The Cascading of Events – The Impact of Decision Making Outside of the EOC

The February storm event began as a typical winter storm hazard and rapidly transitioned into a crisis situation involving prolonged severe weather conditions, prolonged power outages and prolonged water outages. This combination of conditions presented an extremely complex set of challenges for the EOC to command and control and coordinate. While CPS Energy did have a representative at the EOC for the duration of the emergency, decision-making regarding power outages was not made there and did not occur in coordination with the EOC. Rather, the utility participated in the twice-daily EOC calls and provided general information – "ERCOT has required us (CPS Energy) to shed X amount more load" – rather than specific information about which circuits would be powered down and when. This unilateral decision-making made it difficult for the EOC to deploy coordinated resources to targeted areas. It also prevented the type of localized communications that could have allowed affected customers to plan accordingly. City leaders and the public were unable to understand the rationale behind such decisions, especially when the public communications from CPS Energy were inconsistent with their personal experiences. If, by contrast, CPS Energy's load-shedding decisions were done in concert with emergency managers and city leaders, decisions about where to locate warming centers could have been based on an awareness of the critical circuits that were least likely to lose power. Ideally, the load-shedding could have been scheduled in a way that, combined with specific public messaging to affected areas, allowed for proper planning by affected customers. For example, advanced notification of when energy was to be restored – even if only for short durations – would have given the EOC's Joint Information Center the type of information that it could share with the public and to City Council members and County Commissioners for dissemination to their constituents. When water outages began to spread throughout the city, SAWS' decision-making was similarly disconnected with the emergency response. The San Antonio Water System did not have any staff at the EOC, and significant announcements, such as the citywide boil water notice, were shared with the EOC at approximately the same time they were being made publicly, not allowing for any coordinated planning or messaging.

During complex emergencies such as Winter Storm Uri, effective command and control is essential to achieving the most successful outcomes. Effective command and control is dependent on precise alignment of responsibility and authority. While the EOC was responsible for effectively deploying COSA resources and providing timely, accurate, and coordinated information to the public, the EOC lacked the authority to direct the public utilities to provide the necessary information that would have facilitated EOC's command and control responsibilities. In future contingencies, this mis-alignment of

responsibility and authority could have even more serious consequences than were experienced during the February event.

COSA Recommendation 13: COSA should adjust the relationship with CPS and SAWS that provides, during certain contingencies, authority for COSA to exercise effective command and control.

COSA Recommendation 14: CPS Energy's load-shedding decisions should be made in concert with emergency managers and city leaders.

COSA Recommendation 15: SAWS should station a staff person at the EOC during a water-related emergency.

COSA Recommendation 16: SAWS water shortage mitigation decisions should be made in concert with emergency managers and city leaders.

The Impact on Those Affected by the Outages

The EOC is designed to be both a command-and-control center and a coordination center. Both of these functions depend on the flow of accurate and timely information and situational awareness. This information flow is dependent on an effective and efficient communication system. During the February event, communication within the EOC was insufficient to provide for optimal command and control and coordination.

COSA Recommendation 17: Ensure all city departments are communicating to the public through the Joint Information Center (JIC) to ensure consistency in messaging.

COSA Recommendation 18: Ensure CPS and SAWS communications are coordinated through the JIC to improve situational awareness for all entities involved.

COSA Recommendation 19: Coordinate daily media briefings by and between COSA, County officials, CPS and SAWS.

COSA Recommendation 20: City 311 and CPS/SAWS Customer Service Call Centers should develop protocols to enhance the customer experience for the community including extended hours.

COSA Recommendation 21: In addition to the daily emails from the City Manager to City Councilmembers, the Executive Leadership Team should maintain daily communication with their assigned council members to keep them informed of emergency status.

COSA Recommendation 22: Daily e-mails and messaging from the City Manager to the City Council should contain a high-level summary with key takeaways in addition to the detail report.

COSA Recommendation 23: The impact of CPS rotating outages should be clearly communicated and coordinated with COSA and SAWS to determine operational/service impacts more comprehensively.

COSA Recommendation 24: Identify a situational awareness platform that can display evolving information remotely from operational teams to leadership.

D. The Impact on the Community

The Committee has addressed the how it happened with respect to each focus area, CPS Energy, SAWS and the EOC. Understanding the sequence of events is necessary in order to apply the lessons learned on how to reduce and avoid outages in the future during extreme weather. This technical understanding alone is insufficient to comprehend the full impact of Uri and the subsequent effect of the outages on the City of San Antonio and so many other Texas residents. We must consider the people.

As residents experienced water and power outages, some were able to find alternative lodgings at hotels or the homes of friends and family while trying to stay safe and avoid both the exposure to and the spread of the coronavirus. Others found themselves stuck at home. The dangerous, icy roads led to auto accidents and injuries. It did not take long before travel was impeded and roads were closed for safety reasons as access to grocery stores, healthcare, and employment became restricted and for some cut off.

Impacted households, some of which had indoor temperatures as low as thirty (30) degrees Fahrenheit, went to great lengths, sometimes to the point of significant harm, to stay warm and survive in the frigid temperature within their homes. Some resorted to burning the chemically-treated wood of chopped up furniture inside the home and running cars in garages for heat, risking carbon monoxide poisoning.

In addition to the extreme cold, residents were navigating their way around, often in darkness, sustaining concussions, sprains, broken bones and other injuries. And, even after the water supply was restored throughout the service area, many residences and businesses experienced sustained water service disruptions due to frozen and damage pipes. Some San Antonio residents experienced water interruption for more than one week.

San Antonio's most vulnerable, its seniors and other medically vulnerable residents—particularly those in home or facilities that were without power—were put at heightened risk of pneumonia, hypothermia, and frostbite among other ailments by these extremely cold temperatures. While seniors at assisted living facilities were impacted by service outages, seniors who are homebound faced greater risks due to having less proximal support. Still other seniors who were able to stay with friends or family, or who relocated to other alternative housing to escape the loss of power and water had to manage the increased risk of leaving their pod and exposure to COVID-19. This is in addition to the fact that San Antonio seniors traversing icy sidewalks and walkways are at greater risk of serious injury from a slip or fall.

San Antonio's medically vulnerable residents faced the compounding of medical problems with impeded access to medical care or electronic devices not to mention the anxiety, fear, and uncertainty many faced wondering if and when the power would come on next or when the water would flow. Individuals with diabetes faced additional health risks due to the decreased circulation caused by the cold and an inability

to attend dialysis sessions. Those who rely on life-supporting medical devices such as ventilators or frequent medical appointments faced the threat of medical emergency. Many residents facing these circumstances had to make the difficult decisions between either waiting for electricity to resume or getting on the roads to find a way to power their devices.

SAWS, CPS Energy and the City's 311 call lines overflowed with questions from concerned residents, who found it difficult to get a hold of a live representative who could provide answers or connect them with services and essential information. Councilmembers and their staff navigated their own District outages, conducted check-ins with family members who may have been in jeopardy, and attended to new tasks beyond their traditional roles in order to coordinate critical supplies, donations and volunteer deliveries. Additionally, team members worked to connect with local nonprofits, neighborhood leaders, and local governments within Bexar County and coordinate the allocation of essential supplies to neighbors in need.

The winter storm seemed to leave no sector of San Antonio untouched by its cold. Businesses, many still working to overcome the adverse economic effects of the COVID-19 pandemic, were also impacted by weather-related closures, power and water outages, shortages of available staff, and a widespread inability to connect with their customer base. Large San Antonio corporations had to reduce their energy usage and slow down production, impacting their bottom line and further adding to the supply chain disruptions caused by COVID-19. Many sustained damage to water pipes and experienced flooding damage on their premises. Some businesses experienced worker shortages after the Winter storm had passed while many employees missed work to address property damage, family concerns, and other areas of fallout.

Notably, there were some businesses whose doors remained open while they, undeterred by these challenges, continued serving food and providing supplies to the public. A viral photo of exhausted employees at a San Antonio business conveyed to the nation the sacrifices and taxing work of employers and employees who went above and beyond to serve fellow residents during Winter Storm Uri. From first responders, city staff and utilities frontline workers to nonprofits, media partners, and local business leaders, countless individuals took significant risks to look after their neighbors and help respond to the crisis during and after the event. Whether it was the sharing of details on how to (1) accumulate snow for potable water, (2) work gravity flushing toilets, or (3) keep pets, pipes, plants, and people safe from the elements, media partners amplified critical information and provided insights on managing the risks of and damaged caused by the severe weather.

Firefighters, police officers, and EMS first responders, who faced hazardous roads conditions continued to serve the City of San Antonio, putting out fires, delivering emergency supplies, and responding to those in need of medical attention. Firefighters adapted to the challenges of putting out fires while fire hydrants were frozen, calling audibles to shuttle in water, save lives, and mitigate property damage. Some frontline CPS Energy and SAWS workers camped out in their cars or at the facilities where they were stationed for days in order to provide on-site support and react more quickly to situations and directions in real-time. Utility workers braved the elements to restore utility services as quickly as possible to help keep residents safe. Neighborhood leaders, engaged their fellow neighbors, and community organizations to head food and supplies distributions along with volunteer check-ins teams to ensure that those in their area were accounted for.

Local government officials worked together to make others aware of unique initiatives led by businesses, governments, nonprofits, and community groups sharing tools and tactics for response and recovery. Local businesses aided in water and supplies distribution. VIA Transit staff navigated the dangerous roads to help pick up residents and transport them safely to warming centers.

V. CONCLUSION

The response was full of challenges and recovery was not ideal. In retrospect, there are a number of things that could have been done differently, even though there were many circumstances beyond the control of the City, CPS Energy, SAWS and the EOC. What is clear now is that there was a cascading of events. One major disruption caused by the weather resulted in disruptions to the City's infrastructure systems. In the course of managing the effects of Winter Storm Uri, decisions made by one entity affected the another entity's ability to respond, amplifying the intersectionality of CPS Energy, SAWS and the EOC in the daily lives of the residents of the area. Whether the City of San Antonio next faces a weather event, a cyber attack or some other disaster or hazard, Uri has heightened our awareness and the need to explore the City's resiliency under such circumstances.

As the City's systems becomes more interconnected, and interdependence continues to grow across the city, state, nation and world, the likelihood of cascading events during a time of disaster or hazard are likely to continue. It is imperative that the City of San Antonio and its residents do what can be done to minimize the negative impacts when such an event occurs. The Committee's proposed recommendations are designed to help move the conversation along and to encourage leadership to perhaps reach beyond the current and more traditional emergency preparedness framework.

Though this Committee contains a significant amount of talent and skill, its expertise does not compare to the talent and skill sets of those who comprise the leadership of this City and its energy and water providers. With their respective specializations and industry specific insights, they have the ability to build on these recommendations and to continue the work necessary to better prepare and respond to future significant emergency events with changing conditions and cascading impacts.

The work of the CEP has helped to shine a spotlight on the vulnerabilities discovered during Winter Storm Uri and to identify ways to mitigate exposures and fortify systems and infrastructures. The delivery of this report concludes the work of the Community Emergency Preparedness Committee. With this better understanding, the City, its utilities and partners, along with the residents of San Antonio, can begin to better position the City of San Antonio for what may come next.

Exhibit A – Comprehensive Timeline

- **Thursday, February 4th –**
  - CPS Energy took measures to begin to prepare for the upcoming winter weather (summarized in CPSE RFI 8)
- **Tuesday, February 9th –**
  - CPS Energy begins to ramp up natural gas fired generation capacity, bringing it from the 26% recorded that day to 61% by Friday, February 12th (the weekend before the storm hits)
  - Emergency Operations Center, already at Level III activation (increased readiness) due to the ongoing local response to COVID-19, receives National Weather Service update on upcoming severe weather
  - SAWS began to share warning messaging about the upcoming winter weather and protecting the 3 P's–pets, pipes, and plants
- **Wednesday, February 10th –**
  - CPS Energy begins to issue a series of social media messages and a media release. These messages included information on the upcoming cold weather and a call to action focused on safe driving and cold weather safety tips (this continued Friday, February 12th)
  - First community situational awareness webinar was held with City, State, Federal, Private and Non-profit partners
- **Thursday, February 11th –**
  - EOC continued to monitor the weather event and began developing situation reports, which continued throughout the event
  - ERCOT issued their first power demand warning
- **Friday, February 12th –**
  - CPS Energy issued two conservation messages and a winter storm warning
  - State of Texas issued Disaster Declaration
- **Saturday, February 13th –**
  - EOC increased activation Level from III to a Level I (maximum readiness). The Incident Management Team (IMT) and San Antonio Office of Emergency Management (SAOEM) staff began working in-person and remotely
  - A joint City-County Disaster Declaration was issued
  - CPS Energy transitioned messaging to focus on heater safety, outage reporting, emergency preparedness, and energy conservation
  - While CPS Energy did not share messages about a potential for planned or rolling outages with ratepayers, it did share the concern with the City of San Antonio Emergency Operations Center (EOC) for the first time on the 13th and again the following day
- **Sunday, February 14th –**
  - Temperatures in San Antonio dipped below freezing where they remained until midday February 17th
  - Out of concern for potential disruptions, SAWS deployed staff to several pumping stations and distribution sites
  - San Antonio Police Department (SAPD) activated Ice Plan, closing streets and highways in coordination with TxDOT and Public Works. A Wireless Emergency Alert (WEA) on highway closures was sent to the public
  - EOC began discussions on potential warming centers
  - CPS Energy Spruce 1 Generation began to experience loss of control of the forced air fan that feeds the generator's firebox

- CPS Energy customer outreach kicked into high gear with the issuance of 15 social messages regarding breakers, road safety, heater safety, and conservation. It also sent out automated calls to customers in English and Spanish calling for conservation

- **Monday, February 15th –**
  - 12:15 AM – ERCOT issued Emergency Operation Level 1 notification
  - 1:20AM -1:23 AM – Due to widespread generation capacity failures, ERCOT declared Emergency Operation Level 3 (EEA 3), issues load-shedding requirement, and orders grid participants to reduce electricity distribution to their customers by 10,500 MW
  - In response to this requirement, CPS Energy activated the automated load shedding systems; San Antonians began to experience the first waves of rolling outages
  - CPS Energy shared emergency alerts on social media regarding the ERCOT load shed requirement and ensuing rolling outages
  - 1:53 AM – ERCOT came within seconds of a system wide failure
  - For CPS Energy, 11,706 MWh of daily capacity was lost due to weather events and an additional 6,167 MWh of daily capacity was lost to controls and mechanical
  - Spruce 1 Generation Plant failed completely and was returned to limited capacity on the same day
  - South Texas Nuclear Project 1 (STP 1) was forced to shut down due to the freezing of a water pressure sensor (inability to accurately gauge pressure necessitated the shutdown)
  - SAWS made the decision to support the CPS Energy load shedding requests that allow rolling outages at select SAWS pumping stations. However, several other pumping stations lost power because of the rolling outages. These sites were not anticipated to be downed when SAWS allowed the request
  - SAWS water pumping and distribution infrastructure was impacted by CPS Energy's automatic load-shedding program. Specifically, equipment for pumping and weatherization tools such as heat strips were disrupted by the power outages, and pressure sensors, above-ground pipes, and ancillary equipment froze
  - SAWS began sharing messages to inform the public that the rolling outages are affecting SAWS pump stations
  - Conversations of opening warming centers at the City Manager level began, but electricity and water reliability were an issue
  - 10:15 PM – Public Utility Commission of Texas (PUCT) raised price of power to $9,000 MWh (the maximum allowed) to incentivize providers to put as much power on the grid as possible
- **Tuesday, February 16th –**
  - The shortage of natural gas began to become a major curtailment on generation capacity from natural gas units
  - It became evident to SAWS leadership that the effects of the winter storm would be much more prolonged than anticipated
  - With an inability to determine water pressure due to damaged sensors and gauges, SAWS had to move from automatic to manual operation. Without automated pressure information, crews were dispatched to manually measure pressures at points across the system
  - SAWS shared online messaging that informed community of the impacts to SAWS services
  - Henry B. Gonzalez Convention Center Warming center opened
    - VIA and Northside Independent School District began providing transportation to the warming center
    - EOC coordinated with VIA and SAHA to have SAHA residents transported to hotels
  - Regional Medical Operations Center (RMOC) was fully activated. The RMOC is collocated at the EOC and allows coordination across all Emergency Medical Services (EMS) agencies, hospitals, public health representatives, and emergency management leadership
- **Wednesday, February 17th –**
  - City Council held a special public meeting online where SAWS and CPS Energy provided updates

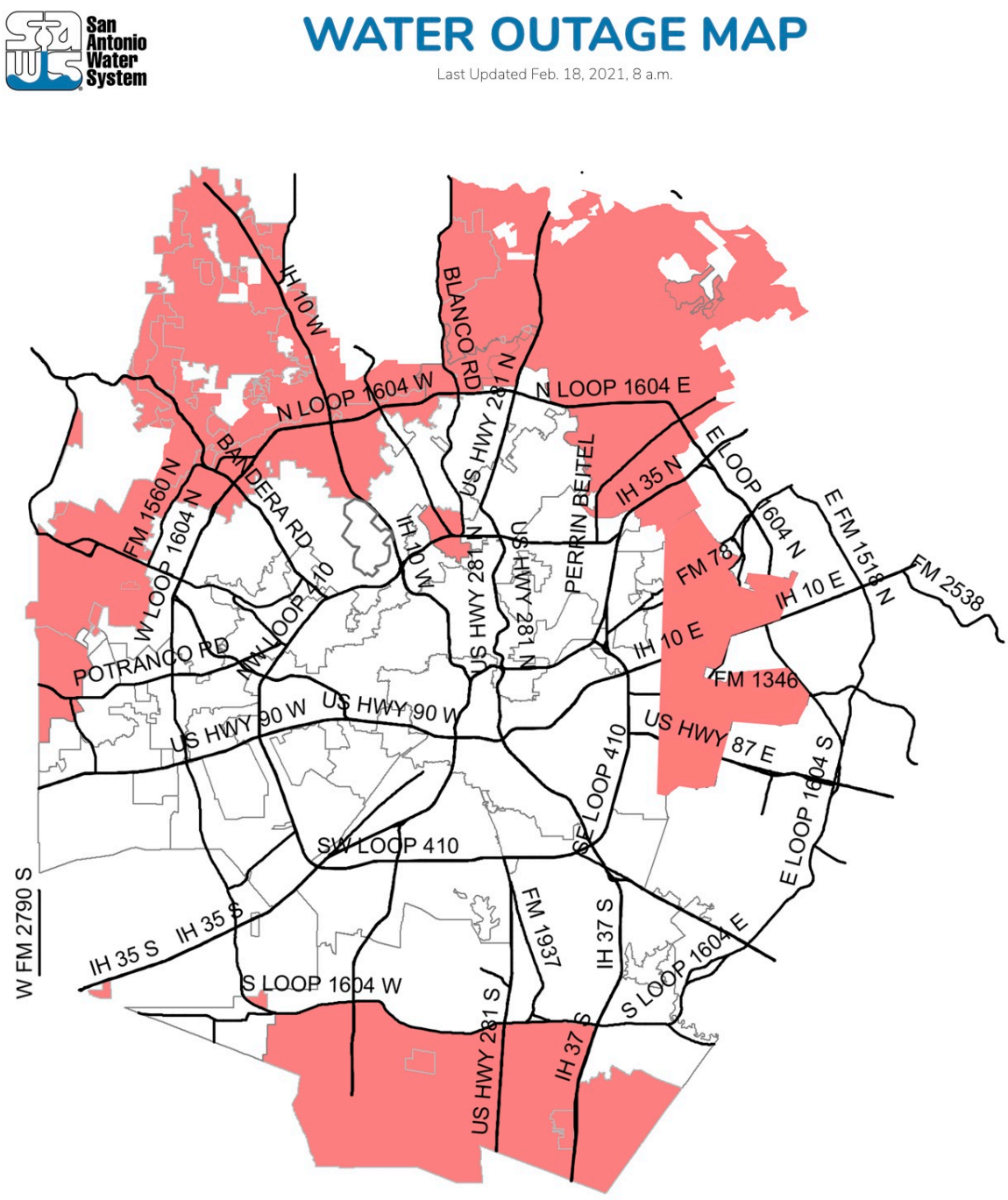
- The heightened loss of generation capacity remained in the 50,000 MW range until midday February 17th when temperatures became more moderate
- CPS Energy was charged an average price of $386 per MMBtu of natural gas which was 100 times the prevailing price before the storm
- SAWS issued a City-wide boil water notice (BWN) in compliance with TCEQ guidelines, which requires the issuance of a BWN in cases where water pressure in a Public Water System drops below a set threshold and a risk of contamination to the water supply arises
- SAWS began planning and setting up bulk water delivery at the more reliable pumping stations
- City of San Antonio begins coordination with SAWS for bottled water distributions
  - City ordered 500,000 cases of bottled water in response to the BWN
  - EOC requested bottled water through the State of Texas
- SAWS began sharing water outage maps
- Strike teams were created for nursing homes, with City providing oxygen refills and assisting with generator repair
- 311 began extending operations through midnight

- **Thursday, February 18th –**
  - STP 1 Generation Plant was restarted
  - Nearly all San Antonians had their power fully restored
  - SAWS restored water service for nearly all areas (except for those with higher elevations located north of 1604 or those whose outages were a result of burst pipes)
  - SAWS non-potable water sites opened
  - Winter weather updates added to Mayor and Judge nightly briefing
- **Friday, February 19th –**
  - 9:00 AM – PUCT ended artificially elevated price of power, dropping the $9,000 MWh rate to prevailing market rate
  - STP 1 Generation Plant resumed full capacity
  - Bulk water and bottled water distribution sites began to be up and running by the afternoon
  - San Antonio food distribution sites opened
  - Water and food delivery to vulnerable populations began
  - Warming Center was closed
  - SAPD ICE Plan was deactivated
- **Saturday, February 20th –**
  - EOC activation decreased to Level III
- **Sunday, February 21st –**
  - Most areas (except for homes and businesses impacted by burst pipes) have their water services fully restored
  - Texas Military forces (TMF) and National Guard forces arrived to assist City with bottled water distribution
- **Monday, February 22nd –**
  - Mayor announced the creation of the SAWS' community Pipe Repair Fund to help vulnerable residents
- **Tuesday, February 23rd –**
  - SAWS lifted the boil notice for all of Bexar County
  - COSA launches an Emergency Resource Call center and website to assist residents affected by the storm. Center helped residents navigate the disaster assistance programs available through FEMA, Small Business Administration, and SAWS
- **Wednesday, February 24th –**
  - Emergency Resource Call Center and City of San Antonio Department of Human Services Benefits Navigators (case managers who specialize in connecting residents with services) were

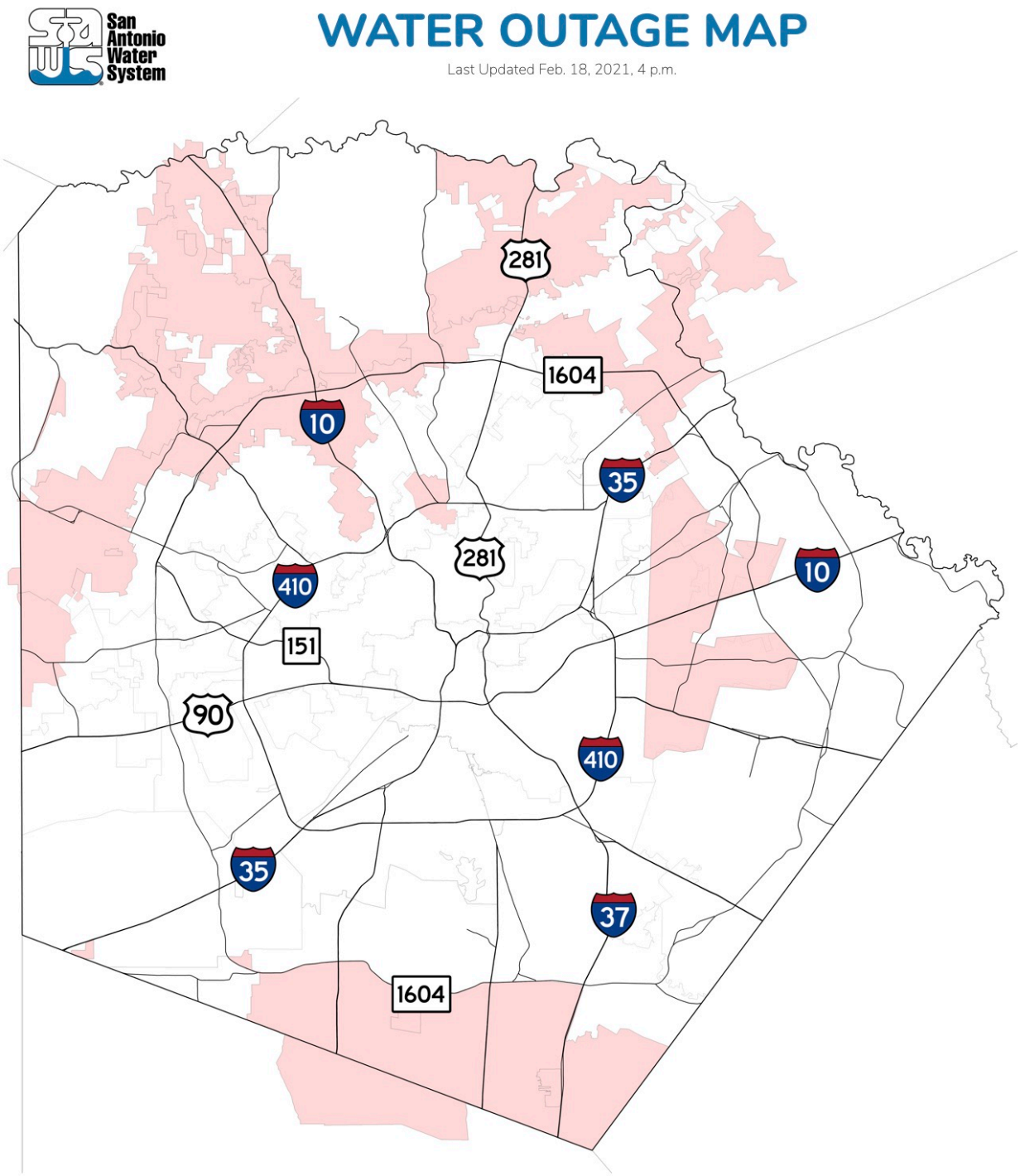
trained in the FEMA individual assistance application process so that they could provide this service
    - Emergency resource center opened
    - Residents began to receive disaster recovery assistance
- **Friday, February 26th –**
    - Bottled water distribution operation ended

Exhibit B - SAWS Water Outage Maps

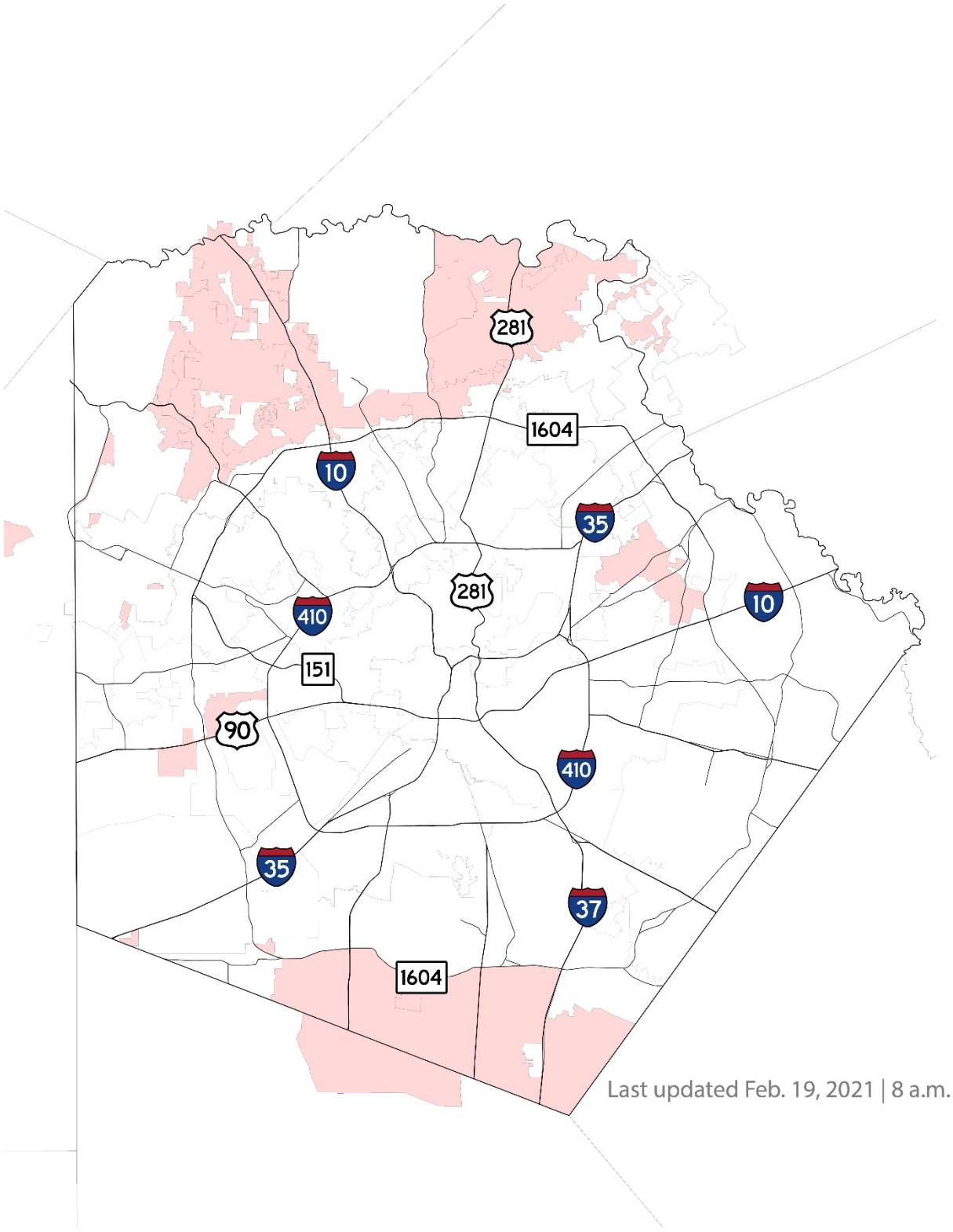
SAWS Water Outage Map – February 18, 2021 8:00 A.M.



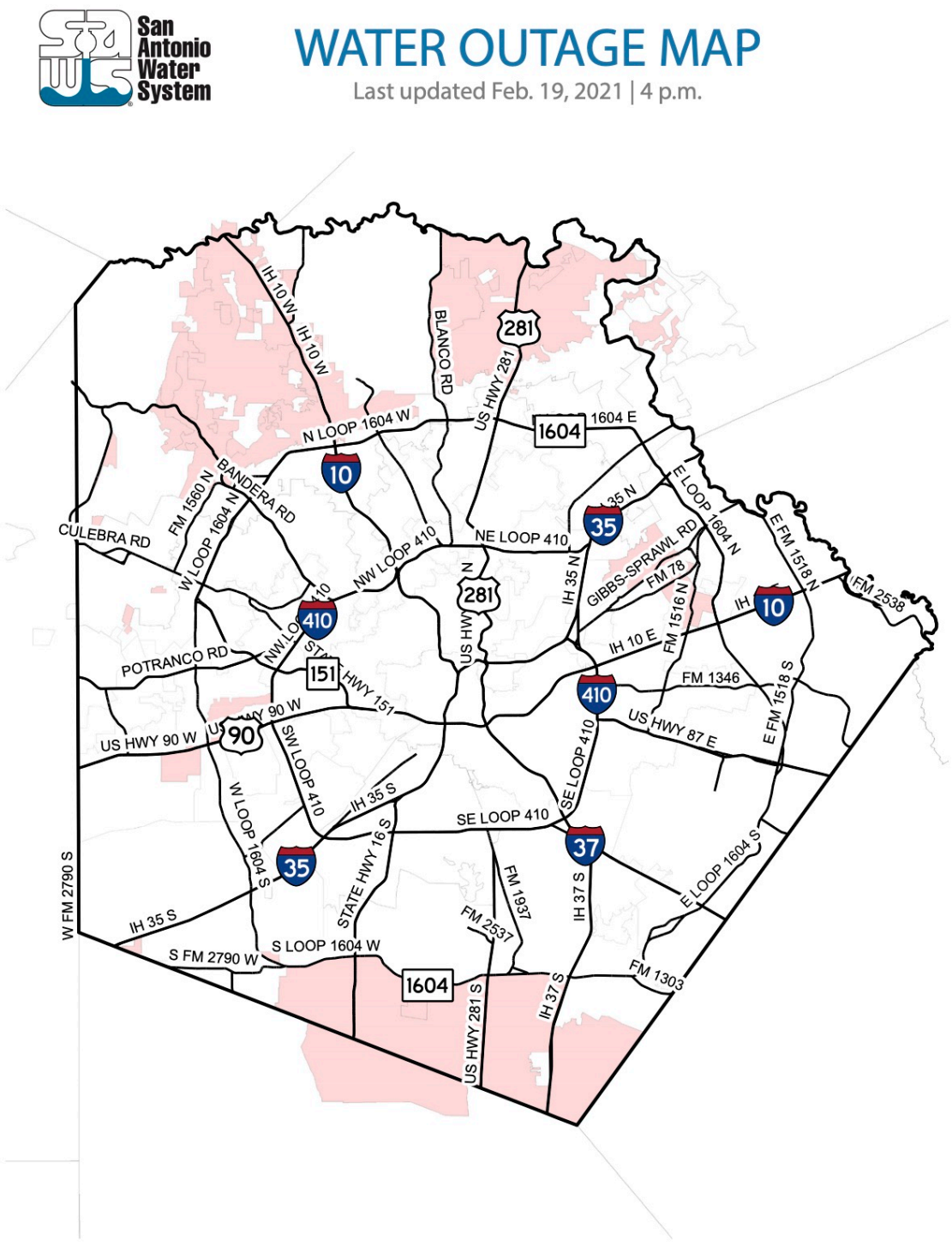
SAWS Water Outage Map – February 18, 2021 4:00 P.M.



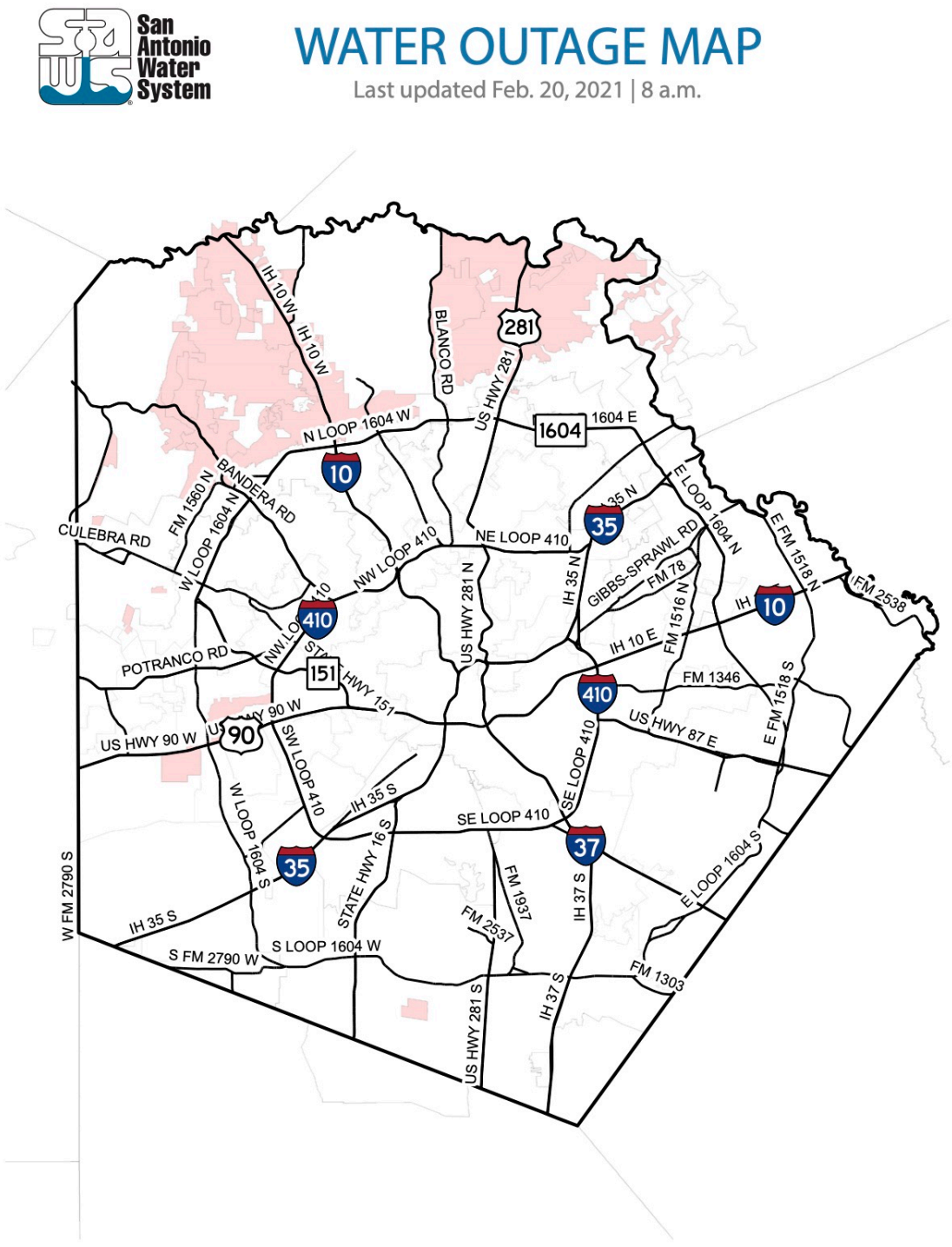
SAWS Water Outage Map – February 19, 2021 8:00 A.M.



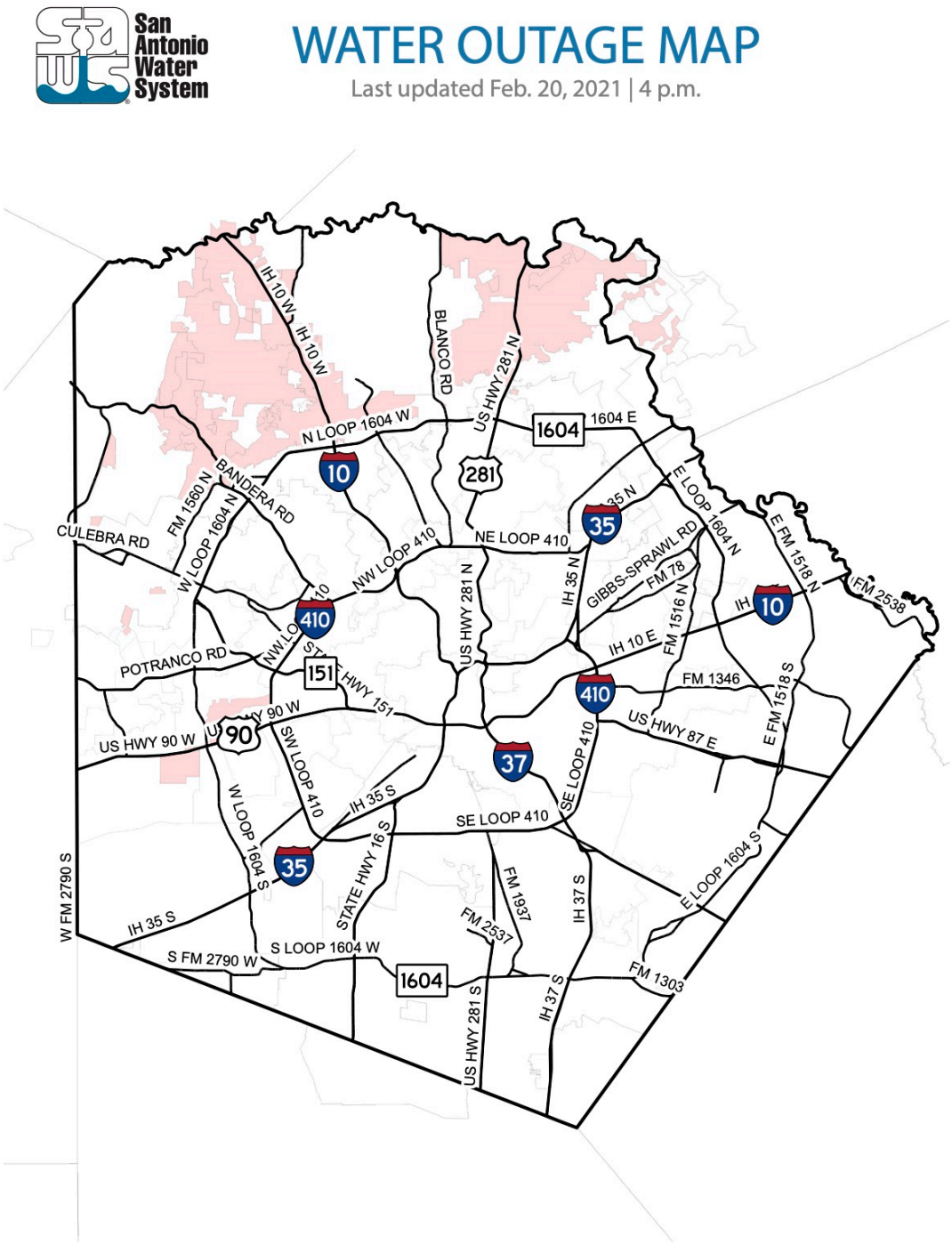
SAWS Water Outage Map – February 19, 2021 4:00 P.M.



SAWS Water Outage Map – February 20, 2021 8:00 A.M.



SAWS Water Outage Map – February 20, 2021 4:00 P.M.



SAWS Water Outage Map – February 21, 2021 8:00 A.M.