Review of Extreme Winter Weather Event (2/14/21-2/20/21)

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Review of
Extreme Winter Weather Event

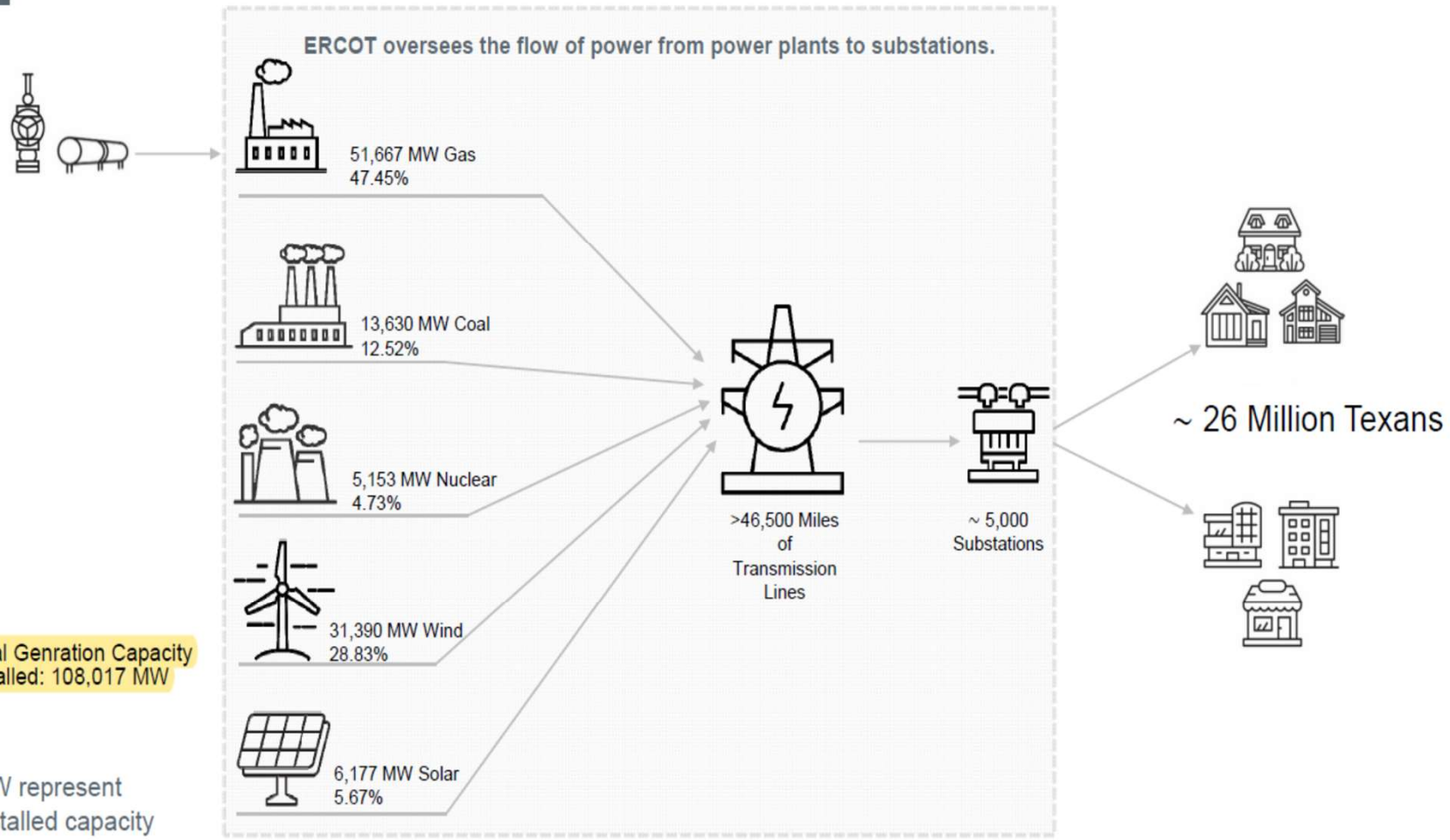
- **Review of February 2021 Extreme Cold Weather Event – ERCOT**

- **Review of Extreme Winter Weather Events:**
  - City of Georgetown's Energy Portfolio
  - Review of Financial Impacts of the Winter Weather Event

Review of February 2021 Extreme Cold Weather Event – ERCOT Presentation

Information shared in the following slides was presented by Bill Magness (President & Chief Executive Officer, ERCOT) during the ERCOT's Urgent Board of Directors Meeting on February 24, 2021.

Electric Generation, Transmission & Distribution Overview



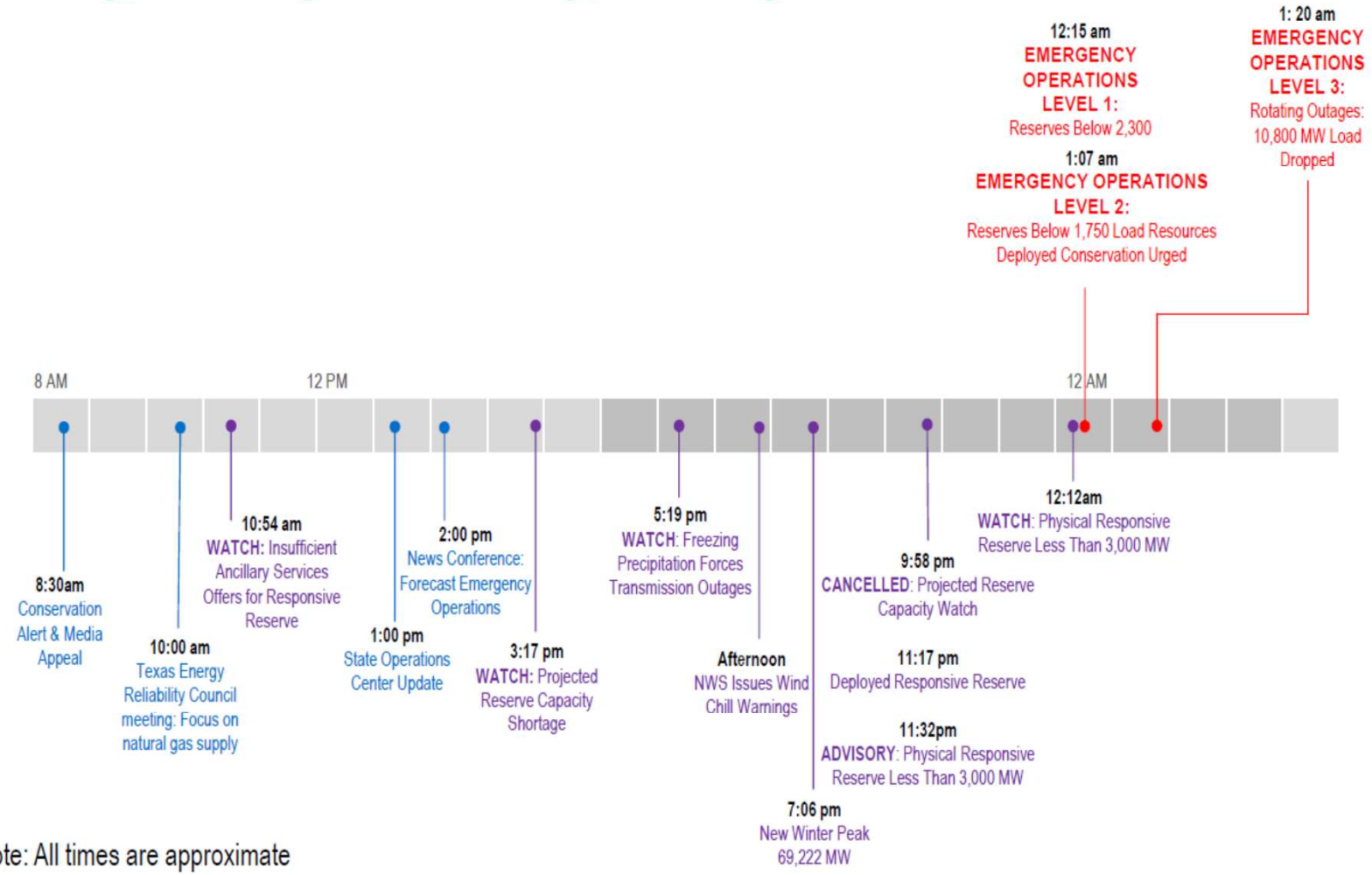
Total Genration Capacity Installed: 108,017 MW

MW represent installed capacity

Overview of Cold Weather Event

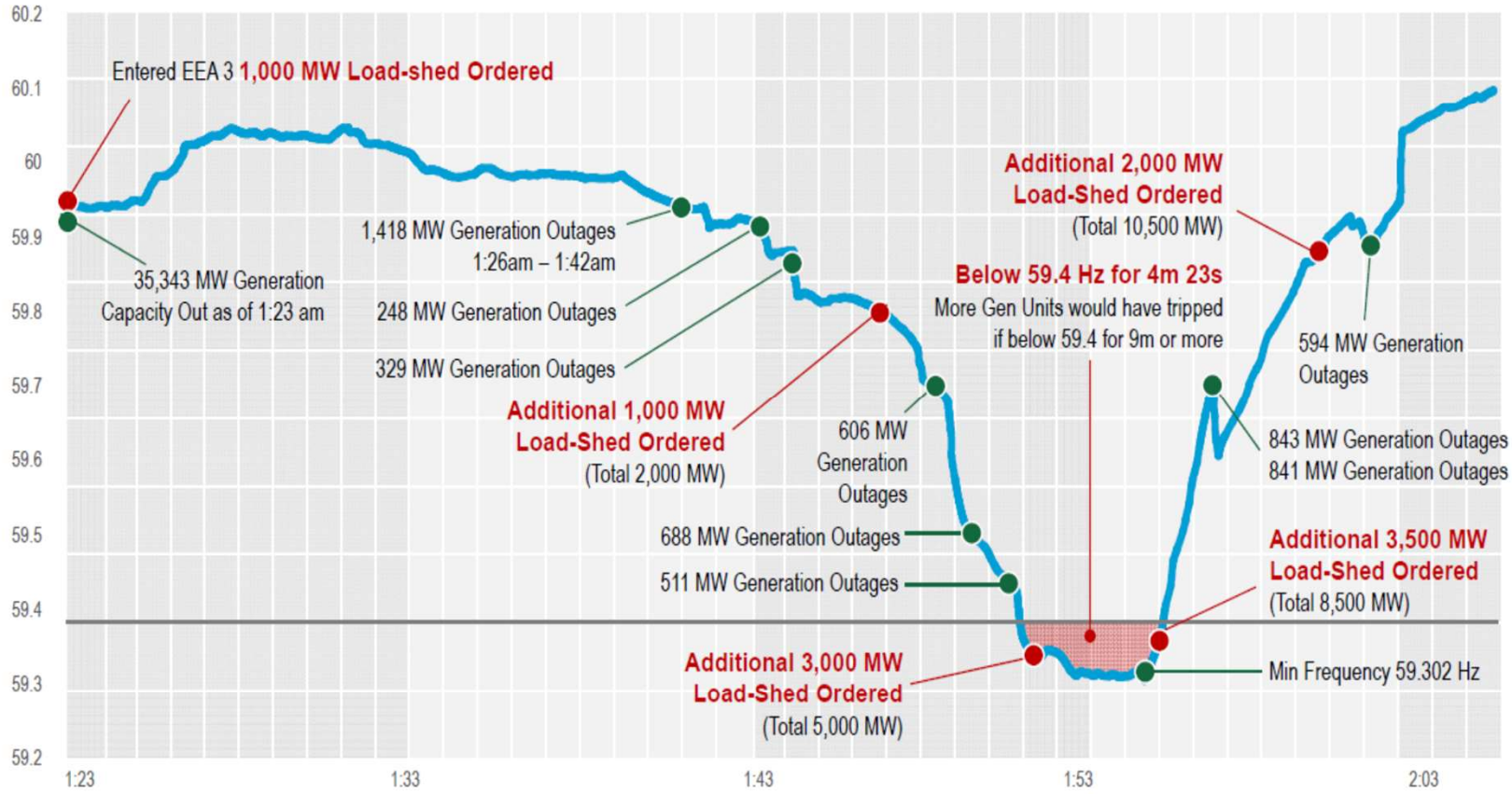
- Record-setting, sub-freezing temperatures and wind chills across the state.
- Approximately 48.6% of generation was forced out at the highest point due to the impacts of various extreme weather conditions.
- Controlled outages were implemented to prevent statewide blackout.
  - Electric demand had to be limited to available generation supply.
- Local utilities were limited in their ability to rotate outages due to the magnitude of generation unavailability and the number of circuits with critical load.

Sunday, February 14 – Monday, February 15

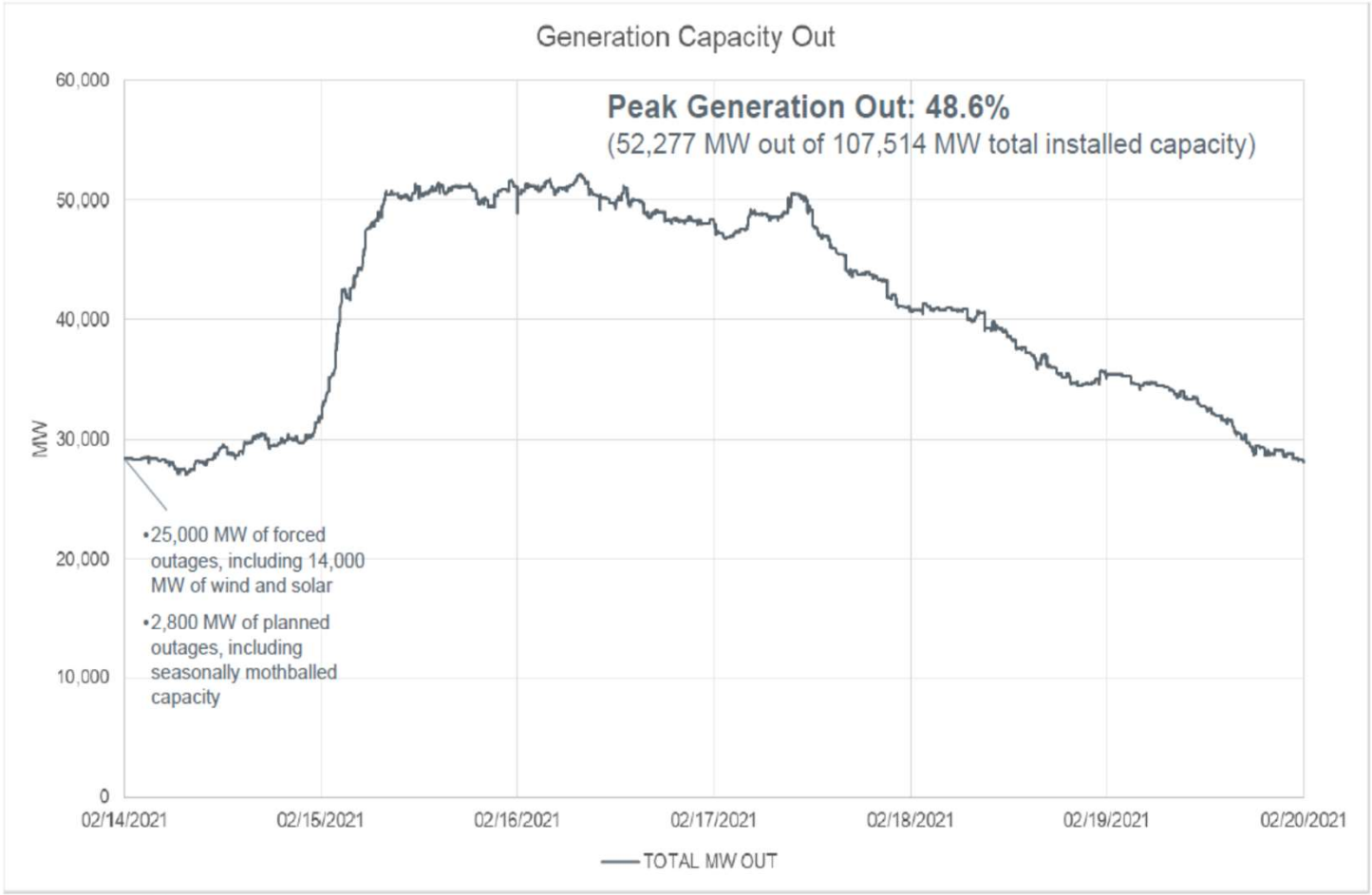


Note: All times are approximate

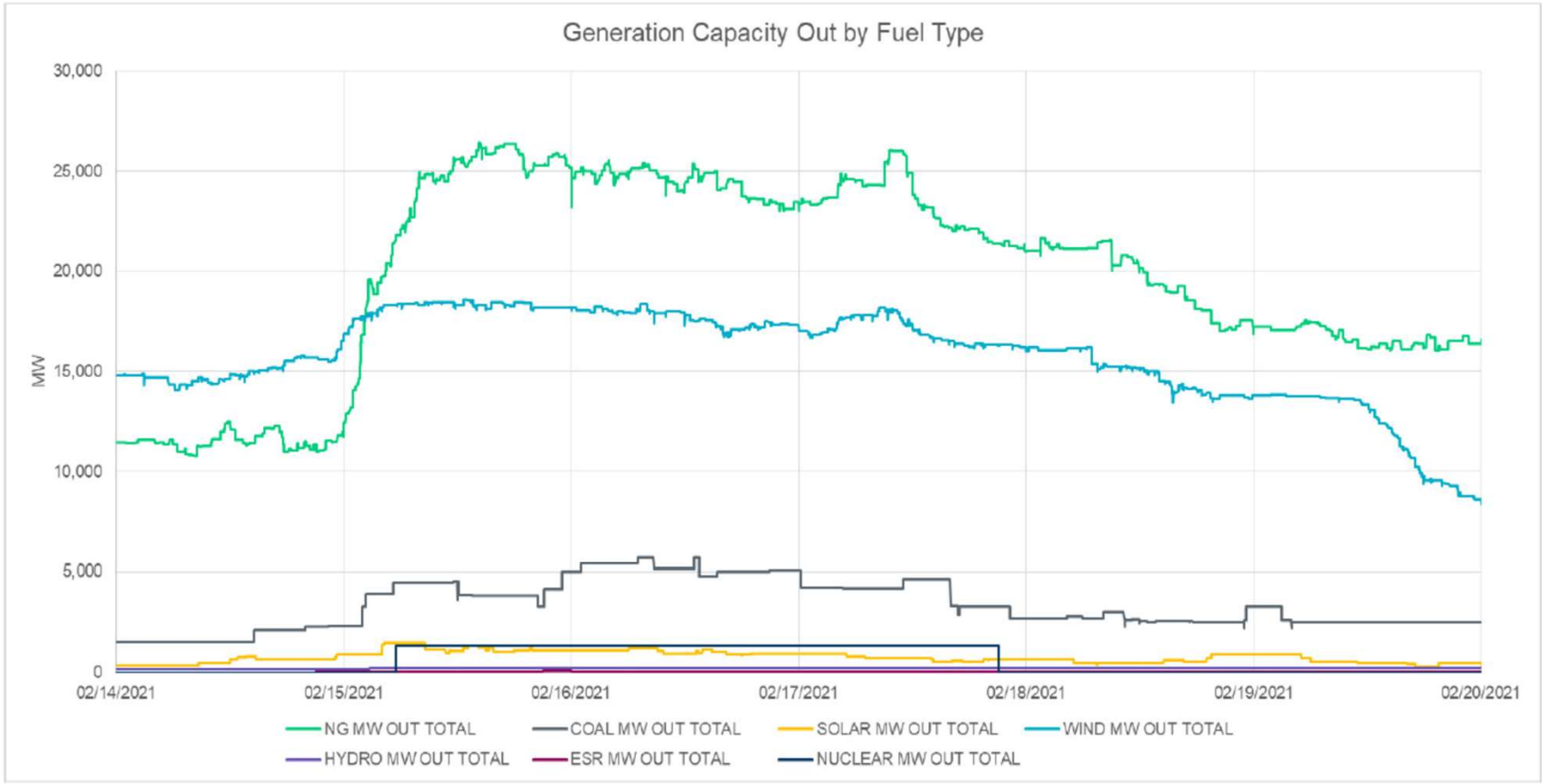
Rapid Decrease in Generation Causes Frequency Drop



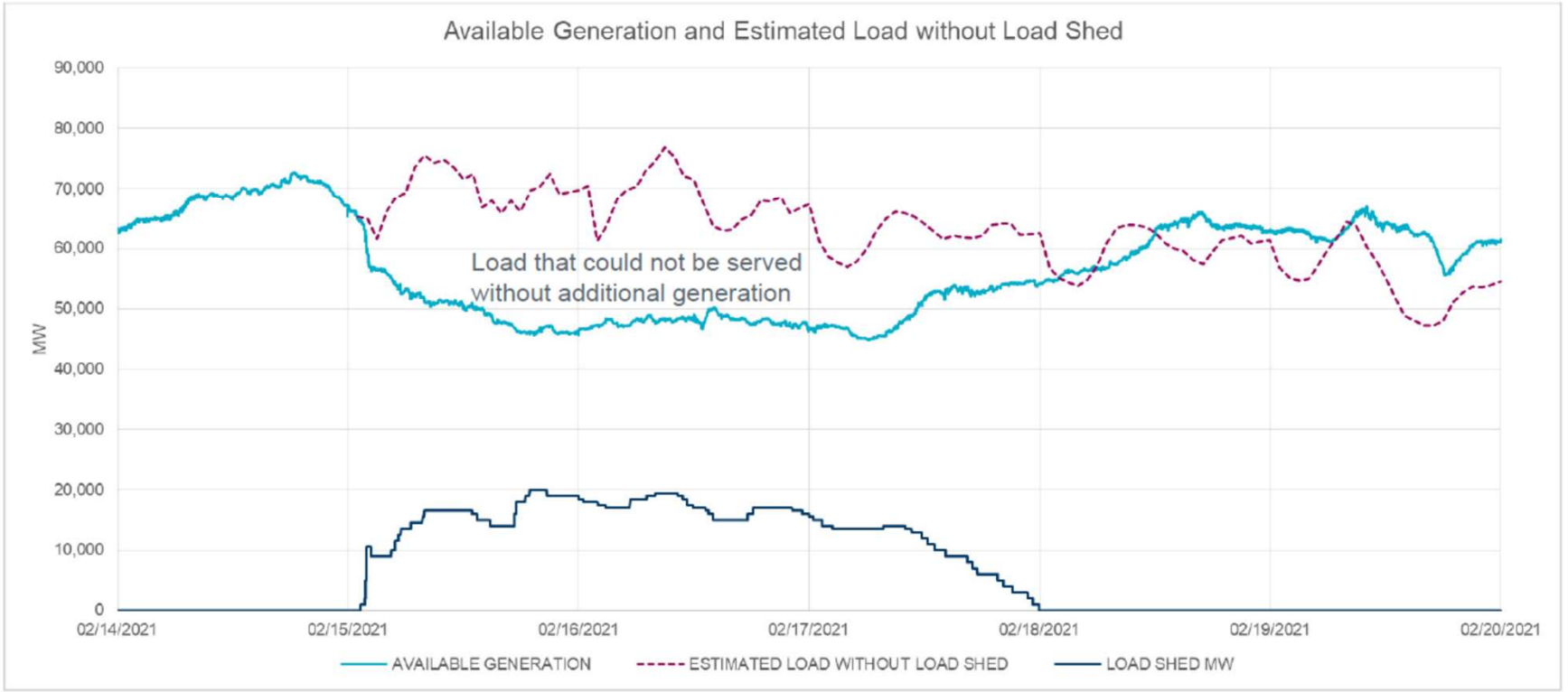
Generation Capacity Out February 14 – 19, 2021



Generation Capacity Out by Fuel Type



Available Generation and Estimated Load Without Load Shed



Available Generation shown is the total HSL of Online Resources, including Quick Starts in OFFQS. The total uses the current MW for Resources in Start-up, Shut-Down, and ONTEST.

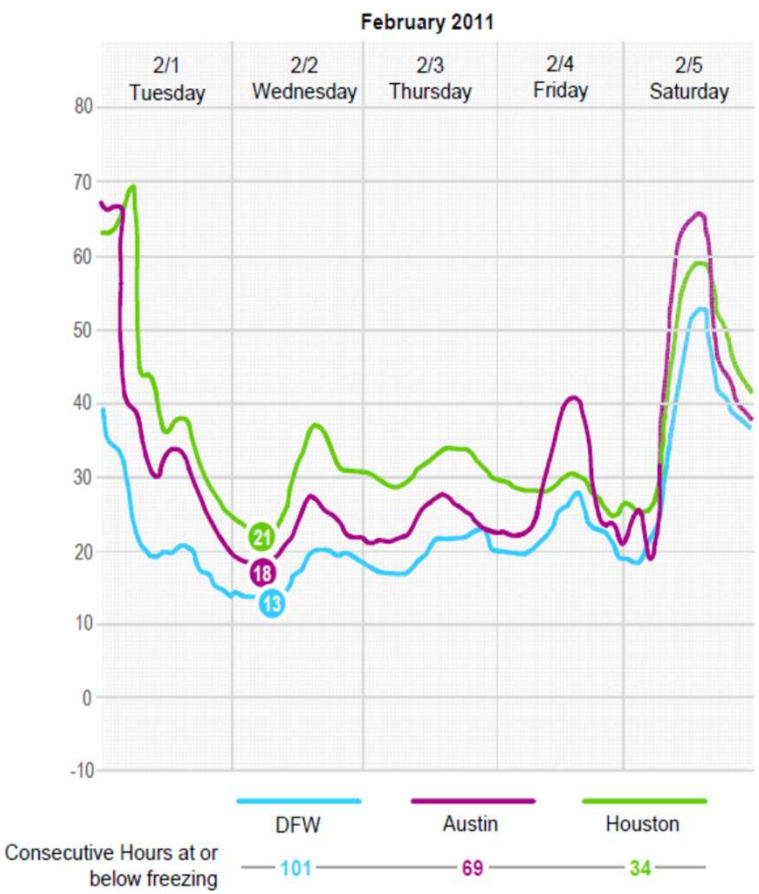
Key Events (Monday, February 15 – Friday, February 19)

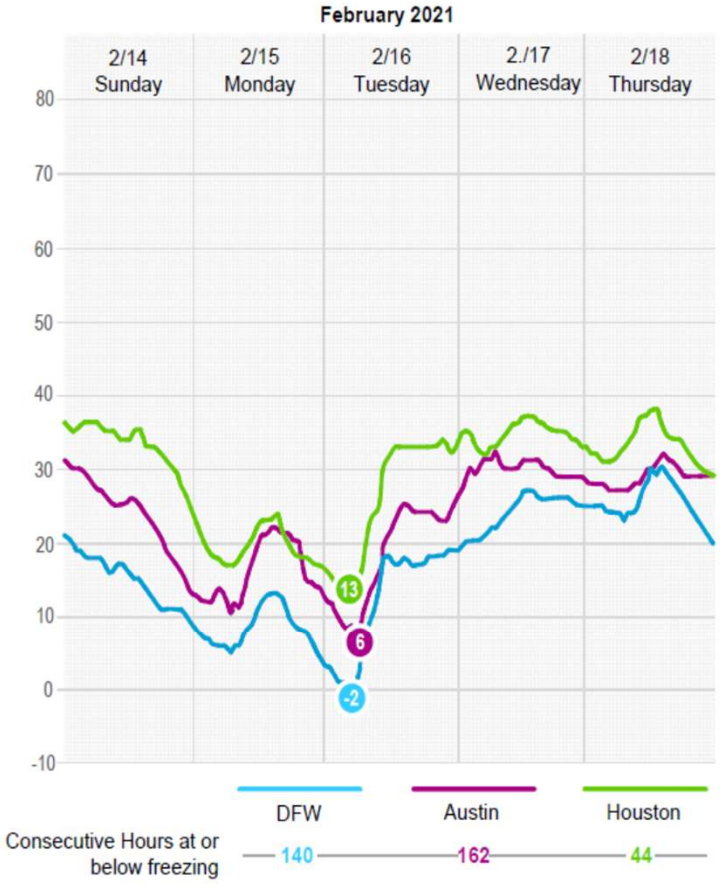
- More than 16,500 control room calls with generators and transmission owners (normal: ~5,000/week).
- Multiple daily coordinating calls between transmission owners and operations management.
- Monday, February 15
  - Up to an additional ~24,000 MW net generation unavailable due to extreme weather; loss of generation was 52,277 MW (approximately 48.6%) at the highest point.
  - 20,000 MW peak load shed.
  - Limited gas availability for gas-fired power plants.
  - Multiple DC-Tie constraints due to neighboring area emergencies.
  - Daily Texas Energy Reliability Council meetings.
- Tuesday, February 16
  - No net gain in generation as some generators were restored and others became unavailable.
  - Decreased volume of controlled outages during the day, increased for evening peak.

PUCT Order setting the maximum price cap at $9000/MWH. This price was in effect from 2/16/21 to 2/19/21.

- Wednesday, February 17
  - Moderating temperatures allowed reduction in controlled outages, small net gain in generation.
- Thursday, February 18
  - Continued gain in generation.
  - 12:42 a.m. - Canceled last controlled outage orders - some outages remained due to ice storm damage; need for manual restoration and return of large industrial facilities.
- Friday, February 19 (all times approximate)
  - 9 a.m. - Returned to emergency operations level 2
  - 10 a.m. – Returned to emergency operations level 1
  - 10:35 a.m. – Returned to normal operations

2011 vs. 2021 Event Temperature Comparison





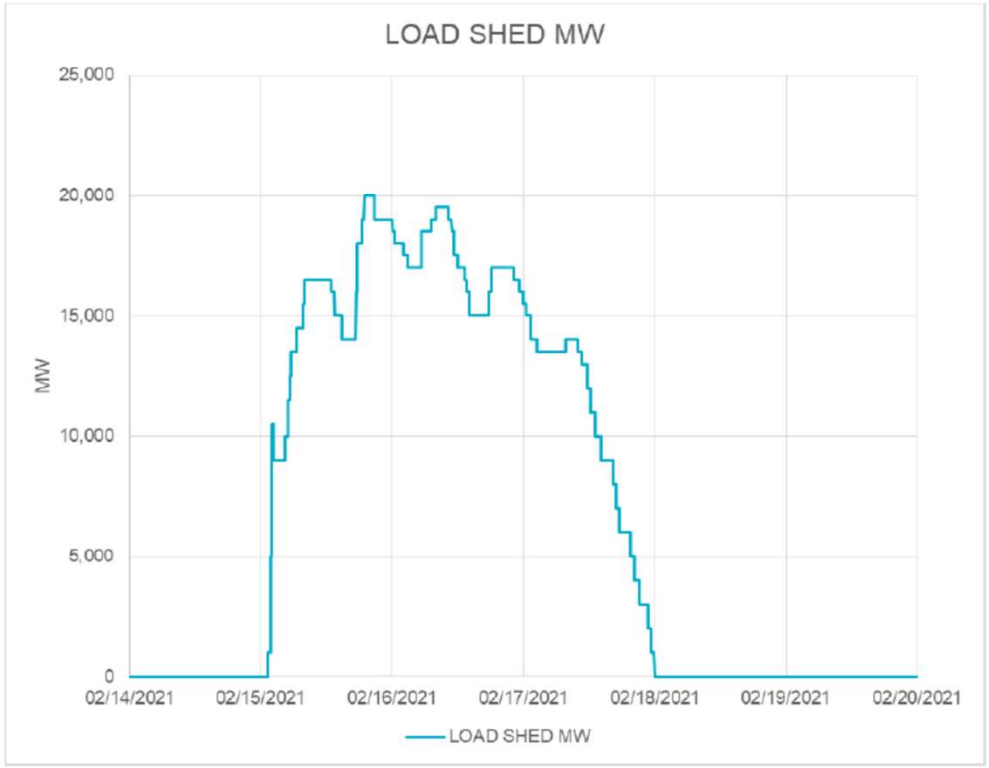
2011 vs. 2021 Event Comparison

	2011	2021
Maximum generation capacity forced out at any given time (MW)	14,702	52,277
Generation forced out one hour before start of EEA3 (MW)	1,182	2,489
Cumulative generation capacity forced out throughout the event (MW)	29,729	46,249*
Cumulative number of generators outaged throughout the event	193	356
Cumulative gas generation de-rated due to supply issues	1,282	9,323
Lowest frequency	59.58	59.30
Maximum load shed requested (MW)	4,000	20,000
Duration load shed request (hours)	7.5	70.5
Estimated peak load (without load shed)	59,000	76,819

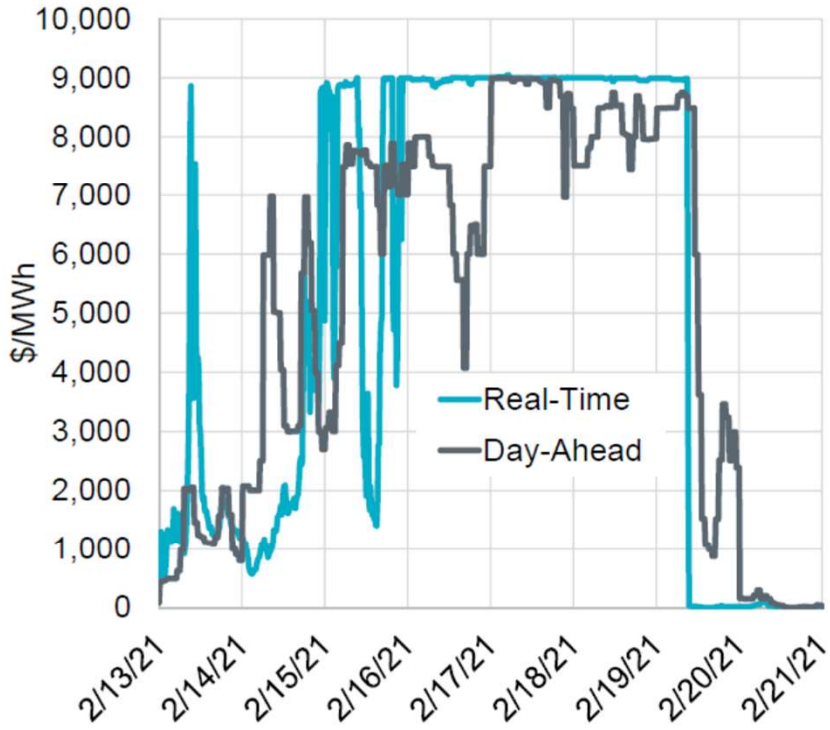
*Note: "Cumulative" values for 2021 were calculated using NERC 2011 report methodology. Cumulative amount for 2021 starts at 00:01 on February 14, 2021

Load Shed Ordered By Transmission Owner

Transmission Operator	% of MW
AEP Texas Central Company	8.7
Brazos Electric Power Cooperative Inc.	4.95
Brownsville Public Utilities Board	0.37
Bryan Texas Utilities	0.51
CenterPoint Energy Houston Electric LLC	24.83
City of Austin DBA Austin Energy	3.71
City of College Station	0.28
City of Garland	0.75
CPS Energy (San Antonio)	6.79
Denton Municipal Electric	0.48
GEUS (Greenville)	0.15
Lamar County Electric Cooperative Inc*	0.07
LCRA Transmission Services Corporation	5.96
Oncor Electric Delivery Company LLC	36.01
Rayburn Country Electric Cooperative Inc.	1.3
South Texas Electric Cooperative Inc.	2.52
Texas-New Mexico Power Company	2.62
ERCOT Total	**100.00**



Real-Time and Day-Ahead System-Wide Pricing



Average system-wide pricing around the event relative to other historical periods (in $/MWh)

Date Range	Real-Time	Day-Ahead
2/14/21 2/19/21	$6,579.59	$6,612.23
January '21	$20.79	$21.36
February '20	$18.27	$17.74

This data is using the ERCOT Hub Average 345-kV Hub prices

Review of Extreme Winter Weather Events

- City of Georgetown's Energy Portfolio
- Review of Financial Impacts of the Winter Weather Event

Georgetown's Energy Portfolio

- Georgetown Electric Power Portfolio consists of:
  - Max Peak on 2/14/2021 @ HE 19 : 134 MW (before load shed)
  - Summer 2020 Max Peak: 165 MW

Contract Type	Energy under Contract	Contract Type	Generated during Event
Mercuria	20 MW	Firm Delivery	Yes
Spinning Spur	144 MW	Variable (As Generated)	Yes
Buckthorn	150 MW	Variable (As Generated)	Yes
South Trent	11 MW	Variable (As Generated)	No (negligible)

- Energy under contract is different from energy available at any given time. This is due to the variable/intermittent nature of the PPAs with Spinning Spur, Buckthorn and South Trent.
- Georgetown's Energy portfolio is net long with regards to supply. The price is fixed.
- Generation Portfolio is volumetrically long energy but, due to the intermittent nature of supply, has volumetric risk.

GEORGETOWN TEXAS

Georgetown's Energy Portfolio

- Going into the event we were monitoring our overall energy portfolio. Both resources and our load.
  - We increased our load forecasts to account for increased heating load.
  - The wind generation forecasts generated by ERCOT accounted for maximum icing potential for wind forecasts (as per ERCOT). In other words the resource forecasts were discounted for potential icing.
  - Going into the week of February 14th , based on resource and load forecasts from 2/13/2021, showed us to be energy short during the following periods:
    - 2/15/2021: HE 1 – 9
    - 2/16/2021: HE 4 – 9, HE 19-24
    - 2/17/2021: HE 1-8 and HE 19-24

Georgetown's Energy Portfolio

- Based on the short positions for 2/15,2/16 and 2/17 we explored the bilateral trades for 25 MW off peak for the three days. The bids were approximately $3000/MWH.
  - As of 2/11 and 2/12 the DAM market was in line with the bilateral trade market and in some cases lower than the bilateral trade.
  - With our energy hedged with our resources and based on energy trades on Inter-Continental Exchange (ICE) we expected the thermal generation to show up in RTM.

Georgetown's Energy Portfolio

- The ERCOT DAM on 2/13 (for operating day 2/14) changed dramatically.
  - Ancillary Services were priced approx. $1M
  - Energy was approx. $3,800/MWH.
- On 2/14 the market fundamentals reports started showing generation being net-short for 2/15.
  - The markets changed so significantly that the DAM, RTM and ICE markets converged on the pricing.
  - We decided not to take our resources and load to RTM as there was hardly any spread between the DAM and RTM markets. This eliminated the forecast risk.
  - With the icy conditions we were not confident about the resource forecasts and did not want to offer our resources in the DAM and find ourselves short in the RTM.
- Critical Events during the event:
  - Energy Emergency Alert (EEA) Level 3 and load shedding started on 2/15/2021 @ 1.20 am.
  - Load shedding ended on 2/18/2021 @ 12.15 am.
  - PUCT order to use the maximum offer cap price of $9000/MWH went into effect on 2/15, HE 18 through 2/19/2021 HE 9.

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Georgetown's Energy Portfolio

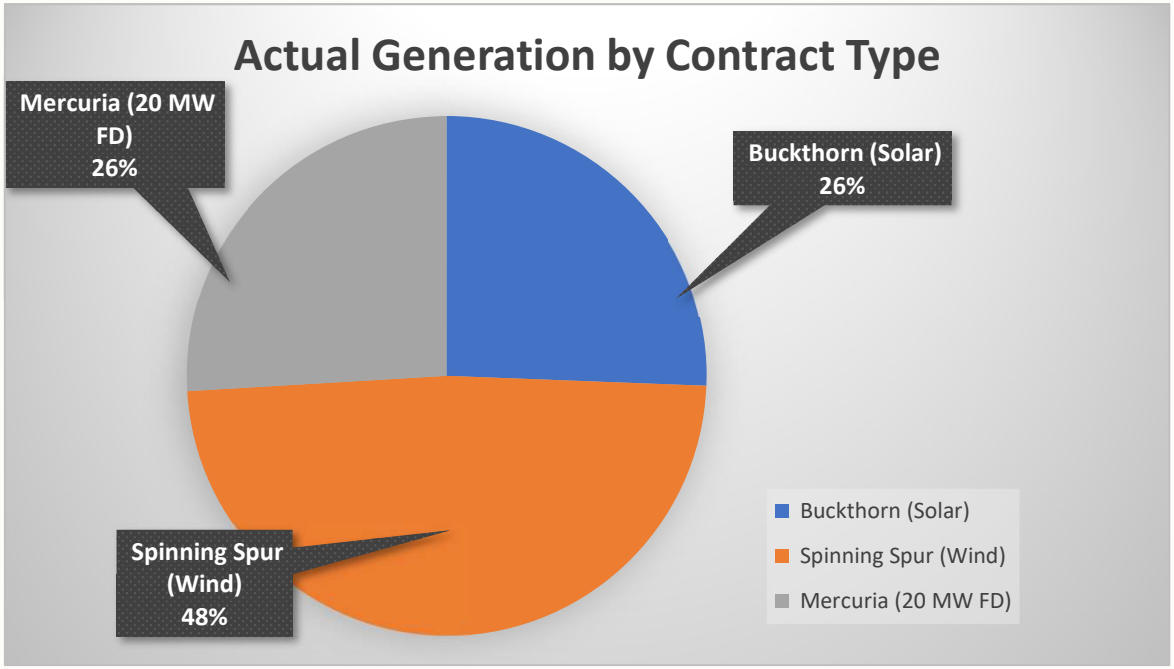
For the entire duration of the event, 2/14/2021 – 2/20/2021, the actual load and the off-setting generation are as follows:

Total Load	Total Generation	DAM/RTM Purchases	%Purchases in DAM/RTM
16,109.64	12,956	3,153.58	20%

Note: Information presented is preliminary and represents the best available data at the time it was created. Unless specified, all data used is non-settlement/preliminary data.

Georgetown's Energy Portfolio

For the entire duration of the event, 2/14/2021 – 2/20/2021, the actual off-setting generation are as follows:



Total Load	16,110
Total Generation	
Buckthorn (Solar)	3,317
Spinning Spur (Wind)	6,279
Mercuria (20 MW FD)	3,360
Total Generation	12,956

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Georgetown's Energy Portfolio

What is the dollar magnitude of this past week's energy purchases ?

Cost of Energy	
Net Energy Purchases	$26,991,465
Ancillary Services	$17,779,149
Total Cost of Energy Purchases	$ 44,770,614

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Georgetown's Energy Portfolio

Why is the dollar magnitude of this past week's energy purchases so high?

- The Ancillary Services costs (one week) was $17.8 M.
- For 2020, the Ancillary Service cost was $710,000.
- The Ancillary Service costs incurred were 25 years worth.
- While there is an energy cap ($9000/MWH), there is no cap on Ancillary Services.

Georgetown's Energy Portfolio

Why is the dollar magnitude of this past week's energy purchases so high?

- The average cost per MWH in January 2021 was $20.79 (RTM)
- The Maximum price cap was set at $9000/MWH.
- The max price cap lasted from 2/16/21 – 2/19/21 (~ 9.00 am)

Georgetown's Energy Portfolio

- Risk Management is a tool when there is a market that works
- What happened during the week of 2/14/2021 was a breakdown of multiple markets