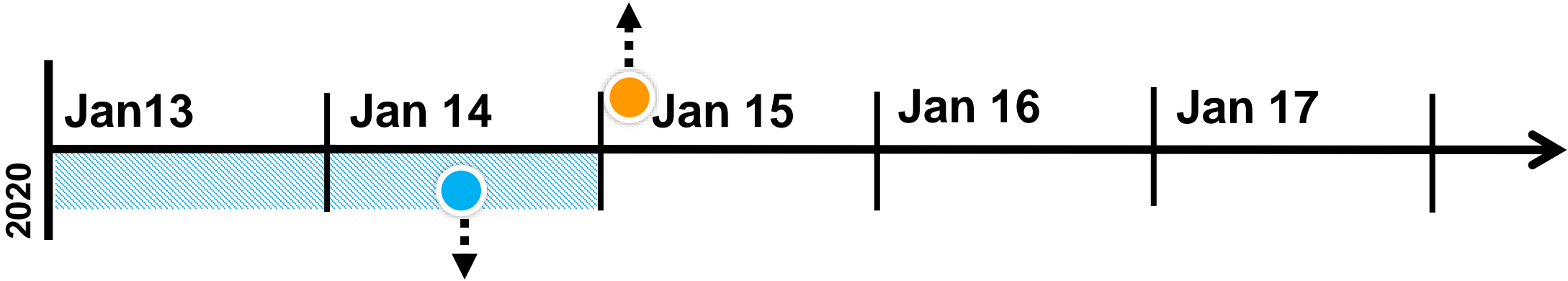# Penalty Examples

Scenario #1:

- Market Seller submitted a non-compliant offer January 13-14

- Error was reported to Market Seller by PJM on January 14 and offer was corrected for January 15

- On January 13th, Market Seller's non-compliant cost-based offer was marginal 06:00-12:00

January 15
Market Seller's offer is compliant

Jan13   Jan 14   Jan 15   Jan 16   Jan 17

2020

January 14
PJM notifies Market Seller
of non-compliant offer

● PJM Notification   ● Market Seller Corrects Error

Hourly LMPs and available MWs at generation resource's location during non-compliant period:

Hourly LMP at Generation Resource Location																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	$12.00	$10.00	$8.00	$11.00	$15.00	$18.00	$20.00	$25.00	$28.00	$22.00	$18.00	$20.00	$22.00	$22.50	$25.00	$27.00	$30.00	$35.00	$38.00	$25.00	$22.00	$20.00	$19.00	$19.00
January 14	$18.00	$14.00	$12.00	$13.50	$16.00	$40.00	$55.00	$43.00	$43.50	$40.00	$35.00	$35.00	$30.00	$32.00	$35.00	$50.00	$55.00	$50.00	$42.00	$30.00	$18.00	$15.00	$12.00	$12.00

Date PJM notifies Market Seller of non-complaint offer

Generation Resource Hourly Available MW																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	80	80	80	80	80	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 14	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Date PJM notifies Market Seller of non-complaint offer

The status quo penalty takes the number of days, capped at 15 days, that the non-compliant offer was submitted divided by 20, which is then multiplied by the sum of the hourly LMP at the generator's location times the generator's hourly available MW for all hours that the non-compliant offer was submitted for the applicable day.

$$\Sigma\ \text{Penalty}_d = \frac{\min\ (d,15)}{20} \times \text{LMP}_h \times \text{MW}_h$$

If Market Seller corrects the non-compliant offer either before or upon notification from PJM or the IMM, then 'd' will equal 1 and the LMP and MW values will be based on the last day of the non-compliant offer.

$$= \frac{1}{20} \times \left[(LMP \times MW)_{hour1} + (LMP \times MW)_{hour2} \ldots + (LMP \times MW)_{hour24} \right]_{last\ day}$$

Hourly LMP at Generation Resource Location																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	$12.00	$10.00	$8.00	$11.00	$15.00	$18.00	$20.00	$25.00	$28.00	$22.00	$18.00	$20.00	$22.00	$22.50	$25.00	$27.00	$30.00	$35.00	$38.00	$25.00	$22.00	$20.00	$19.00	$19.00
January 14	$18.00	$14.00	$12.00	$13.50	$16.00	$40.00	$55.00	$43.00	$43.50	$40.00	$35.00	$35.00	$30.00	$32.00	$35.00	$50.00	$55.00	$50.00	$42.00	$30.00	$18.00	$15.00	$12.00	$12.00

Generation Resource Hourly Available MW																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	80	80	80	80	80	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 14	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

$$= \frac{1}{20} \times (LMP \times MW)_{hour1} + (LMP \times MW)_{hour2} \dots + (LMP \times MW)_{hour24 \;\; last\;day}$$

$$= \frac{1}{20} \times (\$18 \times 100)_{hour1} + (\$14 \times 100)_{hour2} \dots + (\$12 \times 100)_{hour24 \;\; January\;14}$$

$$= \frac{1}{20} \times \$74{,}600$$

$$= \$3{,}730.00 \quad \text{Penalty on January Monthly Bill}$$

The proposed non-escalating penalty is 1/20 of the sum of the average LMP at the generator's location for the hour of the day across all days of the non-compliant offer multiplied by the generator's average available MW for the hour of the day across all days of the non-compliant offer and multiplied by the Market Seller identified error factor & market impact factor.

$$\sum_{h=1}^{24} = \left(\left(\frac{1}{20} \right) \times LMP_h \times MW_h \times E \times I \right)$$

The calculation below assumes that PJM notified the Market Seller of the non-compliant offer after **Day 2** of the non-complaint offer being submitted.

$$= \frac{1}{20} \times \left[avg(LMP_{day1} + LMP_{day2}) \times avg(MW_{day1} + MW_{day2}) \right]_{hour1} \; ... \; + \left[avg(LMP_{day1} + LMP_{day2}) \times avg(MW_{day1} + MW_{day2}) \right]_{hour24} \times E \times I$$

Hourly LMP at Generation Resource Location

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	$12.00	$10.00	$8.00	$11.00	$15.00	$18.00	$20.00	$25.00	$28.00	$22.00	$18.00	$20.00	$22.00	$22.50	$25.00	$27.00	$30.00	$35.00	$38.00	$25.00	$22.00	$20.00	$19.00	$19.00
January 14	$18.00	$14.00	$12.00	$13.50	$16.00	$40.00	$55.00	$43.00	$43.50	$40.00	$35.00	$35.00	$30.00	$32.00	$35.00	$50.00	$55.00	$50.00	$42.00	$30.00	$18.00	$15.00	$12.00	$12.00

Generation Resource Hourly Available MW

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	80	80	80	80	80	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 14	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

$$= \frac{1}{20} \times \left[avg(LMP_{day1} + LMP_{day2}) \times avg(MW_{day1} + MW_{day2}) \right]_{hour1} \;_{...} + \left[avg(LMP_{day1} + LMP_{day2}) \times avg(MW_{day1} + MW_{day2}) \right]_{hour24} \times E \times I$$

$$= \frac{1}{20} \times \left[avg(\$12.00 + \$18.00) \times avg(80 + 100) \right]_{hour1} \;_{...} + \left[avg(\$19.00 + \$12.00) \times avg(100 + 100) \right]_{hour24} \times 1 \times 1$$
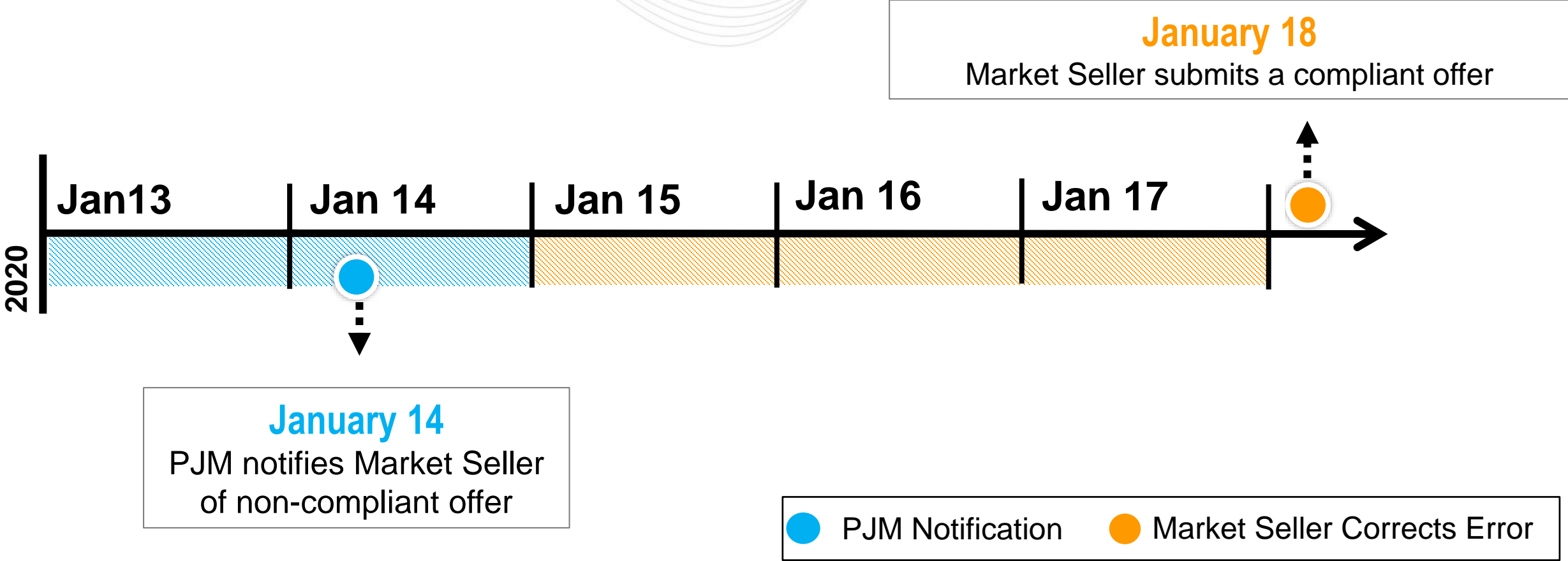
$$= \frac{1}{20} \times \left[\$15.00 \times 90 \right]_{hour1} \;_{...} + \left[\$15.50 \times 100 \right]_{hour24} \times 1 \times 1$$

$$= \frac{1}{20} \times \$62,227.50$$

$$= \boxed{\$3,111.38} \quad \text{Penalty on January Monthly Bill}$$

Scenario #2:

- Market Seller submitted a non-compliant offer January **13-17**

- Error was reported to Market Seller by PJM on January 14 **but offer was not corrected until January 18**

- On January 13th, Market Seller's non-compliant cost-based offer was marginal 06:00-12:00

January 18
Market Seller submits a compliant offer

Jan13 **Jan 14** **Jan 15** **Jan 16** **Jan 17**

2020

January 14
PJM notifies Market Seller
of non-compliant offer

● PJM Notification   ● Market Seller Corrects Error

Hourly LMPs and available MWs at generation resource's location during non-compliant period:

Hourly LMP at Generation Resource Location																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	$12.00	$10.00	$8.00	$11.00	$15.00	$18.00	$20.00	$25.00	$28.00	$22.00	$18.00	$20.00	$22.00	$22.50	$25.00	$27.00	$30.00	$35.00	$38.00	$25.00	$22.00	$20.00	$19.00	$19.00
January 14	$18.00	$14.00	$12.00	$13.50	$16.00	$40.00	$55.00	$43.00	$43.50	$40.00	$35.00	$35.00	$30.00	$32.00	$35.00	$50.00	$55.00	$50.00	$42.00	$30.00	$18.00	$15.00	$12.00	$12.00
January 15	$10.00	$10.00	$14.00	$18.00	$30.00	$60.00	$100.00	$105.00	$104.00	$101.00	$60.00	$30.00	$30.00	$35.00	$35.00	$40.00	$55.00	$60.00	$60.00	$50.00	$42.00	$38.00	$20.00	$20.00
January 16	$12.00	$10.00	$8.00	$11.00	$15.00	$18.00	$20.00	$25.00	$28.00	$22.00	$35.00	$35.00	$30.00	$32.00	$35.00	$50.00	$55.00	$50.00	$42.00	$30.00	$18.00	$15.00	$12.00	$12.00
January 17	$8.00	$11.00	$15.00	$18.00	$14.00	$105.00	$104.00	$100.00	$60.00	$30.00	$30.00	$35.00	$35.00	$40.00	$55.00	$60.00	$100.00	$105.00	$104.00	$32.00	$35.00	$35.00	$30.00	$22.00

Date PJM notifies Market Seller of non-complaint offer

Generation Resource Hourly Available MW																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	80	80	80	80	80	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 14	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 16	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 17	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Date PJM notifies Market Seller of non-complaint offer

If the Market Seller continues to submit the non-compliant offer after being notified by PJM, then in addition to the non-escalating penalty, the Market Seller will be issued a daily escalating penalty. The escalating penalty will be equal to the number of days, capped at 15 days, that the non-compliant offer continued to be submitted divided by 20, multiplied by the sum of the hourly LMP at the generator's location multiplied by the generator's hourly available MW for all hours that the non-compliant offer was submitted for the applicable day.

$$\sum_{h=1}^{24} = \left(\left(\frac{d}{20} \right) \text{ x } LMP_h \text{ x } MW_h \text{ x E x I} \right)$$

Example of **Day 3** escalating penalty calculation (third day non-compliant offer was submitted after receiving notification from PJM of the non-compliant offer):

$$= \frac{4}{20} \times \left[(LMP \times MW)_{hour1} + (LMP \times MW)_{hour2} \dots + (LMP \times MW)_{hour24} \right]_{Day3}$$

Hourly LMP at Generation Resource Location

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	$12.00	$10.00	$8.00	$11.00	$15.00	$18.00	$20.00	$25.00	$28.00	$22.00	$18.00	$20.00	$22.00	$22.50	$25.00	$27.00	$30.00	$35.00	$38.00	$25.00	$22.00	$20.00	$19.00	$19.00
January 14	$18.00	$14.00	$12.00	$13.50	$16.00	$40.00	$55.00	$43.00	$43.50	$40.00	$35.00	$35.00	$30.00	$32.00	$35.00	$50.00	$55.00	$50.00	$42.00	$30.00	$18.00	$15.00	$12.00	$12.00
January 15	$10.00	$10.00	$14.00	$18.00	$30.00	$60.00	$100.00	$105.00	$104.00	$101.00	$60.00	$30.00	$30.00	$35.00	$35.00	$40.00	$55.00	$60.00	$60.00	$50.00	$42.00	$38.00	$20.00	$20.00
January 16	$12.00	$10.00	$8.00	$11.00	$15.00	$18.00	$20.00	$25.00	$28.00	$22.00	$35.00	$35.00	$30.00	$32.00	$35.00	$50.00	$55.00	$50.00	$42.00	$30.00	$18.00	$15.00	$12.00	$12.00
January 17	$8.00	$11.00	$15.00	$18.00	$14.00	$105.00	$104.00	$100.00	$60.00	$30.00	$30.00	$35.00	$35.00	$40.00	$55.00	$60.00	$100.00	$105.00	$104.00	$32.00	$35.00	$35.00	$30.00	$22.00

Date PJM notifies Market Seller of non-complaint offer

Generation Resource Hourly Available MW

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January 13	80	80	80	80	80	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 14	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 16	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
January 17	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Date PJM notifies Market Seller of non-complaint offer

$$= \frac{d}{20} \times \left[(LMP \times MW)_{hour1} + (LMP \times MW)_{hour2} \ldots + (LMP \times MW)_{hour24} \right]_{Day}$$

$$= \frac{4}{20} \times \left[(\$8.00 \times 100)_{hour1} + (\$11.00 \times 100)_{hour2} \ldots + (\$22.00 \times 100)_{hour24} \right]_{Day\ 3}$$

$$= \frac{4}{20} \times \$118,300.00$$

$$= \$23,660.00$$ Day 3 Escalating Penalty

- Penalty total on Market Seller's January bill: $47,341.38

    – Non-Escalating Penalty (Jan 13-14) = $3,111.38

    – Escalating Penalty

        • Day 1 (January 15) = $11,270

        • Day 2 (January 16) = $9,300

        • Day 3 (January 17) = $23,660