Load Management and PRD Event Performance Proposed Solution

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- DR historic performance, especially for larger events has been very good
- New rules implemented 2 years ago where DR no longer triggers a PAI and therefore is not assessed an explicit penalty for non-performance.
- DR was dispatched 6 times this summer
  - This is the highest number of dispatch days in over 15 years
- DR overall performance was significantly down
  - Performance down for all days and all hours - did not see any "fatigue"

June, July and August ’25 Load Mgt Event Performance
DR Performance is based on committed ICAP

	6/23/2025	6/24/2025	6/25/2025	7/28/2025	7/29/2025	8/11/2025	Overall
Estimated average hours	7	7	4	5	6	10	
Total Capacity Commitment (MW ICAP)	1,387	4,053	1,687	571	4,038	226	11,962
Total Capacity Load Reductions (MW ICAP	876	2,936	1,041	386	2,607	120	7,966
Total Performance	**63%**	**72%**	**62%**	**68%**	**65%**	**53%**	**67%**
Total Shortfall	511	1,117	646	185	1,431	105	3,996
CSP Capacity Commitment (MW ICAP)	1,307	3,504	1,607	491	3,490	226	10,623
CSP Capacity Load Reductions (MW ICAP)	825	2,241	962	322	1,990	120	6,460
CSP Performance	63%	64%	60%	66%	57%	53%	61%
CSP Shortfall	482	1,263	644	169	1,500	105	4,163
EDC Capacity Commitment (MW ICAP)	*	549	*	*	549		1,339
EDC Capacity Load Reductions (MW ICAP)	*	699	*	*	613		1,506
EDC Performance		127%			112%		112%
EDC Shortfall		(150)			(64)		(167)

Notes:
1) DR ELCC for 25/26 = 77%
2) Capacity commitment has not been reduced for daily deficiency penalties although penalty only applied to one penalty
3) Capacity load reduction based on sum of average reduction per registration
4) * indicates insufficient number of members to publish information.

PAI event (Registrations dispatched by PJM)

+ PAI Bonus

+ Energy $ (strike price)

+Potential energy cost reduction (depends on retail rate)

+ No Test penalties

PAI penalty

(~$2,300 MWh, RTO, 27/28

Stop-loss 1.5 BRA LDA price)

Conservative estimated incentive
$3,725 MWh = $2,300 (avoided penalty) + $1,425 (short lead strike price)

Non-PAI event (Registrations dispatched by PJM)

+ Energy $ (strike price)

+ Potential energy cost reduction (depends on retail rate)

+Option to substitute event performance for test performance

Conservative estimated incentive
$1,425 MWh (short lead strike price) or ~62% less than a PAI event

Proposed Change – an event is an event

- All Load Mgt/PRD events are subject to a penalty and not required to test when dispatched. Penalty Rate and penalty $ allocation different for non-PAI event.
  - Non-PAI event penalty rate = 50% * PAI penalty rate (~$1,150 MWh based on 27/28 RTO)
    - Expect non-PAI hours ~ twice PAI hours. Estimated PAI hours = 30.
    - Lower rate reflects earlier stage in emergency conditions
  - Non-PAI and PAI events subject to same aggregation rules for compliance
  - PAI + Non-PAI penalty subject to existing PAI Stop Loss rules
  - Penalty $ collected allocated to CSP overperformers and on a prorata basis to LSEs.
    - If CSP over-performers completely make up for underperformance (overall DR performance across CSPs =>100pct) then all penalty $ allocated to CSPs
    - If CSP over-performers offset 50% of under performance then 50% of $ allocated to CSPs with overperformance and 50% allocated to LSEs

Make new rules effective for the 28/29 DY

Proposed non-PAI event changes (Registrations dispatched by PJM)

+ Energy $ (strike price)

+Potential energy cost reduction (depends on retail rate)

+ No Test penalties

Non-PAI penalty

(~$1,150 MWh, RTO, 27/28

Stop-loss 1.5 BRA LDA price for PAI + Non-PAI events)

Conservative estimated incentive
$2,575 MWh = $1,150 (avoided penalty) + $1,425 (short lead strike price)

Proposed non-performance charge - example

		Load Reduction							
Location	**MW (ICAP)**	**HE12**	**HE13**	**HE14**	**HE15**	**HE16**	**HE17**	**HE18**	**HE19**
A	1.0	1.2	1.0	0.8	1.0	0.8	0.7	0.7	0.6
B	2.0	0.0	1.2	2.0	2.0	2.2	2.0	2.0	1.5
C	3.0	2.0	3.0	3.5	3.0	3.1	0.0	0.0	0.0
Total	**6.0**	**3.2**	**5.2**	**6.3**	**6.0**	**6.1**	**2.7**	**2.7**	**2.1**
Avg Reduction	4.3								
Performance	71%								
Shortfall MW		2.8	0.8	-0.3	0.0	-0.1	3.3	3.3	3.9
PAI penalty rate ($/mwh)	$2,300								
Non-PAI penalty rate ($/mwh)	$1,150								
		$3,220	$920	$0	$0	$0	$3,795	$3,795	$4,485
Total Penalty	**$16,215**								
ELCC	0.92								
UCAP commitment	5.5								
UCAP Price	$250								
UCAP Revenue	$503,700								
Penalty/Revenue	3%								

Penalty allocation examples

Example 1: Overperformer completely offset underperformer – overall DR performance 100%

ORGID	Penalty MW	Rate	Penalty		
1	50	$ 1,150.00	$ 57,500.00		
2	5	$ 1,150.00	$ 5,750.00		
3	15	$ 1,150.00	$ 17,250.00		
4	20	$ 1,150.00	$ 23,000.00		
5	30	$ 1,150.00	$ 34,500.00		
	120		$ 138,000.00		
Org ID	**Over-performance MW**	**Max Allocation Rate**	**CSP Allocation Cap**	**Calculated Uncapped Allocation**	**Actual Allocation**
10	15	$ 1,150.00	$ 17,250.00	$ 17,250.00	$ 17,250.00
11	10	$ 1,150.00	$ 11,500.00	$ 11,500.00	$ 11,500.00
12	90	$ 1,150.00	$ 103,500.00	$ 103,500.00	$ 103,500.00
13	5	$ 1,150.00	$ 5,750.00	$ 5,750.00	$ 5,750.00
	120			**Amt Paid to Overperformance**	$ 138,000.00
				Amount Left for LSE Allocation	$ -

Example 2: Overperformance offsets 50% of underperformance – CSP overperformers & LSEs split penalty $

ORGID	Penalty MW	Rate	Penalty		
1	50	$ 1,150.00	$ 57,500.00		
2	5	$ 1,150.00	$ 5,750.00		
3	15	$ 1,150.00	$ 17,250.00		
4	20	$ 1,150.00	$ 23,000.00		
5	30	$ 1,150.00	$ 34,500.00		
	120		$ 138,000.00		
Org ID	**Over-performance MW**	**Max Allocation Rate**	**CSP Allocation Cap**	**Calculated Uncapped Allocation**	**Actual Allocation**
10	15	$ 1,150.00	$ 17,250.00	$ 34,500.00	$ 17,250.00
11	10	$ 1,150.00	$ 11,500.00	$ 23,000.00	$ 11,500.00
12	30	$ 1,150.00	$ 34,500.00	$ 69,000.00	$ 34,500.00
13	5	$ 1,150.00	$ 5,750.00	$ 11,500.00	$ 5,750.00
	60			**Amt Paid to Overperformance**	$ 69,000.00
				Amount Left for LSE Allocation	$ 69,000.00

Appendix

- Historic performance
- Peak shaving considerations
- Gen vs DR high level comparison
- Capacity revenue per MWH combinations
- Other penalties/incentives considered by PJM

Historic Performance summary

	Load Management	
Delivery year	Event performance	Test performance
2012/13	104%	116%
2013/14	94%	129%
2014/15	No Events	144%
2015/16	No Events	134%
2016/17	No Events	153%
2017/18	No Events	163%
2018/19	No Events	146%
2019/20	78%	150%
2020/21	No Events	160%
2021/22	No Events	154%
2022/23	125%	410%
2023/24	No Events*	122%
2024/25	No Events*	103%

Considerations

- Customer choices – is it worth it to curtail? If yes, should it be through the wholesale market or self-directed peak saving (PLC)
  - PLC typically based on 5 summer CP days
  - Customer (or their consultant) must forecast peak days – potentially need to curtail ~10 summer days for 3 hours a day.
- Minimize the timing between the event and the incentive and/or penalty and associated billing.
- Performance compliance aggregation helps diversify risk across the dispatched customers

High level comparison

Item	Gen	DR
Capacity Market	Must offer requirement subject to price mitigation (e.g.: MOPR/MSOC)	Price based offers
Capacity accreditation	ICAP * class ELCC * Performance adjustment factor, CIR cap	Summer and winter ICAP * class ELCC
Energy Market	Cost based must offer requirement based on ICAP. Ability to request outages	Dispatched when expected to be short on reserves, Price based energy offers. Outages in very limited circumstances.
“Non-PAI” compliance impact	No revenue from Energy market when prices are high, future UCAP derate, imbalance penalty (BOR, DA vs RT delta)	Continue with primary business objective ($) but forgo energy revenue incentive to offset cost
Compliance	UCAP by resource/unit	ICAP, ability to aggregate performance (RTO or MAD)

Market rule differences are by design
DR only required to reduce load when needed but expected to fully respond

Total Capacity Revenue ($/MWh) based on capacity prices and dispatch hours

	ELCC		92%										
		Dispatch Hours											
		0	5	10	20	30	40	50	60	70	80	90	100
Price ($/ MW-day UCAP)	**$50**	**$16,790**	$3,358	$1,679	$840	$560	$420	$336	$280	$240	$210	$187	$168
	$100	**$33,580**	$6,716	$3,358	$1,679	$1,119	$840	$672	$560	$480	$420	$373	$336
	$150	**$50,370**	$10,074	$5,037	$2,519	$1,679	$1,259	$1,007	$840	$720	$630	$560	$504
	$200	**$67,160**	$13,432	$6,716	$3,358	$2,239	$1,679	$1,343	$1,119	$959	$840	$746	$672
	$250	**$83,950**	$16,790	$8,395	$4,198	$2,798	$2,099	$1,679	$1,399	$1,199	$1,049	$933	$840
	$300	**$100,740**	$20,148	$10,074	$5,037	$3,358	$2,519	$2,015	$1,679	$1,439	$1,259	$1,119	$1,007
	$350	**$117,530**	$23,506	$11,753	$5,877	$3,918	$2,938	$2,351	$1,959	$1,679	$1,469	$1,306	$1,175
	$400	**$134,320**	$26,864	$13,432	$6,716	$4,477	$3,358	$2,686	$2,239	$1,919	$1,679	$1,492	$1,343

Estimated Customer Capacity Revenue ($/MWh) based on capacity prices and dispatch hours to reduce capacity cost - low case

	Customer share of savings			50%								
		Dispatch Hours										
		0	5	10	20	30	40	50	60	70	80	90	100
Price ($/ MW-day UCAP)	$50	$8,395	$1,679	$840	$420	$280	$210	$168	$140	$120	$105	$93	$84
	$100	$16,790	$3,358	$1,679	$840	$560	$420	$336	$280	$240	$210	$187	$168
	$150	$25,185	$5,037	$2,519	$1,259	$840	$630	$504	$420	$360	$315	$280	$252
	$200	$33,580	$6,716	$3,358	$1,679	$1,119	$840	$672	$560	$480	$420	$373	$336
	$250	$41,975	$8,395	$4,198	$2,099	$1,399	$1,049	$840	$700	$600	$525	$466	$420
	$300	$50,370	$10,074	$5,037	$2,519	$1,679	$1,259	$1,007	$840	$720	$630	$560	$504
	$350	$58,765	$11,753	$5,877	$2,938	$1,959	$1,469	$1,175	$979	$840	$735	$653	$588
	$400	$67,160	$13,432	$6,716	$3,358	$2,239	$1,679	$1,343	$1,119	$959	$840	$746	$672

In the low case, a customer may reduce 50% of their capacity cost which equates to $1,399 MWh if the Capacity Price is $250 MW-day and they successfully reduce load for 30 hours

Estimated Customer Capacity Revenue ($/MWh) based on capacity prices and dispatch hours to reduce capacity cost - high case

	Customer share of savings			90%								
		Dispatch Hours										
		0	5	10	20	30	40	50	60	70	80	90	100
Price ($/ MW-day UCAP)	**$50**	**$15,111**	$3,022	$1,511	$756	$504	$378	$302	$252	$216	$189	$168	$151
	$100	**$30,222**	$6,044	$3,022	$1,511	$1,007	$756	$604	$504	$432	$378	$336	$302
	$150	**$45,333**	$9,067	$4,533	$2,267	$1,511	$1,133	$907	$756	$648	$567	$504	$453
	$200	**$60,444**	$12,089	$6,044	$3,022	$2,015	$1,511	$1,209	$1,007	$863	$756	$672	$604
	$250	**$75,555**	$15,111	$7,556	$3,778	$2,519	$1,889	$1,511	$1,259	$1,079	$944	$840	$756
	$300	**$90,666**	$18,133	$9,067	$4,533	$3,022	$2,267	$1,813	$1,511	$1,295	$1,133	$1,007	$907
	$350	**$105,777**	$21,155	$10,578	$5,289	$3,526	$2,644	$2,116	$1,763	$1,511	$1,322	$1,175	$1,058
	$400	**$120,888**	$24,178	$12,089	$6,044	$4,030	$3,022	$2,418	$2,015	$1,727	$1,511	$1,343	$1,209

In the high case, a customer may reduce 90% of their capacity cost which equates to $2,519 MWh if the Capacity Price is $250 MW-day and they successfully reduce load for 30 hours

PJM considerations

- DR Performance adjustment issue
  - Limited performance hours
  - DR measured based on ICAP – Gen performance adjustment factor relative to UCAP (class average ELCC)
  - Aggregation: CSP > Resource > Customer
  - CSP vs retail customer
- Pull DR from PAI structure and leverage pre-CP DR non-performance charge rules
  - Penalty rate a function of # events and existing annual daily deficient penalty rate (weighted average revenue rate * 1.2 or +$20 MW day UCAP) * 365
    - 2 event days than penalty rate is 50% of annual penalty rate, 3 event days then 33.3% of annual penalty rate, etc.
  - Big change, several details to work out – resources did perform, just need to improve performance.

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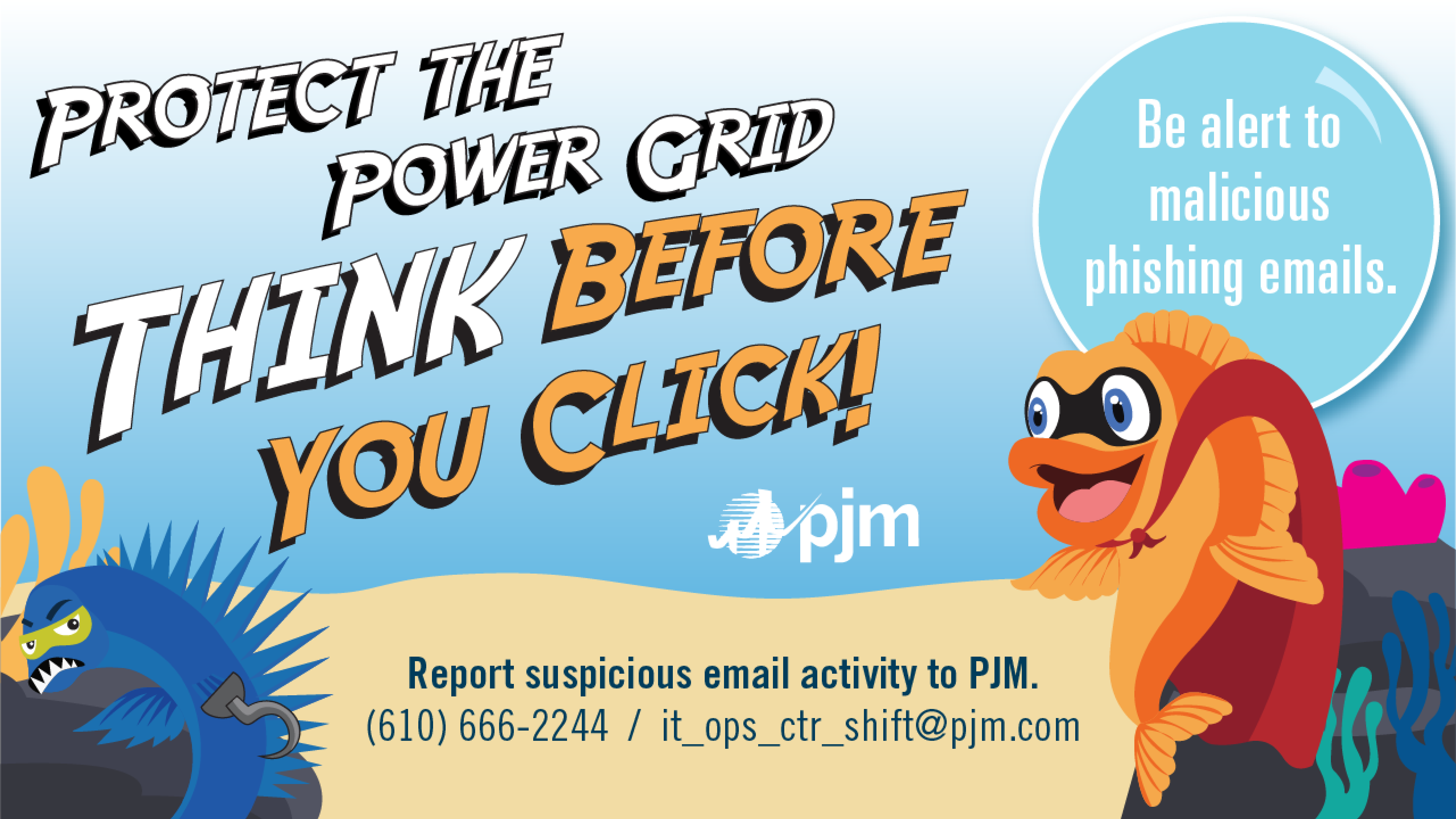
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