

NEW CONTINGENT OUTAGE AND CAPACITY PERFORMANCE COVERAGE

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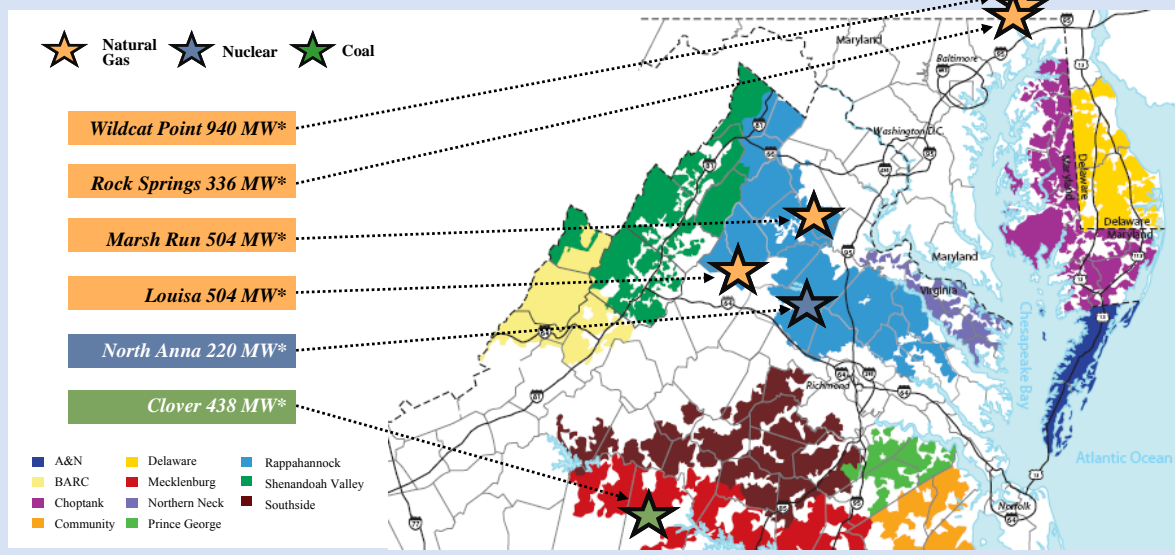
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ODEC'S DECISION TO BUY CAPACITY PERFORMANCE COVERAGE

- ODEC is a not-for-profit tax-exempt power supply cooperative; owns approximately 3,000 MW of diverse generation (natural gas, coal, nuclear, diesel)
- PJM RTO member; FERC regulated; SEC registrant; non-RUS borrower
- ODEC's 11 distribution cooperatives serve approximately 600,000 customers throughout VA, MD and DE and purchase power under an all-requirements, take-or-pay wholesale power contract
- 2017 highlights
 - Peak demand 2,911 MW
 - Energy sales 11,879 GWh
 - Revenues \$753.1 million
 - Total assets \$2.2 billion

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SERVICE TERRITORY AND GENERATION FACILITIES



* net capacity entitlement

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ODEC'S DECISION TO BUY CAPACITY PERFORMANCE COVERAGE

- Since inception of PJM capacity performance charges, ODEC's management has taken a keen interest in developing financial protections
- Interest heightened with 1,000 MW natural gas combined cycle facility coming online in 2018
- Involvement included
 - Board and C-Suite
 - Risk Management Committee
 - Power supply
 - Accounting

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ODEC'S DECISION TO BUY CAPACITY PERFORMANCE COVERAGE

Planning Year	LDA	CP MW	Base MW	CP Indemnity (\$/MWh)	Base Indemnity (\$/MWh)	CP Max Charge	Base Max Charge
2018	RTO	703	231	3,425	1,825	\$108,405,036	\$12,645,564
2018	EMAAC		1,202	2,563		92,409,700	
2019	RTO		928		976		27,133,776
2019	EMAAC		1,216		1,217		44,406,889
2020	RTO	944		3,329		141,473,927	
2020	EMAAC	1,218		3,217		176,314,180	
2021	RTO	1,579		3,682		261,690,668	
2021	EMAAC	1,257		3,593		203,253,127	

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ODEC'S DECISION TO BUY CAPACITY PERFORMANCE COVERAGE

- Limited markets – AEGIS, Archer, HSB/Munich Re and Swiss Re
- Policy limits – CP exposures evolving, what is each year's sweet spot for policy limit
- Deductibles – given the nature of risk, ODEC retained more risk to manage premium
- Policy terms & conditions – outage notices, event duration limits, cyber, earthquake / flood / natural catastrophe, etc.

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Forced Outage Risk Solutions, Managing Director

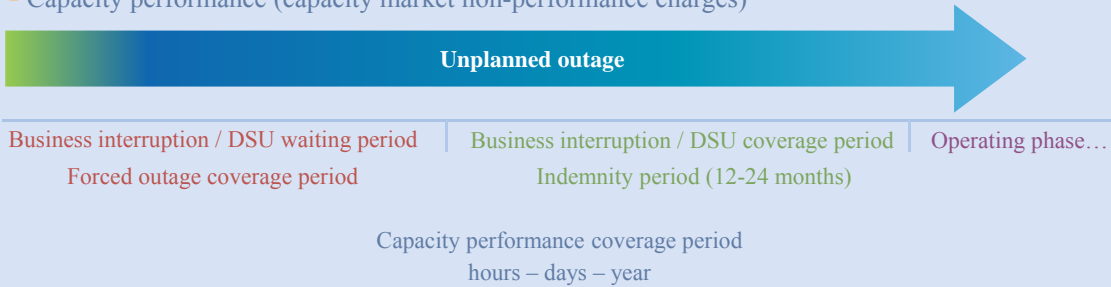
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RISKS IN AN UNPLANNED OUTAGE

- Property damage (cost to repair and / or replace equipment)
- Business interruption / delay in start-up (lost energy revenues, capacity market deficiency charges)
- Forced outage (energy market replacement power price exposure)
- Capacity performance (capacity market non-performance charges)



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FORCED OUTAGE INSURANCE ALTERNATIVES

Alternatives	Comments
Revolver / additional borrowing	<ul style="list-style-type: none"> ▪ A loan: must be repaid ▪ Assumes you later “earn” your way back to normal ▪ Difficult to obtain when credit is tight ▪ A wrong-way risk for the lender
Physical reserves	<ul style="list-style-type: none"> ▪ Opportunity costs / capital-intensive ▪ Geographic deliverability limitations ▪ Volume of reserve ≠ size of outage
Cash reserves	<ul style="list-style-type: none"> ▪ Opportunity cost of excess liquidity ▪ Difficult to fund (self-insure) tail risk events ▪ Reduced ROE
Commercial restrictions	<ul style="list-style-type: none"> ▪ Don’t sell forward ▪ Opportunity cost of lost commercial activity ▪ Fails to address core outage risks
Market – replacement capacity	<ul style="list-style-type: none"> ▪ Trading out of the position ▪ Unknown replacement price ▪ Low bilateral liquidity

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INSURANCE MARKET CAPACITY FOR PJM NON-PERFORMANCE CHARGES

Insurers / reinsurers have interest / willingness / ability to offer capacity for non-performance risk

- Delivery years 2016/17 & 2017/18 (full market estimate)
 - More than 17 deals bound
 - More than 15,000 MWs insured
 - More than \$31 million net premium paid to insurers
 - Average limit purchased = \$30 million (highest = \$100 million)
 - Average net cost of insurance = 3.8% rate on line (~\$4/MWd)

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INSURANCE MARKET CAPACITY FOR PJM NON-PERFORMANCE CHARGES

Our latest experience

- Delivery year 2018/19
 - More than 10 deals bound
 - More than 15,000 MWs insured
 - More than \$10 million net premium bound
 - Average limit purchased = \$23 million
 - Average net cost of insurance = 4.5% rate on line (\$3.80/MWd)

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WHO IS BUYING?

- Generators who do not have the risk appetite or have neither the physical reserves nor the balance sheets with which to absorb the CP risk
- Most CP insurance deals have been pursued by private equity firms, merchant generators, IPPs, and cooperatives
- CP is a large exposure but more important to some generators than others. Although portfolio netting is not permitted, we note that some generators are relying on physically hedging the exposure within certain subsets of their portfolios (i.e., LDAs).
- Generators that are more exposed / in LDAs without portfolio support

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PROCESS AND NEXT STEPS

- Data gathering and exposure analysis
- Insurance structuring
- Policy wording analyses
- Market negotiations
- Placement

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Marina Nadirova

Product Executive

AEGIS

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EXECUTIVE SUMMARY

- AEGIS writes two Generation Outage products: Contingent Outage (CO) and Capacity Performance (CP). Both are double trigger and both triggers need to be fulfilled for the policy to pay
- CO indemnifies power producers against a loss due to an unplanned outage / derate during price spikes in power markets
- CP retains a double trigger in that it indemnifies power producers against an unplanned outage / derate during Emergency Events only, declared by PJM
- CO originated in the early 2000
- CP started last year due to changes in regulation in the PJM region; the capacity market existed in this region since 2005

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EXECUTIVE SUMMARY

- CO and CP policies have been sold to a wide range of clients: independent power producers, large utilities, municipalities, cooperatives, private equities etc. Many of those are AEGIS members or have been covered by AEGIS on the property / liability side historically.
- Those policies cover all type of fossil plants (coal, natural gas and oil) and nuclear plants

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CONTINGENT OUTAGE (CO) MARKET OVERVIEW

- CO has a double trigger and indemnifies power producers for financial loss due to an unplanned outage / derate during a spike in power prices. It can also be structured as fixed indemnity product, where there is a fixed \$/MWh payout during an unplanned event
- Unplanned outage means an event during which a covered power unit is not capable of producing power due to an unplanned failure within the plant site (tube leak, turbine failure, issue with the welding on the rotor, resonance, etc.). Derate means a partial outage, where the power plant produces power at a reduced capacity. Unplanned outages and derates are defined by North American Electric Reliability Corporation Generating Availability Data Systems (NERC GADS) in the US which is a standard in the US power industry

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CONTINGENT OUTAGE (CO) MARKET OVERVIEW

- The power markets can be very volatile especially during severe weather conditions, outages, constraints on the grid and can spike in a matter of hours
- The payout under the policy is calculated by comparing the realized prices to the insured price in the contract and multiplied by MW lost and number of hours of the unplanned event. All realized prices are published daily and are public information, thus the settlement process is straight- forward and doesn't require adjusters
- The insured price can be set at any level, it can be the generation cost or much higher, depending on how much premium the client wants to pay for the coverage

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CONTINGENT OUTAGE (CO) KEY TERMS

- Maximum line size of \$30 million aggregate limit per policy
- Unique features are non-claims bonuses and continuity credits
- Event duration limit: generally 30-90 days depending on the policy
- Additional features of the coverage are expressed as aggregate dollar capacity limit, MW capacity limit, deductibles, etc.
- The policy can have a fixed insured price for the whole duration, variable per month or a spark spread strike (based on natural gas)
- Settled on real-time (RT), day-ahead market (DAM) or both
- The policy can be a fixed indemnity policy, i.e., every time the Insured has an unplanned event, there is a fixed \$/MWh payout

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CONTINGENT OUTAGE (CO) KEY TERMS

▪ Key exclusions

- Coverage is limited to the plant site and the outages outside of the plant site or on the grid are excluded
- Catastrophe
- Terror
- War
- Cyber
- Outage due to issues on the transmission grid
- Inadequate water or fuel supply

Some exclusions can be bought back

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CONTINGENT OUTAGE (CO) CLAIM EXAMPLE

- A 300MW power plant buys a one year (Jan-Dec18) CO policy. It suffers from an unplanned outage from Thursday 04/01/18 at 06:40 to Monday 08/01/18 at 07:40 due to a tube leak. The policy covers 5x16 period (5 peak days, 16 peak hours). The policy has no days deductible. The limit on the policy is \$10 million. The strike in the policy is \$25/MWh. The realized prices are below. The policy settles on the difference between average realized daily prices and the insured price.

Price in USD	04/01/2018	05/01/2018	06/01/2018	07/01/2018	08/01/2018
Average realized price	150	65	Not covered	Not covered	21
Insured price	25	25	Not covered	Not covered	25
Difference	125	40	Not covered	Not covered	-
Hours covered	15	16	Not covered	Not covered	300
MW lost	300	300	Not covered	Not covered	300
Daily payout	562,500	192,000	Not covered	Not covered	-

- The final payout is $\$562,500 + \$192,000 = \$754,500$

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FIXED INDEMNITY CLAIM EXAMPLE

- A 300MW power plant buys a one year (Jan-Dec18) CO policy. It suffers from an unplanned outage from Thursday 04/01/18 at 06:40 to Monday 08/01/18 at 07:40 due to a tube leak. The policy covers 5x16 period (5 peak days, 16 peak hours). The policy has a \$100,000 deductible. The limit on the policy is \$10 million. The fixed payout is \$50/MWh.

Price in USD	04/01/2018	05/01/2018	06/01/2018	07/01/2018	08/01/2018
Fixed indemnity	50	50	Not covered	Not covered	50
Hours covered	15	16	Not covered	Not covered	2
MW lost	300	300	Not covered	Not covered	300
Daily payout	225,000	240,000	Not covered	Not covered	30,000

- The final payout is $(\$225,000 + \$240,000 + \$30,000) - \$100,000 = \$395,000$

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CAPACITY PERFORMANCE (CP) MARKET OVERVIEW

- PJM is one of the largest US electricity markets, encompassing around 170,000 MW
- PJM operates the largest capacity performance market in the US
- PJM procures the electricity through two processes: traditional energy market (real-time and day-ahead markets) and capacity performance (CP) market
- Starting 2017, most generators will get “pay-for-performance” by reliably delivering power for electricity customers, especially during power system emergencies, called Emergency Events
- PJM initiates Emergency Events when it anticipates a shortage of capacity

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CAPACITY PERFORMANCE (CP) MARKET OVERVIEW

- When a power generator which cleared in the auction is not able to deliver during PJM Emergency Events, it is liable for fixed penalties (Non-Performance Penalties/ Capacity Penalties)
- Since 2015, PJM has significantly increased the penalties to the providers for the non-performance, thus creating an opportunity for the CP insurance product
- Each year the CP market assumes an increasing share of the overall PJM market and it's expected that PJM will transition to 100% capacity market by 2020

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CAPACITY PERFORMANCE (CP) KEY TERMS

- The CP policy indemnifies power producers against capacity penalties suffered due to an unplanned outage or derate during the Emergency Events declared by PJM. The payout is calculated by multiplying the fixed capacity penalty by MW lost and number of hours of the unplanned event.
- Policies can be bound for 2018/2019, 2019/2020 and 2020/2021 years
- Line size of \$50 million aggregate limit per policy per year; a higher limit can be syndicated
- Unique features are Non-Claims Bonuses and Continuity Credits
- Event duration limit: 365 days

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CAPACITY PERFORMANCE (CP) KEY TERMS

- Policy term ranges from one to three years with limits set per year
- Premium is paid upfront for the first year of inception. The deposit payment of 20% is required for future years inception.
- There are twelve types of Emergency Events covered under our CP policy
- Main exclusions are the same as for the CO product with possibility of buy-back
- All the Emergency Events are published public information, thus the settlement process is straight forward and doesn't require adjusters

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CAPACITY PERFORMANCE (CP) CLAIM EXAMPLE

A 1000 MW power plant in the PJM buys a one year (Jun18-May19) CP policy. It suffers from an unplanned outage from Monday 12/06/18 at 00:00 to Wednesday 14/06/18 at 23:00 due to a transformer failure. The limit on the policy is \$30 million. PJM declares an Emergency Event covered under the CP policy for 2 hours on Monday at 02:00. The Non-Performance penalties are \$3,424.75 / MWh. The aggregate policy deductible is \$100,000.

- Non-performance penalty = $1000 \text{ MW} * \$3,424.75 * 2\text{h} = \$6,849,500$
- Application of deductible = $\$6,849,500 - \$100,000 = \$6,749,500$
- Payout amount = $\$6,749,500$

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