Fuel Requirements for Black Start Resources
Overview

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MIC / OC
September 7 / 8, 2022

Fuel Requirements for Black Start Resources (FRBSR) Stakeholder Process

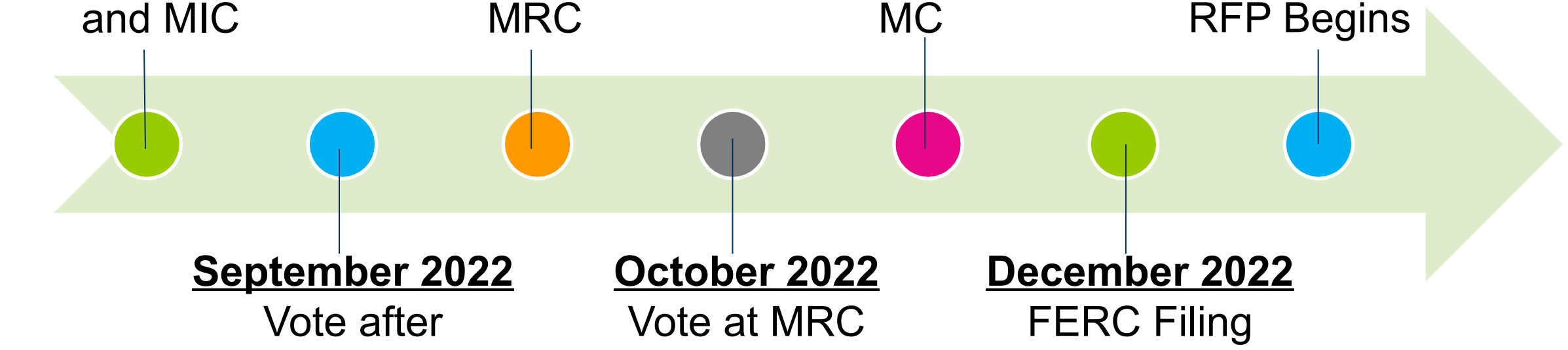
Purpose:

- Develop fuel assurance business rules to mitigate the impact of non-fuel assured Black Start resources being unavailable during a restoration event due to fuel unavailability.

Timeline:

- FRBSR started in 2019 and continued through early 2020. The effort was put on hiatus in March 2020, and resumed in Feb 2022.
- The stakeholder process produced two packages for consideration.
- New fuel assurance business rules would be included in next RTO wide RFP

Timeline



Package Summary

Package	Sponsor	Status	Package Support: Poll #1 (May 2022)	Package Support: Poll #2 (June 2022)
A	PJM	Original from 2019; Removed Jan 2022	*N/A*	*N/A*
B	IMM	**Current**; Updated in 2022	Yes: 30% | No: 70%	Yes: 23% | No: 77%
C	Calpine	Removed in 2019	*N/A*	*N/A*
D	DC OPC / Exelon	Removed April 2022	*N/A*	*N/A*
E	Consumer Advocates	Removed in July 2022	Yes: 29% | No: 71%	Yes: 33% | No: 67%
F	PJM	New in 2022; Removed & consolidated with Package G after Poll #2	Yes: 54% | No: 46%	Yes: 73% | No: 27%
G	Brookfield / DCOPC	New in 2022; Removed & consolidated with Package F after Poll #2	*N/A*	Yes: 37% | No: 63%
H	PJM / Brookfield / DCOPC	**Current**; New in June 2022	*N/A*	*N/A*

Note: When two packages remained at end of 7/14/2022 special session, stakeholders decided not to proceed with Poll #3.

Summary of Key Package “Gap” Areas

Gaps between Consolidated PJM / Brookfield / DCOPC package and IMM package:

1. Intermittent resources (and DER/DR resources) eligibility to provide Black Start Service or be considered fuel assured in accordance with the 90% confidence level
2. Increase in Z-factor from 10% to 20% and X-factor from .01 to .02
3. RTO wide cost allocation vs. current zonal cost allocation
4. Reliability Backstop

Consolidated Offline Vote after September MIC / OC

Reviewed with stakeholders and determined to be preferred approach for unique dual committee assignment.

Open: September 8, 2022 after OC

Close: September ~~15~~ 13*, 2022 at 5:00 p.m. EPT

Special Logistics & Reminders

- **Only one representative per voting member may participate in this offline vote.** If different representatives vote at MIC and OC, pick one for this vote.
  - Technically two votes will be open; one for MIC and one for OC. When vote closes, Voting Support will consolidate the responses and validate one response per member organization.
- Make sure you are registered in voting application, and on the OC / MIC email distribution lists

Contact

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Fuel Requirements for Black Start Resources

Member Hotline

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THINK BEFORE YOU CLICK!

pjm

Be alert to malicious phishing emails.

Report suspicious email activity to PJM.

(610) 666-2244 / it_ops_ctr_shift@pjm.com

Appendix – Detailed Polling Results

June 2022 Package Polling Results

June 24, 2022

OC/MIC Special Session

Fuel Requirements for Black Start Resources

Package Overview

Package	Proposer	Status
A	PJM	Original from 2019; Removed in 2022
B	IMM	Current; Updated in 2022
C	Calpine	Removed in 2019
D	DC OPC / Exelon	Removed in 2022
E	Consumer Advocates	Current; Original from 2019
F	PJM	Current; New in 2022
G	Brookfield / DC OPC	Current; New in 2022

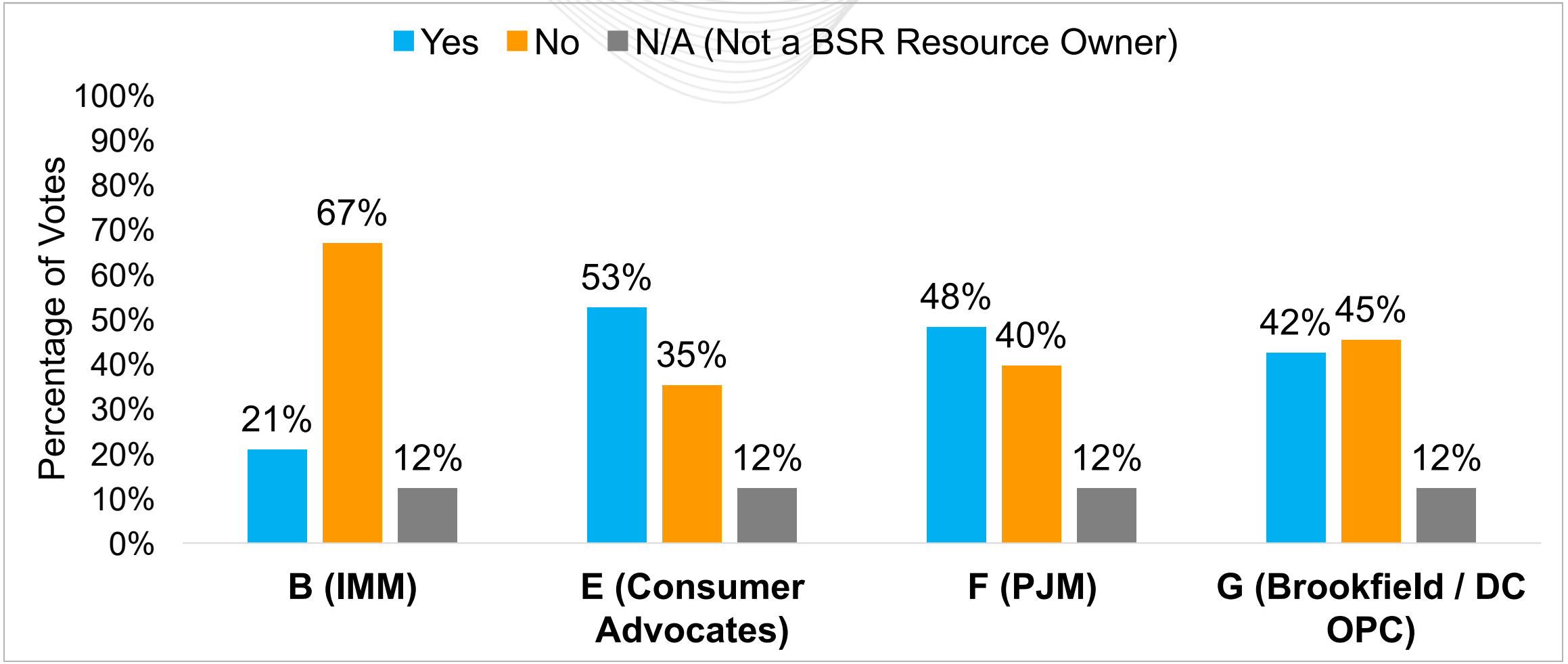
Poll Overview

- Intent
  - Compare support for current packages as proposed
  - Identify design components and solution options that require further discussion to refine packages
  - Facilitate stakeholder feedback

- Overall Results
  - Voting Members: 16
  - Affiliate Members: 123
  - Non-Members: 0
  - Total: 139

(1) Would you consider offering your resource(s) as a Fuel Assured Resource in a Black Start RFP Process?

N/A if not owner of current or potentially new BSR resource



1. Under Package [B / E / F / G], would you consider offering your resource(s) as a Fuel Assured Resource in a Black Start RFP Process?

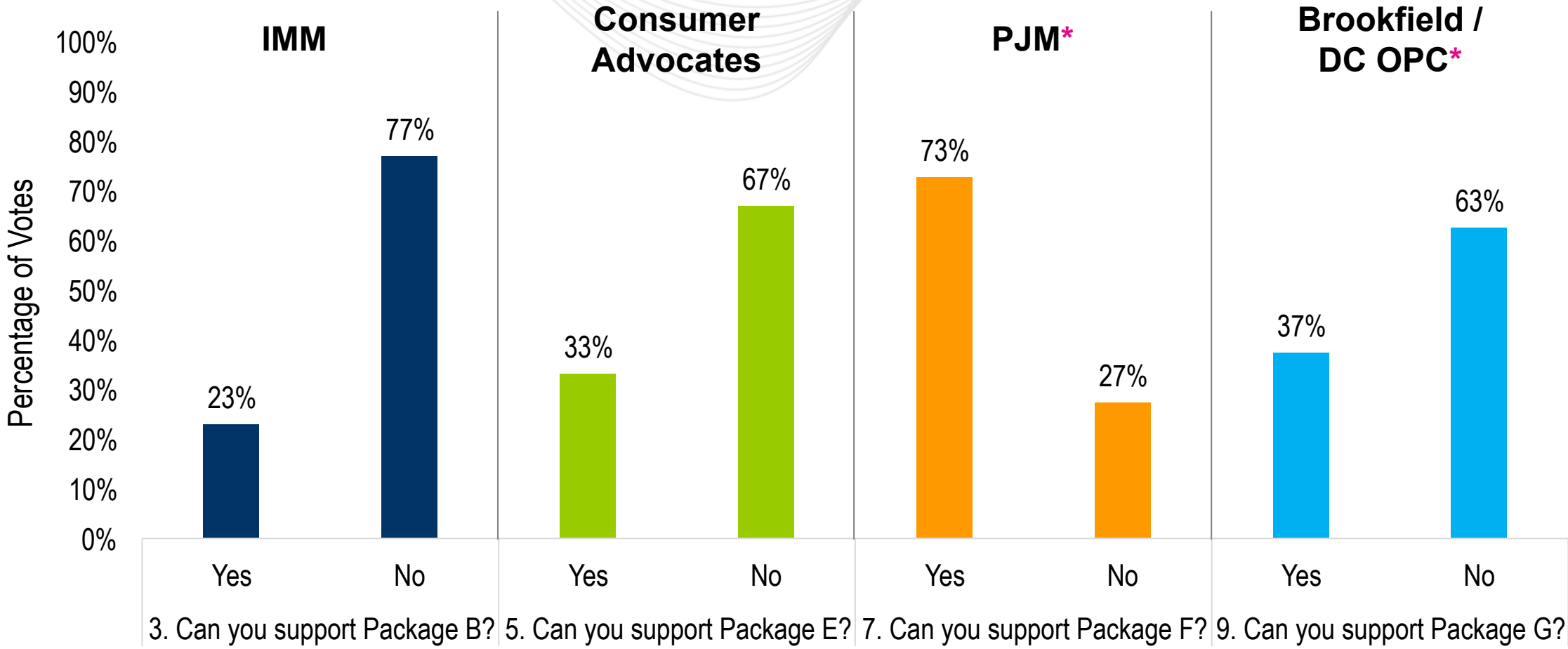
	B	%	E	%	F	%	G	%
Yes	29	24%	73	60%	67	55%	59	48%
No	93	76%	49	40%	55	45%	63	52%
N/A	17		17		17		17	

2. If you answered no to #1, what changes would be required (and to which package(s)) for you to consider offering your resource(s) as a Fuel Assured Resource in a Black Start RFP?

- Packages F & G - REQUIRE updating Emissions component to include waivers and to read as; "Requirements for the Black-Start resources to make best efforts to obtain emission (e.g. Title V) and effluent (e.g. NPDES) permit modifications and or waivers.....". Permit modifications are obtained in early stages of building units and owners normally do not want to make modifications after the permit has been accepted, but could make waiver requests much more easily before or during restoration situations. It's also suggested that PJM adopt Package G's monthly MW 90% confidence level vs. PJMs annual level and combine their packages into one compromised package
- Package E is undeveloped and potentially incomplete. All other proposals have viable components.
- We may not agree with how some of these packages treat Hydro units, but for our own BS units we would have no problem offering into a BS RFP process.
- For PJM Package F, move to a monthly 90% confidence calculation (vs annual 90%)
- Regarding Package B (IMM), we are looking for more necessary details on Fuel Assurance as well as other design components to consider supporting this package.

Package Support Summary

* Consolidated after second poll



Package Support Questions

3. Can you support Package B?

	#	%
Yes	32	23%
No	107	77%

5. Can you support Package E?

	#	%
Yes	46	33%
No	93	67%

7. Can you support Package F?

	#	%
Yes	101	73%
No	38	27%

9. Can you support Package G?

	#	%
Yes	52	37%
No	87	63%

Package Support Comments

4. If 'No' to #3 (Package B), please provide feedback on which solution option you cannot support and why.

- Line 27 - Concurrent fuel testing. Would have to clear entire 138 kv bus.
- Design components need more details
- Package B testing and verification requirements are impractical and overly burdensome. For example, while a concurrent fuel test for units on the same gas pipeline seems prudent, practically it would not represent actual constrained conditions, would be logistically challenging and add unnecessary costs and planning to provide BS service. Similarly, Transition Testing should be up to the unit owner to assess. Regarding Starting System verification, Package B suggests that the BSR owner could be penalized if a start impediment is present, but undiscovered. Packages F & G more clearly and correctly suggest that the BSR owner should report impediments as soon as possible upon discovery, but no later than one hour after.
- IMM package needs to have criteria for the Min Level of Fuel Assurance for BS resources.
- TOs should be permitted to own generation.
- The undefined future criteria is problematic. The changes to the reliability backstop are also a non-starter.
- Looking for more necessary details on Fuel Assurance as well as other design components to consider supporting this package.

6. If 'No' to #5 (Package E), please provide feedback on which solution option you cannot support and why.

- All BS units should have the same Min Run Hour requirements at all times and not be able to choose between 10 and 16 hours. Do not believe that existing non-fuel assured BS units that do not offer into the RFP should be terminated.
- We do not support the one fuel assurance conversion per zone cap.
- The limit on only having 1 fuel assured black start resource per zone is problematic. This proposal needs to be updated in response to the analysis and additional work that has been completed by PJM since the hiatus.

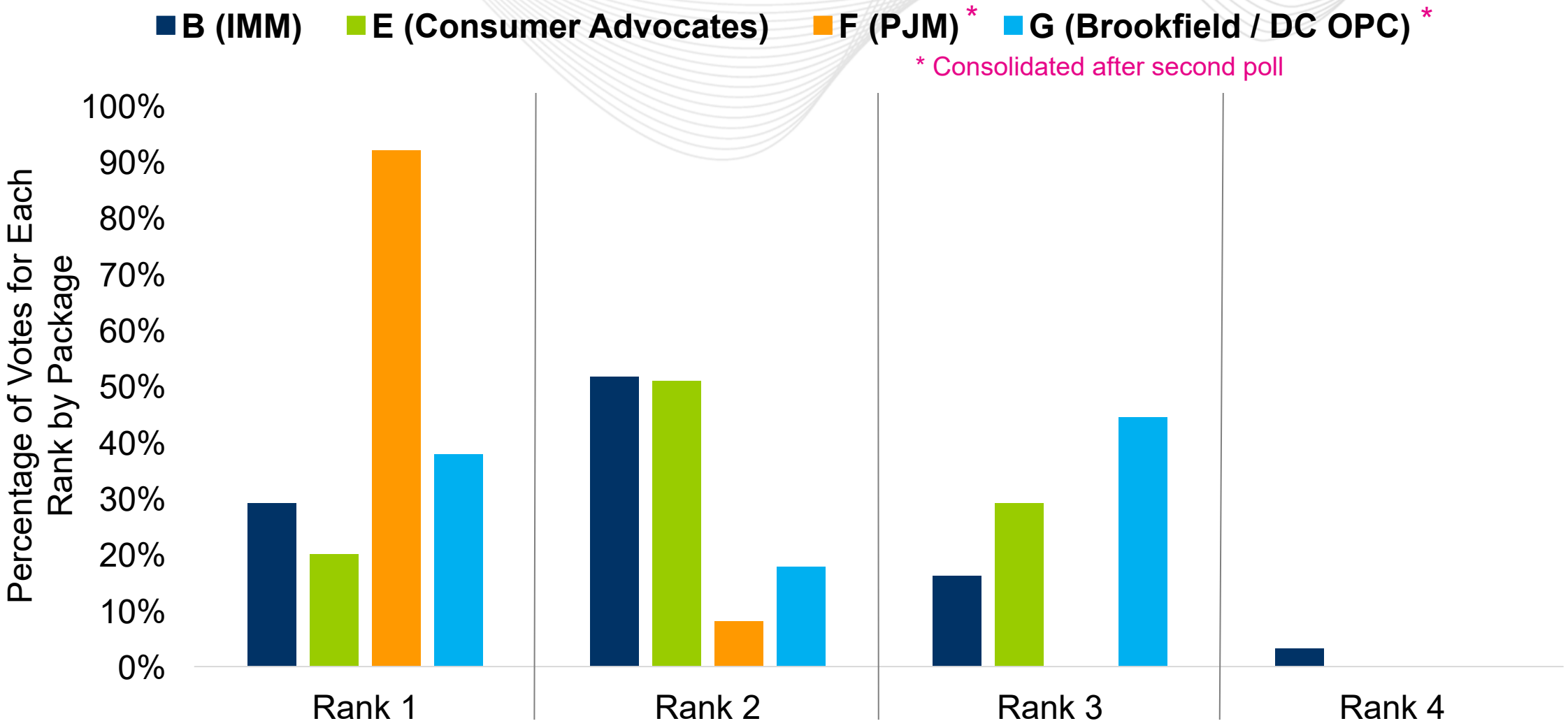
8. If 'No' to #7 (Package F), please provide feedback on which solution option you cannot support and why.

- Packages F & G - REQUIRE updating Emissions component to include waivers and to read as; "Requirements for the Black-Start resources to make best efforts to obtain emission (e.g. Title V) and effluent (e.g. NPDES) permit modifications and or waivers.....". Permit modifications are obtained in early stages of building units and owners normally do not want to make modifications after the permit has been accepted, but could make waiver requests much more easily before or during restoration situations. It's also suggested that PJM adopt Package G's monthly MW 90% confidence level vs. PJMs annual level and combine their packages into one compromised package.
- Any backstop RFP should be designed to discourage utility ownership of generation, if not bar it.
- For PJM Package F, move to a monthly 90% confidence calculation (vs annual 90%)

10. If 'No' to #8 (Package G), please provide feedback on which solution option you cannot support and why.

- Packages F & G - REQUIRE updating Emissions component to include waivers and to read as; "Requirements for the Black-Start resources to make best efforts to obtain emission (e.g. Title V) and effluent (e.g. NPDES) permit modifications and or waivers.....". Permit modifications are obtained in early stages of building units and owners normally do not want to make modifications after the permit has been accepted, but could make waiver requests much more easily before or during restoration situations. It's also suggested that PJM adopt Package G's monthly MW 90% confidence level vs. PJMs annual level and combine their packages into one compromised package.
- Any backstop RFP should be designed to discourage utility ownership of generation, if not bar it.
- We believe Fuel Assured Black Start Resources need to confidently deliver energy 8760 hours per year and not vary monthly.

Package Rankings in Order of Preference (1 = Highest)



Package Rankings

11. Please rank the packages in order of preference. [B /E / F / G]. A ranking of 1 indicates your strongest support. Select N/A if you cannot support a package.

	Rank 1	Rank 2	Rank 3	Rank 4	N/A (Cannot Support)	Weighted Average Ranking Score
Package F	69	6	0	0	38	3.92
	92%	8%	0%	0%		
Package B	9	16	5	1	101	3.17
	29%	52%	16%	3%		
Package G	17	8	20	0	87	2.93
	38%	18%	44%	0%		
Package E	11	28	16	0	84	2.91
	20%	51%	29%	0%		

Additional Comments

12. Is there any additional feedback you wish to provide?

- We should either have requirements for min run times for all units, or don't have requirements for the units min run times.
- Between package F and package G, we prefer the annual assessment over the monthly.
- On the dual pipeline connection, this may be an excessive additional cost to the utility that customers would pay for. This could not occur a short amount of time, so our current understanding is that existing gas plants with firm transportation should be grandfathered versus the gas plant being required to pay for additional interconnection. If a resource has firm long-term transportation, that pays a yearly fixed amount, that then forces customers to pay for additional capacity which may seem excessive. *[Redacted]* has concerns over compensation and whether it is justified to be a Black Start Resource under the current status quo construct, or with any of the proposed packages.

April 2022 Package Polling Results

May 12, 2022

OC/MIC Special Session

Fuel Requirements for Black Start Resources

Package Overview

Package	Proposer	Status
A	PJM	Original from 2019; Removed in 2022
B*	IMM	Current; Updated in 2022
C	Calpine	Removed in 2019
D	DC OPC / Exelon	Removed in 2022
E	Consumer Advocates	Current; Original from 2019
F	PJM	Current; New in 2022
G**	Brookfield / DC OPC	Current; New in 2022

* Updates made after this round of polling

** Submitted after this round of polling opened

Poll Overview

- Intent
  - Compare support for current packages as proposed
  - Identify design components and solution options that require further discussion to refine packages
  - Facilitate stakeholder feedback

- Overall Results
  - Voting Members: 28
  - Affiliate Members: 81
  - Non-Members: 1
  - Total: 110

Questions Targeting Level of Fuel Assurance

Comment Summary

1. Do you believe that fuel assurance requirements for black start resources are necessary for reliability?

	#	%
Yes	69	63%
No	11	10%
Maybe	30	27%

→ Important as lack of fuel assurance can materially impact restoration times, and may avoid single points of failure in restoration plans.

→ Depends on what qualifies as fuel-assured

2. Do you think it is important to have a minimum fuel assurance requirement for black start resources?

	#	%
Yes	69	63%
No	11	10%
Maybe	30	27%

Similar comments to question 1

3. Do you think it is appropriate for the minimum fuel assurance requirement to be one black start site per zone?

	#	%
Yes	49	45%
No	20	18%
Maybe	41	37%

→ Depends on alignment with TO restoration plans

4. Beyond a zonal minimum requirement, should additional fuel assurance investments be made based on defined reliability criteria?"

	#	%
Yes	47	43%
No	11	10%
Maybe	52	47%

- Interest in understanding costs and benefits of this approach
- Depends on alignment with TO restoration plans
- Criteria should better consider changing resource mix

Package Support Questions

5. Can you support Package B?

	#	%
Yes	33	30%
No	77	70%

6. Can you support Package E?

	#	%
Yes	32	29%
No	78	71%

7. Can you support Package F?

	#	%
Yes	59	54%
No	51	46%

Comment Summary

- Needs additional details around what criteria and requirements should be
- Changes to the Reliability Backstop Mechanism may be out of scope

- Concerns about provision for only one fuel-assured BSR per zone
- Needs additional details around what criteria and requirements should be; accounting for updates since hiatus period
- Issues with minimum fuel requirements

- Issues with exceptions to requirements by resource type and minimum fuel requirements
- Concerns about not taking seasonality of renewables into account

Next Steps

- ~~Posting of verbatim comments with attribution (requires stakeholder approval)~~ Verbatim comments with no attribution posted – see following slides
- Review and identify updates to solution packages
- Additional polling to reflect updated set of packages

1. Do you believe that fuel assurance requirements for black start resources are necessary for reliability?

	#	%
Yes	69	63%
No	11	10%
Maybe	30	27%

- Fuel assurance requirements may be necessary to avoid a single point of failure (e.g. single pipeline) in the restoration plan.
- PJM should be responsible for determining whether their should be fuel assurance requirements for Black Start. PJM has demonstrated through analysis that blackstart resource unavailability (whether due to fuel issues or otherwise) can materially impact restoration times, so some level of fuel assurance is prudent.
- Depends on how we determine what qualifies as fuel-assurance.

2. Do you think it is important to have a minimum fuel assurance requirement for black start resources?

	#	%
Yes	69	63%
No	11	10%
Maybe	30	27%

- See question 1
- See answer to Question 1. PJM has done analysis to determine that restoration times can be materially impacted by a lack of fuel assurance. It is important to have a minimum fuel assurance requirement if it material impacts restoration times.
- Depends how fuel assurance is defined; it would seem that in some cases, adequate black start assurance can be achieved through a multi-unit, portfolio-based approach.

3. Do you think it is appropriate for the minimum fuel assurance requirement to be one black start site per zone?

	#	%
Yes	49	45%
No	20	18%
Maybe	41	37%

- See question 1
- Again -- If PJM's analysis determines that one black start site per zone is sufficient/appropriate to limit restoration times then yes.
- PJM analysis demonstrated that unavailability of certain blackstart resources can significantly impact restoration times. These resources should have fuel assurance requirements, or should be rebid through the RFP process to identify more robust restoration solutions.
- Depends on the transmission owner's system restoration plan requirements
- The fuel assurance minimum requirement should make sense in accordance with TO's restoration plans. Transmission zones are not necessarily the corresponding footprint affected in restoration plans.

4. Beyond a zonal minimum requirement, should additional fuel assurance investments be made based on defined reliability criteria?”

	#	%
Yes	47	43%
No	11	10%
Maybe	52	47%

- See question 1
- Again - PJM has done analysis that could support additional fuel assurance requirements beyond the zonal minimum based on cost/benefit.
- Depends on size of zone, Limitations on cranking paths for Black Start units
- Would need to hear from PJM/others on the benefits.
- Fuel Assurance Criteria needs to better consider renewable integration and impact on fuel availability associated with shutdown of end-use customers during black-out.
- Again, as stated in the answer to question 3 we have concerns over having a “zonal” requirement. Instead, the requirement should be commensurate with the Transmission Owner’s restoration plan. It would be better for the TO to determine how their footprint is divided electrically. We also question the DR/DER category of eligible “Black Start Fuel Assurance Solutions by Primary Fuel Types” (cell row 8 of that category, row 24 of the matrix) as DR/DER connected to the sub-transmission or distribution may not be able to be dispatched nor controlled by a Transmission Operator.

Package B (IMM) Support

5. Can you support Package B? (IMM)

	#	%
Yes	33	30%
No	77	70%

- No - not fully developed.
- Package B doesn't appear to identify minimum fuel assurance criteria, but it does say such criteria should be defined.
- TOs should not be permitted to own generation
- Proposal severely lacks details of requirements. Too lax.
- Package B does not provide enough definition around the application of black start facilities beyond the zonal minimum and does not adequately facilitate the participation of intermittent resources.
- We believe this is the best Package of the three. Also, the matrix is clunky as written and hard to follow. It should be streamlined with redundant categories consolidated.
- lacks details
- This package does not establish any new incentives to support enhanced reliability. The proposal also appears to harm reliability with its unnecessary and potentially out of scope changes to the Reliability Backstop Mechanism.

Package E (Consumer Advocates) Support

6. Can you support Package E? (Consumer Advocates)

	#	%
Yes	32	29%
No	78	71%

- Only permits one fuel assured black start resource per zone even if additional resources would be cost effective per the cost benefit analysis.
- Package E fails to account for significant impacts to restoration times beyond a single fuel assured blackstart resource per zone. PJM analysis indicates that certain blackstart resources' unavailability can significantly impact restoration times. Those resources should have fuel assurance requirements or should be rebid through the RFP process to identify more robust solutions.
- No fuel assurance conversions above the one per zone cap.
- We don't believe there should be exceptions to the necessary requirements for specific resource types. The reliability requirement should be determined, and everyone being paid for the service should meet that requirement.
- Proposal severely lacks details of requirements. Too lax.
- Should not be a one per zone cap
- This proposal should be re-evaluated in light of the analytical and technical work done by PJM over the hiatus period.
- insufficient min fuel requirements

Package F (PJM) Support

7. Can you support Package F? (PJM)

	#	%
Yes	59	54%
No	51	46%

- Could support if TOs are not allowed to own generation. PJM could deal with the unlikely outcome of multiple failed RFPs through a tariff waiver at FERC.
- We don't believe there should be exceptions to the necessary requirements for specific resource types. The reliability requirement should be determined, and everyone being paid for the service should meet that requirement.
- Packages B and E appear to better strike the balance of fuel assurance and what qualifies as fuel assurance, noting that this package has improved significantly from pre-hiatus proposals.
- Has enough detailed requirements
- We believe that PJM is assessing the Black Start capability of renewables (including run of river hydro) incorrectly because they are not taking into account the seasonality of renewables. They are essentially looking at the worst 10% production days of the year (36 days per year) and using that as their 90% 16 hour MW assessment for the entire year. They should be doing this assessment on a monthly basis and looking at the worst 10% production days for each month (3 days per month). Assessing 90% for each month is already extremely conservative, but PJM is going way beyond that, which is unreasonable and overly conservative for renewables.
- insufficient min fuel requirements

Additional Feedback

- In summary -- PJM should determine if and how many black start resources should be fuel assured to insure the restoration times are not excessive and based on reliability impacts and cost benefit. Should PJM determine that some number of black start resources should be fuel secure, then it is important that all black start resources (both fuel assured and non-fuel assured) are treated fairly and allowed to recover any costs they have incurred to become black start resources.
- We are generally supportive of Package F, but believe fuel assurance requirements beyond a single resource per zone and those identified by the 10 hour restoration impact analysis could be reasonable. Blackstart restoration circumstances are unpredictable and subject to many varying factors, which we cannot predict. Having predictable performance from blackstart resources (i.e. ensuring they are not on a fuel based outage) is one factor we can control in these events, and it seems prudent to do so, particularly given the costs sited in PJM's original proposal that required fuel assurance from a broader set of blackstart resources.
- Future work efforts should further explore ways to integrate renewable and storage resources into Black Start plans. As noted in Brattle Quad report, developers are moving away from dual-fuel capability given economics and permitting considerations. Consider further exploration of demand reduction impact on black start (as previewed in B. Fitzpatrick Mar. 10 presentation on Gas Risk Assessment), and any impact on how fuel assurance should be considered; one of the few times that demand side reaction to system conditions has been explored. Further explore any special pipeline rules for system restoration.
- While PJM’s overall approach is fundamentally sound, the use of annual MW assessment as opposed to monthly MW assessment for calculating the confidence level for hydro and intermittent resources should be revisited. The use of an annual confidence level MW assessment is unnecessarily conservative and does not accurately represent the ability of these resources to provide black start service on a seasonal basis. Calculating the confidence interval on a monthly basis will not only facilitate the participation of hydro and intermittent resources, but will allow PJM to procure black start service at a lower cost, particularly in jurisdictions with significant decarbonization requirements.
- We believe that PJM is assessing the Black Start capability of renewables (including run of river hydro) incorrectly because they are not taking into account the seasonality of renewables. They are essentially looking at the worst 10% production days of the year (36 days per year) and using that as their 90% 16 hour MW assessment for the entire year. They should be doing this assessment on a monthly basis and looking at the worst 10% production days for each month (3 days per month). Assessing 90% for each month is already extremely conservative, but PJM is going way beyond that, which is unreasonable and overly conservative for renewables.
- Package A is missing no minimum levels specified. Hydro requirements fail to account for no and low flow conditions