ENVIRONMENTAL SECTOR'S COMMENTS ON

MTEP21 EGEAS RESULTS AND SITING CRITERIA

MISO FEEDBACK REQUEST: Please provide feedback on the draft MTEP21 expansion, potential sites, and siting criteria ***by July 24th*** via the MISO Feedback portal, and send any questions or attachments to mtepfutures@misoenergy.org

- Unit Siting Bus Locations – Please inform if site is not feasible (including why) and provide an alternate siting location
- CCS and Battery siting – Please provide feedback if there are specific buses that these resources should be sited at in your respective area/territory

MTEP21 Slidedeck from 7-13-20:
https://cdn.misoenergy.org/20200713%20Futures%20Resource%20Expansion%20&%20Siting%20Review%20for%20MTEP21459261.pdf

MTEP21 Excel Spreadsheet with siting from 7-13-20:
https://www.misoenergy.org/events/mtep-futures-workshop---july-13-2020/

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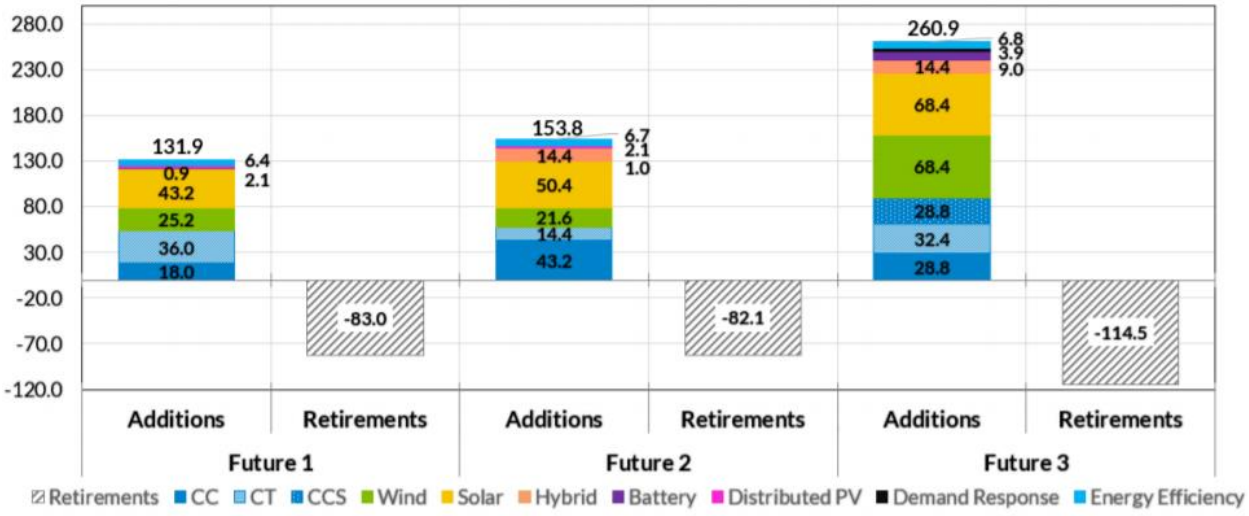
The EO Sector appreciates the opportunity to provide comments to MISO regarding the most recent MTEP21 meeting, held on July 14, 2020. Generally, the EO Sector supports MISO's direction on the MTEP21 Futures process, and we encourage MISO staff to continue interacting with stakeholders and solicit feedback. We also encourage MISO to provide additional details about each future, including percentage of energy requirements met with renewable energy, trajectory of carbon emission reductions over time, and geographic and temporal granularity on retirements occurring in each Future. As discussed in more detail below, the results presented at the July 14th workshop indicate Future 1 and 2 may still be overly conservative and this additional information would help stakeholders better understand how these Futures do or do not reflect our understanding of ongoing and near term changes to MISO's resource portfolio.

Draft Capacity Additions by Future, MTEP21 (2020-2039)



Source: MISO 2020[1]

Futures Results

Capacity additions of new wind, solar, hybrid, and battery resources in the draft results of the MTEP21 show 69.3 GW added in Future 1, 87.4 GW in Future 2, and 160.2 GW in Future 3. These draft results show Future 1 and 2 are likely to be unrealistically conservative compared to the pace we expect to see across the MISO system in coming years. Some of the key indicators of this from the limited data MISO provided include:

- Only an 18 GW increase in renewable capacity in Future 2 compared to Future 1, Particularly considering the steep jump in renewables (73 GW) from Future 2 to Future 3.
- Wind additions *decline* by 3.6 GW from Future 1 to Future 2.
- Energy storage additions are unreasonably low and remain relatively unchanged from Future 1 to Future 2. The anticipated addition of just 1 GW of storage over the next two decades seems unreasonably low, particularly given the 2.7 GW of storage currently in the queue. This is likely due to EGEAS, as an LDC model, is unable to see the value in energy storage and therefore not deploy it adequately.
- No hybrid resources are included in Future 1. This is unrealistically low, especially given that Entergy Arkansas has already contracted for hybrid resources in 2020[2] and over 2.5 GW of hybrid resources are currently in the MISO Queue.[3]
- In addition, we also note the following from slide 5 of the July 14th presentation:
    - Hybrid resources do not increase from Future 2 to Future 3, remaining at a flat 14.4 GW. It is more likely that hybrid resources will increase between Future 2 to Future 3, as opposed to adding the full 28.8 GW of new CCS.

[1] https://cdn.misoenergy.org/20200713%20Futures%20Resource%20Expansion%20&%20Siting%20Review%20for%20MTEP21459261.pdf

[2] https://solarindustrymag.com/arkansas-public-service-commission-approves-searcy-solar-project

[3] https://www.betterenergy.org/blog/hybrid-resources-are-coming-to-miso-an-emerging-opportunity/

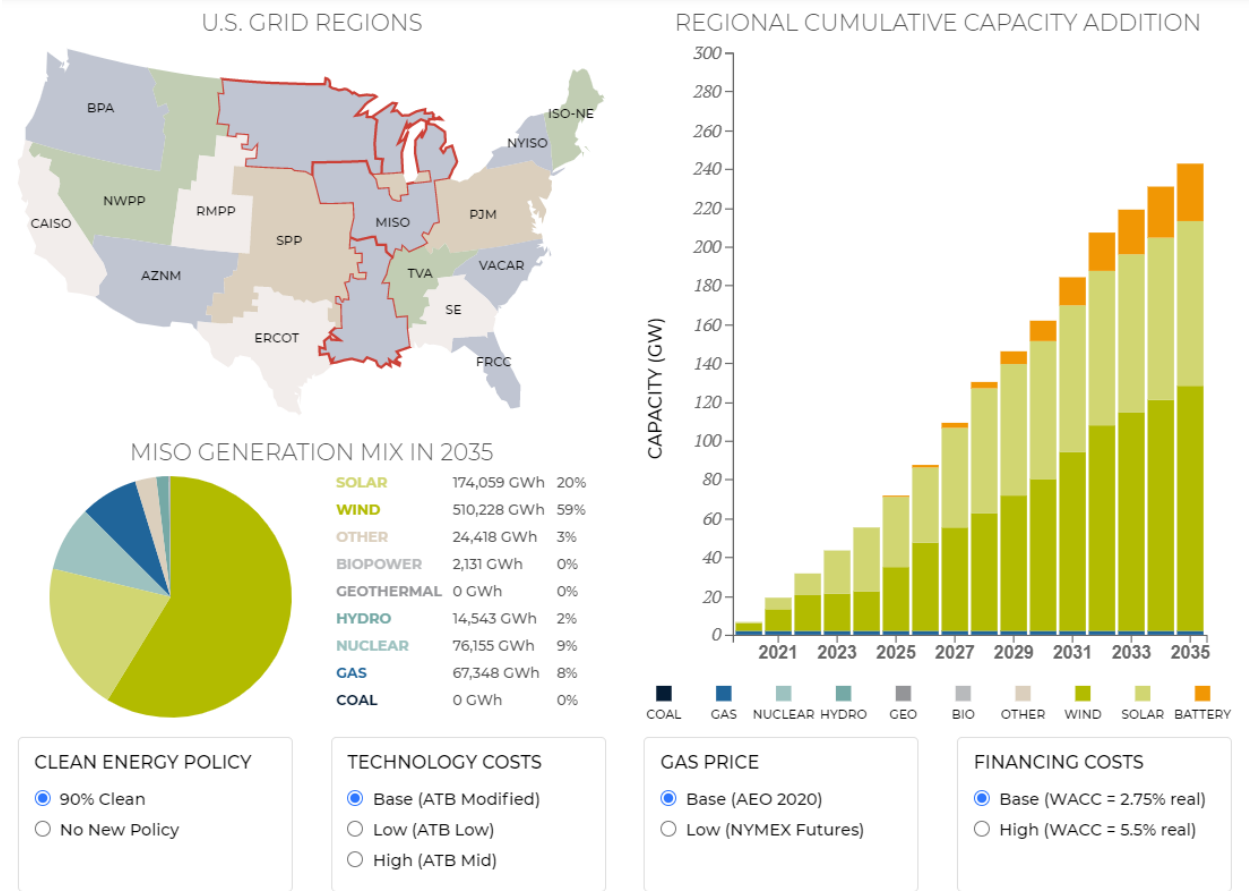
- It appears that distributed PV was not included in the chart provided at the meeting, if this is the case, we request MISO provide those data.

GW's by MISO Future (MTEP21)

	Future 1	Future 2	Future 3
Retirements	83	82.1	114.5
CC	18	43.2	28.8
CT	36	14.4	32.4
CCS	0	0	28.8
Wind	25.2	21.6	68.4
Solar	43.2	50.4	68.4
Hybrid	0	14.4	14.4
Battery	0.9	1	9
DGPV	n/a	n/a	n/a
DR	2.1	2.1	3.9
EE	6.4	6.7	6.8

Recently, the UC Berkeley's Center for Environmental Public Policy, GridLab, and Energy Innovation released a new study to evaluate a 90% clean energy scenario, nationally by 2035. The 2035 Report[4] data available show MISO could anticipate approximately 10GW of energy storage by 2030, and over 30 GW by 2035. BNEF's 2019 Long-Term Energy Storage Market Outlook forecasts that MISO may have 1 GW of energy storage installed by 2023, 5 GW by 2029, 10 GW by 2034 and nearly 15 GW by 2040. This is additional evidence that MISO's model is too conservative in its storage additions in all futures.

[4]http://www.2035report.com/wp-content/uploads/2020/06/2035-Report.pdf?hsCtaTracking=8a85e9ea-4ed3-4ec0-b4c6-906934306ddb%7Cc68c2ac2-1db0-4d1c-82a1-65ef4daaf6c1



Source: GridLab 2020[5]

Site Feasibility

The EO Sector has reviewed the sites provided; however, more information is necessary regarding capacity by LRZ to accurately assess siting feasibility. In addition to capacity, information regarding timing and Future-specific installations is needed. Of the information given, several notable trends warrant discussion.

- In the previous MTEP, solar siting in MISO South was heavily based in Mississippi. This MTEP21 siting appears to continue the trend of siting significant quantities of solar in Mississippi, with considerably less solar in Arkansas or Louisiana. In Arkansas, several solar facilities are already operational and there are likely plans for more additions by both Entergy Arkansas and Arkansas Electric Cooperative. In Louisiana, Entergy Louisiana has issued a 300 MW solar RFP, Lafayette Utilities System plans to issue an RFP for potentially 250 MW of solar (or more), Cleco previously announced a 500 MW RFP for renewables, the 1803 Cooperatives RFP process had many renewable energy projects submitted, and the New Orleans City Council is most interested in a 100% net zero emission mandate by 2040.[6] Louisiana Governor John Bel Edwards has also established

[5] https://www.2035report.com/data-explorer/
[6] https://www.all4energy.org/uploads/1/0/5/6/105637723/2020_04_16_ud-19-01_cno_r-20-104_guidance_re._rps_and_est_proc_sched_.pdf

a Climate Initiatives Task Force.[7] The Louisiana PSC is also evaluating a Green Tariff Docket. As such, LRZ8's and LRZ9's utility-scale renewable portion in the MTEP21 should be increased.

- Alternatively, LRZ9's high level of DGPV sites compared to LRZ8 and LRZ10 seems unusually high, given Louisiana's recent decisions to reduce net metering incentives.[8]

Draft MTEP21 Sites By LRZ

	Solar	Wind	DGPV	CIDSM
LRZ 01	9	82	127	36
LRZ 02	3	16	119	1
LRZ 03	1	54	46	22
LRZ 04	6	19	60	10
LRZ 05	4	10	31	5
LRZ 06	9	11	120	34
LRZ 07	4	25	40	14
LRZ 08	2	1	20	10
LRZ 09	7	1	120	26
LRZ 10	15	2	38	20

Battery Siting

MISO proposes new siting methodology for energy storage. The EO Sector requests MISO provide maps and narrative descriptions of proposed siting methodologies and locations to better explain its proposals. Because stand alone energy storage business models are still evolving with no single best practice, the EO Sector recommends MISO use its proposed methodology, in addition to some additional options, to diversify the energy storage sites. By diversifying the ways energy storage is sited, modeling robustness risk and accuracy is diversified.

Energy storage siting based on areas with the "highest transmission distribution capacity" may be just one type of business model. Stand-alone energy storage resources are also likely to be deployed in areas that need voltage or frequency support, that can also provide energy arbitrage opportunities. Even if an energy storage unit is not directly connected to a renewable energy resource, it is likely that a number of storage facilities will be located in near proximity to planned new generation projects. For example, SPP is planning on siting energy storage near solar and wind energy facilities in future ITP processes.[9] The EO Sector recommends that MISO locate some portion of energy storage resources at top load buses, near areas needing voltage or frequency support, and near new planned resources (perhaps as one-third, each). Additionally, the most recent GI window may provide updated siting information that should be used for a Tier-type methodology, like other generation technologies.

[7] https://gov.louisiana.gov/index.cfm/newsroom/detail/2380
[8] https://pv-magazine-usa.com/2019/09/12/louisiana-guts-net-metering/
[9] https://spp.org/Documents/61412/eswg%20agenda%20&%20background%20materials%2020200205%2006.zip

Given the complexity related to energy storage, energy storage forecasts, business case models, and potential siting recommendations, a more dedicated focus on energy storage is needed. While the Energy Storage Task Force has been retired, MISO should consider reviving the ESTF or creating a new “storage modeling task force” to accelerate better energy storage modeling in MISO planning.

CCS Siting

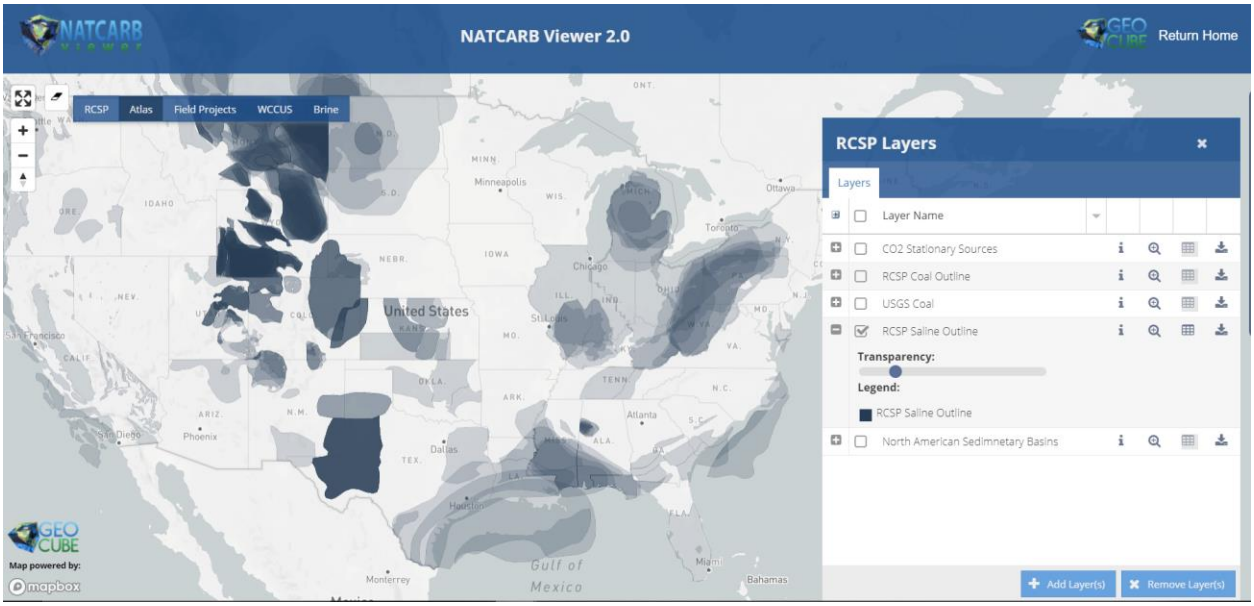
The EO Sector appreciates MISO’s efforts to resolve the higher levels of surplus energy in Future 3. Traditionally, surplus energy has been resolved in modeling exercises by either expanding transmission or curtailing generation resources. In sum, MISO’s modeling suggests that building surplus renewable energy is still a lower-cost option than adding fuel-based zero-carbon resources and is not necessarily an indication of flawed modeling, particularly given MISO’s regional-focused approach that does not consider increased capacity to move energy interregionally. Larger amounts of surplus renewable energy alone is not sufficient to justify forcing natural gas carbon capture and sequestration (CCS) into the model.

We encourage MISO to further evaluate stand-alone energy storage and hybrid resources as alternatives to the CCS built in Future 3 and are concerned that MISO risks falling behind the evolution of battery storage technology like it has for wind and solar resources over the past several years. Given the trajectory of cost and performance improvements over the past few years, we expect these resources to out-compete CCS and we request MISO evaluate opportunities to increase opportunities for storage and hybrid resources while reducing CCS deployment. At a presentation given by GTM Research in 2018, cost forecasts for energy storage showed that within ten years, energy storage would always be the cheaper option compared to new combustion turbine gas units.[10] Under Future 3, it is reasonable to expect fuel-sector greenhouse gas reduction policies in conjunction with electricity and transportation sector policies already reflected in Future 3, meaning CCS will not be considered a "zero-emission" resource given significant upstream greenhouse gas emissions. At a minimum, we would request MISO review the latest cost and performance assumptions released through the 2020 ATB that was published in June. Further, we recommend MISO evaluate its various planning and forecasting software programs to determine if improved software suites are needed.

MISO staff have created some new siting methodology recommendations regarding natural gas CCS. As one parameter, MISO staff recommended using a map of viable locations for long-term CO2 storage; however, the map provided appears to include multiple geologic formations, including formations that are typically used for advanced petroleum recovery efforts - something that is less likely to take place in a low-carbon future. As such, perhaps only geographies with

[10] GTM Research (March 1, 2018). Will energy storage replace peaker plants? [https://event.on24.com/eventRegistration/EventLobbyServlet?target=reg20.jsp&partnerref=UtilityDive&eventid=1588963&sessionid=1&key=D819B894CB820C7457242C81A9C81644&regTag=&sourcepage=register]

saline-based geologic formations should be considered.[11] Salt dome caverns are well-known facilities that could be repurposed for long-term greenhouse gas emission storage.



Further, while we agree that siting CCS resources in areas with easy access to CO2 storage locations will reduce costs, all other things being equal, we encourage MISO to also consider the potential interconnection costs, line loses, and other cost elements of these resources if sited in remote or weak areas of the MISO grid. Pipeline construction for CO2 will add cost to a CCS project, but project developers will ultimately weigh that against other costs such as these to find optimal sites.

NREL ATB Update

The National Renewable Energy Lab (NREL) just recently released its newest version of the Annual Technology Baseline (ATB) for 2020. The EO Sector supports MISO's use of the NREL ATB, as it is now the industry standard for resource planning data inputs for many utilities in the MISO footprint. NREL is hosting a webinar on the new version on July 27th, and we encourage MISO staff and MISO stakeholders to attend.[12] The new NREL ATB data are available here: https://atb.nrel.gov/

[11] https://pubs.usgs.gov/circ/1386/
[12] Register here: https://register.gotowebinar.com/register/835846948552965131