



Item 7.1: System Planning and Weatherization Update

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Reliability and Markets Committee Meeting

ERCOT Public

June 17, 2024

Overview

- **Purpose**

Provide an update on recent activity related to planning, modeling, generation interconnection, resource adequacy and weatherization

- **Voting Items / Requests**

No action is requested of the Reliability and Markets (R&M) Committee or Board; for discussion only

- **Key Takeaways**

- Summer preparation efforts in System Planning & Weatherization were a top priority to be ready for the upcoming season.
- Forecasted load growth coupled with the evolution of generation types and locations have led to Extra High Voltage (EHV) infrastructure consideration to reliably and efficiently facilitate large power transfer across the system.
- Development of the PUC directed Permian Basin Reliability Plan is ongoing to identify transmission needed to accommodate the significant forecasted Load growth in the area.
- Solar and Battery Energy Storage continue to account for the vast percentage of generation capacity requesting new interconnection studies.
- ERCOT recently filed Revision Requests to establish new interconnection and modeling requirements for large loads as they continue to connect to the grid.
- ERCOT continues working with the PUC to make progress on the Reliability Standard, Value of Lost Load and Cost of New Entry studies.

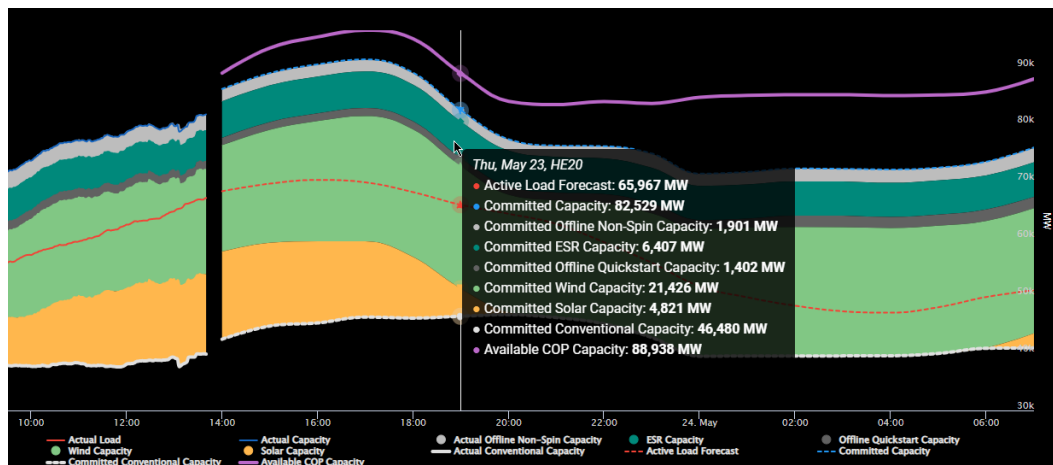
Weatherization and Inspection – Summer Preparations

- Multiple in-person and virtual training sessions for the new weatherization and inspection software portal were conducted in April and May.
 - Approximately 600 Market Participant personnel attended at least one training session.
- An in-person Summer Weatherization Workshop was held on April 26th to review summer weatherization requirements and share best practices.
- On May 1st, the new software for submission of Declarations of Summer Weather Preparedness went live.
- June 1st marked the last day for summer declaration submission and the beginning of the Summer inspection season.
- ERCOT anticipates performing at least 300 generation resource and 300 Transmission Service Provider (TSP) inspections this summer.



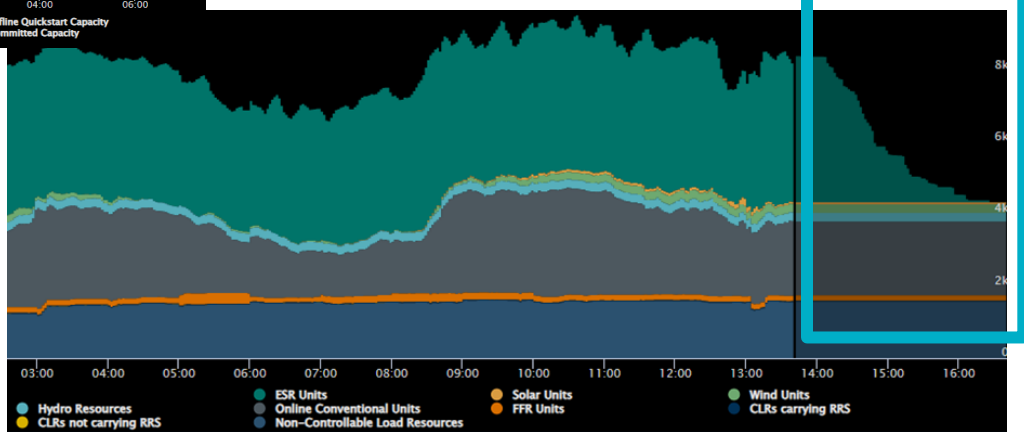
Grid Applications Development – Summer Preparations

Internal tool development to continue to improve situational awareness, especially due to reliance on duration limited Resources.



Key Takeaway: To continue to improve situational awareness, ERCOT has developed several new Control Room displays in advance of Summer.

ESR capacity is now shown in a separate series for tracking near term forecasts of expected committed capacity margin.



A forward-looking calculation has been developed to visualize the duration limited nature of storage devices if deployed at maximum discharge.

Monthly Outlook on Resource Adequacy (MORA)

Key Takeaway: Energy Emergency Alert (EEA) risk is negligible for July. Risk increases in August during evening hours due to higher demand, lower wind and solar generation, and battery limited duration.

July

Hour Ending (CDT)	EMERGENCY LEVEL		
	Chance of Normal System Conditions	Chance of an Energy Emergency Alert	Chance of Ordering Controlled Outages
	Probability of CAFOR being above 3,000 MW	Probability of CAFOR being less than 2,500 MW	Probability of CAFOR being less than 1,500 MW
1 a.m.	100.00%	0.00%	0.00%
2 a.m.	100.00%	0.00%	0.00%
3 a.m.	100.00%	0.00%	0.00%
4 a.m.	100.00%	0.00%	0.00%
5 a.m.	100.00%	0.00%	0.00%
6 a.m.	100.00%	0.00%	0.00%
7 a.m.	100.00%	0.00%	0.00%
8 a.m.	100.00%	0.00%	0.00%
9 a.m.	100.00%	0.00%	0.00%
10 a.m.	100.00%	0.00%	0.00%
11 a.m.	100.00%	0.00%	0.00%
12 p.m.	100.00%	0.00%	0.00%
1 p.m.	100.00%	0.00%	0.00%
2 p.m.	100.00%	0.00%	0.00%
3 p.m.	100.00%	0.00%	0.00%
4 p.m.	100.00%	0.00%	0.00%
5 p.m.	100.00%	0.00%	0.00%
6 p.m.	100.00%	0.00%	0.00%
7 p.m.	100.00%	0.00%	0.00%
8 p.m.	99.83%	0.02%	0.00%
9 p.m.	98.33%	0.48%	0.27%
10 p.m.	99.54%	0.12%	0.03%
11 p.m.	99.99%	0.00%	0.00%
12 a.m.	100.00%	0.00%	0.00%

Note: Probabilities are not additive.

August

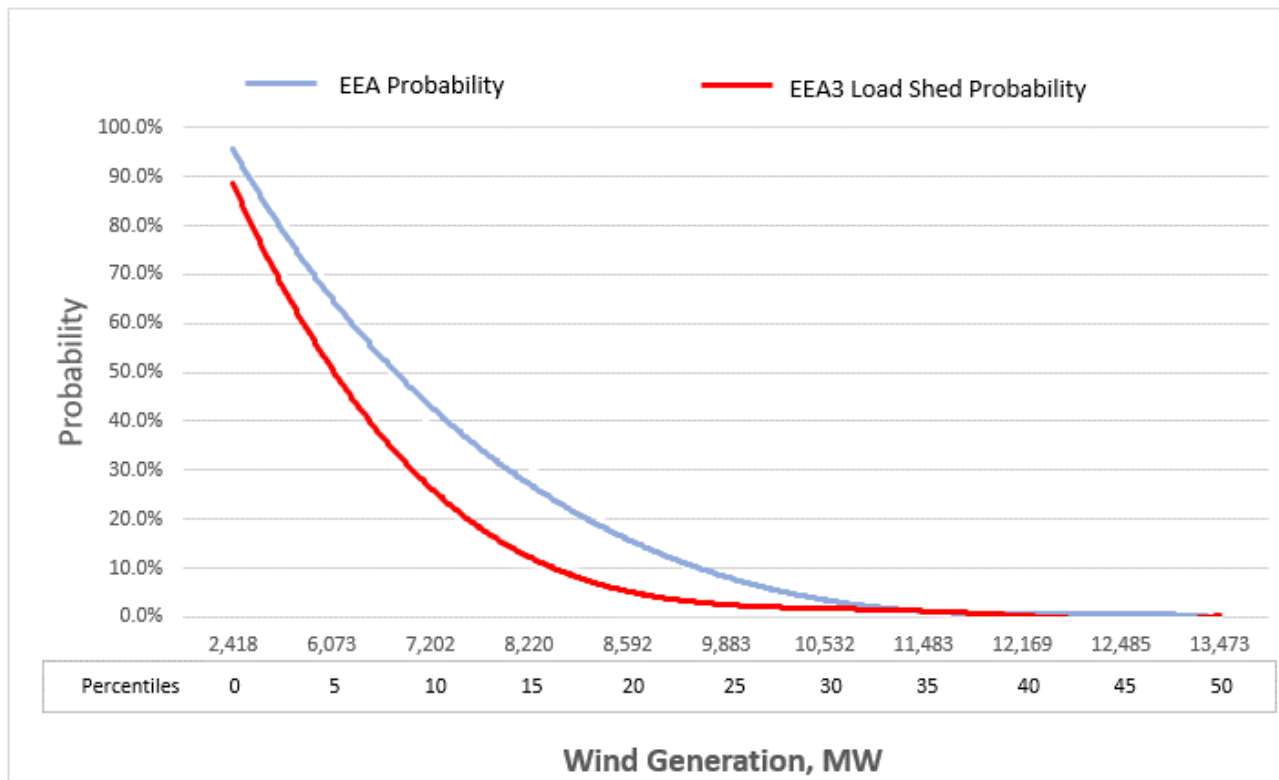
Hour Ending (CDT)	Chance of Normal System Conditions	EMERGENCY LEVEL	
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1 a.m.	100.00%	0.00%	0.00%
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4 a.m.	100.00%	0.00%	0.00%
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6 a.m.	100.00%	0.00%	0.00%
7 a.m.	100.00%	0.00%	0.00%
8 a.m.	100.00%	0.00%	0.00%
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11 a.m.	100.00%	0.00%	0.00%
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1 p.m.	100.00%	0.00%	0.00%
2 p.m.	100.00%	0.00%	0.00%
3 p.m.	100.00%	0.00%	0.00%
4 p.m.	100.00%	0.00%	0.00%
5 p.m.	99.97%	0.00%	0.00%
6 p.m.	99.94%	0.02%	0.01%
7 p.m.	99.67%	0.04%	0.02%
8 p.m.	88.19%	4.68%	2.88%
9 p.m.	72.01%	16.33%	12.02%
10 p.m.	88.73%	4.58%	2.54%
11 p.m.	99.16%	0.06%	0.00%
12 a.m.	100.00%	0.00%	0.00%

Note: Probabilities are not additive.



August MORA: Low Wind Risk Profile for Hour Ending 9pm

- To create a low wind risk profile for 9pm on the August peak load day, the model's hourly wind generation probability distributions are replaced with fixed values corresponding to a range of percentile values.
- All model runs are restricted to fixed wind values pulled from historical August days.
- EEA probabilities are depicted for various wind percentile values.



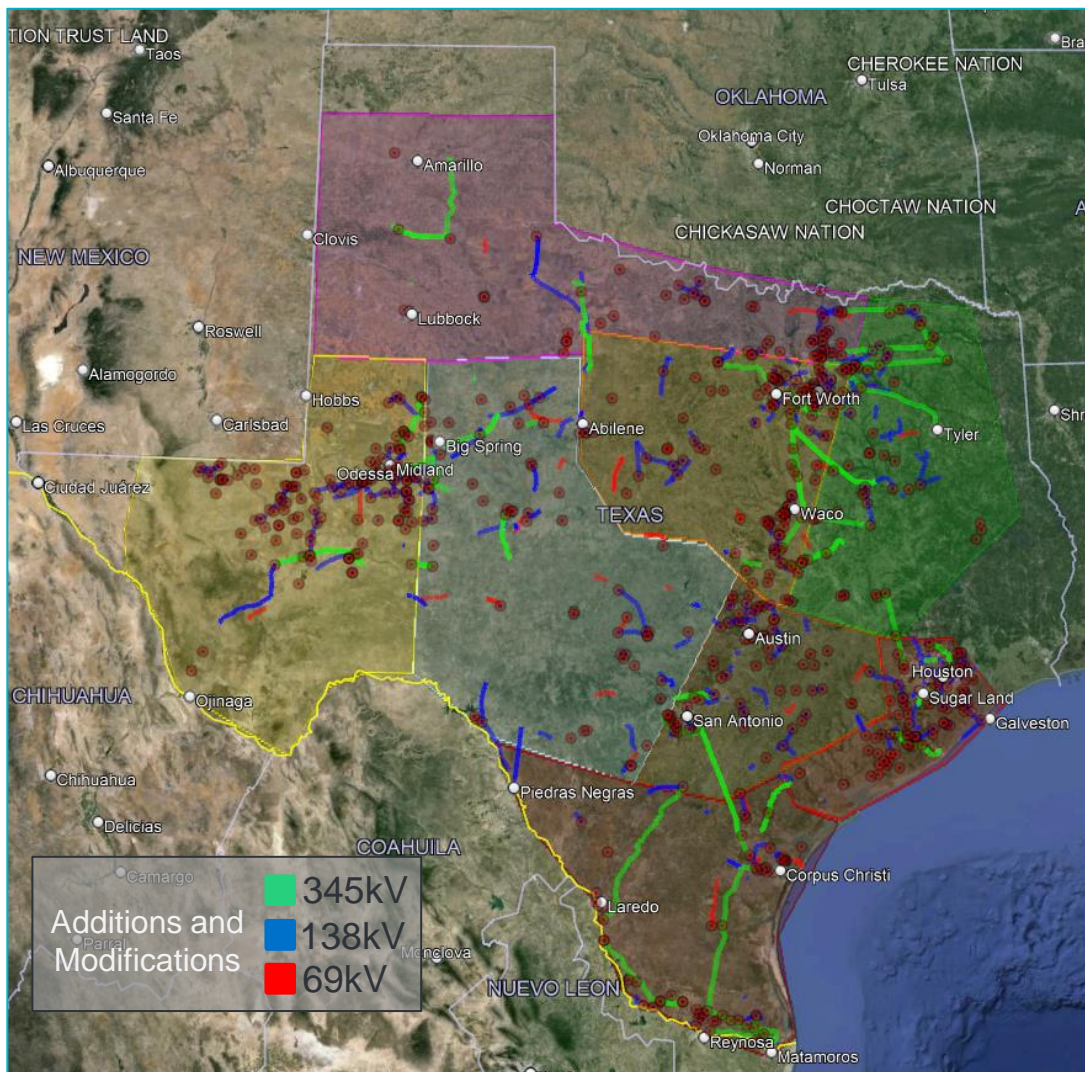
Network Operations Model Updates Prior to Summer

The Network Operations Model is a key input for the Energy and Market Management System applications as the starting point for future use cases including planning, CRR and operations models.

For January through May 2024 ERCOT has processed the following model changes:

- Estimated Line Length – 300+ mi.
- Substations – 116
- Generators – 50+
- Transformers – 64

Key Takeaway: A large volume of work is required to maintain the network model for an evolving grid.

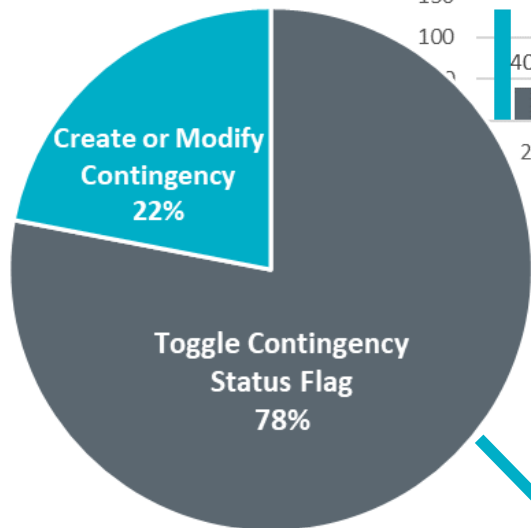
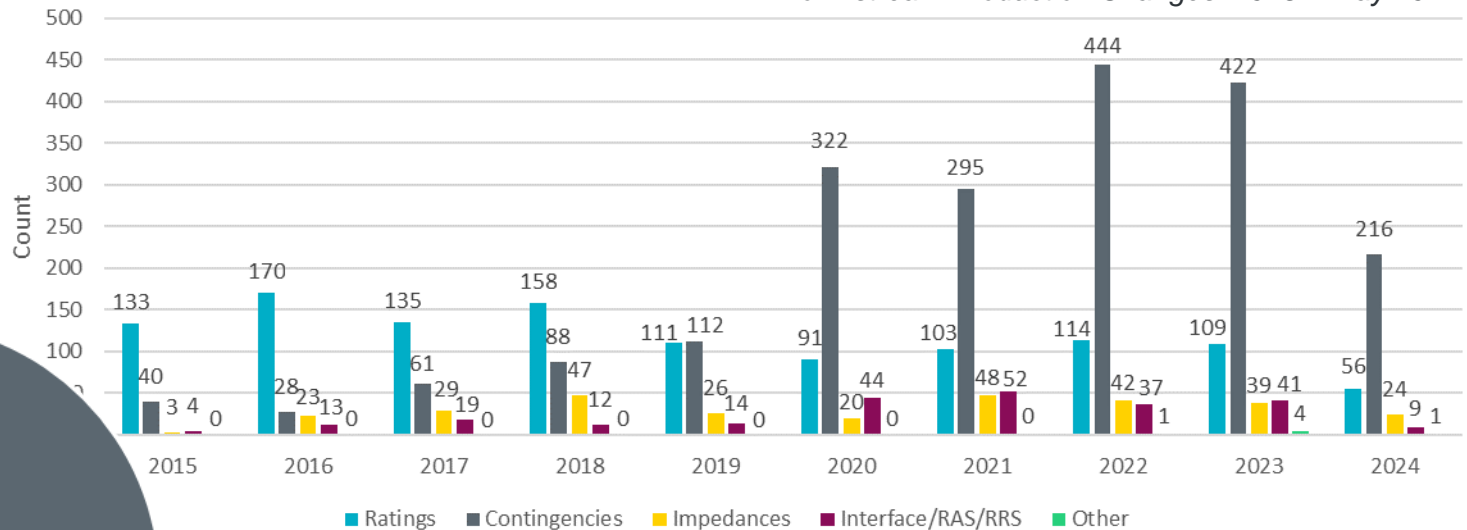


Visualization of ERCOT modeling changes, including additions and modifications, in 2024

Downstream Production Changes (DPC)

The DPC process allows TDSPs and ERCOT to request changes to the currently in-use Production model without loading a new model. Only pre-approved types of changes are considered.

Downstream Production Changes: 2015 – May 2024



Types of contingency-related DPCs

In 2020, ERCOT formalized processes for transitory contingency definitions needed during construction phases of projects thus causing an increase in DPCs.

The majority of contingency-related changes are to keep the model synchronized with field construction.

Key Takeaway: ERCOT actively manages to minimize the number of DPCs.

New Era of Planning Update – EHV Considerations

- An evolving generation mix has resulted in increased distance between generation sites and demand centers.
- With the increase in large loads projected to move to Texas, the preliminary 2024 Regional Transmission Plan (RTP) study results indicate a need for substantial new transmission infrastructure to serve the forecasted load growth.
- ERCOT is considering new EHV transmission lines (765 kV or 500 kV double circuit) as an alternative to only adding new 345 kV in the 2024 RTP.
- Benefits of higher voltage transmission include:
 - Increased transfer capability to load centers
 - Flexibility on Generation Resource siting
 - Outage coordination capacity
 - Reduced impact to Texas consumers due to less Right of Way requirements
 - Lower line losses
 - Possible retirement of series compensation devices
 - Potential exit strategy for some current Generic Transmission Constraints

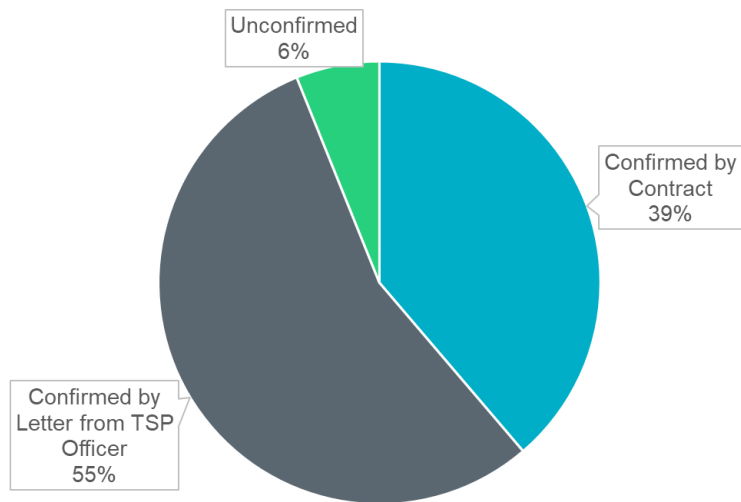


Key Takeaway: Forecasted load growth coupled with the evolution of generation types and locations have led to EHV infrastructure consideration to reliably and efficiently facilitate large power transfer across the system.

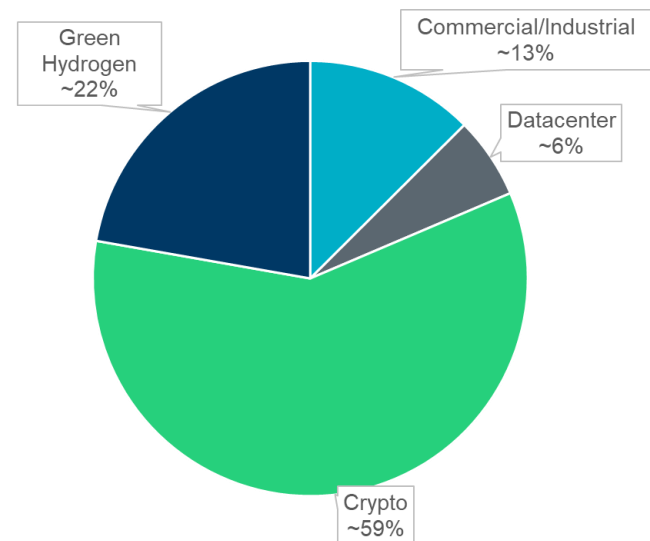
Permian Basin Reliability Plan Study – Update

- Per House Bill 5066 (HB5066), the PUC directed ERCOT to develop a Permian Basin Reliability Plan and file a final plan at the Commission no later than July 2024.
- Based on Load forecast data provided by the TSPs, ERCOT is studying a total Permian Basin Load for 2030 of 23,659 MW (11,964 MW oil & gas and 11,695 MW additional Load).

Breakdown for 11,695 MW of additional non-oil & gas load by confirmation status



Breakdown for 11,695 MW of additional non-oil & gas load by type



- Initial study indicates substantial amounts of local transmission projects will be needed to serve incremental Loads in the Permian Basin region in 2030 & 2038. In addition, significant regional transmission upgrades will be needed to transfer power across the ERCOT System in 2038.
- ERCOT has been providing study updates at monthly Regional Planning Group meetings and will host a workshop on June 28, 2024 to present the Permian Basin Reliability Plan Study.
- ERCOT is on track to file its final plan at the PUC by the end of July.

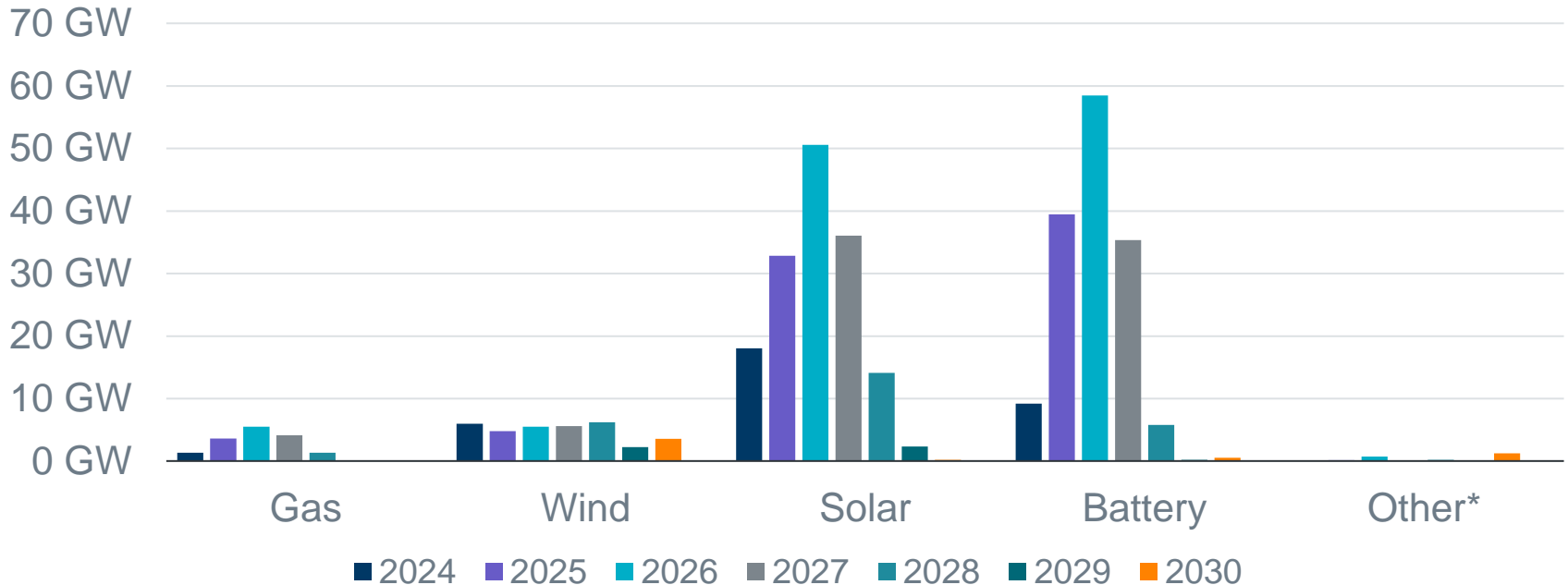


Key Takeaway: With the increased load growth forecast for the Permian Basin area, significant local and regional transmission projects will be required.

Generation Interconnection Requests

1,813 active generation interconnection requests totaling 355 GW as of May 31, 2024
 (Solar 154 GW, Wind 34 GW, Gas 16 GW, and Battery 149 GW)

(Excludes capacity associated with projects designated as Inactive per Planning Guide Section 5.7.6)



A break-out by zone can be found in the monthly Generator Interconnection Status (GIS) reports available on the ERCOT Resource Adequacy Page: <http://www.ercot.com/gridinfo/resource>

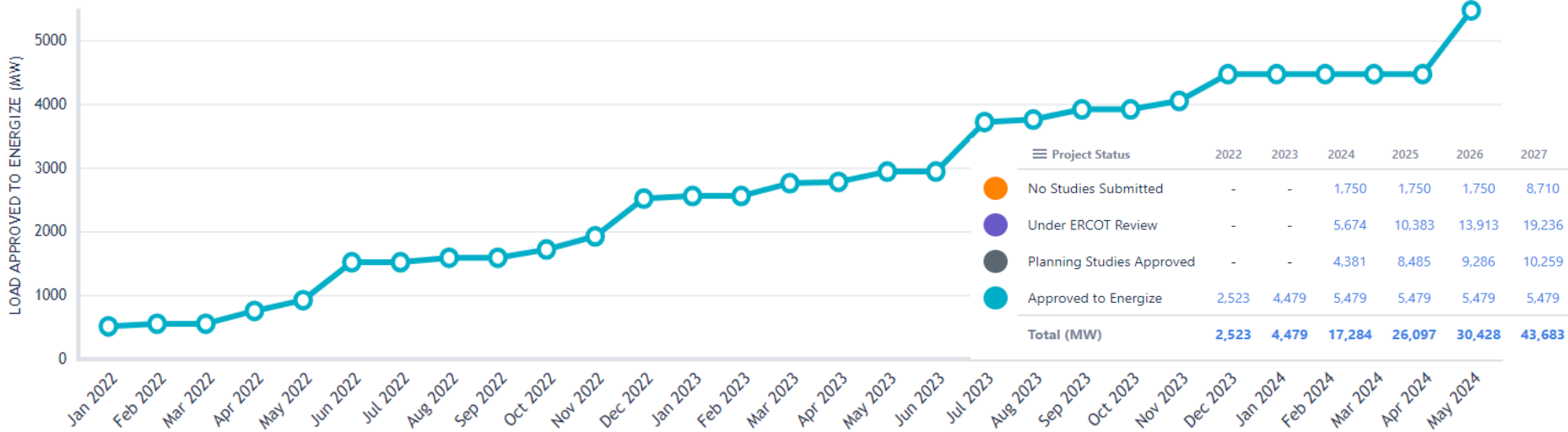
* Other includes petroleum coke (pet coke), hydroelectric, fuel oil, geothermal energy, other miscellaneous fuels reported by developers, and fuel cells that use fuels other than natural gas.

Key Takeaway: Solar & Battery Energy Storage account for approximately 86% of the generation seeking interconnection. New requests as a result of the Texas Energy Fund will be flagged in future reports as they enter the ERCOT queue.



Large Load Integration Overview

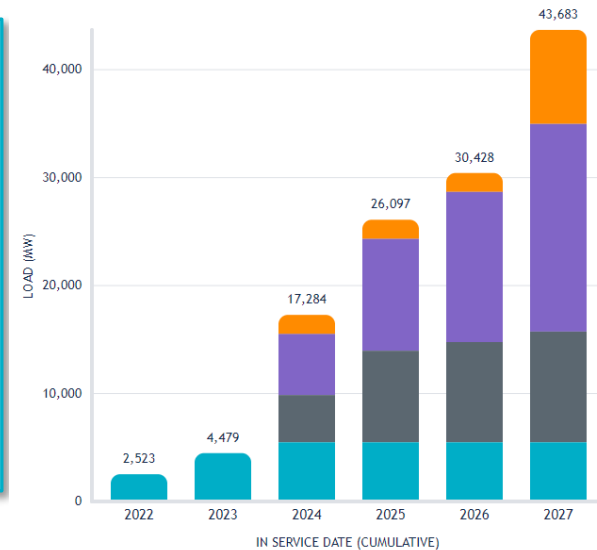
Large Loads Approved to Energize - Growth Since 2022



Key Takeaways

- ERCOT recently filed NPRR1234 and PGRR115 to establish new interconnection and modeling requirements for large loads.
- 5,479 MW of Large Load have been approved to energize in the past 2 years.
 - Of these, 2,991 MW is believed to be operational
 - Remaining 2,488 MW may energize at any time without additional approval
- The amount of Large Load connected to the ERCOT grid is projected to continue growing rapidly.

Actual and Projected LFL Growth 2022-2027



Reliability Standard, VOLL, and CONE Study Updates

- Reliability Standard:
 - In May, Commissioners agreed to PUC Staff’s Reliability Standard proposal as outlined in Commission Staff’s memo:
 - 0.1 Frequency (Expected loss-of-load event once every 10 years)
 - 12-hour maximum event duration with 1% exceedance probability
 - Maximum magnitude determined by ERCOT analysis of load shed that can be safely rotated during an event; Commissioners will seek public comments on the proposed 0.25% exceedance probability
 - Initial review of the Reliability Standard starting in January 2026 (to align with market design review), and every five years thereafter
 - PUC Staff’s Proposal for Publication was filed June 5, 2024 and Commission is expected to consider June 13, 2024
- Value of Lost Load (VOLL):
 - VOLL survey closed in May; Final VOLL report expected by end of August
- Cost of New Entry (CONE) Study
 - Results presented at the May Supply Analysis Working Group
 - ERCOT filed a draft with the Commission June 6, 2024



May 2024 Capacity Demand and Reserves (CDR) Report

The CDR report is to provide forecasted Planning Reserve Margins for ERCOT summer and winter Peak Load Seasons.

	2025	2026	2027	2028	2029
Loads and Resources (in MW)					
Total Summer Peak Demand (assuming normal weather before reductions from Energy Efficiency Programs)	87,962	89,655	91,396	92,880	94,132
Firm Peak Demand	80,639	81,520	82,309	82,689	82,677
Total Capacity	115,596	125,854	130,656	131,385	132,312
Reserve Margin					
(Total Resources - Firm Load Forecast) / Firm Load Forecast	43.4%	54.4%	58.7%	58.9%	60.0%
Reserve Margins Including New Contracted and Non-Contracted Loads for Forecast Years 2025-2029					
New Contracted Loads (with Signed Interconnection Agreements)	5,582	11,549	16,444	20,076	21,036
Reserve Margin with New Contracted Loads	34.1%	35.2%	32.3%	27.8%	27.6%
Prospective Non-Contracted Loads Reported by Transmission Service Providers in Officer Letters	1,600	10,685	19,735	30,619	31,694
Reserve Margin with New Contracted plus Non-contracted Loads	31.6%	21.3%	10.3%	-1.5%	-2.3%

- For consistency with other ERCOT planning reports as they have evolved since HB5066, ERCOT reflected Non-Contracted Loads in the CDR.
- Non-contracted Loads are those for which an officer of a TSP has documented in a letter sent to ERCOT attesting that there is a high likelihood that the Loads will materialize. These prospective Loads are not associated with a signed interconnection agreement or Facility Extension Agreement (FEA) and are considered more speculative than Loads with a signed interconnection agreement or FEA.

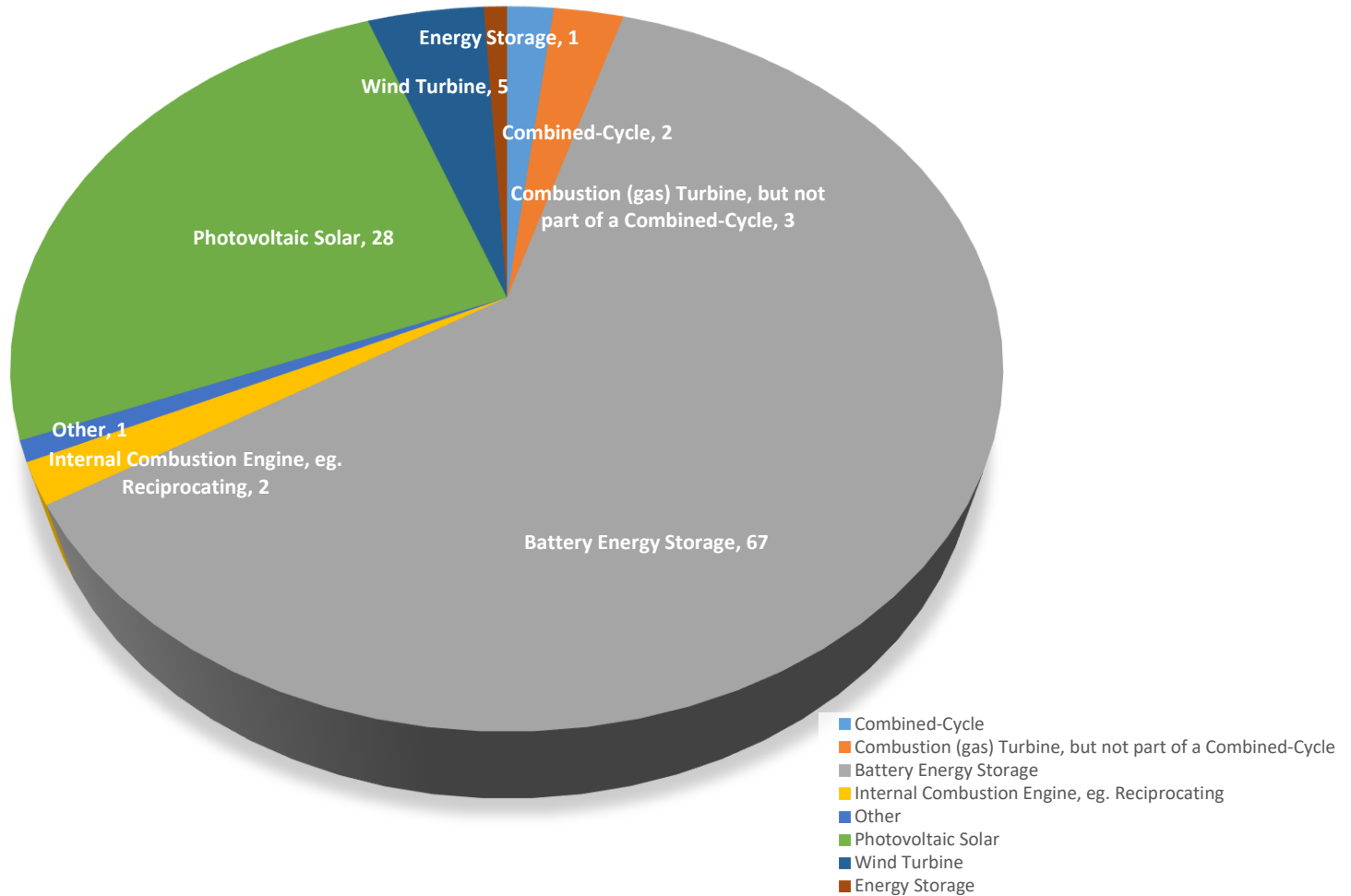


Key Takeaway: For first time, ERCOT reflected the TSP prospective load in the CDR.

Appendix

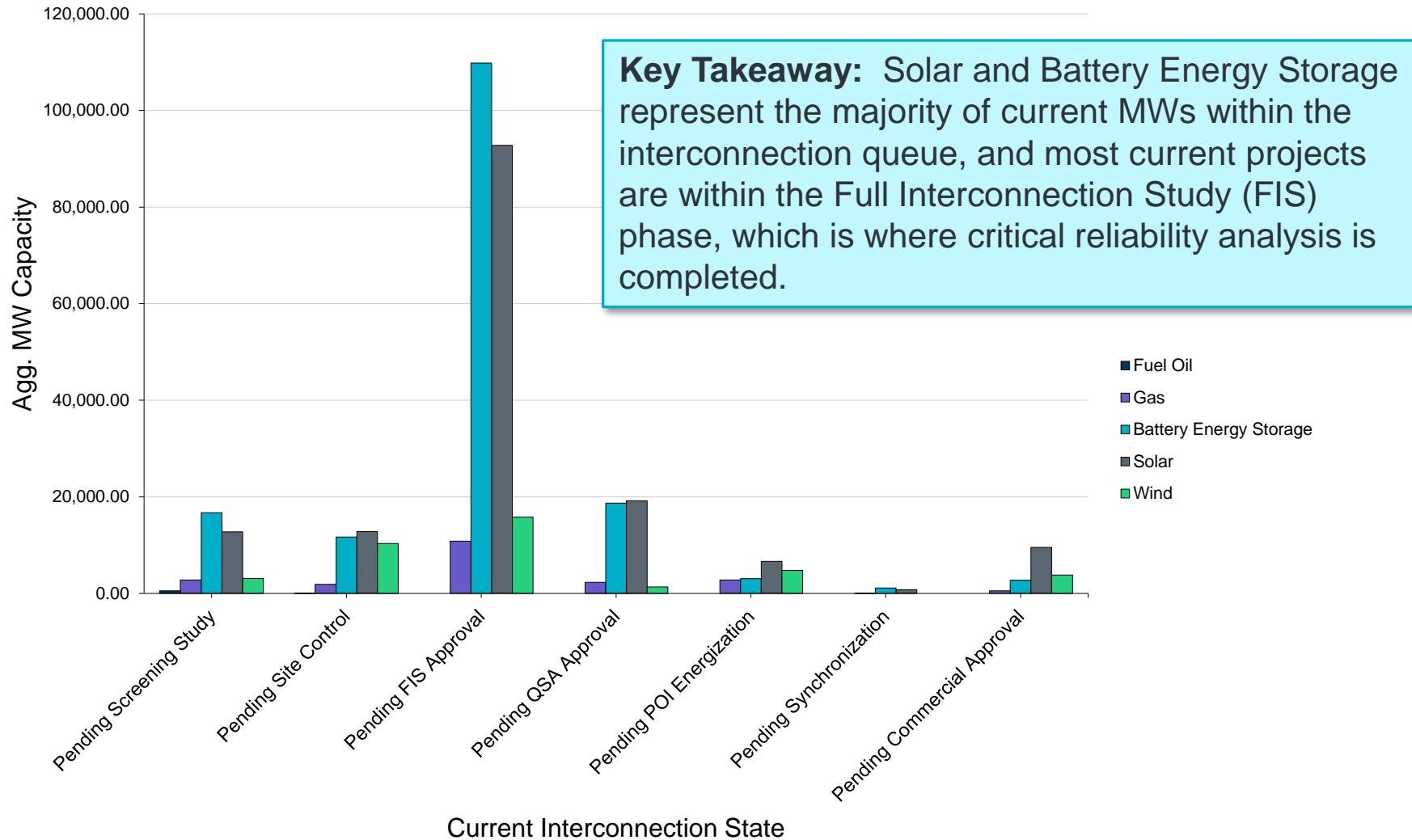
Generation Interconnection Activity (as of May 28, 2024)

Applications Received in the last 60 days by Fuel



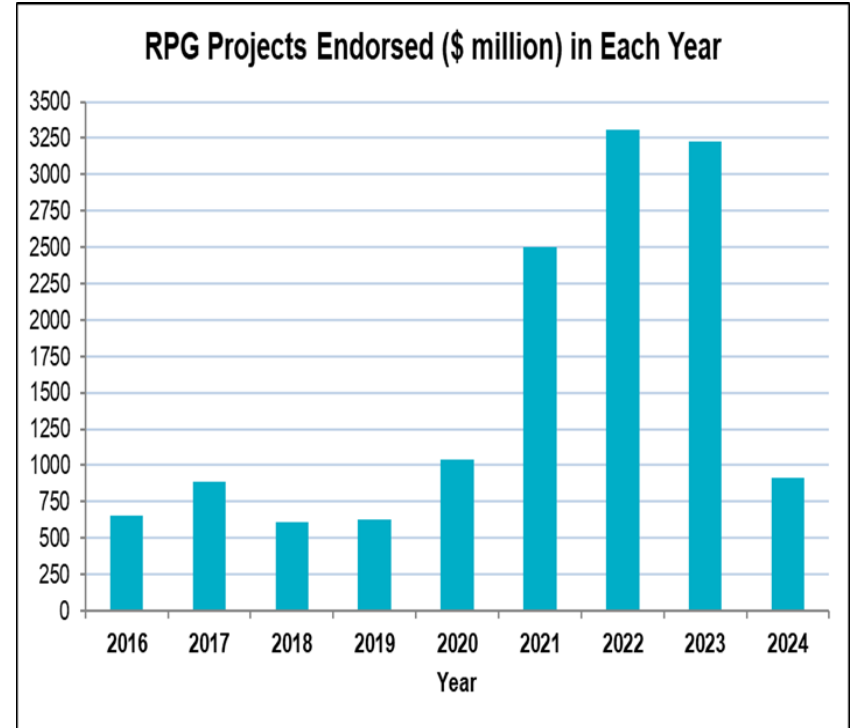
Key Takeaway: Battery Energy Storage continues to be the most active generation type requesting interconnection studies.

Generation Resource Project MWs by Fuel Type and Interconnection Stage (as of May 28, 2024)



Transmission Planning Summary

- As of February 1, 2024, projects energized in 2024 total about \$789.5 million.
 - \$1.553 billion energized in all of 2023
- As of April 30, 2024, ERCOT has endorsed transmission projects totaling \$918.8 million in 2024.
 - Total endorsed transmission projects in 2023 equaled \$3.231 billion
- As of February 1, 2024, projects in engineering, routing, licensing, and construction total about \$13.933 billion.



Key Takeaway: Revision Requests will be forthcoming to implement the recommended congestion cost savings test for an economically-driven projects evaluation as well as establishing a resiliency criteria.