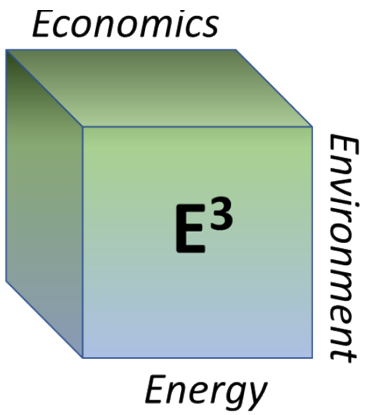

Capacity Market Reform

Concept Overview

- A market design that is robust to changing generation configuration and locations to procure all required capacity commitments to maintain RTO-wide level of reliability at the 1-day-in-10-year standard to prevent involuntary load shedding due to a lack of resources.
- Minimizes rule complexity and makes the market simpler, reduces administrative burden, and eliminates exceptions for requirements.
- Non-discrimination based on resource types, size, age, technology, fuel.
- Allows market participants to reflect risks associated with capacity commitments in offers.
- Enforcement of transmission deliverability standards for all resource types to ensure reliability.
- Recognize the stochastic nature of generation output from intermittent and variable resources in modeling transmission constrained LDAs.
- Maintain or strengthen strong incentives for performance of committed resources
- Reflect inter-relationship with energy and ancillary service markets
- Capacity is inherently a market for reliability, and other considerations (e.g., emissions levels) by states or loads managed contractually outside the Capacity Market
- Economically efficient outcomes that mitigate all forms of market power (both supply and demand-side) and market manipulation
- Place demand-side resources on the demand-side of the market and enforce use of interval metering data to measure whether obligations have been met or not.

See principles listed above for how this meets reliability needs

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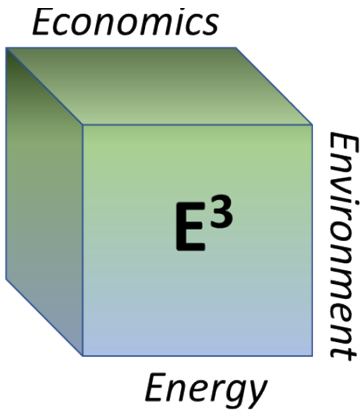

Capacity product definition

Capacity is a reliability call option with liquidated damages for non-performance and bonuses for over-performance: 1) Option price if the price of capacity; 2) The strike is a system condition: a) In the day-ahead or real-time energy markets the ability to call on resources with their cost-based offers to mitigate transmission or other reliability issues in operations; b) Based on entering emergency conditions (RTO-wide or local) designed to avoid involuntary load shedding; 3) Liquidated damages in the form of penalties for non-performance; 4) Bonuses for over-performance for any resource regardless of whether it has a capacity commitment or not.

In concept this is the same as operating reserves in real-time operations which pay an option price, and the strike is a condition where a contingency occurs, and there are penalties (albeit smaller) for non-performance.

All resources committed have the same obligations regardless of type. This makes the capacity product easily fungible and transferrable.

Actions to be Incentivized

1) Performance when system needs it most for reliability.
2) As it is becoming less predictable when resources are needed most, this means resources must be available to perform at any time.
3) This puts a premium on good maintenance or weatherization practices, and at the same time minimizing the times needed for outages to do maintenance (see the evolution refueling outage times for nuclear resources as an example).
4) Commit the resources with greatest available and ability to perform when needed, and not commit poor performing resources, or resources that are not likely to perform during known peak conditions (e.g., winter morning and evening ramps when there is no sun).
5) Align risk taken by Capacity Market Sellers with the risk of reliability actions such that those resources with greatest risk of performing when needed are reflected in capacity offers, penalties, bonuses.

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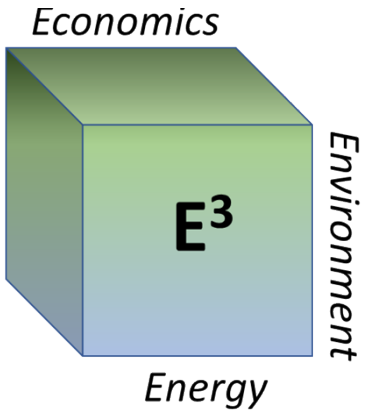
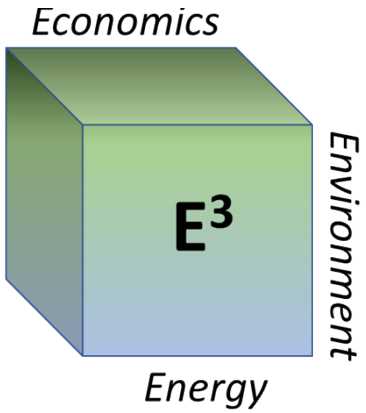


Key Work Activity 2 - Reliability Risk and Risk Drivers

Determine the types of reliability risks and risk drivers to be considered by the capacity market and how they should be accounted for.

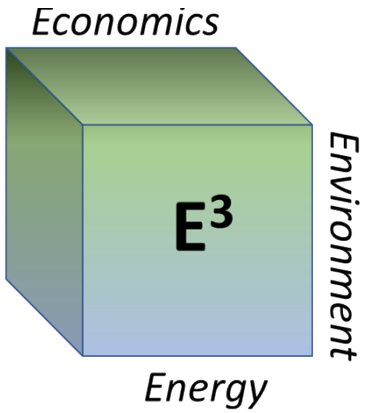
Loss of Load Studies and Assumptions	**Capacity Value**	**Transmission and Intermittent Resource Output**
Move to hourly loss of load assessments with the following emphases: 1) Shoulder periods when planned and maintenance outages are scheduled and accompanied by unexpected weather. 2) Winter peak periods especially morning and evening ramps 3) Examine and account for a variety of weather outcomes between 50/50 and 90/10 and correlated with outages of all types 4) Account for changing weather patterns with climate change	ELCC for all resource types 1) Intermittent, storage and hybrid resources and thinking of moving toward marginal ELCC 2) Controllable resources and account for correlated outages by resource type and weather conditions	Currently, CETO/CETL accounts for resources as if they are perfectly controllable in determining these values to produce the 1-in-25 LDA criteria. 1) Account for stochastic output in determining CETO/CETL 2) Examine correlation between LDA capacity deficiencies and weather, and RTO-wide deficiencies
	See also capacity Accreditation	



Key Work Activity 3 - Procurement Metric and Level

Determine the desired procurement metric and level to maintain the desired level of reliability.

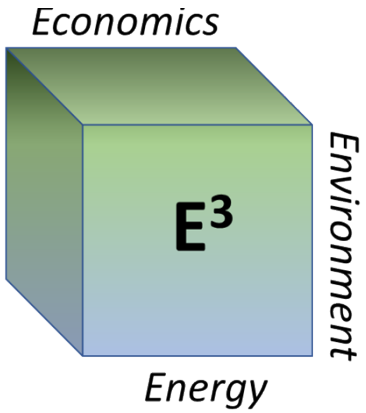
Level of Reliability	**Procurement Level**	
The 1-in-10 standard is a study only and does not require it be operated to. The 1-in-10 in the target level of reliability and should go back to being associated with Net CONE. The Current and proposed VRR curves set the 1-in-10 target at a price above Net CONE which biases the system to excess capacity and may not lead to efficient entry or exist decisions to maintain the target. Reassess the VRR Curve to let Net CONE be price at which the 1-in-10 is achieved	Systemic load forecast bias upward three years forward due in large measure to overly optimistic economic indicators forecasts has driven excess procurement Use the BRA to procure about 90% of 1-in-10 three years forward, then use IAs to procure remaining needs Eliminates incentives for resources to commit and buy back in IAs to capture rents without need to perform	
Change the VRR curve immediately	Revisit the must offer requirement to match the procurement level in the market power mitigation	



Key Work Activity 4 – Performance Assessment

Determine the performance expected from a capacity resource.

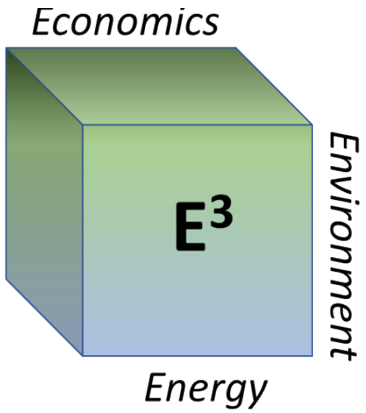
Time Performance is Expected	Defining PAI	Excuses from Non-Performance
As today, measure performance during PAI based upon emergency conditions since this is a reliability call option PAI can be locational by LDA or within an LDA Subject to under-performance penalties and over-performance bonuses	All capacity must be called economically before entering a PAI. This includes DR and PRD. The system will not be allowed to go into reserve shortage because of economics alone. For localized PAI, all economic capacity must be called that can help before entering a PAI.	Dispatching a unit would result in transmission violations On a PJM approved outage All other reasons for non-performance subject to penalties
	Revisit obligation for must offer into energy market for DR and PRD	



Key Work Activity 5 – Qualification and Accreditation

Determine the qualification and accreditation of capacity resources.

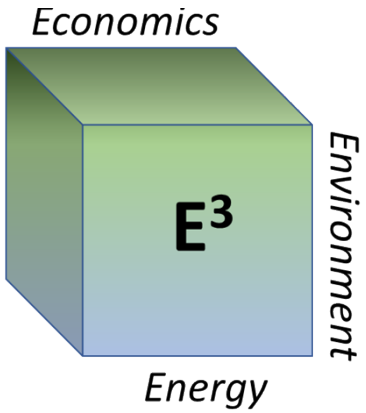
ELCC Accreditation for Variable and Intermittent Resources	ELCC for thermal resources	Requirement for CIRs to Back Energy Counted in ELCC
Current ELCC methodology is a good vertically integrated utility planning tool but does not look at marginal changes and allocate capacity value to resources based on their marginal contribution.	Move toward marginal ELCC for thermal resources to account for correlated outages.	RAA Schedule 9.1(H) "Energy Resources are not included in the effective load carrying capability analysis. Generating units that are expected to only offer or otherwise provide a portion of their Accredited UCAP for that Delivery Year are represented in the analysis in proportion to the expected quantity offered or delivered divided by the Accredited UCAP."



Key Work Activity 6 – Obligations of Capacity Resources

Determine the desired obligations of capacity resources.

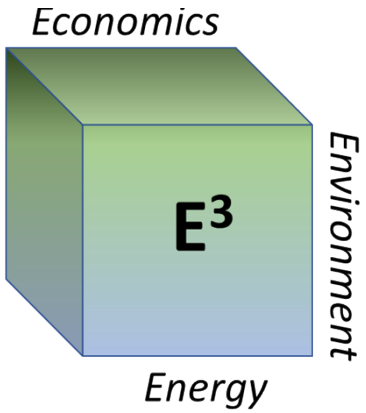
Capacity Market Must Offer Obligations	Energy Market Must Offer Obligations	Outage Requests and Reporting
For resources that have capacity commitments, there is a must offer obligation to offer into RPM auctions. Includes all generation types, including storage, variable and intermittent, Demand Resources, Energy Efficiency. Resources that do not have capacity commitments do not have a must offer requirement	All resources with capacity commitments have a must offer obligation into the Day-ahead energy markets and offer to be available in real-time. Includes Demand Resources, Energy Efficiency, and all generation resource types	Consider forward notice times for planned and maintenance outages and anything less than these timelines could be considered forced outages. There are potential reliability incentives and performance consequences when needed most.



Key Work Activity 7 – Enhancements to the Capacity Procurement Process

Determine if there are needed enhancements to the capacity procurement process.

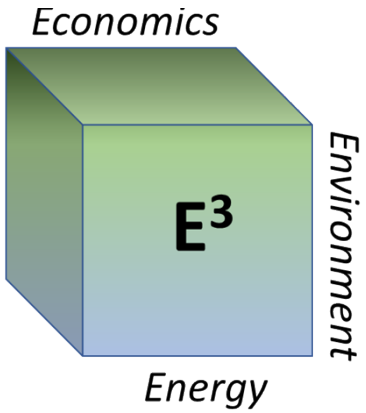
Reconsider Procuring Capacity based on 3-year forward load forecast	**Locational Resource Reliability Requirement Procurement**	
See Procurement level above Issue is the tree year forward forecast has been biased upward in large part due to over-optimistic economic forecasts and the breaking of GDP load growth linkages over time	Currently, CETO/CETL accounts for resources as if they are perfectly controllable in determining these values to produce the 1-in-25 LDA criteria. 1) Account for stochastic output in determining CETO/CETL Examine correlation between LDA capacity deficiencies and weather, and RTO-wide deficiencies	



Key Work Activity 8 – Seasonal Capacity Construct

Items related to a seasonal capacity market construct.

Ensuring Going Forward Costs Can Be Recovered	**Reflecting Risks of Not Clearing Annually**	
Consideration made in offers so that resources can cover their annual going forward costs and reflect the risk of not clearing in one season.	In each season resources must be able to reflect risks of not clearing in other season so they can cover annual going forward costs if only committed for a single season.	



Key Work Activity 9 – Supply-side Market Power Mitigation Rules

Determine if supply-side market power mitigation rules in the capacity market need to be enhanced.

Reflecting Performance Risk in Offers	**Default MSOC**	
MSOC defined by a unit specific algorithmic, verifiable method for risks above Default MSOC.	Use known historic PAI by zone (or sub-zone) as expected penalty intervals, penalty assumed PAI intervals to craft a default MSOC.	