Alberta Capacity Market

Comprehensive Market Design (CMD 1): Design Rationale Document

Section 2: Supply Participation

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2.1 Prequalification for Capacity Resources

2.1.1 General Prequalification Requirements

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- Many of the prequalification topics identified were not discussed by the Eligibility working group through SAM 3.0.
- Resources 1 MW and greater should be eligible to participate in the capacity market.
  - The working group unanimously supported resources 1 MW and greater participating in the capacity market. They indicated that resources 1 MW to less than 5 MW should be eligible to participate on a "may offer" basis while resources 5 MW and greater "must offer" into the capacity market.
  - Stakeholder feedback received through SAM 3.0 suggested that 1 MW is an acceptable size; however, additional work could be completed to determine if it should be lower (or higher) than 1 MW.

Comparison to SAM 3.0 Position:

- The design is not materially different from what was described in SAM 3.0.

AESO Rationale:

- Requiring qualified resources to participate in future auctions, unless delisted, gives the AESO visibility to auction participants and more accuracy in determining supply adequacy.
- A 1 MW minimum size aligns with energy market minimum block size and the declaration of available capacity (AC). In order to perform the availability assessment, an AC must be captured and maintained for the capacity resource.The requirement for capacity resources to demonstrate the ability to sustain energy for at least four hours derives from the historical observation of the duration of system stress events (emergency energy alerts, or EEAs, last on average four hours). This is not to say that the capacity resource does not have an obligation past four hours; it's simply to say that in order to prequalify the capacity resource must be able to sustain its unforced capacity (UCAP) in energy production for four hours.

2.1.2 ISO Requirements for Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- ISO requirements for prequalification topics identified were not discussed by the working group through SAM 3.0.

2.1.3 External Capacity Resources Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- Resources external to Alberta should be eligible to participate in the capacity market.
- The working group unanimously supported resources external to Alberta participating in the capacity market.
- Stakeholder feedback received through SAM 3.0 suggested that the capacity market should be inclusive, subject to resources competing on a level playing field.

- As it relates to imports, stakeholders suggested that importing resources should have bids reviewed for out-of-market payments.

AESO Rationale:

- Allowing external resources to participate in auctions provides an additional source of supply and increases market liquidity and competition.
- Prequalification requirements for external resources are intended to ensure that external resource capacity is deliverable to Alberta under required system conditions.

2.1.4 Demand Response Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- Demand response resources and price responsive load should be eligible to participate in the capacity market.
- The working group unanimously supported the participation of demand response resources and price responsive load on the supply side of the capacity market with the ability to choose between down-by and down-to offers.
- The working group was also directionally aligned that demand response participation on the demand side of the capacity market should be allowed.
  - The working group did not vote on demand response participation on the demand side of the market given the uncertainty related to cost allocation, and would consider that resource's participation once the approach to cost allocation is resolved.
- Stakeholder feedback received through SAM 3.0 suggested that the capacity market should be inclusive, subject to resources competing on a level playing field.
  - As it relates to demand response, some stakeholders also suggested the various rules that demand response should be excluded from, or have exceptions with, including UCAP calculation, and must-offer requirements.

Comparison to SAM 3.0 Position:

- The design is not materially different from what was described in SAM 3.0 in terms of demand side resources participating on the supply side of the market. The design differs from SAM 3.0 in that the participation of demand response resources on the demand side of the capacity market is not proposed at this time.

AESO Rationale:

- A demand response resource must be a retail or self-retail asset belonging to a valid pool participant to ensure the appropriate metering is captured and collected.
- Demand response and price-responsive load will only be eligible to participate on the supply side of the market in the initial capacity market because demand-side participation adds extra complexity for the auction bidding process and clearing. Additionally, the mechanism for cost allocation is unknown at this time and there are no assurances that a demand side resource will have its costs reduced by the volume cleared in the capacity market.
- Participation on the demand side of the capacity market may be considered as a future market enhancement once the cost allocation methodology is completely understood.

A demand response resource must be a retail or self-retail asset belonging to a valid pool participant to ensure the appropriate metering is captured and collected. The capacity market will leverage the existing load settlement processes to ensure accurate and consistent measurement. This restriction will limit aggregation of component resources to the pre-defined load settlement zones.

2.1.5 Energy Efficiency Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- The working group did not reach a recommendation on energy efficiency. Additional information regarding eligibility and performance measurement is required.
  - The working group had requested additional questions be answered prior to a recommendation on the eligibility of energy efficiency (EE), including:
    - How are out-of-market payments handled for energy efficiency resources?
    - What are the administrative costs for participating on the supply side of the capacity market? On the demand side?
    - Will historical EE projects be eligible? How far back?
    - How is energy efficiency reflected in the adequacy target?
- At some point, do energy efficiency projects move from a supply offer to be reflected and adjusted in the total demand procured?
  - Stakeholder feedback received through SAM 3.0 suggested that the capacity market should be inclusive, subject to resources competing on a level playing field.
    - As it relates to EE, stakeholders shared a mixture of support or opposition to energy efficiency participation, often citing that the market should not pay for a resource whose delivery of capacity cannot be effectively measured.
    - Those in support of energy efficiency resource participation cited it as a low-cost, short lead time resource that can reduce capacity costs to consumers.

Comparison to SAM 3.0 Position:

- The design is materially different from what was described in SAM 3.0.

Energy efficiency resources will not be eligible in the initial implementation of the market.

AESO Rationale:

- While EE is a capacity resource in other capacity markets, the complexities other markets have faced with determining UCAP and assessing performance for EE requires further study of the implementation issues associated with EE, which precludes participation in the initial auction. In recognition of the potential benefit that EE resources may provide to the capacity market, a roadmap will be developed to determine EE participation in future auctions.

2.1.6 Variable Energy Resources Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- The working group assumed conventional and variable generation would be eligible to participate, excluding Renewable Electricity Program (REP) resources, subject to the same performance requirements for all resources in the capacity market.
- Stakeholder feedback received through SAM 3.0 suggested that the capacity market should be inclusive, subject to resources competing on a level playing field.

Comparison to SAM 3.0 Position:

- The design is not materially different from what was described in SAM 3.0.

AESO Rationale:

- Including variable resources will increase overall market competition provided that their reliability value is appropriately reflected.

2.1.7 Storage Resources Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0;

- Storage resources should be eligible to participate in the capacity market.
- The working group unanimously supported the participation of storage resources in the capacity market.
- Stakeholder feedback received through SAM 3.0 suggested that the capacity market should be inclusive, subject to resources competing on a level playing field.
- As it relates to storage, some participants noted that the existing tariff may warrant a redesign to encourage storage participation, and that the AESO should consider a UK model for its UCAP calculations for storage resources.

Comparison to SAM 3.0 Position:

- The design is not materially different from what was described in SAM 3.0.

AESO Rationale:

- Including storage resources will increase overall market competition provided that their reliability value is appropriately reflected. Requirements for storage resources to maintain their energy production to the UCAP level for at least four hours are intended to ensure sufficient reliability value from the resource.

2.1.8 Aggregate Capacity Resources Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- Resources should be able to aggregate when participating in the capacity market.
- The working group unanimously supported resource aggregation in the capacity market provided that one of two conditions are met:
  - Aggregation of resources allows the UCAP of the combined resources to be higher than the UCAP of each individual resource; or
  - Aggregation allows the resources to meet the minimum size threshold in the market.
- The working group also agrees that resources behind a single meter may aggregate to form one capacity supply resource.
- Stakeholder feedback received through SAM 3.0 was supportive of aggregation.

Comparison to SAM 3.0 Position:

- The design is not materially different from what was described in SAM 3.0.

AESO Rationale:

- The AESO supports aggregation because it increases overall market competition while providing the opportunity for resources smaller than 1 MW to participate in the market.
- Aggregation beyond a single enterprise is not permitted, as is the case in the energy market, because the AESO can only produce a bill/statement for a single entity or divide the settlement results according to per cent ownership share.

2.1.9 Self-supply Resources Prequalification

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- A majority of the working group (all 14 agreed, one with reservation) recommended that the following requirements apply for loads to be eligible to self-supply:

- The load must be capable of being served in whole or in part by generation that is located on the same site, and at the same point of interconnection to the electric system, or under an Industrial System Desgination or Duplication Avoidance Tariff.
- Sites with onsite generation that cannot physically flow their gross volumes due to system connection limitations must self-supply.
- Sites with onsite generation and no connection flow limitation can choose to self-supply with the following conditions:
  - The site must have a bi-directional net interval meter at the connection to the electric system.
  - Be a pool participant.
  - On-site generation (gross) must meet the minimum eligibility requirements for capacity resources (i.e., size, project milestones for new resources).
- Self-suppliers can be connected to either the transmission system or the distribution system provided they meet the requirements listed above.
- Self-suppliers must declare their intention to self-supply prior to the base auction for the delivery year.
  - This would not limit a new resource's participation in rebalancing auctions.

- Industry feedback on SAM 3.0 indicated:
  - General support for the requirements with certain language suggestions as modifications.
  - Physical constraints that limit generation volumes from being delivered to, and the load from being served from, the interconnected electricity system should be recognized.
  - Self-supply eligibility should not be limited to self-supply where the load and generation are owned by the same participant. The requirements should not restrict arrangements from being considered by application of the condition that the on-site generation must be a pool participant.
  - The cost allocation approach chosen by the government should be taken into account and it is important to strive to ensure fairness, avoid cross subsidization, and avoid any unintended reliability consequences.

Comparison to SAM 3.0 Position:

- The design is not materially different from what was described in SAM 3.0.

AESO Rationale:

- A limitation has been put on self-suppliers such that they can only switch self-supply status every three years to increase market certainty because the AESO needs to know how much self-supply capacity to remove from the procurement volume in order to build an accurate demand curve. Accordingly, the AESO needs to know a self-supplier's intention in the delivery year before each base auction for that delivery year.

2.1.10 Prequalification of Existing Capacity Resources

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- The prequalification of existing capacity resources was not discussed by the working group through SAM 3.0.

AESO Rationale:

- Prequalifying existing assets reduces administrative burden. Changes in prequalification status are intended to reflect changes in the ability or intention of the resource to provide UCAP, which needs to be reflected in subsequent auctions.

2.2 Qualification for All Resources

- Allowing prequalified resources to remain eligible for future auctions until delisted or deemed ineligible by the AESO reduces the administrative burden of prequalifying resources every year for every auction.
- The qualification process will occur before every auction in order to ensure that UCAPs have not changed for prequalified resources from auction to auction.

2.3 Unforced capacity (UCAP) Ratings

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- The working group unanimously supported using UCAP to represent capacity values, with reservations related to flexibility of behind-the-fence generation, subject to an appropriate performance and payment adjustment mechanism and subject to reasonable data requirements for new assets.
- Stakeholder feedback received through SAM 3.0 was supportive of using UCAP as a calculation method.
- The working group also explored various methodologies for calculating UCAP of various technologies, including effective load carrying capability (ELCC) and other resource-specific calculations used in other markets. Many working group members and industry stakeholders suggested that the AESO should strive for a single methodology to calculate UCAP for all resource types.
- The working group was supportive of forced outage rates being included in the calculation of UCAP, with some stakeholders suggesting that planned outages should also be included in the calculation.

- Working group members and stakeholders have expressed concern with the AESO's ability to calculate UCAP with the current data it collects through the Energy Trading System (ETS).

Comparison to SAM 3.0 Position:

- The design is not materially different from what was described in SAM 3.0 as UCAP is being utilized. Calculation details of UCAP were not defined in detail in SAM 3.0.

UCAP for Self-supply: Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- The working group achieved directional alignment that the UCAP for self-supply sites with installed capacity of onsite generation greater than their total load should be determined based on ELCC.
  - The working group members expressed concerns with the complexity and lack of transparency with the approach; however, felt it represented the best way to determine UCAP for these types of sites.
  - It was recognized that further exploration of this option is required and the AESO and working groups should investigate whether a simpler process could proxy for full-blown effective load-carrying capability modelling.
- Industry feedback on SAM 3.0 indicated general agreement that the UCAP calculation be done on a net basis for behind-the-fence resources, such as ELCC or analysis of relevant historical data.

Comparison to SAM 3.0 Position:

- The proposed design is different from the SAM 3.0 recommendation, in that the AESO proposes not to use an ELCC methodology to calculate UCAP for self-supply resources. The proposed design is to calculate UCAP for net self-supply resources using a capacity factor methodology.

AESO Rationale:

Why UCAP instead of ICAP in Alberta's capacity market?

- The AESO selected UCAP for the Alberta capacity market because linking UCAP determination for capacity resources to performance during scarcity conditions creates an incentive for capacity resources to maintain high availability and perform when the system needs them most.
- Installed capacity (ICAP) reflects only the technical specification of the capacity resource while UCAP captures the observed operational performance over a defined historical period.
- Capacity resources that perform better than or equal to their UCAP during periods of system stress will receive a higher UCAP rating and will also avoid payment adjustments. Both these factors may allow the resource owner to submit competitive offers in the capacity auction, making them more likely to clear in the capacity auction.
- UCAP methodology is based on sound principles for capacity market design:
  - UCAP methodology: accounts for performance risk. Suppliers—and not consumers—bear the risk and the rewards associated with their resource's performance and thus UCAP rating. This places risk in the right place, in order to incent investment by suppliers to maintain high resource reliability (high UCAP) and to enable the capacity market's price signal to select a reliable, cost-effective resource portfolio.
  - UCAP methodology is resource neutral. All capacity resources receive a UCAP rating based on performance during a subset of tight supply cushion hours. A supplier of 1 MW of UCAP will be able to deliver the same amount of system reliability and receive the same compensation regardless of their technology.

Why not ELCC?

- The use of an ELCC approach was suggested and considered through the working group process for quantifying the UCAP of certain technology types, and even all asset types.
- ELCC measures the capacity of a particular resource by simulating the resource adequacy effects through isolation of the impact of the resource in question from those of all the other sources. This is accomplished by calculating the unserved energy expectation of two different cases: one with and one without the resource. Some other jurisdictions have chosen to use an ELCC methodology to quantify the value of variable generation resources. MISO uses ELCC for wind UCAP determination. Ireland uses a form of ELCC for all resource types.
- The AESO proposes to not use an ELCC approach to estimate the UCAP technology types in the initial capacity market auction for the following reasons:
  - First, it is less transparent than the chosen methodology and market participants would not be able to assess how investment and operation decisions would impact their UCAP in the future.
  - Second, it is more complex than the chosen methodology, and with the limited experience with the new resource adequacy modeling tool and limited time for market implementation, the increased complexity and risk wasn't considered feasible.

Why not EFORd?

- The AESO proposes not to use the equivalent forced outage rate (EFORd) under demand conditions to determine UCAP in the auction because the AESO does not have the data available to accurately calculate an EFORd statistic for all assets. While the data could be obtained, the capacity and availability factor approach, which uses energy market data in its determination, will provide an equivalent measure of unit reliability during periods of tight supply conditions.

Why an annual rather than a seasonal UCAP?

An annual UCAP is being determined to align with the annual capacity product the AESO is procuring.

- The AESO selected an annual UCAP based on working group analysis and discussion that a seasonal capacity market product introduced complexity into the capacity auction. The working group idenitified that a seasonal UCAP and market could:
    - Reduce investor certainty due to the difficulty in forecasting capacity market revenues.
    - Present difficulties associated with the need for a higher price cap in a seasonal auction (which is required for resources that might only clear one season but require a full year's worth of capacity revenue to remain in the market).
- The working group also discussed that the estimation of a seasonal capacity volume and seasonal UCAP became increasingly difficult as the period of estimation became more granular given the data available to the AESO.
- The work group and SAM 3.0 feedback is generally split equally between the selection of a seasonal and annual capacity product. While a seasonal product differentiates between the seasonal capacity needs and allows resource types with seasonal capacity to monetize such value, it was decided that the additional complexity of a seasonal auction would negate these benefits.

Why tight supply cushion hours for the determination of UCAP?

The supply cushion is the difference between the energy that Alberta supply is capable of supplying at a given moment in time, and what is actually demanded by load.

Supply cushion is a proxy for real-time system reliability risk. A large supply cushion indicates less real-time system reliability risk, because more energy remains available to the AESO to respond to unplanned market events. A low supply cushion indicates that the system has fewer resources available to react to unexpected outages or load increases.

Supply shortfall conditions arise when the supply cushion is zero. When the supply cushion falls to zero, all available power in the merit order has been utilized, and System Controllers may be required to take emergency action to ensure system stability.

- The AESO chose tight supply cushion hours to reflect the reliability value of a resource when it is most required by the system. Measuring asset performance during a historical subset of tight supply cushion hours would be indicative of future performance of the capacity resource.

Why 5 years of history and 100 tight supply cushion hours each year for determination of UCAP?

- Assessing a resource's capacity contribution over a five-year period will provide a reasonable estimate of future unit performance. This large sample over periods of low supply captures the variability in system conditions over different seasons.
- The number of recommended hours for the availability assessment (100 hours annually) is based on the average number of hours historically between 2011 and 2017 in which supply cushion was below 400 MW, conditions which characterize system tightness. On average, 100 hours split evenly between the summer and winter seasons should result in 35 days of the availability assessments annually. When using the availability assessment days for the past five historical years (175 independent samples) to calculate UCAP, the statistical error in the UCAP estimate is approximately 2%, providing a robust estimate or resource capability during tight supply cushion hours, including EEA events.

Why capacity factor for variable generating units?

The capacity factor is the ratio of actual electrical energy produced over a given period of time to the maximum possible electrical energy output over the same amount of time.

- Run-of-river hydro, wind and solar generators have capacity factors limited by the availability of their fuel source (water, wind or sunlight). The amount of energy produced by variable resources is independent from energy market signals. In other words, variable generators cannot change production output to respond to tight system conditions (when energy prices are at their peak) and only generate if the fuel source is available. The capacity factor methodology proposed by the AESO serves as a good proxy for capturing the level of reliability that a variable resource can provide the system in tight system stress conditions.

- Self-supply resources are built primarily to supply onsite load and, similar to variable generators, operate for the most part independent from market energy signals. However, some self-supply resources are capable of providing operating reserves and those may not be captured using a simple capacity factor calculation. The AESO will explore whether modifying the capacity factor calculation to better capture the level of reliability that a self-supply resource can provide the system is required in order to reflect this.

- The AESO proposes that a capacity factor methodology that captures both historical energy and dispatched operating reserves will allow approximation of the level of reliability that the intertie can provide when also taking into consideration transmission transfer capabilities. Historical scheduled amounts allow for interactions between energy markets throughout the Western Electricity Coordinating Council's jurisdiction and other complex factors that may impact external supply to be reflected in intertie capacity values.

Why availability factor for dispatchable resources?

The availability factor measures the energy plus operating reserve capability of a dispatchable unit during historical periods of tight supply.

- The availability factor of a large hydro or thermal resource measures the percentage of the time that resource has historically been available to provide energy to the grid. The AESO considers the hydro assets on the Big Horn, Brazeau and Bow River systems to be large hydro assets. By reviewing unit availability over a significant number of historical hours, the AESO expects this factor will be a good determination of the resource's ability to deliver energy over future periods of tight supply.

- The must-offer, must-comply framework ensures that the available capability declared by these resources in the past reflects actual unit capability to generate energy or provide operating reserves at any given hour.

- The availability factor provides a good representation of a resource's future ability to perform under similar conditions.

- The data required to complete the availability factor calculation is available to the AESO through unit specific historical available capability submission in ETS, which is representative of a unit's actual availability given the must-offer, must-comply obligation under the ISO rules.

- The availability factor methodology:

    - Is unit specific.

- Aligns individual performance with capacity market revenues.
- Captures both the energy and the operating reserve potential of a generation unit.

- The maximum capability values of a unit are stable and only increase when a unit upgrades its capability

Why does the UCAP value capture both planned and forced outages?

In eastern capacity markets, the UCAP value only reflects resource forced-outage rates. , which are assumed to be random and do not reflect planned maintenance outages. The determination of capacity requirements in these ISOs assumes that planned maintenance outages (including the refueling outages of nuclear plants) occur during low-load periods of the year in which the capacity is unlikely to be needed. Capacity market systems, therefore, restrict the scheduling of planned maintenance outages by capacity market resources. NYISO, ISO-NE, and PJM require that generators provide advance notification of all planned outages, and outages are subject to being rescheduled by the ISO based on reserve adequacy or reliability needs.

- In eastern capacity markets the UCAP value only reflects resource forced-outage rates. However, Alberta's capacity market needs to ensure that planned maintenance outages are, in practice, scheduled in a manner consistent with the assumptions used in developing the capacity requirement. Currently, the AESO does not restrict the duration and frequency of planned maintenance outages scheduled by the participant, as long as notification of the planned outage is provided to the AESO 24 months in advance (ISO Rule 306.5).

- ISO Rule 306.5 is expected to remain unchanged (see Section 10 for further details). The AESO will be informed of generator planned outages but not act as an approver. In other words, there will be no restriction on market participants in regard to schedule timing, duration and frequency of planned outages in Alberta's capacity market. Added flexibility in selecting the timing and duration of maintenance outages translates into special considerations in estimation of the resource's contribution to system reliability. The probability of resource unavailability due to planned outages should be reflected in a resource's UCAP values as they better reflect the realities of Alberta's outage planning rules.

Including planned outages in UCAP calculations is intended to incent the overall reliability characteristics required by the system.

- See PJM: Generator Planned Outages http://www.pjm.com/~/media/committees-groups/subcommittees/raas/20170530/20170530-generation-outage-categories.ashx
- See ISO-NE FCM https://www.iso-ne.com/static-assets/documents/2017/02/m20_forward-capacity-market_rev24_20170203.pdf
- See AESO Rule 306.5 https://www.aeso.ca/rules-standards-and-tariff/iso-rules/section-306-5-generation-outage-reporting-and-coordination/

2.4 Credit Requirements for Participation as a New Capacity Resource

Input from Working Group Members and Industry Stakeholders through SAM 3.0:

- Topic was not discussed by the working group through SAM 3.0.
- The AESO intends to impose capacity market credit requirements for new resources selling into the forward and rebalancing capacity markets. These credit requirements for new resources selling into the capacity market will help mitigate the risk of new resources failing to deliver on their obligations,

and becoming unable to pay for all of their obligations to the AESO The AESO developed its credit requirement proposal in consideration of Alberta's unique needs, and after reviewing the credit rules used in PJM, ISO New England, and the UK – the three most established forward capacity markets. Table 1 below summarizes the capacity market credit requirements in these other markets.

- The AESO intends to adopt this rationale as well. New resources pose a much greater risk of non-delivery compared to existing resources, since they are not in service at the time they clear the forward auction. Any number of factors could interfere with a new resource's ability to come online by the start of the delivery year, including: delays in permitting, failure to secure financing, delays in equipment delivery, delays in construction and equipment installation, issues with installation that lead to a lower than expected capacity rating, and insolvency of the developer. These factors drive the capacity market credit requirement. In contrast, most of the credit risk associated with existing resources is due to their participation in energy and ancillary services markets, and is already covered under the AESO's current credit policy.
- The credit requirement mitigates the risk of non-delivery and failure to pay adjustments by:
  - Allowing the AESO to recover some of the payment adjustments it is owed, and replacement capacity costs it incurs due to non-delivery.
  - Creating an additional incentive for new resources to physically deliver.
- In order to reduce costs to consumers, the AESO must establish a credit requirement sufficiently high to minimize the impacts of defaults.[1] At the same time, credit requirements cannot be set so high as to create unnecessary barriers to participation by smaller investors. While ISO New England (ISO-NE), and the UK have comparable credit requirements, PJM's is much higher. PJM's higher requirement may be due to a more conservative approach to credit risk, and the fact that PJM increases market participants' unsecured credit limit if they earn net revenues in PJM's markets. The AESO's proposal to impose a capacity market credit requirement of 15% of annual net-CONE (with a minimum value of $7.30/kW-year) strikes a reasonable balance between these factors, and is consistent with the requirements in other jurisdictions shown in Table 1.
- The cost to the AESO of non-delivery increases with each forward auction cleared by a new resource, which is why the AESO is proposing to impose the 15% of net-CONE credit requirement for each delivery year. As Table 1 shows, this proposal is consistent with the approaches of PJM, ISO-NE, and the UK.
- The AESO's proposed capacity market credit requirement for new resources will supplement its existing credit policy which specifies limits on unsecured credit, and the acceptable forms of secured credit for participants across the AESO's markets. In Table 1 we report unsecured credit limits, and acceptable forms of secured credit for the two U.S, and the UK forward-capacity markets. Unsecured credit limits in U.S. markets were tightened by the Federal Energy Regulatory Commission (FERC) following the 2008 financial crisis when U.S. RTOs faced severe credit stresses. In Order 741 and its subsequent modification, the FERC limited unsecured credit to $50 million per market participant.[2] In both U.S. markets, unsecured credit limits increase with the credit rating of the market participant and its net worth up to the $50 million limit. PJM also allows a market participant's historical net revenues across PJM's markets to count toward its unsecured credit limit for the purposes of its capacity market credit requirement. These differences across markets may be explained by differences in volatility. Generally, a more volatile market will require higher credit requirements. At this time, the AESO does not believe that any change is required to its current guidelines on unsecured credit or acceptable forms of secured credit.

[1] The other objective of credit policy, to protect the AESO's liquidity in the event of a default, is less pressing in the case of the capacity market since the AESO is the only buyer in the forward capacity market.

[2] In the same order, the FERC also imposed several other requirements intended to reduce the liquidity risks and costs to ISO/RTOs of a market participant default. Most of these requirements are not directly applicable in the capacity market context. See: Credit Reforms in Organized Wholesale Electric Markets, Order No. 741, 75 FR 65942 (Oct. 21, 2010), FERC Stats. & Regs. ¶ 31,317 (2010) (Order No. 741) and Order No. 741-A, 76 FR 10492 (Feb. 25, 2011), FERC Stats. & Regs. ¶ 31,320 (2011).

Table 1

Capacity Market Credit Requirements for New Resources in Other Forward Capacity Markets

Component	PJM[3]	ISO-NE[4]	UK[5]
Applicability	New capacity only	New capacityoOnly	New capacity only
Credit Requirement (After Clearing a Forward Auction)	~50% Annual net- CONE	8.3% Annual Clearing Price	£10,000/MW (~12% Annual net-CONE)
Adjustment of Credit Requirement Over Time	Increases with each forward auction cleared for separate delivery years	Increases with each forward auction cleared for separate delivery years	Increases with each forward auction cleared for separate delivery years
Unsecured Credit Limit	Increases with credit rating, net worth, and historical net revenues across all PJM markets Maximum: $50 million per market participant	Increases with credit rating, and net worth Maximum: $50 million per market participant	N/A
Acceptable Forms of Secured Credit	Cash Letter of Credit	Cash Letter of Credit Mutual Fund Shares	Cash Letter of Credit

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- As project milestones are achieved, the AESO will reduce the capacity market credit requirement since the risk that a new resource will fail to deliver decreases. The quantitative reduction in credit requirement with each completed milestone is intended to reflect the associated reduction in non-delivery risk.
- Reducing credit requirements as milestones are completed also provides incentive for resources to adhere to development timelines.

2.5 Supply Participation Assessment Against the Capacity Market Design Criteria

- By adopting a standard capacity product based on UCAP, the capacity market should achieve desired reliability objectives by creating a real and measurable supply adequacy product that will allow a wide variety of technologies to compete to provide capacity.
- Supply participation considers the unique aspects of Alberta's electricity system in the design – in particular, the treatment of cogeneration – and the calculation of UCAP for capacity providers given the fact that our highest demand for capacity is when capacity resources are restricted the most.
- The UCAP methodology, while unique, is consistent with the criteria around best practices and lessons learned from other capacity markets' adoption of UCAP as a standard capacity market product definition.

[3] Credit Overview and Supplement to the PJM Credit Policy, October 6, 2017.

[4] Exhibit IA, ISO New England Financial Assurance Policy, June 1, 2017.

[5] Applicant's Credit Cover Process, July 6, 2015. Government Response to the March 2016 consultation on further reforms to the Capacity Market, 2016.

- The eligibility of energy efficiency will be included as part of the market evolution roadmap. This is consistent with the criteria for pursuing staged implementation where appropriate.