UCAP Discussion

Design Working Group

June 12, 2018

Agenda

- Review
  - over arching UCAP changes
  - Approach to use to allow for a UCAP range
  - Interties
  - Capacity committed load UCAP
  - UCAP approach for self supply sites

Overarching UCAP changes

- Hour count change
  - The AESO proposes to establish UCAP for capacity assets using the tightest 250 hours each year
  - Why the change
    - UCAP value determination doesn't change materially across asset types when using 100 hours or 250 hours

      – material previously presented to work groups
    - This change recognizes the significant concern from a number of stakeholders that 100 hours is too limited of a sample
    - The performance framework for availability will continue to be based on the tightest 100 hours each year

UCAP Range

Background and Objective

- In the last version of CMD, the idea of a UCAP range was introduced in order to recognize potential concerns with use of historical data due to transitional issues due to the introduction of capacity market
- UCAP is calculated based on historical performance, which may not be fully indicative of future participation in the capacity market
- Ranges should not be so wide as to adversely impact reliability or effective functioning of the market

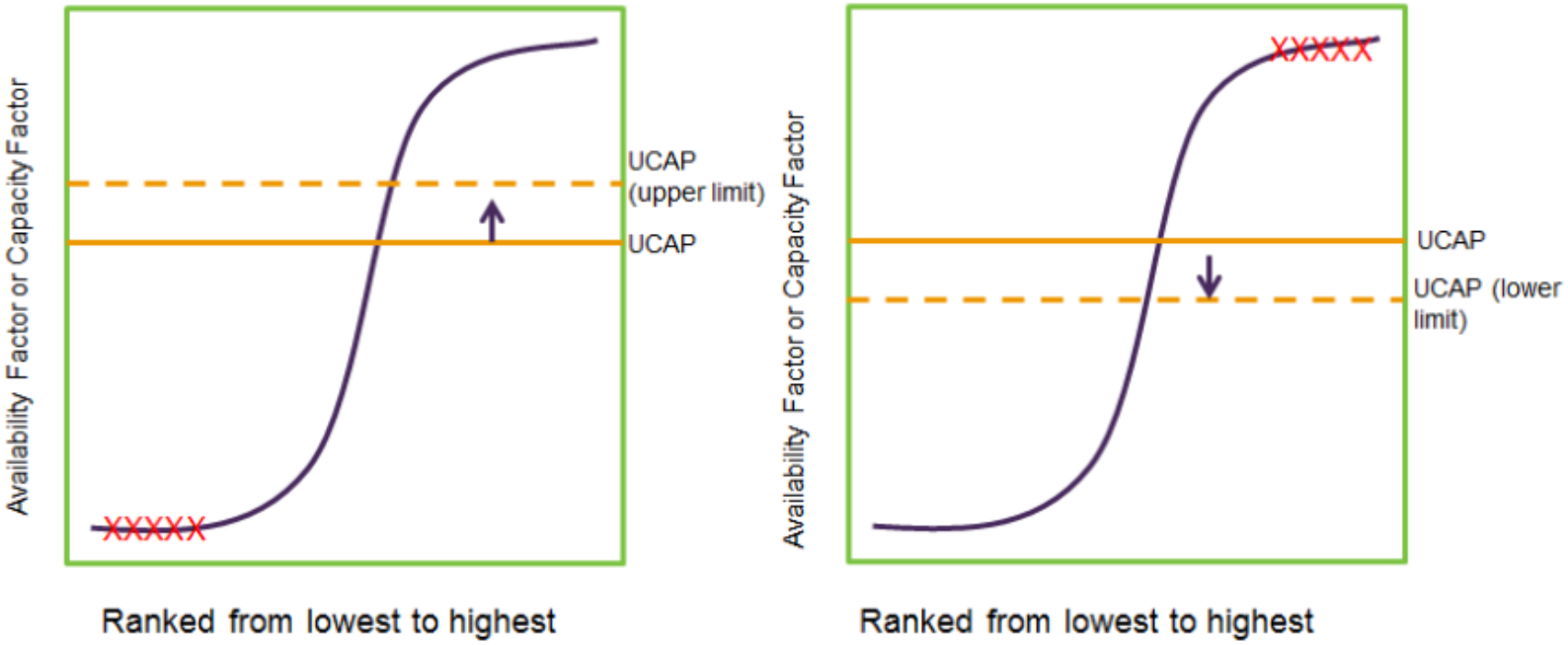
Why Is The “Right” Amount of UCAP Important

- Some stakeholders have suggested participants be able to choose their own UCAP values or have a wide range
- Asset UCAP values which are too high are not reflective of true reliability value of the asset.
  - Ex. A 100 MW wind-farm receives 100 MW of UCAP but can’t deliver 100 MW when system is at supply adequacy risk
- Asset UCAP values which are too low can result in market distortions
  - Installed asset base too high – real time energy price signal distortions
  - Potential to physically withhold capacity from market by choosing a low UCAP value
  - May not effectively differentiate between asset characteristics – price distortion

Establishing a UCAP Range

- AESO reviewed various approaches for establishing a UCAP Range:
  - "Elimination" method, minimum & maximum method, standard deviation approach, others
- Participants anticipate that their future performance will be driven by different incentives, and that the outages and maintenance patterns of their assets will change
- AESO's proposed approach to establish the range is to:
  - Utilize historical data to determine a base UCAP
  - Establish an asset specific range by eliminating some hours
    - Eliminate 5% of hours in which an asset was *lowest* performing, effectively *raising* average performance to determine an upper limit for the range
    - Eliminate 5% of hours in which an asset was *highest* performing, effectively *lowering* average performance to determine a lower range
  - Establish an overall range for all assets: +/- 2% of performance factor or +/- 1 MW for smaller assets

UCAP Range

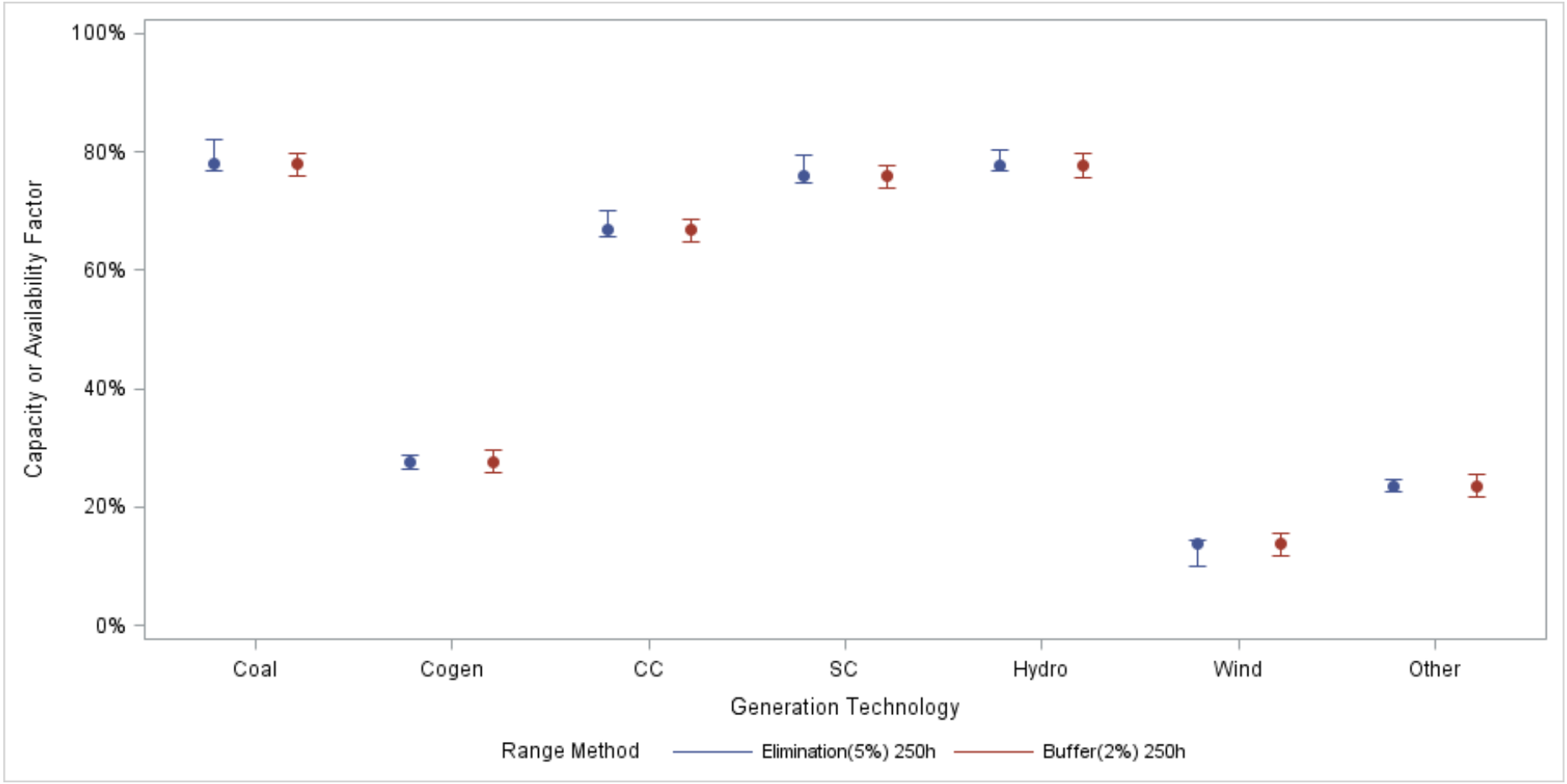


- Each asset can choose a range within **the maximum** of:
  - the range established in accordance with the elimination method, or
  - a range of +/-2% around their calculated capacity or availability factor
- Every capacity asset will receive at least +/- 1 MW of UCAP for their range

Elimination method recognizes potential future performance

- Purpose of UCAP range is to handle transitional issues with the move to the capacity market
- Elimination method recognizes potential future performance, while still ensuring reliability is not compromised
- UCAP Range is expected to narrow over time, as transitional issues related to the move towards a capacity market are dropped from historical data

Range of Resource Performance Factors
Summary by Generation Technology



External Assets

Change to intertie capacity limits

- With the change of number of hours from 100 to 250 hours, there has been a change to the values determined for the intertie capacity limit, see below:

Intertie	Firm Trans-mission*	Average over tightest supply cushion hours					
		Intertie metrics (MW) 1250 tight supply cushion hours			CMD Methodology		
		ATC 1250 hours	ATC Prior to LSSi arming 1250 hours**	Historical Flows 1250 hours***	Intertie Limit (MW) using minimum hourly function 1250 hours	Intertie Limit (MW) using minimum hourly function 500 hours (for reference)	Minimum Hourly Function
BC/MATL	780*	482	444	240	444	437	min(ATC prior to LSSi arming, firm)
BC	480	452	0	202	374	362	min(ATC, firm)
MATL	300	201	0	45	201	187	min(ATC, firm)
SK	153	125	0	38	125	125	min(ATC, firm)

* Values for firm transmission to be confirmed

**ATC minus the minimum LSSi requirement in any given hour

***Metered volumes plus active operating reserves

UCAP for External Assets

- CMD3 reflected removal of reference to named generating resource or utility system
- Rationale for removing this reference is as follows:
  - Distinction between named resource or utility system not required because external capacity assets can be either
  - This avoids limiting external resource to providing their capacity market obligation only from specific generating assets
  - AESO has no ability to validate the data submitted for a named or system external resource, and would have to rely on the external entity. No independency of verification

Questions

- Any issues with the approach for determining UCAP of external assets?
- Does the approach of moving away from named or system resources provide external resources additional flexibility or optionality in meeting their capacity market obligation?

Demand Response

Demand Response
UCAP determination

- Until performance data for Demand Response (DR) assets becomes available, the AESO will de-rate the capacity contribution of all DR resources by 9%. [availability factor of 91%]
- This applies to:
  - Guaranteed Load Reduction
  - Firm Consumption Level
- UCAP = Capacity Contribution * (1- de-rating factor)
- The de-rating factor was derived by examining the capacity event performance of demand response assets in other jurisdictions. In absence of performance data this approach will serve as a proxy to account for the risk of non-performance
- 4 jurisdictions examined – 3 selected:
  - **PJM [97.25%]**
  - **ISO NE [94.2%]**
  - **NYISO [81.2%]**
  - **UK [data not used as reflects DR performance in the ancillary market]**
- (97.25% + 94.2% + 81.2%)/3 = 90.8%

Demand response UCAP
Firm Consumption Level

- To establish a Qualified Baseline of a Firm Consumption Level asset examine load consumption based on the 250 tightest supply cushion hours of the previous year
- Create data for each tight supply cushion hour using the following methodology
  - The AESO will average the load consumed in a “like” hours on:
    - the previous 15 day non-holiday weekdays prior to the tight supply cushion hour for non-holiday weekdays
    - the previous 10 day weekend and holiday days prior to the tight supply cushion hour for weekend and holiday days
- Exclude from the data
  - Days with tight supply cushion hours or with performance events
- Each asset will declare the firm consumption level: the load to which the asset is willing to reduce to or below during performance events
- The difference between the Baseline and firm consumption level is the UCAP of the asset
- The approach recognizes that pool prices generally increase with tightness in supply and price responsive loads can be expected to reduce consumption as price increases.

Demand response
FCL: establishing the Qualified Baseline

- An example on how to establish a Qualified Baseline in one hour:
- Tight supply cushion hour has occurred on April 27,2017 between 5-6 PM
- Average consumption during 'like' hours on the 15 non-holiday days prior to the tight supply cushion hour to create a single data point
- This calculation will be performed for each of the tight supply cushion hours to establish a qualified baseline

Date/Day			1-2 p.m	2-3 p.m	3-4 p.m	4-5 p.m	5-6 p.m	6-7 p.m	7-8 p.m
03-Apr	Tuesday	Day 1	22.3	23.1	23.9	23.1	22.3	19.9	19.1
04-Apr	Wednesday	Day 2	22.3	23.1	23.9	23.1	22.3	19.9	19.1
05-Apr	Thursday	Day 3	24.6	25.4	24.6	24.6	23.9	20.7	20.7
06-Apr	Friday	Day 4	12	13	13.5	11.7	12	22	19
07-Apr	Saturday	Weekend	23.55	23.85	24.3	23.85	23.25	22.5	21.75
08-Apr	Sunday	Weekend	23.25	25.2	24.6	23.25	21	19.5	18
09-Apr	Monday	Tight Supply	15.75	15	16.05	15.9	15.9	16.05	15.9
10-Apr	Tuesday	Day 5	15.6	15.9	15.75	15	15.15	15.75	15
11-Apr	Wednesday	Day 6	21	21.75	22.5	21.75	21	18.75	18
12-Apr	Thursday	Day 7	23.25	24	23.25	23.25	22.5	19.5	19.5
13-Apr	Friday	Day 8	12	11.25	12	11.7	12	21.75	21
14-Apr	Saturday	Weekend	23.55	23.85	24.3	23.85	23.25	22.5	21.75
15-Apr	Sunday	Weekend	23.25	25.2	24.6	23.25	21	19.5	18
16-Apr	Monday	Event Day	15	15.75	15	16.05	15.9	15.6	15
17-Apr	Tuesday	Day 9	15.75	16.2	15.6	15.9	15.75	15	15.15
18-Apr	Wednesday	Event Day	21.75	22.5	21.75	21.75	21	20.25	19.5
19-Apr	Thursday	Day 10	12	11.4	11.7	11.25	11.7	22.5	21.45
20-Apr	Friday	Day 11	25.2	23.85	25.2	24	23.7	23.25	21.75
21-Apr	Saturday	Weekend	24.6	24.3	24.6	23.85	23.25	20.7	20.25
22-Apr	Sunday	Weekend	24	23.85	23.25	23.25	21	20.25	18.75
23-Apr	Monday	Day 12	15.75	15	16.05	15.9	15.9	16.05	15.9
24-Apr	Tuesday	Day 13	15.6	15.9	15.75	15	15.15	15.75	15
25-Apr	Wednesday	Day 14	23.25	25.2	24.6	23.25	21	19.5	18
26-Apr	Thursday	Day 15	23.25	23.55	23.25	23.25	22.5	22.2	21.45
Qualified Baseline hour			**18.9**	**19.2**	**19.4**	**18.8**	**18.4**	**19.5**	**18.7**

Self Supply
Methodology for accounting for un-dispatched energy for capacity factor assets

Background

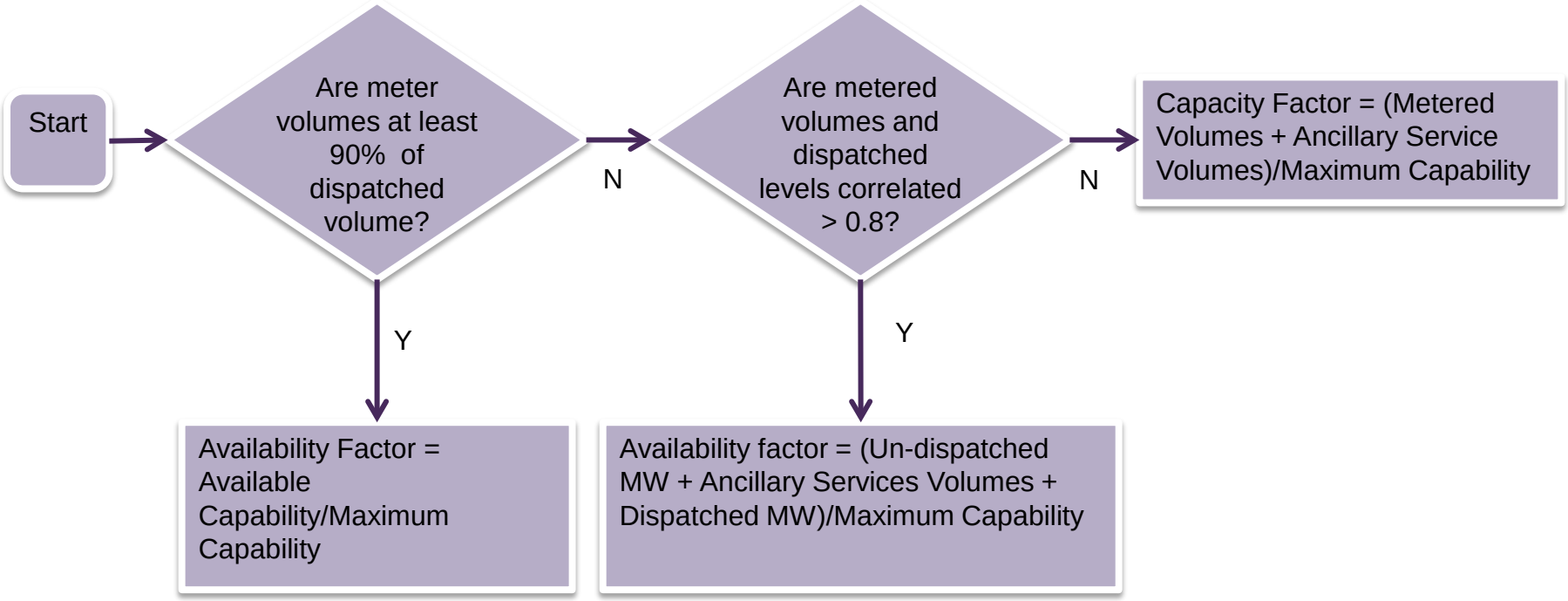
- In the TWG sessions the AESO was given the feedback that un-dispatched energy should be included, as well as AS contributions in the capacity factor UCAP calculation
- The AESO has suggested that for some assets, dispatch level (DL) and metered volumes (MV) increases are not correlated, resulting in un-dispatched energy not contributing to reliability
- The AESO is considering including a screen to determine whether or not to include un-dispatched energy as part of the capacity factor UCAP calculation

Methodology

In order to determine whether or not an increase in dispatch leads to an increase in net output the following screen is proposed

- Run a standard correlation coefficient between dispatch levels and metered volumes for each availability factor (AF) asset to establish a baseline for correlation levels.
- AF assets under 25 MW will not be included in analysis. Due to the 5 MW threshold allowed by dispatch tolerance rule, these assets do not respond to most dispatches.
- AF assets that provide TMR services will not be included in the analysis, since TMR dispatches distort the relationship between dispatch levels and meter volumes.
- Run a standard correlation coefficient between dispatch levels and metered volumes for each capacity factor (CF) asset. Any CF assets with correlations above the baseline determined using AF assets should get full credit for un-dispatched energy.

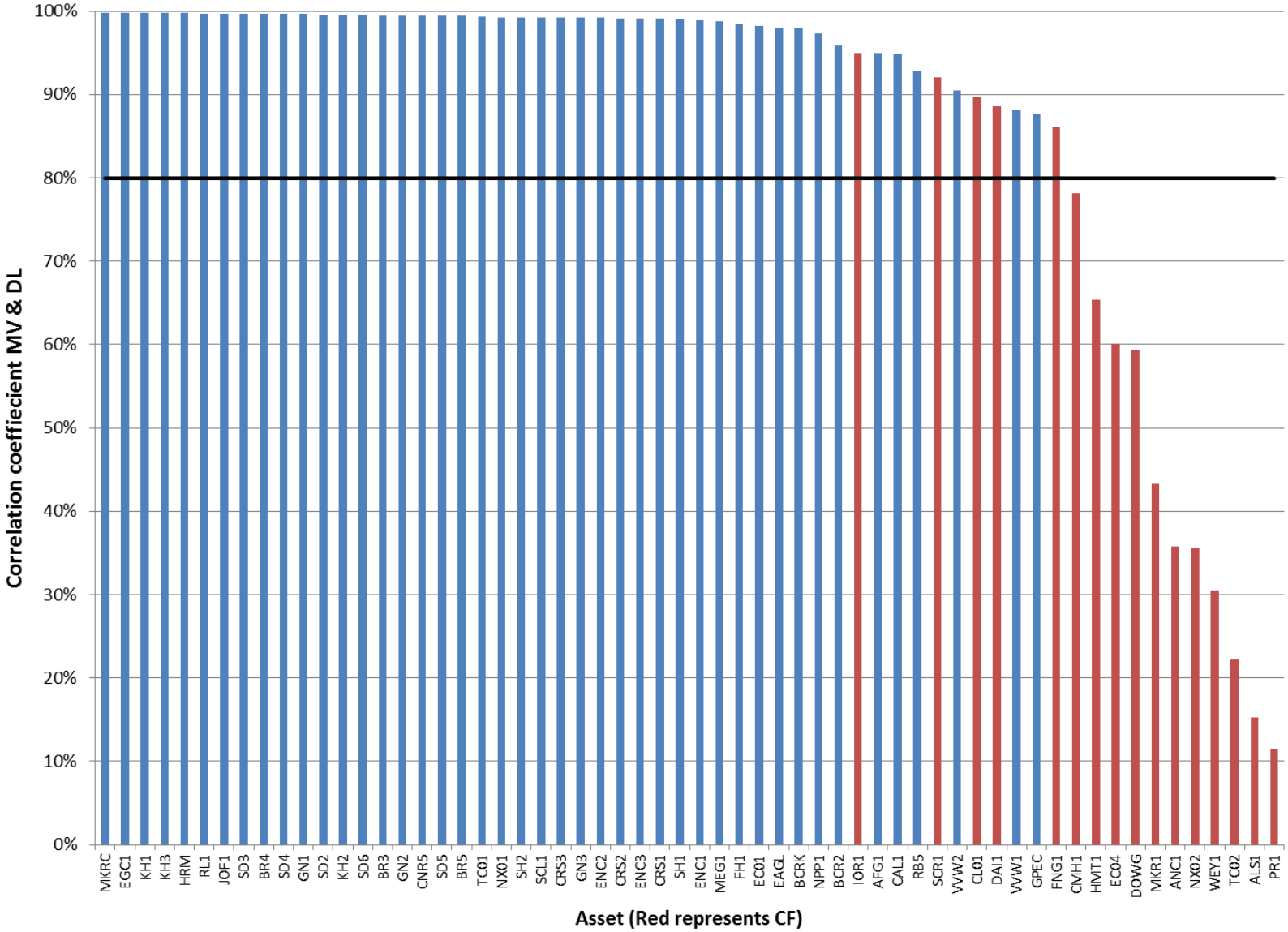
Classification of Self Supply Resources



Self supply resources are assessed based on their ability to provide energy to the grid in a consistent and predictable manner by looking at dispatch levels and net-to-grid outcomes.

A two tier approach is utilized to determine which resources may receive credit for their un-dispatched MW.

Results


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Correlation coeffiecient MV & DL
MKRC EGC1 KH1 KH3 HRM RL1 JOF1 SD3 BR4 SD4 GN1 SD2 KH2 SD6 BR3 GN2 CNR5 SD5 BR5 TC01 NX01 SH2 SCL1 CRS3 GN3 ENC2 CRS2 ENC3 CRS1 SH1 ENC1 MEG1 FH1 EC01 EAGL BCRK NPP1 BCR2 IOR1 AFG1 CAL1 RB5 SCR1 VVW2 CL01 DAI1 VVW1 GPEC FNG1 CMH1 HMT1 EC04 DOWG MKR1 ANC1 NX02 WEY1 TC02 ALS1 PR1
Asset (Red represents CF)

Recommendations for UCAP calculation

- Correlation levels between MV and DL for AF assets ranged from 88 to 100 percent. The correlation baseline could be established at a level close to 80 percent. According to literature, a correlation between .80-1.0 can be considered "very strong"[1].
- A baseline of 80 percent would give full credit for un-dispatched energy to the following CF assets[2]:

Asset	Description	Technology	Correlation MV to DL
IOR1	Mahkeses	Cogeneration	95%
SCR1	Suncor - Base Plant	Cogeneration	92%
CL01	Christina Lake	Cogeneration	90%
GPEC	Grande Prairie EcoPower	Other	88%
FNG1	Fort Nelson	Combined Cycle	86%

[1] Pearson's correlation - http://www.statstutor.ac.uk/resources/uploaded/pearsons.pdf

[2] DOWG's formula was reassessed using metering points DOWG and DOW1. The asset is a CF asset with correlation lower than 0.8, which means that un-dispatched volumes will not be included in the UCAP calculation