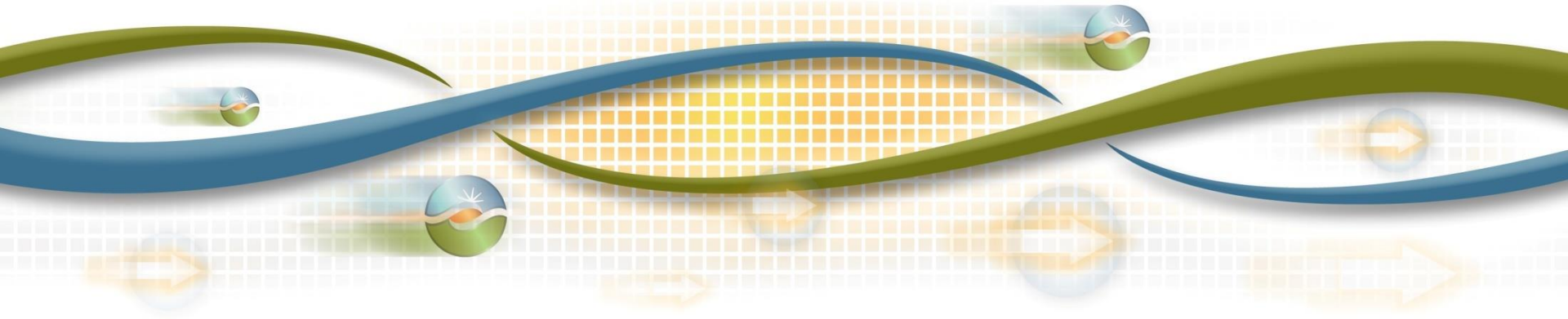# Comments on DMM's presentation
CRR Auction Efficiency - Stakeholder Working Group

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DMM's assertions about CRR revenue adequacy and CRR payments are based on an incomplete characterization of the CRR fundamentals

- Yes, a correlation between revenue adequacy and CRR profits is obvious to be expected

- Whether these variables have a weak or strong correlation and whether their correlation is positive or negative is far from obvious.

- Revenue adequacy and CRR profits are dependent on more variables than just auctioned CRRs and DAM prices.

DMM's presentation dismisses the report's findings on the impact of market misalignments

Achieving "revenue adequacy" implies nothing about ratepayer losses from auction

100 MW line limit in DAM every hour of month

DAM
CRR

70 MW allocated   30 MW auctioned
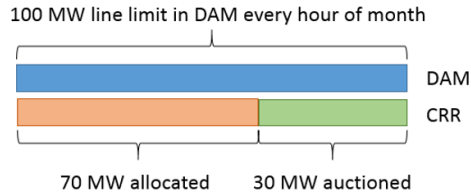
- Revenue adequacy$_k$:
$$\sum_h \left(Price_{k,h}^{DAM} * \left(100\,MW_{k,h}^{DAM} - 100\,MW_k^{CRR(auctioned+allocated)} \right) \right)$$
  – Perfectly revenue adequate
- Ratepayer profits from auction$_k$:
$$30\,MW_k^{CRR(auctioned)} * \left(Price_k^{Auction} - \sum_h Price_{k,h}^{DAM} \right)$$
- Attempting to match CRR model to day-ahead market model:
  – Important for *allocated* CRRs
  – Misguided for *auctioned* CRRs

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Let's use the very same DMM's formulation as the starting point and as a first step let's clean it up based on the intended example

- Let's use index k to define the set of [transmission] lines

- $100MW_k^{DAM}$ should actually be just 100

- $100MW_k^{\text{CRR (alloc+auc)}}$ should actually be just 100

- $MW_k^{CRR(auctioned+allocated)}$ needs to be $MW_k^{allocation} + MW_k^{auction}$

- "adequacy$_k$" should read "adequacy for line k"

- "auction$_k$" should read "auction from line k"
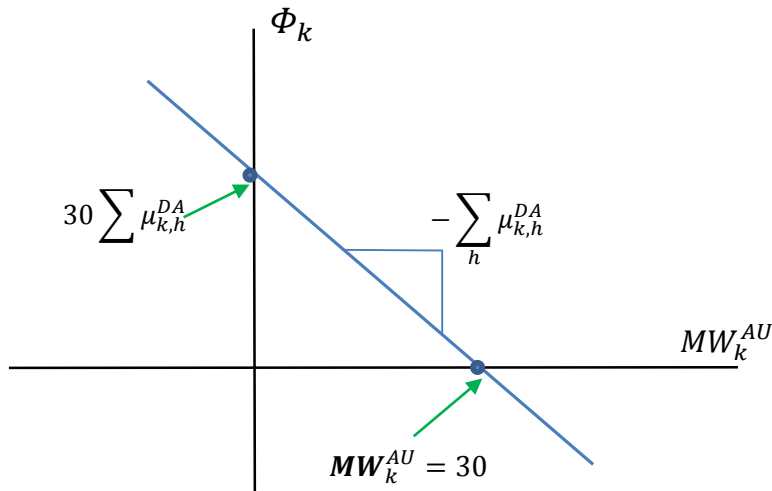
- Let's differentiate variables from parameters

Alignment between markets means indeed a lot for both revenue adequacy and CRR profits

- Revenue adequacy

$$\Phi_k = \sum_h \mu_{k,h}^{DA} \left(100 - 70 - MW_k^{AU}\right)$$
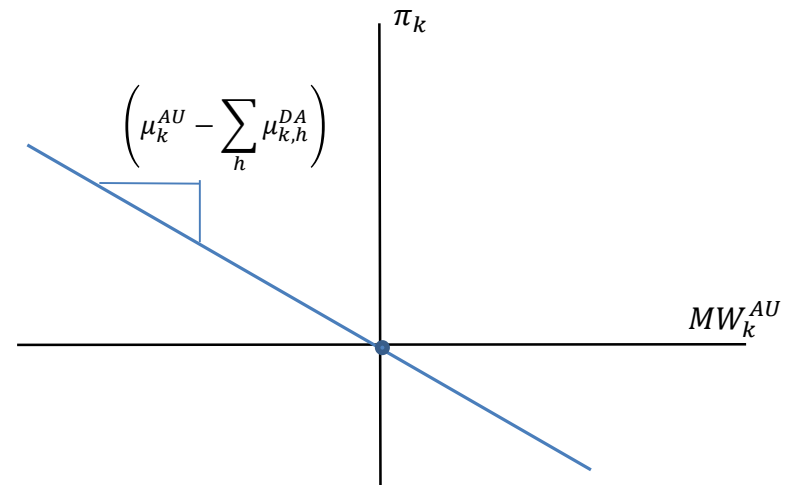$$\Phi_k = \sum_h \mu_{k,h}^{DA} \left(30 - MW_k^{AU}\right)$$

$If \quad \lim_{MW_k^{AU} \to 30} \Phi_k = 0$

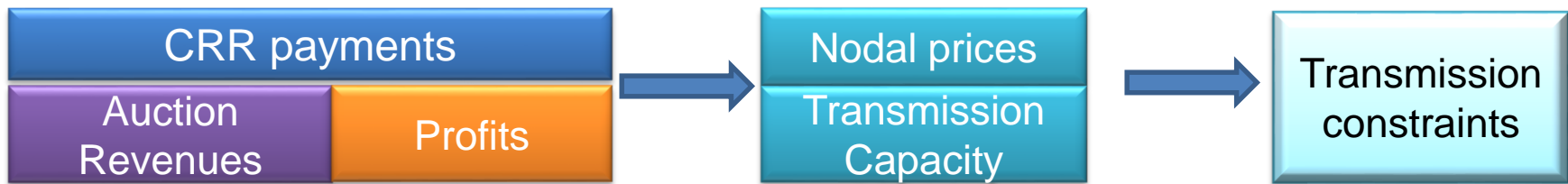then revenue adequacy is attained, regardless of the DA prices cleared.

- CRR profits

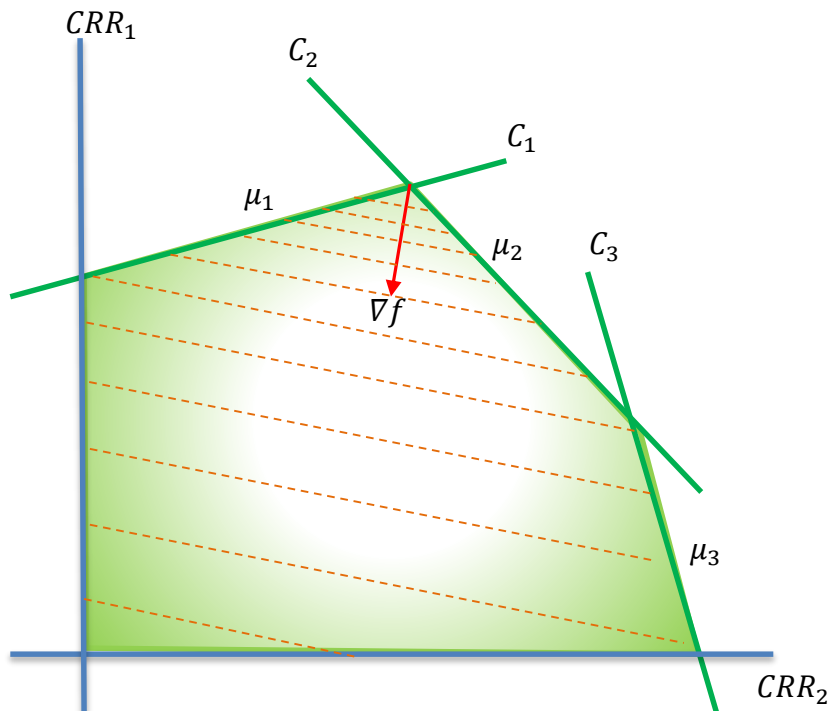$$\Pi_k = MW_k^{AU}\left(\mu_k^{AU} - \sum_h \mu_{k,h}^{DA}\right)$$

If $\quad \lim_{\mu_k^{AU} \to \sum_h \mu_{k,h}^{DA}} \pi_k = 0$

then profit neutrality is attained, regardless of the CRR capacity cleared.

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Fundamental variables of CRR profits

CRR payments			Nodal prices		Transmission constraints
Auction Revenues		Profits	Transmission Capacity		

Congestion Rents and Auction Revenues have same fundamental variables

Auction revenues are derived from the basis of the solution:
Capacity released and constraint prices
$$AR = \sum C_i \, \mu_i$$

CRR payments are derived from congestion rents, which are derived from the basis of the DAM solution:
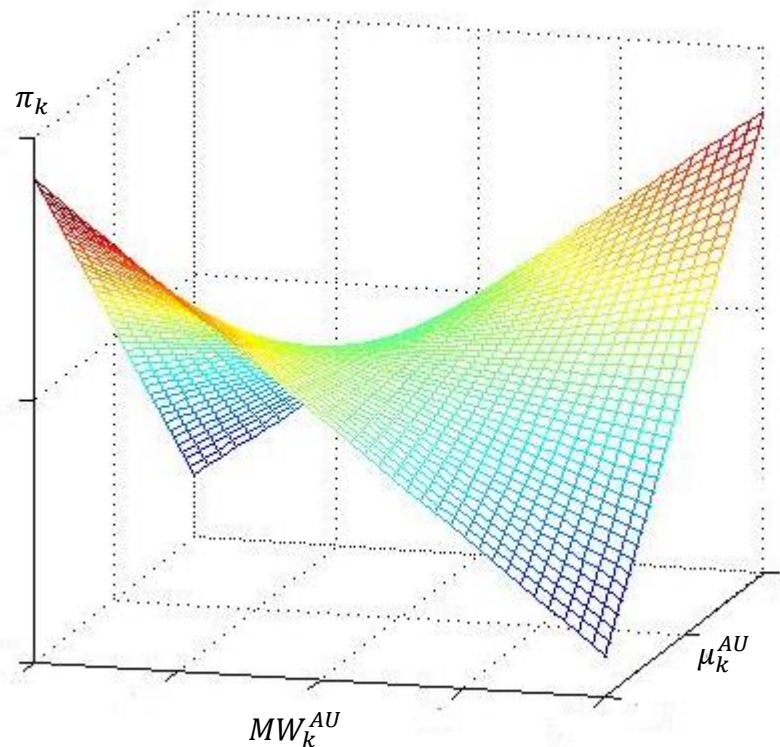Capacity released and constraint prices
$$CR = \sum C_j \, \mu_j$$

DMM's conclusions misguide the discussion by stating that alignment between markets is only important for revenue adequacy but not for CRR profits

$$\left(\mu_k^{AU} - \sum_h \mu_{k,h}^{DA} \right)$$

π_k

MW_k^{AU}
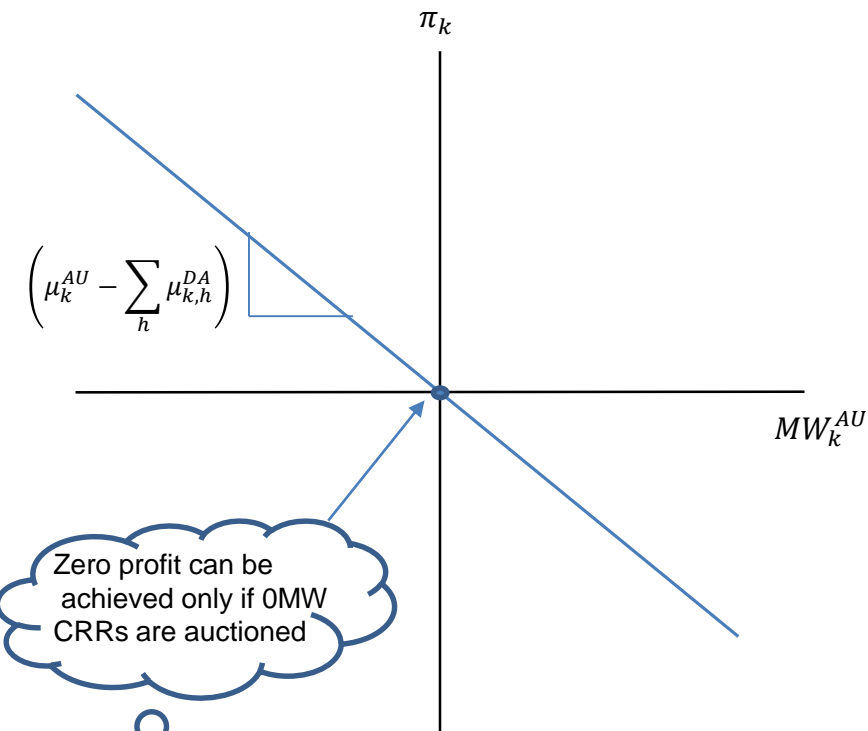
Zero profit can be achieved only if 0MW CRRs are auctioned

DMM's incomplete dimension of the impact of misalignment between markets

π_k

μ_k^{AU}

MW_k^{AU}

More reflective dimension of the impact of misalignment between markets

Both plots are parameterized over a given value of DAM congestion prices
Negative axis for independent variables are still plotted for simplicity in graphing

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