

Matrix of Outcomes for 5 Different Ways of Settling the Energy Component  
of Inadvertent Interchange  
Inadvertent Interchange Payback Taskforce, Business Practices Subcommittee  
North American Energy Standards Board

Howard is illustrating 5 energy pricing alternatives. I relabel the first 3 as variants of using the Bads' Worst Market Price:

1. Use the Bads' Worst Market Price with Goods' Market Prices Averaged.
2. Use the Bads' Worst Market Price
3. Use the Bads' Next-Worst Market Price

Using Bad's Worst Market Price is identical to using Good's Best Market Price which is depicted in the third row of my May 8<sup>th</sup> matrix. So, the first 3 alternatives share this alternative's perversity illustrated in the matrix, namely that Decongestion is not being paid or Congestion is not being charged when the Bad's Worst Market Price is on the supply side of the Inadvertent energy transaction (in Howard's new examples 1-4, 2-2, 2-4, and 3-3). Furthermore the 3<sup>rd</sup> alternative has the added perversity that the Best-priced Good is penalized (in Howard's examples 3-2 and 3-3).

Howard's 4<sup>th</sup> and 5<sup>th</sup> alternatives collapse to what I relabel as

4. Use Own Market Price

as depicted in the 5<sup>th</sup> row of my May 8<sup>th</sup> matrix. This alternative has no such distortionary disadvantages of the other alternatives.

Finally Al DiCaprio (PJM) has recently proposed a 5<sup>th</sup> alternative:

5. Use the Goods' Best Market Price when Frequency is Low, and Use the Negative of the Bads' Best Market-Price when Frequency is High.

This is the worst of the 5 alternatives, with 7 perversities, compared to 6 or less elsewhere. Alternative 5 abuses congestion pricing to achieve extreme underpricing of Inadvertent when frequency is high. When frequency is high it rewards Congesters, and overrewards Decongesters. Correct congestion price signalling is sacrificed to set the energy price to achieve correspondingly incorrect and extreme frequency-contribution price signalling. When frequency is low Alternative 5 fails to economically reward Decongestion., a shortcoming it shares with alternatives 2 & 3. Alternative 5 does not properly reflect congestion in the energy price consistent with the scheduled energy market. Such inconsistency makes Inadvertent rife for abuse to avoid paying for congesting, or to avoid providing good inadvertent when uncompensated for decongesting.

Alternative 5 chooses a price for Inadvertent when frequency is high that is way below the price on the cheap side of a transmission constraint and effectively adds a payment made for providing inadvertent energy, to a penalty for hurting frequency, or a payment received for energy taken, to a reward for helping frequency. When frequency is low, Alternative 5 prices congestion sometimes higher than Alternatives 2 & 3 which sacrifice charging the energy price on the correct side of the congestion to capture pricing of frequency-contribution. Alternative 5 chooses the price on the expensive side of a transmission constraint when frequency is low, instead of on the side favorable to the good frequency performer.

Howard Illian has indicated how Alternative 5's unnaturally extreme penalties and rewards for over-frequency compared to under-frequency create a natural bias to under-generate. To the contrary, the locational energy pricing of Alternative 4 combined with an "adder" for frequency-contribution creates lower prices for over-frequency Inadvertent compared to under-frequency Inadvertent. The contributor to over-frequency is paid for the energy he supplies but pays a penalty for how much he is hurting frequency, while the taker of over-frequency Inadvertent pays for the energy he takes but receives a reward for helping frequency. On the other had the contributor to underfrequency pays for the Inadvertent energy he takes and also pays a penalty for how much he is hurting frequency, while the supplier of underfrequency Inadvertent is both paid for the energy and paid a reward for helping frequency. So, under Alternative 4, all-in prices for under-frequency Inadvertent are generally higher than for over-frequency Inadvertent. Unlike Alternative 5, Alternative 4 does not harm reliability because it does not bias undergeneration and does not violate congestion pricing.

In this and in Howard's previous paper, use of a single price for the Inadvertent energy transactions of all Balancing Authorities with the Interconnection shares the perversity of over- and under-charging/paying congestion. This alone argues in favor of Howard's 4<sup>th</sup> alternative of using each Balancing Authority's own price as its settlement price.

A market's (agent's) bid/offer spread is different from a market-MAKER's (principal's) bid/offer spread. A market's bid/offer spread is the distance between the highest bidder in the bid stack and the lowest offer in

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the offer stack. A transaction "price" is set when the highest bid or the lowest offer is "hit". Accordingly, unlike market-MAKERS, markets have a "single" (last) transaction price, not a "binary" price. So, we need to sort out the apples of "bid/offer spreads" from the oranges of "transaction prices". Inadvertent energy pricing should recognize a Balancing Authority not in its affiliated commercial role as a market maker, but in its role as representing its underlying market. Accordingly, we can dismiss spreads and their complications from Howard's paper, and thereby collapse his 4<sup>th</sup> and 5<sup>th</sup> alternatives. A simple way is to regard an inadvertent transaction as an "involuntary" transaction or a "forced" transaction and not presume which side of the bid/offer spread is hit. In other words, on average, and in a "negotiated" situation, the transaction price is the midpoint of the spread and should be so deemed here. That still achieves the anti-gaming objective of Howard's 5<sup>th</sup> alternative by completely disincentivizing widening the spread from both ends, and by halving the incentive of widening it from one end. This may be disincentive enough, short of violating the market principle of spreads by outright reversing them as Howard does in his 5<sup>th</sup> alternative. That way, inadvertent energy pricing is recognizing transactions between "markets" (agents) and not between "market makers" (principals).