LOCATIONAL-PRICING FOR INADVERTENT INTERCHANGE

Prepared for

The NAESB Inadvertent Interchange Payback Task Force

by

Howard F. Illian, President
Energy Mark, Inc.
334 Satinwood Ct. N.
Buffalo Grove, Illinois 60089
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1. INTRODUCTION

The NAESB Inadvertent Interchange Payback Task Force evaluated a number of alternatives for pricing the Energy Component of Inadvertent Interchange during the last few meetings and conference calls. This paper provides support for the local pricing alternative and the rational for selecting that alternative. It enumerates insights derived from preparing examples of the many pricing alternatives.

The choice of the local pricing alternative is based as much on the disadvantages of the other alternatives as it is on the advantages of the local pricing alternative. One lesson that has been learned from the weaknesses and failures of power markets is that first, the pricing method must do no harm to the market. This is much the same as the primary rule of medicine. Only by following a path that first does no harm to the market is success likely to be achieved.

2. SINGLE-PRICE VERSUS LOCATIONAL-PRICE MARKETS

Although I have spent literally years studying power markets, most of my efforts have been directed toward the study of Ancillary or Reliability Services. As we began to investigate the Energy Component of Inadvertent Interchange I started with many of the same biases toward single-price markets as others in the group. However, during the investigation of these alternatives I realized that there was a fundamental question with respect to the type of market within which we are working. Will it be a single-price market or a Locational-Priced market? I fully expect it to be a Locational-Priced market.

Single-price Design:

When restructuring began the preferred method of selecting the market price for power markets was the Single-Price auction. From a theoretical point of view, this is still the preferred method for many market designs when there are no transmission constraints that cause the markets to experience price fragmentation or Locational-Prices. The performance of many of these markets was observed to be less than acceptable because the transmission constraints caused price differences between market locations. These price differences could be manipulated in the Single-Price market to extract unreasonable profits by some market participants. These market limitations contributed to the market problems experienced in California, New England, Texas and elsewhere. All of these markets have since modified their designs to include some form of Locational-Pricing to reduce the detrimental effects that valid Locational-Price differences can have on the market.

Locational-Price Alternative:

As we began developing the energy price component, a task that was not done as part of the JIITF, I began to realize that the alternatives we were considering were based on the assumptions of a Single-Priced market. Therefore, the best of the Single-Price alternatives, the highest price plus and a bad contributor adder (Example 2), still contained all of the disadvantages associated with attempting to manage a Locational-Priced market with a Single-Price alternative. This is why I suggested that an

alternative that actually used the Locational-Prices to represent the Energy Component be investigated along with the other alternatives. The development of the alternative examples leads me to conclude that the best alternative for pricing the Energy Component of Inadvertent Interchange is a Locational-Pricing alternative.

3. SINGLE-PRICE ENERGY COMPONENT ALTERNATIVES

There are a number of characteristics of the single energy price alternatives that we have considered that make them unacceptable as a valuation method for Energy Component of Inadvertent Interchange. Many of these disadvantages are discussed below.

Single-Price Selection:

The selection of a Single-Price to use in a Single-Price Energy Component alternative requires the selection of the highest price from all of the available prices when frequency is low and the lowest price from all of the available prices when frequency is high in the Locational-Priced market. The selection of any other Single-Price creates the opportunity for a control area to manipulate Inadvertent Interchange to their advantage if their price is higher than the selected price when frequency is low or their price is lower than the selected price when frequency is high. This opportunity to manipulate Inadvertent Interchange is unacceptable in a market because is encourages a control area to exchange services reserved to manage reliability for economic gain thus reducing the interconnections ability to respond to emergencies.

Balanced Compensation:

All of the Single-Price alternatives result in a balance between total revenue collected for Inadvertent Interchange and the total revenue paid out for Inadvertent Interchange. This revenue derives directly from the fact that Inadvertent Interchange In and Inadvertent Interchange Out is always balanced for every hour. This balancing of revenue coupled with the selection of either the highest price or the lowest price insures that all participants with Interchange In will pay the same settlement price for energy and all participants with Interchange Out will receive the same settlement price for energy, although these prices could be negative in some cases. Therefore, the balanced compensation results in penalties in the form of price differences between the Locational-Price and the settlement price for those with bad Inadvertent Interchange that is more dependent on magnitude of transmission constraints than it is on the effect on reliability. This balanced compensation also results in rewards in the form of price differences between the Locational-Price and the settlement price for those with good Inadvertent Interchange that is more dependent on magnitude of transmission constraints than it is on the effect on reliability. This characteristic of potential over-reward and over-penalization is unacceptable. Even the addition of a Bad Contributor Adder can only modify these unjustified levels of penalty and reward.

Un-penalized and Un-rewarded Participants:

In the Single-Price alternatives, the party whose price is used to set the Inadvertent Interchange price will not pay a penalty or receive a reward. In addition, others with the same price will also be in the same position of not being penalized for bad inadvertent or rewarded for good inadvertent. Therefore, to insure that these parties are properly penalized and rewarded for their behavior their price must be modified by an adder to incent the correct behavior. Even the Single-Price alternatives require a behavior adder.

Constraint Bypass:

If the market price differences result from valid system constraints, the compensation differences for Inadvertent Interchange will not maintain those price differences. This results in the provider of good Inadvertent Interchange receiving compensation that should go to the party managing the system constraint. Providing that compensation to the wrong party insures that the constraint is subject to bypass. Discouraging constraint bypass is one of the major reasons that markets are moving to Locational-Pricing alternatives.

Conclusions:

1. Single-Price alternatives require prices from all participants to identify the highest or lowest price.
2. Single-Price alternatives result in penalties and rewards that are unrelated to the reliability problem.
3. Single-Price alternatives still require adders to insure that penalties and rewards are provided for all participants.
4. Single-Price alternatives do not respect the system constraints that Locational-Prices represent.

4. LOCATIONAL-PRICED ENERGY COMPONENT ALTERNATIVES

As analysis of the pricing alternatives moved forward, I realized that the Single-Price alternative created perverse effects because of the base price differences between interconnection locations. Valid prices are required from each participant to insure that the highest or lowest price is selected. Even the choice of a Single-Price would not eliminate the need to have an adder to assure that all parties are penalized for bad Inadvertent Interchange and rewarded for good Inadvertent Interchange. Therefore, the Single-Price alternative is no simpler than a Locational-Price alternative. Since the Locational-Price alternative is no more complex than the Single-Price alternative, why not make the Energy Price Component neutral by selecting the Locational-Price and use just the adder to reward good behavior and penalized bad behavior.

Single-Price Disadvantages Corrected by Locational-Pricing:

The selection of a Locational-Price solution eliminates most of the disadvantages associated with the Single-Price alternatives.

1. Most opportunities to manipulate the market are eliminated because each participant sees its own price as the Energy Component Price. There is no need to select the highest or lowest price.
2. Since the prices are different, the compensation is not balanced. Therefore, there is no unjustified penalty or reward related to the price differences.
3. All participants remain unrewarded by the Energy Component Price. Therefore, the Frequency Component is the only penalty or reward for bad or good Inadvertent Interchange. This demands that the penalty reward adder, Frequency Control Component, be well supported technically. In the Single-Price alternatives the adder could be overlooked easily and based on judgment alone.
4. Since Locational-Prices are used there is no need to design an Energy Component pricing system. This method relies solely on the hourly market to set prices and leaves the market in control of the Energy Component pricing rules. If the energy market design is changed, then the change will automatically be reflected in the Inadvertent Interchange Energy Component Price. As a result, there will be no constraint bypass of valid system constraints reflected in the market prices.

Locational-Pricing Compensation Balance:

As with all Locational-Pricing methods, there is no assurance that the revenues for the Inadvertent Interchange Energy Components Out will equal the revenues for Inadvertent Interchange Energy Components In. There are some factors that may allow us to estimate the long-term position that the Interconnection will be required to support.

1. If Inadvertent Interchange is driven by random error, even a Locational-Pricing method will tend to be revenue neutral over the long-term.
2. If as others have suggested, that higher prices tend to incent leaning on the interconnection for energy and lower prices tend to result in over-generation, it will only take a small bias in these directions coupled with the first factor to put the interconnection in a positive revenue position over the long-term.
3. This means that a method to distribute this excess revenue back to the market without creating market distortions will be required.

The above compensation balance indicates a small risk associated with revenue adequacy.

Frequency Control Component:

The Frequency Control Component of Inadvertent Interchange would provide the penalty and reward adder. The penalties and rewards would be more than just an arbitrary adjustment. Because the Frequency Control Component is designed to provide appropriate compensation for the supply and use of Ancillary or Reliability Services provided to others to control the interconnection energy balance and interconnection frequency, it can be a cost justified tariff initially and potentially turned into a market based adjustment in the long-term as Reliability Markets develop.

5. RECOMMENDATIONS

The NAESB IIPTF should move forward with the development of a locational based Energy Component pricing model. Only this alternative supports all of the different market designs being implemented interconnection wide because only this model defers full pricing mechanism to the hourly market. This method addresses both the energy and transmission congestion (constraint) components of the Inadvertent Interchange as suggested in the NERC JIITF document.

The IIPTF should investigate the compensation provided by the NERC JIITF Frequency Control Component. This could be the supplemental compensation necessary to enable locational Energy Component pricing to provide the correct price signals for Inadvertent Interchange in all cases.