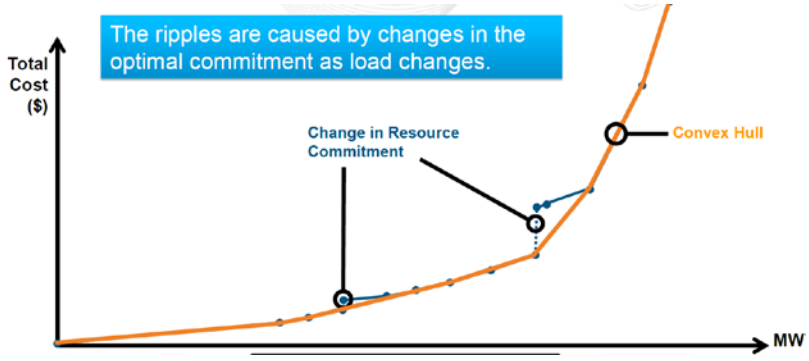
Important Concepts from Price Formation Education Session 2: Alternative Pricing Frameworks

1. Locational Marginal Pricing

The locational marginal price (LMP) reflects the incremental cost of supplying the next megawatt of load at a particular location while satisfying all operational constraints. LMPs only include incremental energy costs, but do not include start-up or no-load costs. LMPs are produced as a result of economic dispatch with the commitment fixed. Uplift payments may be needed to ensure that generators follow dispatch instructions.

2. Convex-Hull Pricing

Convex-hull pricing has also been called minimum uplift pricing. Since the result is extending LMP to incorporate commitment related costs, the approach has also been called extended locational marginal pricing (ELMP). The convex hull of a non-convex function is the closest convex function that encloses the original function. The convex-hull price is the slope of the convex hull of the total cost curve.



Advantages of Convex-Hull Pricing

Convex-hull pricing produces a more "intuitive" relationship between changes in load and price: When load increases, price either stays the same or increases. When load decreases, price either stays the same or decreases. In addition, convex-hull pricing incorporates start-up and no-load costs into the price, minimizes total uplift and allows block-loaded resources and those operating at their minimum or maximum limits to affect the price when appropriate.

Disadvantages of Convex-Hull Pricing

Convex-hull pricing is difficult to calculate computationally and is difficult to interpret. In addition, convex-hull pricing can have "counterintuitive" properties, such as positive prices for nonbinding system constraints (i.e., transmission or reserve constraints). Since implementing convex-hull pricing is not computationally feasible, an approximate convex-hull solution can be calculated using separate dispatch and pricing runs. Many other ISOs/RTOs use separate dispatch and pricing runs in their approximate ELMP designs.