



## Downstream Energy Operational Excellence

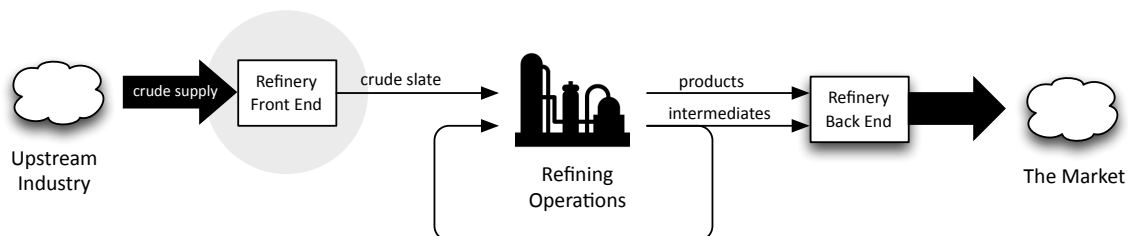
*Better/faster/cheaper refining and petrochem made possible with simulation modeling and analytics*  
September 25, 2015

### Introduction and Background

The downstream sector of the energy industry is enjoying a financial resurgence and a newfound emphasis as a result of the sharp decline in commodity prices over the last year. That is a welcome change to most market participants. But more importantly the change in market conditions is an opportunity for the downstream sector to move even further toward operational efficiency and effectiveness by capitalizing on ways to optimize key parts of the value chain.

Simulation modeling and analytics are important tools for improving complex operations, while helping to leverage years of existing human knowledge and experience. Proven mathematics and data are brought to bear to build models of operations—models that can be used to understand the behavior of industrial facilities under a wide variety of operating and financial conditions.

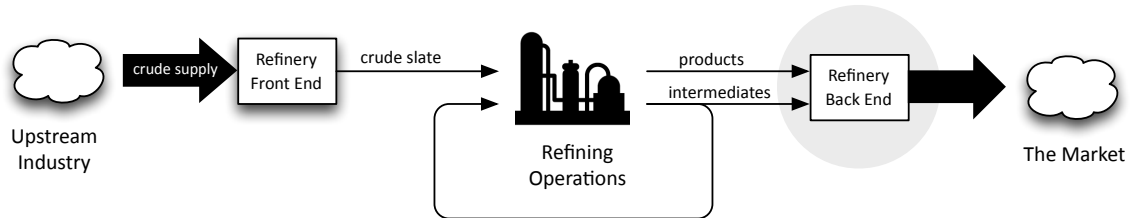
### Case Study #1: The Front End of the Refinery



Take the crude oil refining industry for example. Most modern refinery units are highly optimized, using expensive fit-for-purpose models and software. However, the front end of the refinery—the place where purchased crude slates are staged for processing—remains today a largely manual effort glued together with spreadsheets. This is out of step with the sophistication of the refinery operation itself. Could the front end be optimized as well?

By allowing an optimization model to consider all of the thousands of plausible crude purchases, a supply manager could make more rapid, data-driven decisions with regard to the crudes available in the market.

### **Case Study #2: The Back End of the Refinery**



Now let us take a look at the back end of the refinery, the place where a range of “clean” products emerge, along with a number of intermediate by-products (many of which are consumed by other operating units within the company). Here too we see a noted lack of sophistication in choosing the right market location at the right time to maximize the profitability of the firm. Our observation is that this function is again governed by spreadsheet analysis at best when optimization represents best in class performance of the back end to bring it into balance with the refinery unit.

Consider the value of a model that could simultaneously examine the inventory of products at the refinery gate while moving through every possible market where these products can be sold (even with long term supply contracts in place there are opportunities to optimize). Such a model would show a scheduler how to set up the outbound logistics that maximizes the value of its product position at any given moment.

### **Case Study #3: Maximizing the Value of Every Molecule in Petrochemicals**

A petrochemical firm was in the business of making a certain finished product. In making the final product a large number of by-products are generated. These by-products were a distraction to the main focus on the finished product, so the company simply sold these by-products off at cost to quickly get them out of the way.

Along comes a new management team that recognized that under certain conditions and with certain by-products, the markets could be quite lucrative. The question came up: could we make more money by treating these by-products as products themselves?

**Company executives were stunned to learn from the model runs that at times it made sense to make less finished product to maximize the value of other by-products**

## *Downstream Energy Operational Excellence*

Through the power of simulation modeling we were able to imagine, in a data-driven way, a future world that did not currently exist—one where the company managed operations in such a way that it maximized the full value of the asset by allowing each product and by-product to earn its way in the value stream. Company executives were stunned to learn from the model runs that at times it made sense to make less finished product to maximize the value of other by-products.

### **Our Approach**

We have years of experience in solving a wide range of business challenges using simulation modeling and analytics. Our firm wrote the bible of business problem solving with analytics, *Profit from Science*, published by Macmillan.

We have handled a number of projects in the downstream energy industry. We use our client's vast experience and knowledge to craft models that are purpose-built for a particular organization's needs.

Business Laboratory  
6700 Woodlands Parkway  
Suite 230-202  
The Woodlands, TX 77382  
(281) 318-1761  
[www.business-laboratory.com](http://www.business-laboratory.com)

