Cost & Capital

February 2015

Sourcing in a Declining Market

Category Sourcing Guide

- **Resin Price Decline.** Many industrial resins have seen dramatic price reductions due to the decrease in crude oil and natural gas feedstocks.
- **Crude Oil Impact.** While crude oil is the main feedstock for most resins, pricing is also affected by open capacity and demand.
- **Savings Pull Through.** While costs and prices have declined, buying organizations need to ensure the full benefit is followed through to the purchase price for resin and moldings.

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Cost and Capital Partners *is a management consulting firm that works with companies to improve cost and capital efficiency. Our client base includes Fortune 1000 companies from the industrial, automotive, electronics, hospitality, process, consumer goods, transportation and white goods industries. We work with clients to improve results and enhance visibility for strategy development. Supplier engagement is a core focus ranging from direct supplier negotiations to market and financial viability assessments. In addition to working with clients to execute sourcing initiatives, we also deliver sourcing training that enables organizations to increase their level of professionalism in supplier engagement.*

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Percent decrease for common items based on reduction in crude from $110 per bbl.

	WTI Crude Price								
	$30	$40	$50	$60	$70	$80	$90	$100	$110
Naphtha	73%	64%	55%	46%	37%	27%	18%	9%	0%
HDPE	53%	47%	40%	33%	27%	20%	13%	7%	0%
PP	57%	50%	43%	36%	29%	22%	14%	7%	0%
ABS	53%	46%	40%	33%	26%	20%	13%	7%	0%
Injection Molding	11%	10%	8%	7%	6%	4%	3%	1%	0%

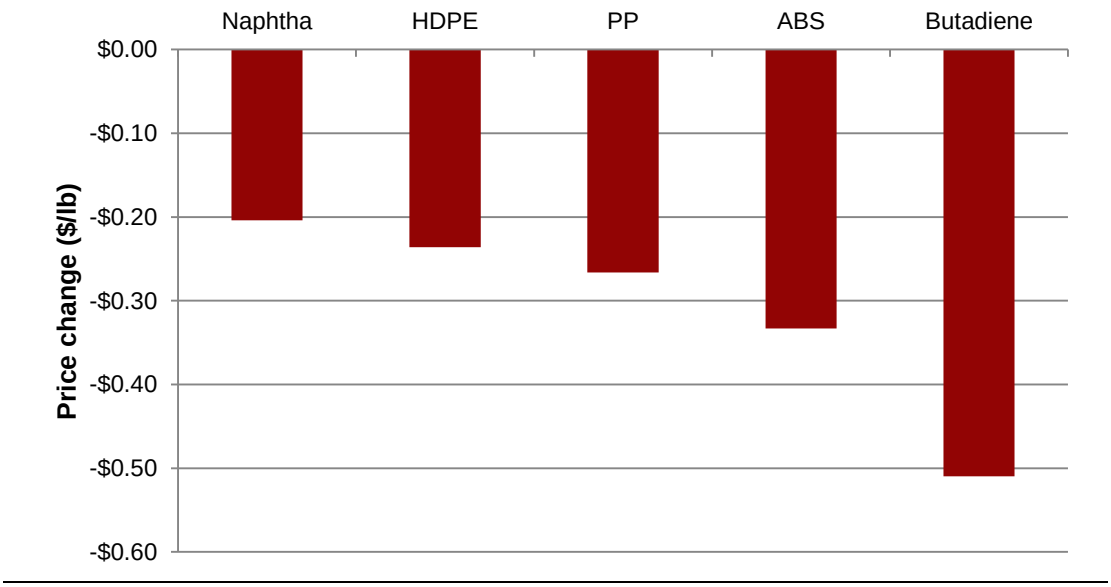
Resin Market Overview

The last time crude oil decreased more than $50 per bbl in three months, it was December 2008 and the global economy was on the verge of collapse. The crude oil crash of 2008 was demand driven. Products were not being ordered, people were not driving and the price of crude tumbled following the economic principles of supply and demand.

The $50 per bbl decline in crude prices at the end of 2014 was different. This crash was supply driven. With crude oil prices at or above $100 per bbl for years, companies mobilized more expensive forms of oil extraction such as hydraulic fracturing to recover oil from shale plays, mostly in the United States. Oil production from the US outpaced the gradual shrinking of demand for oil. The new oil production was searching for buyers and as production outstripped demand, prices fell.

What this means for consumers of oil derivatives is that logically, the prices paid for these products should also decrease. Many organizations are struggling with how much of an impact the lower oil prices should have and how to budget for savings. It is also vital to ensure one's organization will be able to execute and achieve lower pricing.

Figure 1: **Production Cost Change Based on a $50 Decrease in Crude Oil Pricing**



Source: Cost & Capital Partners

Producer Cost

As seen in Figure 1, the rapid decline in crude oil should have a direct impact on the cost of many commonly purchased resins and derivatives. While costs are declining for the producers of resins, the impact on the purchase price is not always 1:1.

> ***ABS producers managed to pocket some of the cost relief to improve margins with prices down by €80-85/tonne during the final quarter of the year.***
>
> **– European Plastics News February 5, 2015**

The challenge for resin buyers is to pull through the savings for direct purchases of resin as well as for plastic components manufactured by third parties.

Contract Escalators

Many resin contracts periodically update based on a baseline index such as Henry Hub Natural Gas, WTI crude, or product indices such as propylene, polyethylene, butadiene, etc. Escalators provide a mechanism between buyers and sellers to adjust for changes in market pricing. However, escalators have a tendency of breaking down when commodities have large fluctuations in price. The reason is that baselines are set for a particular moment in time. The baseline can reflect a period of excess or tight supply, and the escalator therefore locks in a particular margin. Buyers are susceptible to three common factors that can sub-optimize pricing

1. **Link to production method** – Many resins can be produced through several chemical processes using various feedstocks, energy and capital investment. If the index does not link the producers' cost with price, then there is an opportunity to limit the benefit as raw material pricing moves downward. This can be seen in the polyethylene market. The US producers crack ethylene from natural gas while European producers crack ethylene from naphtha derived from crude oil. When natural gas prices plummeted following the US shale peak, US producers sold at the market price even though they were generating gross margins of 70%. Now that crude oil has decreased, any contracts linked to natural gas that were signed in the past four years will not fall as much as the market price. In these cases, buyers need to understand the global market to develop leverage to update contract terms.
2. **Tight Supply** – Contracts signed during periods of tight supply will naturally lock in a higher profit margin. While contracts signed across different time periods will have similar escalation, according to a large resin producer, the base price can fluctuate by $0.50 per lb. based on what the producer expected to be able to achieve in the market.
3. **Link to Cost** – Escalators that are linked to the producers' actual production cost protect the producer during times of increased commodity costs. Resin production includes the cost of feedstocks, capital investment, energy, operational labor, overhead and profit. Escalators should only alter the price of the feedstock, not the value add that is under the control of the producer.

Savings Pull-through

Spend is typically categorized by whether or not pricing is linked to a market index. While escalators can be useful, they also have shortcomings when handling rapidly changing commodity prices. Most escalators accurately reflect moderate changes in underlying costs. However, escalators are not designed to handle extreme changes such as the price of crude oil falling more than 50% in three months.

Agreements that do not automatically change to reflect changes in underlying costs are called fixed contracts. These contracts call for the same price regardless of any changes in underlying costs.

The appropriate strategies differ depending on the material being purchased and whether it is on an escalator or a fixed price contract as seen in the table.

Figure 2: **Managed spend categories affected by crude price developments**

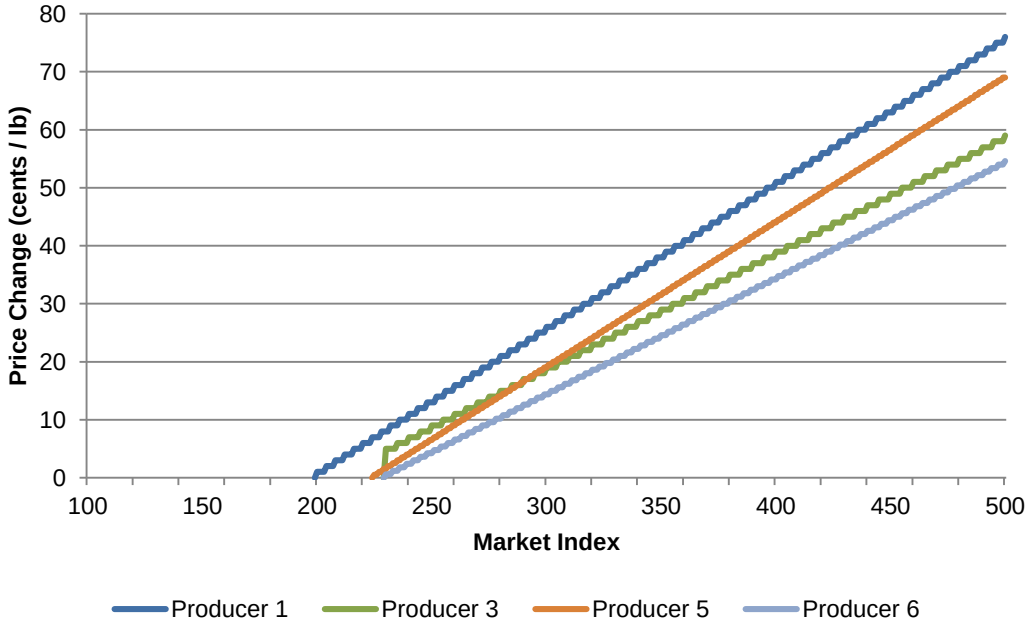
	Escalator	Fixed
Direct Resin	Audit index mechanism at extreme feedstock changes to ensure alignment to actual producer costs	Determine contract price update based on market, cost and price history
Distributor	Compare escalator feedstock input to align with actual producer manufacturing method input cost	Leverage market knowledge to drive pricing to reflect market declines
Injection Molder	Audit index mechanism against actual resin cost impact to piece price	Map resin pricing to total piece cost and link lower oil pricing to the reduced supplier resin cost

Source: Cost & Capital Partners

Audit Approaches

Contracts that include escalators based on a market index set the starting point for escalation at a defined point and include a formula for how the pricing will adjust based on the changes to the index. The first step to ensure that escalators accurately reflect changes in the market is to model their output. This approach is called Zero Input Modeling. In this approach, escalators are tested at extremes to see if the resulting price reflects an appropriate amount of producer cost. At zero input, the price should reflect the capital, labor, overhead, energy and profit only.

Figure 3: **Modeled Impact of Multiple Contracts Based on Changes to the Index**



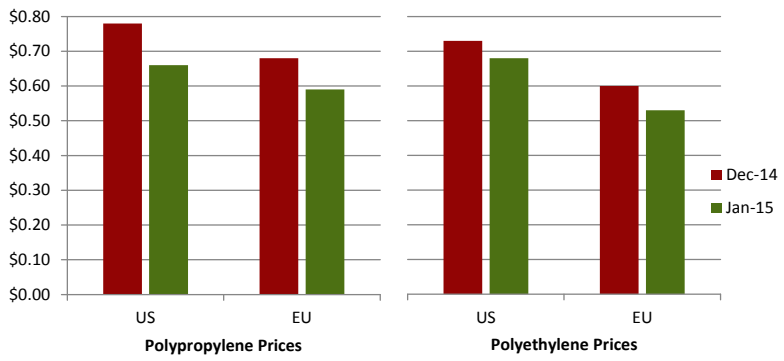
Source: Cost & Capital Partners

As seen in Figure 3, testing the escalators for various inputs shows the baseline amounts, how quickly prices should increase or decrease as well as any floors or ceilings on the price level. Escalators can be compared across multiple producers or within the product portfolio of a single producer to highlight inconsistencies. Results of the Zero Input Modeling will show how one producer or contract becomes more or less competitive in the market based on the escalator mechanism. Combined with a production process cost model, teams can develop strategies to shift volume, renegotiate contracts and reset escalator mechanisms. The escalator analysis is a key step in verifying the quality of the escalator as well as comparing current prices to the market.

Supplier Intelligence

In addition to testing the index mechanism, buying organizations should review supplier financials to uncover what suppliers and sub-suppliers are telling the financial markets about changes in cost. As seen in Figure 4, a producer of polypropylene and polyethylene reported the decrease in selling prices due to changes in costs and market demand. This data is effective when negotiating with the supply base because they have to make every effort to insure financial reports are accurate and a true reflection of their business. Therefore, buyers can be confident that the public information is factual.

Figure 4: **Financial Report Analysis – LyondellBasell Annual Report Feb 2015**

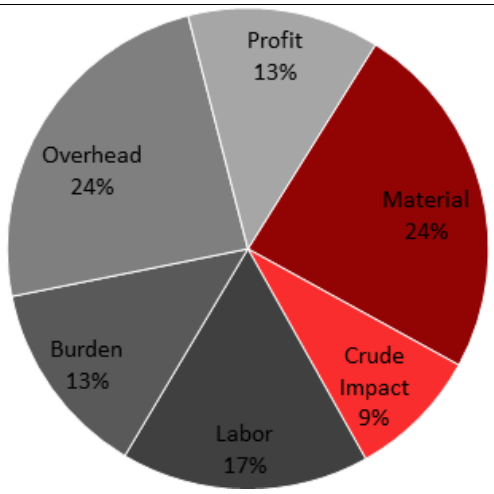


Source: LyondellBasell Annual Report

Third Party Spend

Suppliers that produce plastic products through injection molding, blow molding, extrusions and other methods either employ an index mechanism to reflect the changes in raw material cost, or offer fixed price contracts. When raw materials decrease rapidly, buying organizations need to understand how much the raw material change should affect the piece price. Cost models and activity based costing are the most effective way to set targets for the supplier to achieve. As seen in Figure 5, a common injection molding cost model shows a piece price reduction of 9% due to a $50 per bbl. reduction in crude prices.

Figure 5: Injection Molding Sample Cost Model - $50 per bbl decrease in crude impact



Source: Cost & Capital Partners

While cost models are effective at analyzing an entire portfolio, activity based costing is a better method for more complex manufacturing methods. Activity based costing maps the exact impact to the supplier for volume, scrap, set-up time, cycle time, tooling and other key operational data. A detailed costing tool, such as the Cost & Capital Universal Costing Tool, can provide detailed insight into higher volume components that do not necessarily fit in standard cost models. A detailed template of activity based costing is highlighted in Figure 6. Suppliers often appreciate the insight provided through a detailed cost analysis. All elements of cost can be traced back to specific processes, requirements and order quantities. The fact-based approach eliminates the need for positional negotiations when commodity prices change. The increased transparency results in a principled discussion on cost drivers as well as activities that can reduce supplier cost and the corresponding selling price.

Figure 6: Detailed Cost Template for Injection Molding Sample

Part Details

Part Number	Two shot mold template		**Supplier**	TBD	
Part Description			**Supplier Location**	USA	
			Exchange Rate	1.0000	USD : USD
				1.0000	USD : USD
					per US ton
Hourly Rate	$ 20.00	USD			per lb.
Part Weight	0.0620	kg	**Depreciation Years**	5.00	Years
Gross : Net Weight	1.05 : 1		**Capacity Utilization**	78%	
Tool Cost	$217,000		**Annual Units**	250,000	

Bill of Materials and Key Inputs

Materials	Qty	UoM	Cost per UoM		Cost per piece
Marlex HDPE	0.030450	kg	$ 0.937		$ 0.0285
Resin 2	0.034650	kg	$ 0.937		$ 0.0325
Packaging	0.125000	ea	$ 0.250	Carton	$ 0.0313
					$ 0.0923

Process Step Details

Process Steps	Cycle Time	Units per Cycle	Equipment Type	Equipment Cost	Equipment Uptime	Capacity Utilization	Process FTQ	FTE's	Labor Cost per Piece	Fixed Cost per Piece	Total Process Cost
Material Preparation	25.00 sec	4		$ 40,000	92%	78%	98%	0.3	$ 0.0192	$ 0.002742	$ 0.02196
Injection Molding	42.00 sec	4	130T press	$ 370,000	80%	78%	98%	0.3	$ 0.0227	$ 0.047906	$ 0.07059
Packaging	3.80 sec	1		$ 5,000	98%	78%	98%	1.0	$ 0.0219	$ 0.000187	$ 0.02207
									$ 0.0638	**$ 0.0508**	**$ 0.1146**

Material		$ 0.0923
Labor		$ 0.0638
Burden		$ 0.0508
Plant Overhead		$ 0.1000
Overhead	15%	$ 0.0858
Profit	8%	$ 0.0458
Selling Price FOB Supplier Dock		**$ 0.5722**

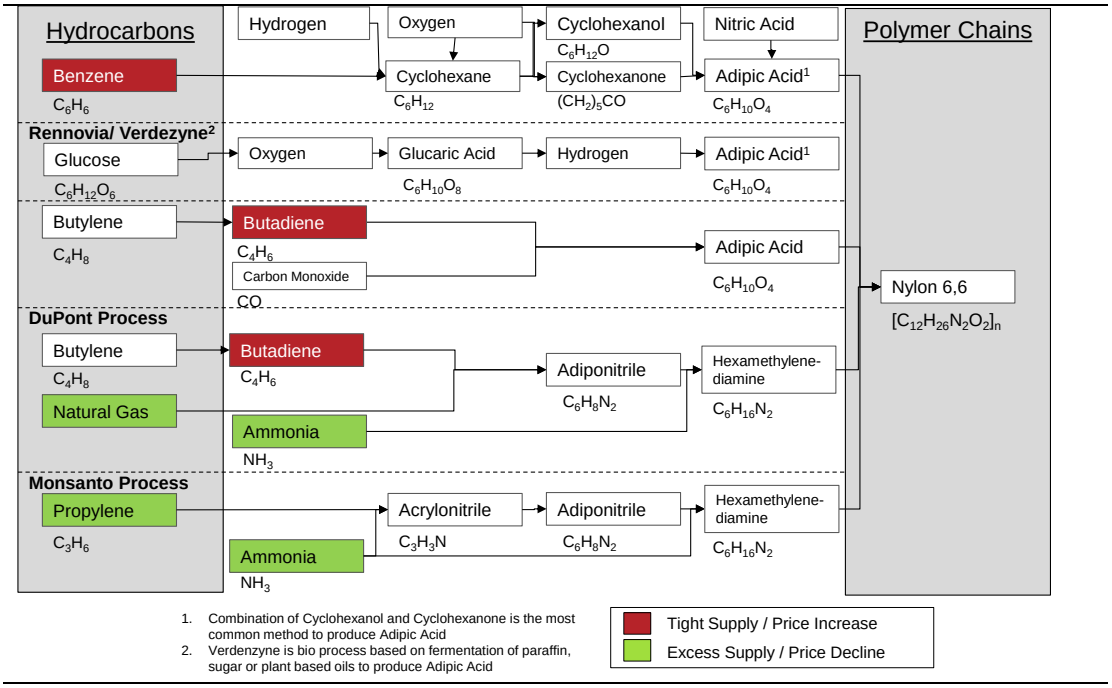
Source: Cost & Capital Partners

Cost Models

Many buyers of resin feel unprepared to negotiate with suppliers. This is often due to the fact that most buyers do not possess the chemical background to accurately understand the producers' costs and processes for manufacturing products. Most resins used in manufacturing are based on decades old chemistry that is well documented and established. The difficulty for many buyers is to translate these processes into the fundamentals of cost and finance.

While the chemical process can seem intimidating, the fundamentals are the same as a cost model for a stamped or injection molded component. Costs can be traced for each step in the process from raw materials to value add. Being able to talk to the supplier with a detailed understanding of the production costs results in a more transparent and more effective negotiation.

Figure 7: Mass Balanced Cost Models



Source: Cost & Capital Partners

Cost & Capital Partners applies the fundamentals of mass-balance to trace various feedstock routes to the end product. Using production process cost models provides insight into the specific process used by a producer, the advantage of one feedstock over another and the true cost to produce the product. Production process cost models are not only effective in negotiations, but are also useful for identifying global variations in cost and process. These variations can be leveraged to optimize the sourcing footprint and develop a comprehensive category strategy.

For most common resins, the major element of the cost model is the input feedstock. Other areas include yield loss, capital equipment depreciation, energy, labor, overhead and profit. Cost models need to take into account not just the changes in input costs, but also the impact of productivity at the producer. For this reason, cost models need to be refreshed with the latest industry information as well as supplier site visits to calibrate the output.

Conclusion

Buying organizations have not experienced such a dramatic reduction in the underlying costs of resins and plastics since the end of 2008. As was the case then, producers and third parties will attempt to withhold the value of cost savings unless motivated by customers. Many chemical producers reported improved margins even though selling prices declined. This is due to the fact that costs declined faster than selling prices.

The first step to securing a fair price is to understand what the target price should be. As seen in Figure 8, cost models can estimate the percentage reduction for key inputs, resins and third party products.

Figure 8: **Variable Cost Impact by Crude Price per bbl.**

	WTI Crude Price								
	$30	$40	$50	$60	$70	$80	$90	$100	$110
Naphtha	73%	64%	55%	46%	37%	27%	18%	9%	0%
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Injection Molding	11%	10%	8%	7%	6%	4%	3%	1%	0%

Source: Cost & Capital Partners

Leading organizations will not wait for the supply base to offer a reduced price. Setting fact-based targets and presenting transparent analyses to the supply base is the best way to achieve savings. A coordinated approach using cost models, supplier financial data, activity based costing and a fact-based negotiation agenda are proven to be most successful.

About Cost & Capital Partners

Cost & Capital Partners works with our clients to support supply chain operations. Our benchmark databases, portfolio of detailed cost models and our Universal Costing Tool can be quickly deployed across sourcing organizations to rapidly secure savings.