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Jeff Bause, NOXCO, USA, explains the benefits of a subscription-style service in the refining and petrochemical industry to more accurately budget annual ongoing maintenance.

Addressing the question of a facility's maintenance plans and costs in the year ahead and beyond is difficult enough in a 'normal' year, considering all of the unknown factors that arise before and during a turnaround. While a refinery or plant manager will always attempt to have a complete understanding of the level of work that needs to be completed during planned maintenance activities, the unknown of the future makes precise planning nearly impossible.

The year 2020 presented a new level of unexpected factors to consider, which makes

the one-year forecast appear even more daunting. While some routine projects are easy for a manager to put pen to paper and calculate a number, there are many 'one-off' or monthly utility charges that complicate a forecast quickly, and make it more difficult to predict an actual cost with accuracy.

It is a widely-stated figure that 30 – 40% of project expenditures come from unplanned work. In the refining space, this number can be mitigated due to the long-term planning period leading up to a turnaround, but the unknown factor of unforeseen expenses is still

ever-present. The challenges that managers face as they attempt to budget for future maintenance costs are obvious.

The concept of subscription services

One potential solution is to implement a much more precise and 'planned' budget for major anticipated expenditures whenever possible. In this case, think of a subscription service in the downstream sector to ensure that there is a cap on costs and to enable planned budgeting to remain very close to the forecasted plan.

While the idea of subscription services may be new for some industries, the overall concept has been

Table 1. A comparison of the services included in a subscription partnership as compared to a traditional catalyst management plan	
Subscription service	Catalyst management plan
Focus is overall system performance	Focus is catalyst performance
System and catalyst testing	Catalyst testing
Full on-site inspection	N/A
Annual inspection/maintenance	N/A
Catalyst life projection based on overall system performance, catalyst tests, and field data	Catalyst life projection based on laboratory test
Includes:	Includes:
Catalyst laboratory testing	Catalyst laboratory testing
Catalyst life projection	Catalyst life projection
Catalyst inspection	N/A
System inspection/field data analysis	N/A
Catalyst cleaning	N/A
Ammonia injection tuning	N/A
Replacement catalyst	N/A
Catalyst installation	N/A
Catalyst disposal	N/A

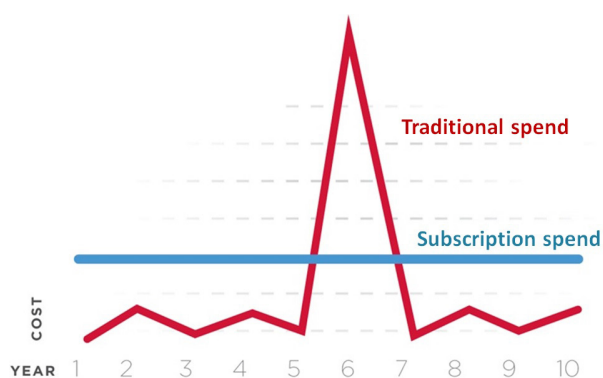


Figure 1. A subscription service ensures predictable, structured payments and eliminates an unpredictable budget.

around for generations. An example of a basic, well-known subscription service is that used for magazines, which can be widely bought from newsstands or retail locations at a fair, warranted, and convenient price – and one which many people are prepared to pay since there is an established and qualified demand.

For those individuals who find great value in a particular magazine and want to read it on a routine basis, and who know they will turn to it time and time again, there comes a point that this 'one-off' price no longer seems fair or warranted and becomes much less convenient. A reader will then think to transition to a different model, as it is understood there will be an ongoing demand or need which can be forecasted.

A reader then looks to a subscription service. First and foremost, the cost saving is pronounced, as there is typically a cost saving of 70% or more by changing the purchase to this different model. Moreover, once subscribed, there are some other indirect costs and/or time savings that may be realised.

A convenience factor comes into play, as the publication is directly mailed to the subscriber and there is no extra effort required to procure the magazine. One does not need to take time to visit a newsstand to see if the new edition is available, and one is never inconvenienced by late delivery. The subscription also provides a certain peace of mind, as there is the confidence that the delivery will take place, with the task fully removed from a person's to-do list.

Finally, there is an implied guarantee of delivery, even if demand is particularly high in a given time period. A subscriber is guaranteed delivery regardless of other external factors.

The bottom line is that with an on-going contract in-hand, it is expected that one will receive a superior price, better service, and the benefit of getting what is wanted without lifting a finger or even proactively thinking about the service.

The case for industrial subscriptions

Translating this back to refineries and the petrochemical industry, there is an obvious place for a subscription service that will take budgeting forecasting to the next level. There is a clear opportunity for establishing a method and system to more accurately and precisely budget annual ongoing maintenance.

In a perfect world, a facility manager could simply press the 'set it and forget it' button on all of the maintenance services that can and will be needed over time, and know that somehow the needed services will take place through the work of highly skilled workers, and the assets will do their jobs fully as intended.

While that scenario is not possible for most assets, what if this 'set it and forget it' button was available for a recurring capital expenditure in a facility, such as the selective catalytic reduction (SCR) catalyst? This would be a way to remove the uncertainty of replacement decisions and instead install a continuous performance guarantee.

It would also allow the realisation of the full value of a plant's SCR catalyst through what should be a detailed and proven lifecycle management programme, which includes ongoing testing, cleaning, and replacement.

The premise of a subscription service for refineries, gas processing plants, and petrochemical facilities would bring value streams to facility owners and managers with the following benefits:

- A flat and forecastable rate for predictable budgeting.
- Streamlined operational planning.
- Guaranteed performance and emissions compliance.

Predictable budgeting

Currently, when a plant purchases a new catalyst, the facility receives a warranty from the catalyst manufacturer. Plant management, however, assumes a great deal of responsibility after this transition takes place. Not only must the plant monitor the unit, but also tune, clean and troubleshoot the systems using the expertise of either a third party or via plant staff who may or may not be trained on the best way to maintain the system. Moreover, after many years, when the useful life of the unit has ended, plants must replace the catalyst at a significant capital expenditure.

It is important to note that every unit is different in size, design, age, permit levels, and so on. This means there is no consistent formula to use to calculate when maintenance will be required, or when the end of the useful life will occur and the dollars must be available. This makes budgeting especially difficult.

A subscription service would turn this uncertainty around, and ensure that a facility has structured payments in place that would remain constant for an extended time.

Streamlined operational planning

Unknowns from the SCR system wreak havoc on longer-term planning and budgeting. Lead time on a new catalyst is often 4 months or more. This long lead time, paired with the ongoing effort to minimise the risk of NO_x non-compliance, make it common practice to purchase a new catalyst too soon. This has an obvious impact on cash flow.

A subscription service would maximise the useful life of the catalyst through a combination of carefully timed activity testing, catalyst cleaning, and tuning. Importantly, such a contract would help ensure a catalyst is not replaced too early in its lifecycle. Additionally, the concept of a subscription service offers up the potential for the strong purchasing power of a large-volume catalyst buyer.

Keeping guarantees in place

SCR systems currently operate with only 3 – 5-year performance guarantees from catalyst manufacturers, as a catalyst loses efficiency as it ages. After the guarantee period, the operator bears the full risk of non-compliance.



Figure 2. A subscription service delivers performance, predictability, cash flow, and 100% risk mitigation through a turnkey solution.

An alternative is to find a catalyst management and maintenance plan to reduce the frequency of replacement without a lapse of performance guarantee even after the supplier's performance guarantee has expired.

Having guarantees in place through a subscription will help ensure that plants meet their goal to be in full NO_x compliance 100% of the time, and avoid the costly price of missing the mark. The transfer of responsibility to another entity is very enticing, as is the mitigation of operational risk at a facility.

Making the reality of a subscription service come to life

Optimally-timed, planned maintenance through a subscription programme would offer a great number of quantifiable benefits to a facility, with predictable and manageable costs at the top of the list.

There are also qualitative reasons to participate in such a programme. Plant ownership and management would benefit from peace of mind and the understanding that there are tools in place to best calculate the optimum replacement time for a catalyst. A fixed and predictable budget also puts one at ease, as does knowing that outsourced catalyst lifecycle management experts are the ones managing the 'black box' and delivering optimal performance with needed and timely maintenance throughout the system.

However, for such a programme to be a true success, a strategic partnership of trust, and one that offers complete transparency of unit performance data, is required.

Will a subscription-based service become available, and provide all the described benefits, which are both quantitative and qualitative in nature? If so, many burdens would be lifted, many unknowns would be pushed to the side and the owners and managers of facilities would enjoy myriad benefits that include cost containment, streamlined operational planning, and guaranteed emissions compliance. 