

FIRING UP: Achieving Generator Full Potential

As market dynamics shift, generating maximum value from baseload coal-fired generators has become an urgent priority. Tinkering at the edges will not secure the future – only wholesale transformation can create the value that will sustain the viability of baseload coal-fired generators. L.E.K. Consulting has developed a Generator Full Potential (GFP) framework that addresses the full suite of improvement levers for generators, covering both cost efficiency (operating and capital costs) and availability optimization. Moreover, it ensures the sustainability of results through building the necessary supporting management practices, systems and performance management regimes.

Under Pressure

Baseload coal-fired generators are increasingly under pressure on multiple fronts. Market participants are battling a range of encroachments, including:

- the improving cost competitiveness of alternative fuel sources (e.g. gas in the U.S.A.);
- carbon pricing (e.g. Australia);
- sustained environmental demands to reduce carbon dioxide emissions; and
- the growing market share of renewable energy initiatives, which is driving both greater residual load volatility and pricing pressure.

These pressures are fundamentally disrupting the operating regimes and economics of coal-fired generation – many baseload operators can no longer expect to operate at high availability with wholesale market prices consistently above production costs. To survive and thrive in this environment, baseload coal-fired generators must fundamentally transform themselves.

Minor cost improvements are not enough. Moving to a materially lower cost position and maximizing value through an appropriate availability regime are now essential to survival. For many generators, there is real urgency to achieve this transformation. Already, greater than 21,000 Mega Watts (MW) of coal fired generation capacity has been decommissioned in the U.S.A. since 2008, with another 30,000MW forecast to be decommissioned by 2022.

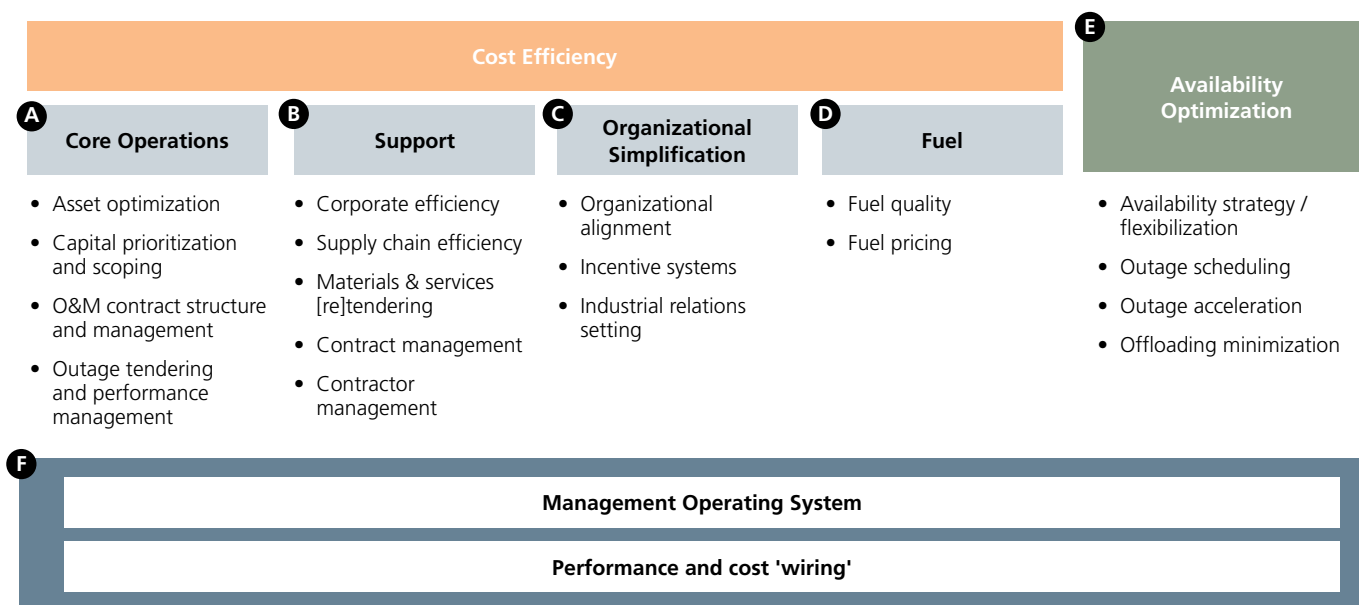
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A Way Forward

L.E.K. Consulting has worked with baseload coal-fired generators to help drive transformation with significant results. Through our experience we have developed a robust transformation approach – ‘Generator Full Potential’ (Figure 1).

Figure 1

Generator Full Potential (GFP)



This Executive Insight illustrates the power of the GFP program by focusing in on a selection of key elements. However a holistic approach is needed to deliver substantive and sustainable transformation.

Creating Cost efficiency

Substantially lowering costs requires examining the entire cost base (e.g. opex and capex, support and operational costs) – piecemeal cost improvements are insufficient. In addition, it will require a reconsideration of the fundamentals of what work should be done and the best approach to do necessary work.

Quick Wins

A fundamental review of cost drivers is time consuming. However, an early quick win campaign, focusing on items with low risk to asset performance, can build momentum and

establish the case for further investigations. Once early results have been achieved, subsequent efforts can focus on higher risk and more challenging improvement categories (e.g. decisions around maintenance settings), but against a backdrop of early successes.

Quick win campaigns should avoid a mindset of deferring or descoping capital projects – while improving short-term cash flow, such ‘successes’ are inherently temporary (and potentially compromise longer-term asset performance). Moving to a sustainably lower cost base requires addressing the underlying drivers of cost. Following are several such examples of addressing underlying drivers of costs.

Example Cost Lever: Asset Optimization

Generation businesses are, at their core, a series of discrete but connected assets. Achieving the full potential for a generation business can only be realized by driving each asset to its full potential, from both a performance and cost perspective, recognizing that changes in one asset can affect a 'downstream' asset.

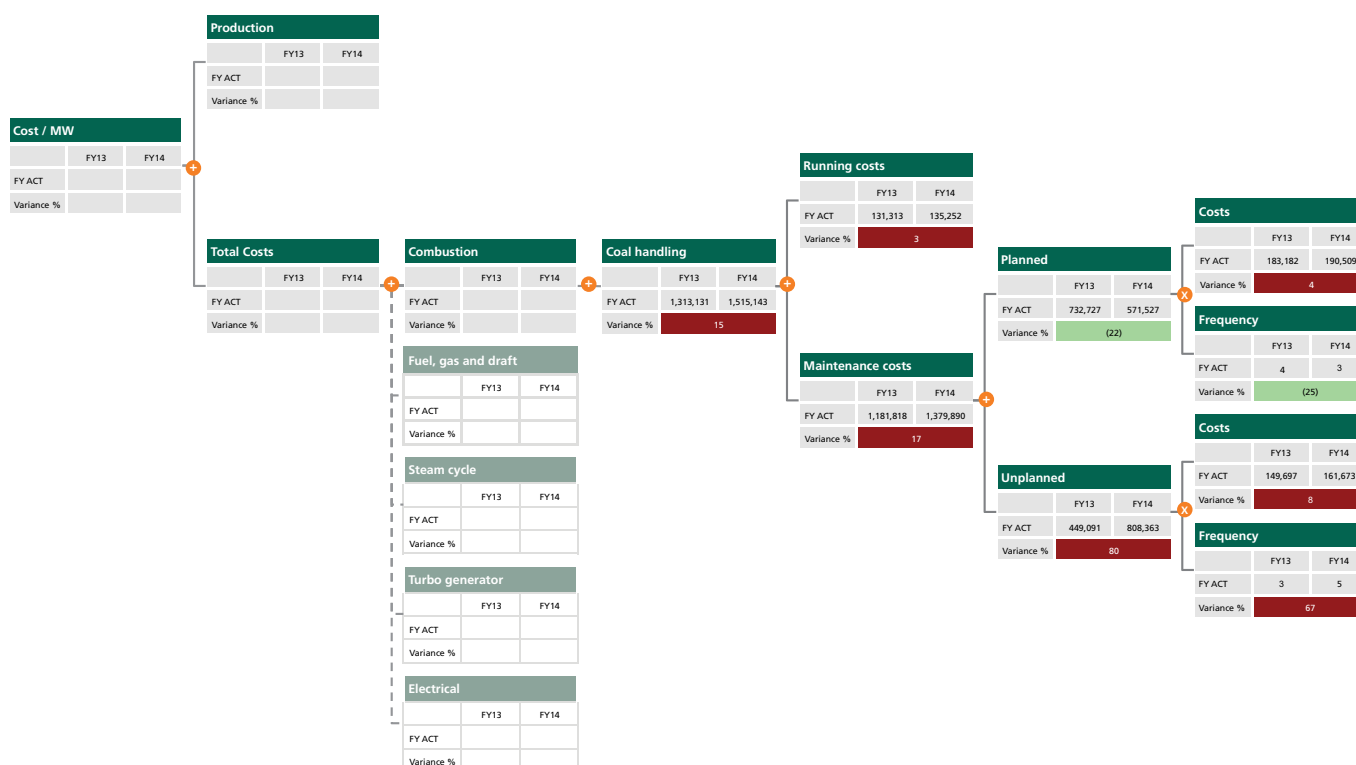
There are many techniques for improving the performance of an asset, such as process re-engineering, Six Sigma, Lean etc. For any technique used, the key is providing transparency on the underlying drivers of performance and engaging with the asset operators in a way that allows them to optimize these drivers. What makes L.E.K. Consulting's approach distinct is a focus on value based performance measures through the use of our bespoke Value Driver Tree (VDT) tool.

A well-constructed VDT captures the full suite of operational drivers and orders them in a manner so they link to the predicted performance and operational cost of the asset, at multiple levels of that asset. This direct and cascading linkage between operational drivers and cost and performance outcomes allows a fact-based investigation of not only which operational drivers offer the greatest cost reduction potential, but also the cost-performance trade-offs that may need to be made. Moreover, the nature of such an approach supports asset operators deploy their subject matter expertise to the topic.

Figure 2 below, **Value Driver Tree**, illustrates a 'cost cascade' that clearly demonstrates the cost and performance related to combustion. This VDT identified that maximum improvement potential existed through streamlining the maintenance regime of the coal-handling infrastructure. The analysis demonstrated that equivalent performance could be realized through an increase in planned maintenance resulting in lower operating costs due to a reduction in overtime and unplanned downtime.

Figure 2

Value Driver Tree (subset shown)



More sophisticated VDT trees can extend this analysis into dynamic 'what if' scenarios. Ultimately, the VDT tool has many uses beyond being a one-off investigative tool – it should be the primary basis for measuring, managing and optimizing the operational and commercial performance of an asset.

Example Cost Lever: Contractor Management

Generators often have a substantial number of contractors who typically perform a broad range of specialist activities. However, this secondary workforce is often undermanaged relative to permanent employees and, if over-sized relative to the need, can lead to substantially higher costs.

One L.E.K. client did not accurately know how many contractors they had on-site or the average duration of their contractors. L.E.K. conducted a forensic examination involving matching security cards, safety training logs and accounts payable to unearth a huge body of allegedly 'spot' contractors that were very lightly managed. It was found that some had even been on site for more than nine months for multiple days per week even though the specialist task was forecast to be approximately three months.

Availability Optimization

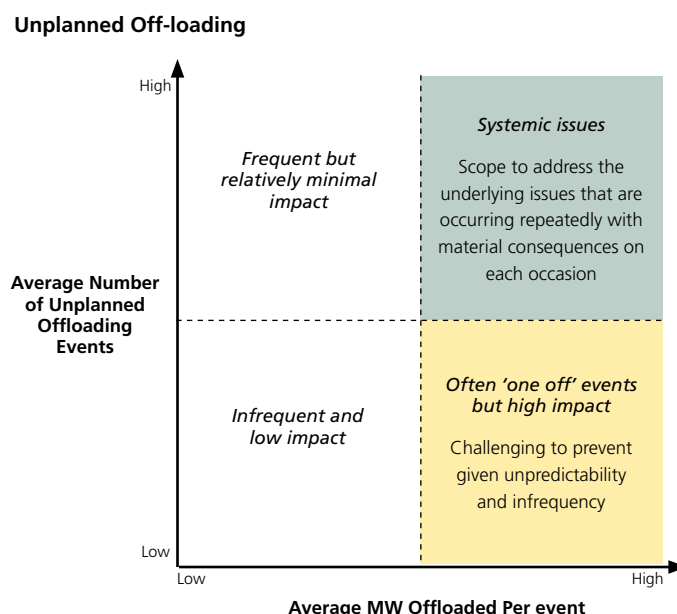
Subject to typical wholesale market pricing, maximizing availability is a key value driver of baseload coal-fired generators.

In most cases outage strategies are infrequently reviewed. However, an analytical review of the true risks of extending the period between outages and linking outage schedules to plant performance can drive a more commercially centric perspective to outage strategies. Furthermore, accelerating individual outages through improved project management and contractor incentive structures can minimize lost output from those outages that are undertaken.

In addition to outage strategy and performance, availability can be maximized through minimizing unplanned offloads. Attention is typically given to high loss unplanned offload events, however such events are challenging to prevent given their unpredictability and do not drive sustained improvement as they are infrequent. Rather, sustained and material results are best achieved through an investigation that drills down into the root causes of systemic and high cost unplanned offload events. See Figure 3.

Figure 3

Identifying Systemic and High Cost Unplanned Offloads



Such systemic issues can be targeted with specific remedial actions that minimize the frequency and/or magnitude of these failures. In our experience, it is common for these remedial actions to be broadly known to operational staff but the cost of the repair was previously considered prohibitive. However, a more precise understanding of the nature of the unplanned offloading events and the value gained from minimizing them supports a commercial, rather than engineering centric, decision to undertake the necessary expenditure on remedial action.

Perhaps the greatest challenge to optimizing availability is when there has been a structural change to market dynamics and wholesale market prices are below production costs for sustained trading periods. Such an environment requires challenging norms of how 'fixed' costs might move to a variable basis. For example, moving to a higher share of contractor workforce over permanent employees, and/or re-evaluating rigid shift structures to provide more flexibility.

Sustaining the Results

While one-off efforts to rein in costs are valuable, this is not a viable long-term solution. It is critical that cost and availability improvements are embedded into a new way of working. Consequently, L.E.K. focuses on helping management achieve sustainable results through two means:

1. **Management Operating System (MOS):** framed around the end-to-end cycle of major workflows (which typically cut across organizational boundaries), the MOS gives clarity to how work is managed and controlled (as opposed to how a particular task is done). For example, a MOS identifies key events/milestones in a workflow and the inputs, meetings, governance arrangements and tools required. This codification and discipline gives management the means to ensure that the overall workflow is controlled appropriately.

2. **Performance and cost 'wiring':** ensuring the lower cost base and new ways of working are 'wired' into the business through appropriate Key Performance Indicators (KPIs) that are actioned through practical and action oriented review sessions which cascade through all levels of the organization. All organizations will use KPIs, but it is relatively common for these to become stale and not actively used in a manner that genuinely drives performance – a top to bottom review of existing KPIs and how they are used typically unearths substantial improvement potential.

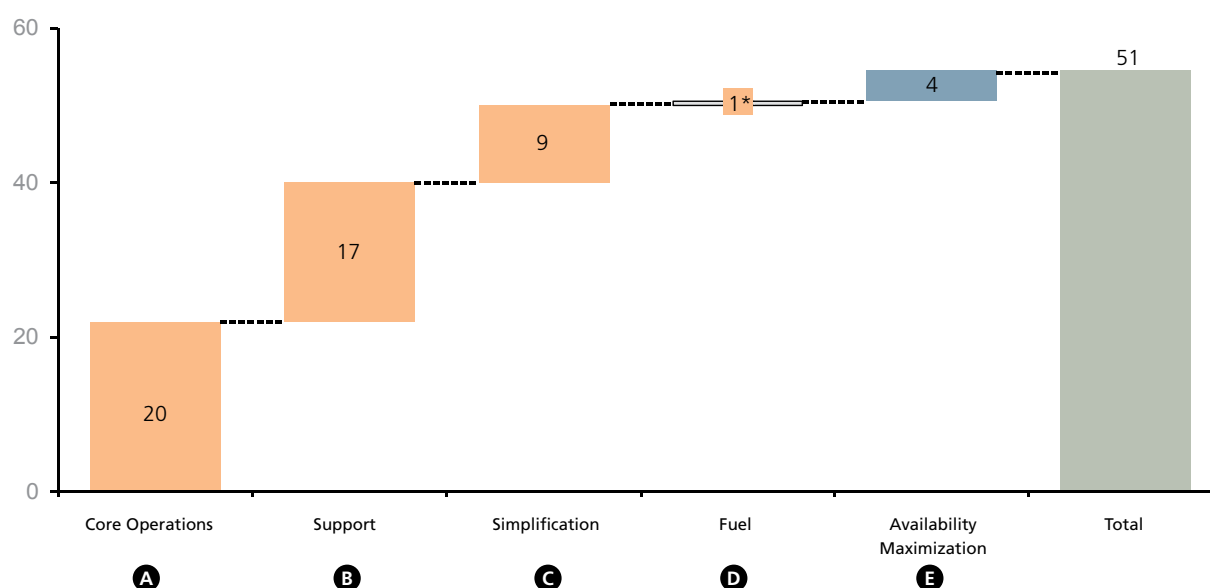
Difficult but Possible

Substantial performance improvements are possible. Figure 4 illustrates a success story based on the GFP program. Through analyzing, implementing and then embedding the principles of GFP, this generator achieved sustained improvements of \$USD51 million.

Figure 4

Client Outcomes

Sustainable cash flow uplift
Millions of dollars (USD)



Note: *Generator owns all fuel requirements

Successfully achieving such a broad based transformation is challenging. However, doing so through the comprehensive and coordinated GFP program maximizes the prospect of success. Baseload coal-fired generators should ask themselves three key questions:

- 1 Is our current trajectory sustainable?
- 2 Do we have total transparency on the underlying drivers of cost and performance, as outlined in the GFP program?
- 3 Are we confident that we have pushed these drivers to their full potential?

If the answer to any of these questions is 'no' it's time to do something different.

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