

Global Asset Sustainability:

Breakthrough lean best practice
counters rising energy costs

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Executive summary

Companies are taking a new approach to improve asset operating performance: Global Asset Sustainability. Companies that establish a strategy and global approach that incorporates this new lean practice can improve operating, financial, and environmental performance.

The price and availability of energy has changed the business landscape forever. Companies with major plants, facilities, and equipment are facing a stark reality: energy consumption is eroding profit margins. Energy costs, environmental concerns, competitive pressures, and global complexity will not reverse course over the long haul. These challenges have set a stage on which new lean practices to operate more efficiently are taking hold across nearly every industry. Evolving new lean asset management practices now include monitoring and managing the energy consumption of assets.

Energy costs comprise an increasingly large portion of a company's operating and maintenance budget. To counter this trend, companies are forced to reallocate budgets away from strategic initiatives to cover escalating energy costs. For many companies, this cost is in the hundreds of millions or more, and it is the assets—from equipment on the shop floor to HVAC units in facilities—that consume the most energy. To further compound this challenge, conventional enterprise asset management (EAM) ignores this major expense.

Take, for example, a company that operates across 50 facilities. Conventional EAM may indicate acceptable operating conditions of the chiller component within an HVAC system, when in actuality the chiller at each facility is consuming \$5,000 more in energy than was expected. Global Asset Sustainability (GAS), a new breakthrough approach that incorporates energy consumption into an asset management practice, provides the required visibility and control, and answers to eliminate this waste. In this example, Global Asset Sustainability could save the company an additional \$250,000 per year in HVAC energy costs on top of the traditional EAM savings. This Global Asset Sustainability approach and resulting savings can be applied to any energy-consuming assets, such as the motors that drive production equipment.

The benefits of GAS are far-reaching. Improvements can be realized in environmental compliance, energy costs, asset availability, energy control strategies, preventive maintenance, capital investment decisions, and inventory management. GAS strengthens current continuous improvement and lean initiatives with strategic energy-saving opportunities.

Operational effectiveness is the price of entry for businesses today. Companies must keep costs low and revenue-generating capabilities high. Until recently, companies have held separate views of asset performance and energy consumption. This has now changed. Companies are taking a new approach to improve asset operating performance: Global Asset Sustainability. Companies that establish a strategy and global approach that incorporates this new lean practice can improve operating, financial, and environmental performance.

Adapting to energy costs is not optional

The current lean approach of reducing waste in all its forms (e.g., inventory, downtime, and non-value-adding paperwork) has lowered costs and increased profitability, but today that's no longer enough, given the economic and environmental uncertainty of energy. As a result, evolving lean best practices now include monitoring and managing the energy consumption of assets. Companies that establish a strategy and global approach incorporating this new practice can not only deliver superior shareholder value, but also establish a DNA within their operation that promotes greater agility, brand equity, and financial strength.

Today, assets are usually measured in terms of their ability to meet operating needs. Most businesses rely heavily on assets such as heating, cooling, air-conditioning and ventilation systems, production machines, and materials handling equipment for optimizing their success. Clearly, an asset's ability to perform well and reliably with high-quality output is critical to business success.

However, this "effectiveness" view of assets, a classic asset management view, may also be creating suboptimal overall results, since it ignores energy consumption, which in terms of cost represents 30% to 90% of most companies' operating and maintenance expenses today, excluding personnel (see Figure 1). In contrast, the new operational goal is to optimally manage for both operational success and energy efficiency.

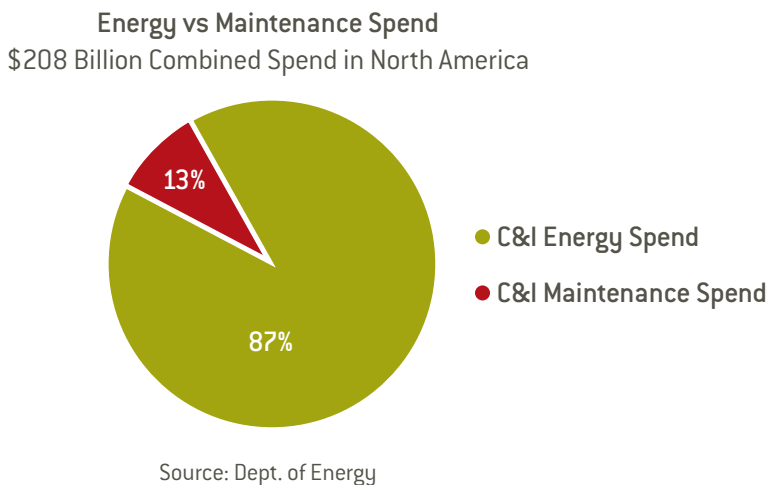


Figure 1: Commercial and industrial (C&I) companies often spend over 80% of their nonlabor operating and maintenance budget on energy.

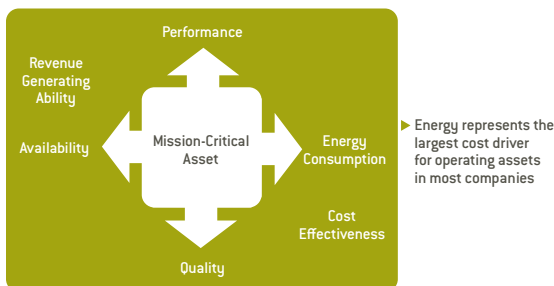
New lean approach: Global Asset Sustainability

In such a challenging environment, companies must leverage all sources of efficiency and effectiveness for critical assets. Using sound lean practices, companies are now focusing on four major areas of waste as they review asset performance: availability, performance, quality, and energy consumption. Together, these four elements constitute a new lean practice: Global Asset Sustainability (see Figure 2).

- Availability is critical for the asset to serve the company as intended. Maximizing uptime has long been a goal for maintenance, facilities, and asset managers. If production and facility assets are not available, the company is often hobbled in its ability to generate revenue.
- Performance reflects how well the piece of equipment is behaving or how fast it is operating compared to the theoretical specifications for its operation. When companies make capital investments, decisions rest on this performance rating. To meet financial goals in both cost and revenue terms, assets must perform as close as possible to that rating.
- Quality—how good an asset output is—can have a material impact on the company's margin, whether it is having a retail store at the optimal temperature to drive consumer buying, keeping humidity at a level where machinery and people can work effectively, or ensuring production equipment consistently puts out product at or above specification.
- Energy consumption is increasingly costly, and has become an integral element of asset performance. An asset's energy consumption may change over time, based on the conditions of operation and maintenance, eating into margins if it is inefficient. For example, a single 100-hp motor running continuously at 95% efficiency over a five-year period will cost a company close to \$350,000 in energy (10¢/kwh). If the same motor consumes just 5% more energy due to suboptimal operation (e.g., energy waste), it will cost almost \$17,500 more to operate. By monitoring energy usage, companies can gain a view of the asset's true operating costs and take action (e.g., notify maintenance and operations) when excess energy consumption occurs to minimize this waste and associated costs.

These are four foundational elements in the overall ability of a company and its assets to generate revenue, serve customers well, fend off competitive threats, and keep costs low. To compete with companies throughout the world, even small differences in these factors across all critical assets can add up to major improvements in the company's financial performance.

Figure 2: The Global Asset Sustainability index consists of four major components: availability, performance, quality, and energy consumption. The first three factors are part of overall equipment effectiveness (OEE); the equation is new with the addition of energy. Energy is the largest cost driver for operating assets in most companies.



In addition to serving customers more reliably and increasing shareholder value, GAS is also a sound approach to stewardship for the communities in which companies operate. Keeping energy costs to a minimum and monitoring emissions lower the environmental impact and carbon footprint of the operation. This environmentally supportive approach can promote and strengthen brand equity among potential customers, partners, and investors.

GAS adds a new dimension to asset management, helping companies manage conflicting business conditions. Soaring costs through higher energy prices and carbon emission taxes (imminent in some regions of the world) are colliding with extreme price pressures due to global competition and changing customer expectations. To drive this initiative, GAS establishes a new measure of operational success—the GAS index.

This key performance indicator combines the four major factors to gauge an asset's performance: availability, performance, quality, and energy consumption. Valuable for individual assets, GAS goes further and also provides a global, enterprise-wide view of the performance of all assets both by traditional effectiveness measures and energy consumption to ensure best results for the company.

GAS is a compound metric represented by the equation:

Availability x Performance x Quality x Energy Consumption

where each factor is a percentage of the theoretical best possible performance of an asset along that line.

Fortunately, new technology has combined with the evolution of asset management applications to allow companies this comprehensive view of Global Asset Sustainability. Those with a mature asset management practice can now evolve to include a view of energy; others just embarking on their asset management program should consider starting with the largest impact item—energy consumption of assets—from day one.

Global Asset Sustainability Example 1: *Pinpointing Best Practice Control Strategies*

Through GAS, one retailer's energy consumption data at three stores in Florida showed a distinct difference in energy cost per square foot for their heating, ventilating, and air-conditioning (HVAC) chillers. Each store had two chillers of equivalent design specifications and operated at the same ambient temperature. Energy consumption analysis at the individual asset level made it apparent that the stores were employing different operating and control strategies for the two chillers.

The retailer identified the best-practice chiller control strategy by benchmarking energy consumption across assets and applied it at the store with the highest consumption. The result: 23.7% reduction in energy consumption of their chillers, amounting to approximately \$8,000 in annual savings for one asset in one store. The full enterprise benefit comes as the company rolls out this best practice to the two chillers in all of its 850 stores.

Asset management systems as a foundation

Whether mature or immature in asset management practices, companies can embrace GAS successfully. Relatively mature companies already use EAM to ensure they can operate efficiently. EAM helps ensure that systems and pieces of equipment that run production and facilities experience minimal downtime, maximum lifespan, and effective operation. In essence, EAM helps align asset infrastructure with business requirements.

Like some other enterprise systems, EAM becomes a system of record, or a consistent single repository, for asset management information throughout the lifecycle of the asset. This system plays a role as assets are purchased, commissioned, operated, maintained, and even retired. EAM has proven benefits in boosting efficiency through improving equipment capacity, productivity, and operating costs. It also increases productivity of maintenance labor, and can lower maintenance, repair, and operating inventory levels and costs (see Figure 3).

Area	Proven EAM/Practice Results	Data Source
Operations Efficiency	Efficiency up 20.1%	A.T. Kearney
	Production Capacity up 5%-15%	Pulsemark Benchmark
	Production Downtime down as much as 20%	ARC Advisory
	Energy consumption down 10%	US Department of Energy
Maintenance Labor Costs	Maintenance labor cost down 10-30% through scheduling	Gartner Group
	Productivity up 28.2%	A.T. Kearney
	Overtime down 10%-50%	Grant Thornton & PriceWaterhouseCoopers
	Contractor cost down 25%-50%	PriceWaterhouseCoopers
MRO Inventory Costs	Inventory and maintenance storeroom down as much as 25%	Tompkins Associates
	Maintenance material cost down as much as 19.4%	LifeCycle Engineering Study / A.T. Kearney

Figure 3: Expected savings from EAM are significant in areas such as operational efficiency, maintenance labor, and MRO inventory costs.

EAM helps companies use an increasingly critical asset performance metric: overall equipment effectiveness (OEE). This metric recognizes and factors in the major issues of availability, performance, and quality. This combined metric helps balance conflicting demands (for example, required throughput targets, the need to sometimes take equipment down for maintenance, and quality desired). World-class companies now operate at 85% OEE, based on 90% availability, 95% performance or capacity, and 99.9% quality.

Global Asset Sustainability Example 2:

Triggering Physical Maintenance Activities to Trim Energy Costs

An auto parts manufacturer's energy consumption data for a specific asset showed a distinct difference in the Global Asset Sustainability index (GAS) versus Overall Equipment Effectiveness (OEE), as shown in Figure 4. GAS shows an energy degradation that equates to a \$7,125 expense in excess energy consumption annually. In this case, periodic maintenance (a filter replacement) restores the asset to optimum energy efficiency. GAS provided this manufacturer with the visibility into energy consumption at the asset level needed to prescribe a more energy-efficient maintenance strategy. Using GAS, the company can now also alert maintenance proactively when real-time asset operation indicates that energy waste is about to occur.

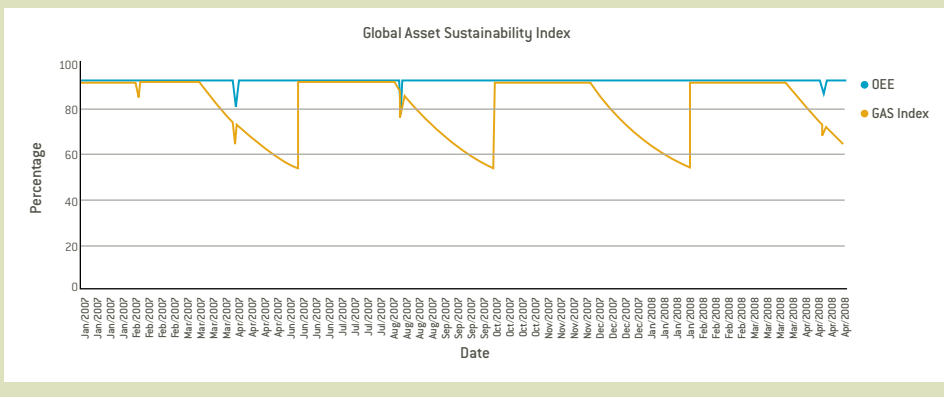


Figure 4: OEE may not show the entire picture for an asset. In this example, OEE indicates solid operating performance, but energy consumption shows a clear cycle in which the GAS index declines, then recovers. The decline represents costly energy waste which conventional EAM and OEE does not capture.

Today's frontier for EAM: Factoring in energy efficiency

Even before adding explicit energy consumption monitoring, EAM should reduce energy consumption. The US Department of Energy (DOE) has stated that proper application of maintenance practices supported by technology such as EAM should result in 10% energy savings.

Companies that use EAM today can take the simple next step of adding energy consumption monitoring. This can lead to a significant jump in the benefits and energy cost savings beyond the asset management program already in place. At 30% to 90% of operating and maintenance expense, a very small decrease in energy consumption can impact overall operating costs significantly.

As well as driving energy costs down, combining a view of energy consumption with operational effectiveness in the GAS index may reduce the risk of fines and environmental or regulatory problems. A company operating in a more socially responsible manner may also improve its brand. With carbon emissions carrying credits or taxes, this approach may also generate new sources of revenue for organizations.

For example, one leading paper manufacturer plans to do just that. To support its environmentally conscious customers, the company plans to implement an asset sustainability strategy as part of its EAM initiative to reduce energy consumption on the factory floor. The company expects a 5% to 10% reduction in energy consumption for all assets monitored, leading to significant cost and greenhouse gas (CO₂) emission reductions.

Companies not yet using EAM on an enterprise basis now have the opportunity to tackle the largest element of costs immediately. When the company reduces energy consumption, it will gain significant overall cost reductions. These savings from energy can directly improve profitability or help to fund a more robust EAM implementation throughout the organization to deliver further benefits in operating efficiency and materials reductions.

There are many scenarios in which a company can gain the benefits of asset sustainability. Three examples of energy cost savings from a GAS program are highlighted in this paper:

- Process and control strategies
- Physical maintenance activities
- Identifying, prioritizing, and implementing retrofits

Companies gain not just one benefit, but an aggregate of all of the above. It is the derived aggregate value that will result in energy reductions equal to or exceeding the 6% to 20% benchmarks established. Since GAS is a new lean practice, it is likely to improve over time and include other areas as well.

The new equation for competitive operations

Operational effectiveness is the price of entry for businesses today. Companies must keep costs low and revenue-generating capabilities high, or they fail. To date, companies have at best had separate views of asset performance and energy consumption. This has now changed, and companies must take a new approach to improve asset operating performance.

As energy prices and financial consequences of energy consumption continue to rise, companies must employ new lean energy best practices to use less of it, while continuing to improve the productivity of operations. Since the equipment that runs facilities and core business processes are major consumers of energy, it stands to reason that such best practices must incorporate a new performance benchmark for success that factors in energy consumption and cost throughout the lifecycle of those assets (see Figure 5).

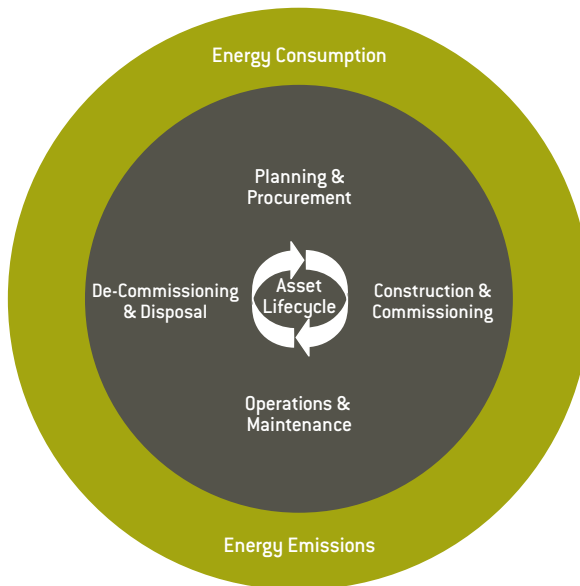


Figure 5: Asset management practices and EAM systems to support them must consider all phases of the asset lifecycle, and ensure that both energy efficiency and operating effectiveness are as high as possible.

Global Asset Sustainability Example 3: *Selecting & Replacing Equipment with Confidence*

GAS encompasses the entire lifecycle of an asset (design, procurement, operations, maintenance, and ultimately disposition). For instance, GAS provides companies with a more complete picture of asset costs, including energy costs, to help drive better repair versus replace decisions. Let's look at the financial impact of replacing motors based on trading off asset cost versus energy efficiency ratings.

Over the lifetime of the motor, it will incur substantial costs for electric use:
 $(100 \text{ hp} \times .746 \text{ kW/hp} \times 40,000 \text{ hrs} \times \$.07/\text{kWh})/.93 \text{ eff.} = \$ 224,602.$

However, if the motor is just 2% more efficient, it will cost significantly less:
 $(100 \text{ hp} \times .746 \text{ kW/hp} \times 40,000 \text{ hrs} \times \$.07/\text{kwh})/.95 \text{ eff.} = \$ 219,873.$

In this example, the company could “afford” to pay up to \$4,727 more for the motor (typically about a \$10,000 item) with 2% higher efficiency rating, and still realize savings on electricity use.

Note: These are sample assumptions for motors that run at full load (93% or 95%) 24 hours per day, 7 days per week. Typical lifespan for such a motor is 40,000 hours, or roughly 5 years of continuous operation.

While all of this may seem intuitively obvious, the GAS index provides a new and essential perspective in support of a breakthrough lean best practice approach to asset management. It takes a comprehensive view of asset availability, performance, quality, and energy consumption. This new approach can be applied throughout the lifecycle of the asset, as well—from procurement to operation and maintenance, through to retirement. It can help in both strategic planning and day-to-day operation.

Without this integrated and more complete view of an asset's contribution to both the top line and bottom line, companies cannot expect to enhance their operations and competitive standing. Having this view automated and integral to an asset management approach is critical due to the complexity and market challenges of most operations today.

Management Recommendation

Market leaders are moving rapidly to reduce energy consumption and costs as a top-priority initiative of their improvement programs. The benefits of such a program extend from more efficient operations to increased shareholder value, improved environmental conditions, and new market opportunities. Organizations face an opportunity to further lower costs while ensuring reliable, high-quality operations through all of their properties, plants, and equipment. Those who take a GAS approach can make a major leap in profitability and sustainability.

About Infor EAM Asset Sustainability Edition

Infor EAM Asset Sustainability Edition is a natural evolution of the widely used Infor EAM solution. Infor EAM provides a strategic view to help organizations plan and manage assets and the materials required to keep them running. It also provides day-to-day tactical support for maintenance technicians, supervisors, and plant employees. Infor EAM Asset Sustainability Edition is a breakthrough new solution that integrates energy management with asset management. With Infor EAM Asset Sustainability Edition, Infor has redefined enterprise asset management from a solution that helps you maintain and extend the life of your assets to a solution that also can help you lower costs by reducing your energy consumption. For additional information, visit www.infor.com/green

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