Reviving the Russian power industry

A path to smart cost cutting, capacity growth, and profit gains
## Contacts

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About the authors

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Executive summary

Structural problems in the Russian power industry are worsening as the country’s economy heads into recession and investments in new capacity and modernization fail to provide expected returns. Given these conditions, it is of paramount importance that electricity generation companies enhance their operations, unlock additional profit drivers, and increase shareholder value. To achieve this, power companies operating in Russia, whether they are domestic companies or multinationals, must focus on three critical strategic phases: (1) launch high-performance projects, modernize assets, and develop industry-leading capabilities; (2) transform the cost structure by decreasing expenditures on maintenance and administrative support functions and by enhancing energy efficiency to free funds for development projects; and (3) reorganize the operating model and processes to increase the effectiveness of operational management and enable agility for growth.
The unexpected downturn

Just a decade or so ago, optimism abounded in the Russian power industry. Government liberalization had attracted huge investments from independent electricity generation companies — domestic as well as several foreign players, including Germany’s E.On, Italy’s Enel, and Finland’s Fortum. These companies were ostensibly going to add significant capacity and modernize the assets and organizational frameworks in an industry that had been characterized by low efficiency and productivity, obsolete equipment, nontransparent planning procedures, lack of knowledge transfer, and high personnel turnover.

Included among the many varied optimization programs that power generation and distribution companies implemented during this period are the following:

• Fortum — which in the past nine years has acquired a slew of power plants — shed layers in its organizational structure, improving productivity through automation and combining several positions into single jobs.

• Mosenergo became one of the first Russian generation companies to implement lean management principles. In the process the company engaged its labor force to come up with production efficiency initiatives.

• For the past decade, Russian power company Irkutskenergo has offered employees financial incentives for generating and implementing new workplace improvement ideas. Combined with other programs, this initiative has produced impressive results: For example, in 2010 alone, when the program had matured sufficiently to assess the extent of its impact on the company’s performance, Irkutskenergo’s savings amounted to 470 million rubles (US$8 million), and by 2014, savings had climbed to 760 million rubles (US$12 million).
• TGK-1, a power company owned primarily by Gazprom (although Fortum also has a large stake), began a program in 2012 aimed at increasing shareholder value. The program revolved around extensive cost reductions for labor, fuel, and administration. Results were almost immediate: In 2013, TGK-1’s shares outperformed Russian power industry stock indexes. TGK-1 has a new effectiveness-improvement program for 2015–17 that will include modernization of heat generation assets, fuel and water usage efficiency, and various cost-cutting measures.

• OGK-2, majority owned by Gazprom, is conducting an efficiency program for 2014–16 that involves optimizing the production process, decreasing fuel consumption, and motivating employees.

• The Russian subsidiary of Enel has undertaken a continuous improvement program called Zenith, which has already led to as many as 90 cost optimization initiatives.

These and other efforts have greatly modernized Russian power companies, bringing efficiency to some operations as well as gains in productivity and more openness to the workplace. But the improvements in the sector have lost ground to a serious downturn in the Russian power industry that began around 2010, the result of economic conditions and government activity unanticipated when the industry was in full bloom 10 years ago.

In the past five years or so, the economic slowdown in Russia, along with overcapacity and outmoded plants, has produced a toxic mix that has affected the power market in significant and troubling ways. With the World Bank forecasting negative to flat economic growth in 2015 and 2016, power consumption has flattened (see “Russia Economic Report,” Sept. 2015, on www.worldbank.org). Moreover, the Russian government has imposed price containment actions that hold utility fee increases to below the inflation rate. Meanwhile, power system regulators have excluded a range of power plants — chiefly, the many less efficient ones — from taking part in a program that guarantees payments to utilities that upgrade failing plants or build new capacity. Worse yet, access to capital is at a premium at a time when at least 65 percent of power generation equipment has yet to be modernized and much of it is facing obsolescence.

Given these trends, it is not surprising that two industry equity indexes of Russian power generation companies, MICEXPWR and RTSEU, have declined since 2011 with significant drops in the first and second quarters of 2012 and 2013 (see Exhibit 1, next page).
Exhibit 1
Change in MICEXPWR and RTSEU energy stock indexes, 2012–Q3 2015*

*Q2 and Q3 2015 are estimates

Source: Moscow stock exchange; Strategy& analysis
Adopting a Fit for Growth* approach

Facing tight conditions, some Russian power companies have begun to limit their financial exposure by cutting costs across all segments of their operations in a broad-brush fashion and cancelling large capital projects. However, in many cases, this is a shortsighted strategy that runs the risks of ceding market share, short-circuiting the efficiency programs that have been put in place, and undermining the future development of the company, especially its ability to be nimble when economic conditions improve and there are more growth opportunities.

Indeed, there is a far better alternative for Russian power companies: a strategic model we call Fit for Growth. The strategy gives companies a performance improvement road map for cutting costs judiciously, building out intelligently, and enhancing efforts to drive leaner, more efficient processes. Companies that put the strategy in place are able to withstand negative economic factors — and resist the instinct to cut back indiscriminately when times are difficult. With this comprehensive approach, companies reallocate their resources. Instead of spending excessively when they’re flush, they implement projects that will directly improve profitability and effectively manage the business with optimized organizational structure and head count.

For Russian power companies, this strategy consists of three elements (see Exhibit 2, next page):

1. Earmark funds and resources for high-performance projects, and for developing differentiating capabilities intended to drive maximum equipment efficiency along with favorable power generation levels. In turn, these improvements should decrease outlays and improve profitability.

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**Exhibit 2**
The *Fit for Growth* strategic model

**Company’s strategy**

Clear articulation of the capabilities that really matter to strategy and ability to win in the market

**Build industry-leading capabilities**

*Invest in sustainable and differentiating capabilities funded by improvements in the cost structure*

**Transform cost structure**

*Develop a clear cross-organizational cost agenda making deliberate choices from front line to back office*

**Reorganize for growth**

*Implement an organization model, processes, and systems to unlock potential and enable agility for growth*

**Enable change and cultural evolution**

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Source: Strategy&
2. Optimize expenditures on maintenance and repair as well as administrative and other expenses, and divert cost savings to support critical new high-performance projects and capabilities development.

3. Increase efficiency by redrawing the organizational model around a holding center, energy-generating business units, and centralized/shared maintenance and support functions.

In any *Fit for Growth* strategy, a power company operating in Russia should plan on implementing the changes in three critical phases.

**Build industry-leading capabilities and facilities**

In the first phase, the company builds its assets and develops the capabilities of an industry leader. It’s noteworthy and instructive that E.On and Enel, the two most profitable companies in the Russian wholesale power market, based on gross margins (see Exhibit 3, next page), have also led the industry since their entry into the Russian market in the amount of money they earmark for the modernization of power plants and the installation of new capacity, according to our analysis of company data.

Indeed, the success of a power company in Russia depends on investments in renovation, productivity increase, and environmental safety. To determine the amount to invest, it is necessary to benchmark and control not only financial key performance indicators (KPIs) but also asset productivity and other operating coefficients. Asset upgrades made proactively, before the assets deteriorate, could prevent the destruction of the company’s value in the long term.

One of the most salient ways to improve performance is by installing combined-cycle gas turbines (CCGTs) (see Exhibit 4, page 12). E.On’s profitability can be traced to this; the company has retrofitted three of its five plants with this equipment since 2007, a move that contributed greatly to production growth (up 20 percent over four years) and earnings before interest, taxes, depreciation, and amortization (EBITDA) improvement (up 300 percent in the same period). Enel has installed new turbines at two of its five plants.

Improving equipment efficiency is essential for power companies because doing so is usually a precursor to reducing fuel costs, which account for 40 to 70 percent of total operating expenses. Currently, most of the newly installed gas turbines in Russia are in the E and F classes, whereas more advanced gas turbines
Exhibit 3
Gross profit margin of Russian wholesale generating companies, 2013

<table>
<thead>
<tr>
<th>Company</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.On Russia</td>
<td>27%</td>
</tr>
<tr>
<td>Enel Russia</td>
<td>14%</td>
</tr>
<tr>
<td>OGK-2</td>
<td>11%</td>
</tr>
<tr>
<td>Inter RAO (electric)</td>
<td>9%</td>
</tr>
<tr>
<td>Kuzbassenergo</td>
<td>6%</td>
</tr>
</tbody>
</table>

Source: Company data; Strategy& analysis

(G and H classes) are becoming more popular around the world. According to experts’ forecasts, by 2020 the global gas turbine market share of G and H equipment will be as high as 30 percent. The efficiency difference between the two turbine classes is seemingly minimal: The best G and H models have an efficiency rating of 60.9 percent with a capacity of 530 megawatts, compared with 59.3 percent with a capacity of 495 megawatts for the E and F classes (see Exhibit 5, page 13). Nevertheless, this distinction is significant, because a reduction in fuel costs of only 1 percent can drive up EBITDA by as much as 7 percent.

But turbine retrofits may not in themselves fully deliver the modernization gains that Russian power companies need to navigate the difficult industry terrain. Indeed, one power company with CCGT power plants and total capacity exceeding 10 gigawatts found that its fuel costs were still exceedingly high — about 75 percent of total production expenditures. The primary culprit was fuel overburning, which was linked to weaknesses in equipment operation regimes and components. To address these issues, the company needed a combination of production process reorganization and additional technology upgrades.
Exhibit 4
Relationship between share of CCGT equipment in electric capacity installed and net profit margin of Russian generating companies, 2013
Exhibit 5
Modern gas turbines’ characteristics

Source: Company data; Strategy& analysis
The company implemented a two-step program:

1. Low-cost optimization of equipment operation, including adherence to operating performance target indicators, regular refinement of target indicators, elimination of air intake into boilers or turbines through cracks and looseness, and efficient allocation of the load.

2. Technology modernization, including installation of a modern condenser tube cleaning system, implementation of modern controls and monitoring systems, renovation of power plant turbine wheel spaces to enhance productivity, and a new boiler surface with higher heat exchange efficiency.

According to Strategy& estimates, these efficiency improvement measures could help decrease fuel usage by about 1 percent within three years, whereas initial investments for technology modernization would equal only 30 percent of total forecast savings.

In some cases, when power plant equipment is obsolete and cannot be upgraded, a more radical approach, such as asset liquidation and possibly replacement, is necessary. This can be accomplished in two phases:

1. Decommissioning outmoded equipment, while preserving parts and components that are still viable and can be used at other sites. During this phase, it is important to continue to deliver heat to consumers and to maintain the safety of the energy grid by temporary or permanent transfer of the load to other power plants. Without that step, local authorities and the system operator will not approve the decommissioning.

2. Constructing new power facilities if the liquidated unit is being replaced. This stage will require a significant investment, which ideally will be paid off over time by the substantial savings in fuel and production costs from the modernized site.

Power plant decommissioning and the replacement program should add approximately 10 percent to company EBITDA.

One of the most critical capabilities for a Russian power company to embrace is a highly knowledgeable, astute, and efficient sales and procurement function that is adept at best-cost fuel acquisition and developing go-to-market strategies for optimal profitability from power facilities. To support this capability, an established system for managing spark spreads is critical. The system should use the following set of processes and procedures:
• Scenario-based analysis of production options to find the optimal regime of power plant operation

• Selection of the most advantageous generation equipment mix at the given heat and electricity load

• Market monitoring and forecasting

• Optimization of the volumes generated and load distribution with the equipment mix and market situation

• Calculation of optimal bids for day-ahead market and real-time market

• Audit of trading strategies

Russian power company KES Holding, which owns the generation facilities TGK-5, TGK-6, TGK-9, and Volzhskaya TGK, offers an apt illustration of the impact of sales capabilities. The company recently undertook a large-scale project to increase the efficiency of its sales function, which included the establishment of a high-quality IT system to improve the equipment mix and load distribution. As a result of this campaign, KES’s spark spread has risen by as much as 10 percent.

**Transform cost structure**

The second leg of the *Fit for Growth* strategy for Russian energy firms involves reducing costs, generally by optimizing head count, minimizing overhead, and increasing employee and equipment productivity. For most power industry companies, three operational areas represent the best opportunities for cost-cutting measures that will significantly improve EBITDA.

**Maintenance**: By improving maintenance staff utilization and implementing more efficient and more judiciously designed maintenance planning procedures, a power company can reduce working hours by 5 to 25 percent and improve EBITDA by 1 to 5 percent.

A generating company with several power plants throughout the country provides a notable example of a successful rollout of a cost-saving maintenance improvement program. This effort was based on precise planning of equipment repair needs and included the following:

• Identification of a medium-term plan, covering two to three years, for equipment maintenance
• Preparation of an optimal maintenance schedule around market conditions and production requirements

• Price comparison for different types of labor resources

• Segmentation of the work that should be done by full-time internal employees (for instance, small-scale and routine maintenance tasks) and those that should be outsourced to independent contractors (such as large capital or infrequent projects)

• Categorization of maintenance works into those that are constant and those that are variable

• Allocating optimal workloads between maintenance staff permanently based at the power plant and a mobile maintenance team that travels among several power plants in a specific region

Based on what the managers learned during this equipment repair-planning phase, the power company was able to create a workload chart (see Exhibit 6, next page) that smoothed out maintenance staff utilization by the type of work and the kinds of workers required to complete the jobs. Implementing this program, the company realized labor cost savings of 15 to 20 percent over five years.

Maintenance costs can also be trimmed by upgrading equipment repair schedules to anticipate problems and address systemic weaknesses before a breakdown occurs (see Exhibit 7, page 18). This dynamic, predictive approach involves scheduling asset maintenance based on real-time data regarding the equipment’s current performance and status (condition-based maintenance) or its remaining useful life (reliability-centered maintenance). Under this type of program, equipment maintenance and repair expenditures are based on criticality, which can be measured by the impact of failure on plant capacity, the complexity of the part, the level of difficulty to repair, and the degrees of system redundancy.

In Russia, preventive maintenance at thermal power plants is commonplace, the result of guidelines for operations and upkeep that were initiated under the Soviet system. And although this is certainly a more proactive approach than merely running equipment until it fails, it is not dynamic enough to meaningfully reduce maintenance expenditures, especially when power companies are facing a period of flat revenue and looking for cost-cutting opportunities. However, in order to implement predictive maintenance — either condition-based or reliability-centered — companies need to install sophisticated monitoring systems that can analyze and assess the future state of the machines.
After undertaking dynamic equipment repair scheduling, the power generating company discussed earlier was able to rightsize its maintenance portfolio to 10 percent reactive, 35 percent preventive, and 55 percent predictive, compared with its earlier 55 percent, 31 percent, and 14 percent, respectively. This workload reorganization decreased equipment outages by 45 percent and the risk of accidents by 75 percent. Condition-based maintenance can produce as much as 12 percent in cost savings over preventive maintenance programs, and reliability-centered maintenance can reduce costs by an additional 10 percent or more.

**Administration and support functions:** Additional savings can be realized through optimization of procurement and support functions as well as by reducing outstanding accounts receivable. By centralizing procurement of certain items, power companies can buy in volume and gain bargaining power. And by encouraging competition among suppliers through contract bidding and price transparency, they can trim procurement costs even further. Equally important, cash flow can...
### Exhibit 7
**The value of dynamic equipment repair scheduling**

<table>
<thead>
<tr>
<th>Category</th>
<th>Reactive</th>
<th>Preventive</th>
<th>Predictive</th>
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<tr>
<td><strong>What</strong></td>
<td>Fix when equipment breaks</td>
<td>Scheduled maintenance</td>
<td>Condition-based maintenance</td>
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<td><strong>When</strong></td>
<td>No scheduled maintenance</td>
<td>Static: maintenance based on a fixed time schedule for inspect, repair, overhaul</td>
<td>Dynamic: maintenance based on current condition</td>
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<tr>
<td><strong>Why</strong></td>
<td>N/A</td>
<td>Maintenance requirements predicted during design</td>
<td>Based on real-time evidence to prevent equipment degradation</td>
</tr>
<tr>
<td><strong>How</strong></td>
<td>N/A</td>
<td>Per equipment, OEM manual, or educated guess</td>
<td>Continuous collection of condition data</td>
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<tr>
<td><strong>Value gains</strong></td>
<td>12%–18% cost savings over reactive maintenance programs</td>
<td>8%–12% cost savings over preventive maintenance programs</td>
<td>18%–22% cost savings</td>
</tr>
</tbody>
</table>

Source: Strategy& analysis
be enhanced and the cost of working capital minimized by establishing direct customer payments, eliminating third-party billing systems, and effectively decreasing accounts receivable. Moreover, in most large utility companies, administrative and support functions such as accounting, legal, and HR tend to be bloated and inefficiently bureaucratic. When that is the case, it is possible to come up with more efficient levels of staffing through scaling and benchmarking. The results of improvements in administration will vary depending on the size of the company, levels of inefficiency, and types of costs affected. However, we have found that improvements in procurement procedures can cut supply chain costs by 10 to 30 percent and boost EBITDA by 5 to 15 percent.

**Power usage:** A utility company can realize savings by minimizing the amount of power that is used internally at the plant and not distributed to consumers. This can be achieved by optimizing equipment working hours, reducing the amount of non-generating equipment, decreasing the usage of heating and lighting, and minimizing near-plant power leakage and circuit losses. These measures can result in a 5 to 10 percent expense reduction, or a 2 to 4 percent EBITDA gain.

**Reorganize for growth**

The third element of our *Fit for Growth* approach involves optimizing the operating model. Ineffective and unsuitable operating models in the generation business can lead to poor plant performance, including forced outages, high environmental expenditures, fleet attrition, and professional staff loss. Indeed, it should come as no surprise that one power company that recently suffered a significant loss of market capitalization is also burdened by these operating model deficiencies:

- A short-term focus on asset performance as opposed to a more effective asset life-cycle performance perspective
- The decentralization of key roles and responsibilities to plants, which has led to siloed behaviors, inefficiencies, and suboptimization of resources
- Complex process and information flows made even more problematic by a lack of strong governance and performance management practices
- All support functions located outside central operations, resulting in process gaps and confusion about individual roles and responsibilities for support tasks
Operating models vary for power companies, depending on fleet scale and composition. A network of regional business units is often an appropriate model for companies that have many power plants over widespread geographic areas and significant market diversity in features such as maturity and types of power generation, fuel production, and delivery. Less complex power providers may be best served by structuring their operations into business units based on fuel usage — dividing them into hydro, gas, and coal units, for example. But under any circumstances, the organizational model should combine scale and flexibility by placing the business units on a peer level with the service centers that support them, while both groups report to a holding center led by the CEO (see Exhibit 8, next page).

In turn, the holding center can determine how to allocate and delegate core capabilities and responsibilities to specific business units, as well as which roles and tasks should remain in the C-suite. In addition, the holding center should formulate which functions to manage out of the service center and which jobs can be outsourced. (For an example of an organizational structure for a power company with many plants situated in different locations, see Exhibit 9, page 22.)

This approach to organizational modeling can help achieve the following goals:

- Better management of operational KPIs
- Clear structure of generation P&Ls at all levels
- Clear interfaces to executive board, sales and trading, and other units
- Operational control of budget indicators
- Appropriate allocation of resources
- Comprehensive management of risks
- Accelerated decision-making process for existing projects and faster approval of future projects due to reduction in discussions and red tape
Exhibit 8
Scaled and flexible operating model

Source: Strategy& analysis
Exhibit 9
Detailed organizational structure

Source: Strategy& analysis
Conclusion

As the Russian power market tightens up and it becomes increasingly difficult to eke out earnings, achieving success depends on smart growth strategies that focus on high-performing projects, distinctive capabilities, optimizing expenses on maintenance and inventory, internal energy efficiency, and an effective operating model. Although this may be a tall order, it is a beneficial method for survival in an increasingly difficult marketplace. This strategic approach, which assumes that cost cuts and efficiency will cover new investments, offers the opportunity of reallocating funds to modernization of the energy production process without any additional capital injections. All of that will improve the financial position of power companies and, most important, increase their value to shareholders.
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