Small equals big: Unlocking savings in small to midsize capital-project portfolios in chemicals

Increased rigor in managing smaller chemical projects can help capture significant untapped value.

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Capital projects are an essential contributor to chemical-company growth: witness the half dozen new ethylene crackers currently being built on the US Gulf Coast. Such large-scale projects get a lot of top-management attention. But they account for only just over half of the chemical industry's $400 billion in annual capital spending. There is another category of capital expenditure that many chemical companies have struggled to manage: modest outlays for sustaining and maintaining existing assets as well as for small to midsize growth projects.

Chemical companies have an opportunity to capture significant additional value—and promote increased asset reliability and safety—by better managing their portfolios of small to midsize projects.

Projects with a value of $50 million or less (and commonly less than $10 million) add up to a major portion of chemical-company spending. These typically account for 80 percent of all capital projects by number, and up to 50 percent of capital-spending value. In our experience, improving the

way these projects are selected and managed can deliver savings of 15 to 30 percent, and these savings can be redirected to more value-creating projects. Such projects can have return-on-investment rates significantly higher than many larger ones: debottlenecking exercises, for example, can earn high returns because they sell into familiar markets and to customers already known to want more product. Done right, this kind of action can also boost overall return on invested capital (ROIC) by as much as four percentage points—an important consideration, given that ROIC performance has historically been the primary driver of chemical-company valuations.

When speaking of their approach to managing smaller capital projects, most chemical-company executives we talk with describe a well-defined and effective process: projects are selected based on business logic, designed with optimal scope, and executed under stringent time lines with sufficient supplier engagement. Indeed, we observe that in many cases, these companies do have robust stage-gate governance frameworks with clear requirements in place that would, if followed, lead to capital projects that are well designed and executed.

The reality, however, is often vastly different. Time and again, we see business cases that overestimate returns while underplaying risks, and we see projects advance through stage-gate processes that are not followed or are applied with significant gaps. Despite having a robust paper process, project sponsors are usually overburdened by the large number of projects and have insufficient time and, in some cases, technical capabilities needed for truly stress-testing a proposed small to midsize capital project.

As a result, many of these projects are poorly formed in the front end. They end up being relegated when up for final approval and funding, where the added scrutiny typically sends teams back to the drawing board. Not only does this approach waste time and money, it also increases the risk of approving a flawed solution. Best-in-class chemical companies are overcoming these problems by developing small to midsize capital-management programs and teams, based upon six building blocks: align capital strategy and allocation with corporate strategy, optimize portfolios, streamline project concept and design, implement lean project governance, use effective procurement and contractor-management processes, and institute sustainable organizational enablers (Exhibit 1).

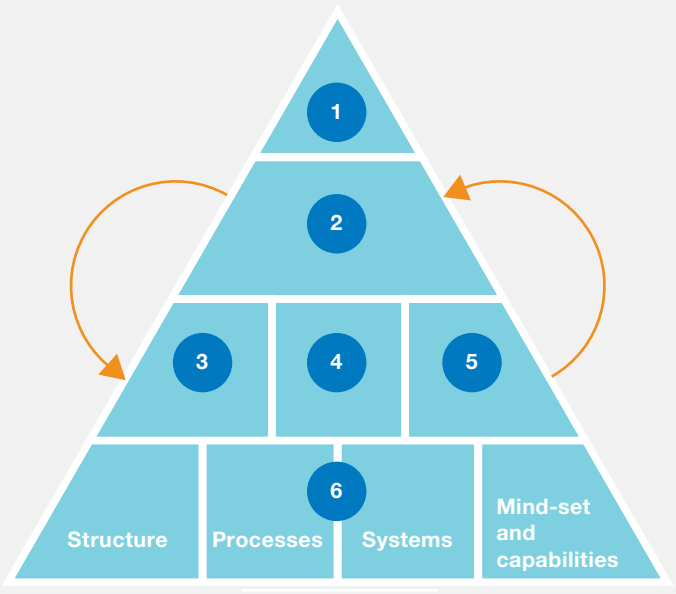
Align capital strategy and allocation with corporate strategy

Companies that manage capital projects well translate overall corporate strategy into individual business-unit or regional capital strategies. If the overall strategy cannot clearly translate to allocation to component businesses, it is unlikely the strategy will lead to the desired outcomes. To get capital allocations right, companies must closely consider the risk-return profile of each business unit or region.

Some best-practice chemical companies make sure projects are properly aligned with overall strategy and are appropriately prioritized. Because many of the projects are small, the allocation is often done at the business-unit or product-line level, which makes it necessary for companies to adopt disciplined processes to ensure expenditures are aligned with overall strategy. For example, to ensure a tight link between high-level strategy and small-project execution, one diversified chemical company added a gate to evaluate how any project's goal linked to strategy. At the same time, the company prioritized the assets that it judged most critical to executing its overall strategy.

Leading companies also make sure to examine projects in terms of the value they create for the company overall. This approach often leads to a conclusion that a project should not go ahead and

Exhibit 1 **There are six interlocking components of capital-productivity excellence.**



1 **Capital strategy and allocation:** Align capital strategy with long-range plans and allocate capital effectively across businesses.

2 **Portfolio optimization:** Optimize risk and return in a manner aligned with business strategy.

3 **Streamlined project concept and design:** Optimize project concepts to solve business need and generate best net present value.

4 **Lean project governance and stage-gate process:** Tailor approach to project and stress-test assumptions.

5 **Effective procurement and contractor management:** Create road maps to drive substantial value.

6 **Organization enablers:** Manage sustainable process and organization that creates year-over-year value in sustaining capital management.

Source: : McKinsey analysis

that the value-creation goal can be achieved in other ways. This process constitutes an important release mechanism enabling chemical companies to escape from the "engineer's mind-set" seen at some companies—a focus on implementing the best engineered project possible regardless of value created.

Best practice also calls for establishing systems to monitor capital spending regularly. One multi-business-unit chemical conglomerate holds an annual cross-unit reporting session where the heads of engineering and operations outline total spending, return on capital deployed, project-status snapshots, and each unit's capital-spending priorities and project pipelines. This ensures discipline in annual capital-spending cycles.

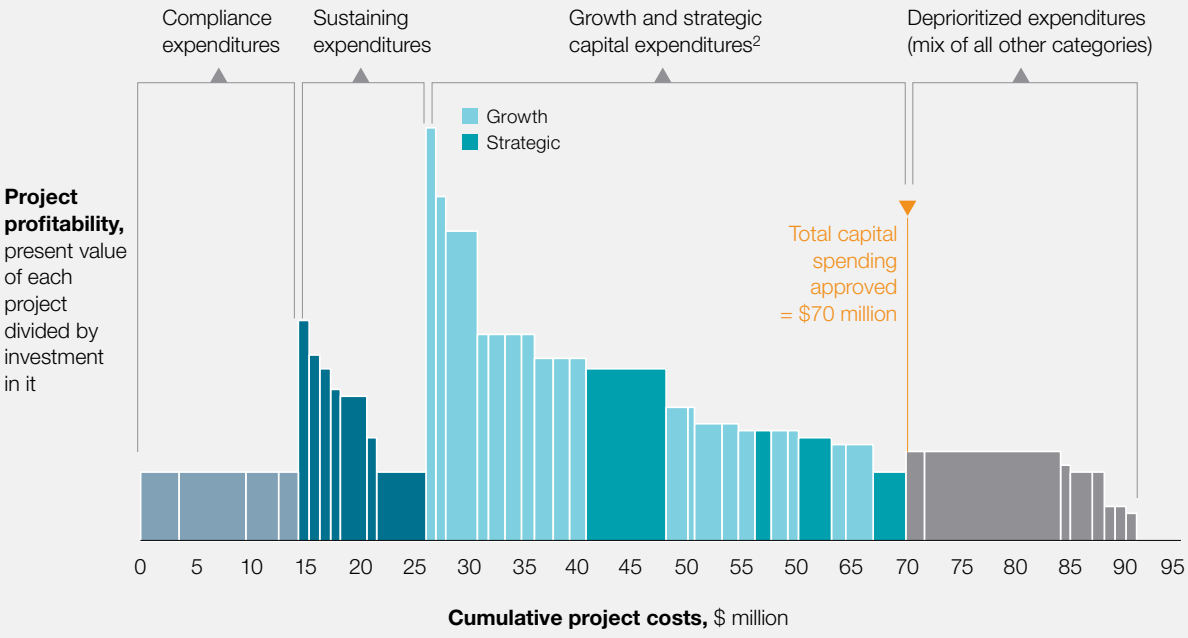
Optimize portfolios

Management teams often lack the data or process to debate the merits of one portfolio of projects over another. Instead, they may pursue a default basket of projects year after year or make blunt, across-the-board spending cuts without actively shaping the

portfolio so that it is optimized not only to maintain operations but also to enable growth. In contrast, the most successful companies identify an optimal portfolio of projects, basing their assessment on three factors:

- Prioritization. Best-practice companies require a business-case evaluation for each project. This helps bring transparency about the business problem the project aims to solve, and it helps determine which projects can be delayed or canceled. This in turn frees up funds to spend on the projects with the most attractive returns. These companies also classify their projects and make sure that the mix aligns with their strategic aims. Typical classifications include "must do" investments to comply with regulations, "sustaining" projects to improve the production process and reduce the likelihood of outages, "strategic" projects to open up future growth directions, and "growth" projects to increase margins or revenues (Exhibit 2). Here

Exhibit 2 **A sample view of a portfolio[1] after optimization shows a reduction in spending of more than 20 percent.**



[1]Business unit example.
[2]"Strategic" investments should always have robust business rationales, but in contrast to "growth" investments, they sometimes have less-certain defined financial metrics (ie, net present values) because of long-time horizons or uncertainty of success. Flagging as "strategic" clarifies that the business case may not be as solid as a "growth" project but also indicates the possibility of greater longer-term contribution.

Source: McKinsey analysis

again, having a clear business case that shows return on investment helps prevent projects being advanced simply based on their classification. Across all these categories, committed and work-in-progress capital expenditures generally are prioritized to minimize cost escalations.

- Financial- and nonfinancial-indicator trade-offs. Trade-offs are based on financial measures such as net present value (NPV), internal rate of return, and profitability index, as well as nonfinancial indicators such as carbon-dioxide emissions. Best-in-class companies apply NPV calculations to all projects, including those that have no revenue component and those that can reduce the risk of significant hits to the company's profitability resulting from production outages. Applying a range of measures enables the company to make refined trade-offs in choices of projects.

- Scenario modeling. Evaluating the outcome of a portfolio under various hypothetical strategic objectives or constraints can be a powerful way to show management the risks and other factors it should consider. For example, one chemical company models the net cash flows to the business under different end-product and feedstock-price scenarios and compares returns of different portfolios; in bear markets, some maintenance-biased portfolios actually come out ahead of purely growth-focused portfolios.

Streamline project concept and design

Streamlining project concept and design requires two steps. First, managers need to scrub the business cases for each project to ensure they are realistic, robust, and comparable with each other. Second, projects should be optimized for cost and value over their life span (see sidebar, "How two companies found major savings in their small-project capital spending").

When scrubbing business cases, companies must ensure projects meet key objectives. Does the proposed project fix a real problem, or can noncapital solutions be employed to address the root issue (for example, using contract manufacturing or rebalancing supply across plants to meet demand)? Is it based on complete, error-free data? Are the underlying assumptions reasonable? Have all dependencies been identified? In addition, managers should look for common pitfalls or problems that can occur. Examples include teams tacking on nice-to-have but costly features or capabilities, exaggerating the impact of not doing the project, proposing major modifications when easy workarounds to solve the problem are possible, and proposing expansions for plants that are neither sold out nor expected to sell out any time soon.

When optimizing projects, managers should analyze key cost drivers. Can the project be done with less capital by optimizing the project scope, simplifying technical specifications, or buying from lower-cost sources? Can the project be made to generate revenue faster—for example by reducing construction or ramp-up time or by introducing a phased implementation process? Can cash flows during the operation be enhanced by improving yields or reducing running costs? Careful evaluation and brainstorming with technical or commercial experts can often lead to solutions that offer the same benefits at greatly reduced cost. Best-in-class companies conduct design-optimization reviews as a project progresses, starting with project design and continuing through equipment selection once basic engineering is completed.

Following this approach, one petrochemical company avoided replacing expensive process vessels, saving more than 50 percent of the originally budgeted capital cost. By applying this process to more than 100 projects ranging in value from $8 million to $150 million, the company cut 30 percent from

How two companies found major savings in their small-project capital spending

One major chemical company urgently needed to cut costs. Using the approach outlined in this article, the company identified ways to cut 25 percent from its small-project capital spending. It found that more than 20 percent of the projects could be deferred or replaced by lower-cost alternative solutions, and another 30 percent could be modified to reduce capital spending significantly through design optimization. At the same time, reprioritizing projects based on factors such as a revised net-present-value (NPV) assessment, exposure to strategic geographies, and regulatory concerns enabled the company to accelerate capacity expansions at sold-out units to generate more cash.

In another example, a petrochemical company was able to cut through a tangle of several hundred projects (with average project outlay of $12 million) that was constraining its ability to invest in growth projects. Rigorous portfolio optimization demoted 50 percent of the projects to the discretionary category and eliminated 10 percent outright. Scrubbing of the remaining projects better matched the scope of each project to the needs of the company, which accelerated the highest-value-generating projects. As a result, the company cut its capital spending on small to midsize projects by 30 percent and improved NPV on the optimized projects by 70 percent.

the projected capital-spending requirements, netting total savings of more than $1 billion to date, and increasing overall NPV by more than 70 percent. More significantly, the training and experience its staff received during this yearlong effort built permanent analytical and technical skills that the company is now applying to scrub and optimize both small and large projects.

Implement lean project governance and stage-gate processes

Many companies have effective stage-gate processes for managing large projects. However, we observe that this is rarely the case for smaller projects. A common challenge is the application of a one-size-fits-all approach to managing projects, which leads to frustration and to process or bureaucratic overload.

Companies with effective portfolio management tailor their approach by size and complexity of a project. They apply levels of rigor according to the scale and degree of complexity: for example, for smaller, simpler projects, they streamline the number of stage gates and stakeholders involved. By redeploying engineering and project-management staff to the most complex or costly projects, they maximize value.

We have also found that companies often miss a crucial step in governance when it comes to smaller projects: stress-testing or challenging of objectives of project proposals and the assumptions behind calculations. Examples include using benchmarks for cost estimates instead of precise project-specific calculations, or failing to consider multiple design solutions. Stress-testing provides another opportunity to verify that the project will truly meet a business's objective. This work is best done by experts who are independent of the project teams. In our experience, formally introducing and ensuring external and independent challenges at each stage gate is fundamental to delivering the required optimization and execution outcomes.

Use effective procurement and contractor-management processes

Many companies describe excellent capabilities in managing their capital procurement. In reality, many fail to integrate procurement professionals into the front end of the project life cycle. As a result, they miss opportunities to incorporate the latest supply-market insights or technology advancements.

In the procurement of products and materials, the best-performing companies create clear product road maps, allowing them to bundle like commodities across different projects and sites. They employ advanced analytic tools such as clean-sheet cost modeling to facilitate supplier discussions. Finally, these companies look to expand their supply markets to include global suppliers to take advantage of the best technology or labor markets.

Best-practice companies also effectively manage the contractors that fabricate, install, or replace capital equipment. They find the most appropriate contracting models (for example, switching between cost-plus and lump-sum approaches) rather than always sticking to the same contracting approach. They base decisions upon the clarity of the project scope and an understanding of the execution risk of the project, as well as the natural ownership of that risk. They carefully assess contractor capabilities and select contractors that can deploy the most efficient and effective crews. Finally, they recognize that regardless of the contracting model, effective owner oversight is critical. Not only does it mitigate the typical information asymmetry between owners and contractors, it also creates room for additional contractor margins.

Institute sustainable organizational enablers

One of the most important success factors in effective small to midsize capital-project management is that senior management treats it as a priority. Leading companies actively manage their process with regular performance dialogues between project teams and senior management.

In addition, these companies do not treat small to midsize capital-project optimization as a one-off event. High-performing companies invest in team capabilities that promote project optimization and higher standards of execution throughout the company. They invest in training a cadre of project- and portfolio-management experts. They also create centers of excellence, which they use to train small-project teams from different production sites to be more effective and efficient in leveraging resources at their disposal. Over time, the training program can be rolled out across the whole company. This approach spreads expertise across all sites, which is essential for small-scale projects that are typically driven at the site level, in contrast to megaprojects that get lots of attention from headquarters. Using this "Capex Academy" approach, one company put every project team through thorough training and coaching on the prefeasibility and feasibility phases. This effort resulted in substantial increases in project quality.

While many companies manage large-scale projects effectively, few apply the same discipline to small to midsize projects. By applying appropriate rigor in their evaluation, prioritization, and optimization of this small to midsize portfolio, companies can unearth significant savings and develop a strong organization rooted in capability building. The impact of adopting these approaches is significant, not only in capital-spending savings but also in NPV gains. ■

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