

# McKinsey on **Finance**



## **Perspectives on Corporate Finance and Strategy**

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## When **payback** can take **decades**

For capital-intensive businesses, the variables in portfolio decisions can seem overwhelming. Streamlining can help.

**Boris Galonske,  
Stephan Görner, and  
Volker H. Hoffmann**

**For companies** in capital-intensive industries, investments are more often than not of the supersized variety. The utility that builds new plants that employ a variety of power-generating technologies, for example, handles an investment volume of a daunting size and complexity. Then there is the uncertainty: once a company embarks on an investment, decades can pass before it actually creates value. In the basic-materials and energy industries, for instance, the average new project costs about \$500 million and takes 20 to 30 years to create value on a net present value (NPV) basis.

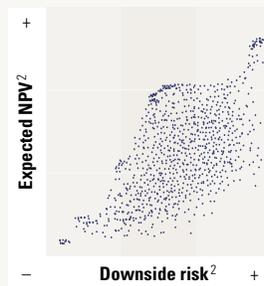
Taken together, the uncertainty and the complexity make it particularly difficult for companies to sort through myriad combinations of prospective investments and select the most promising ones. If a power company, for example, considered only limited variations of the most obvious factors—the size, location, technology, and timing of possible investments, as well as a variety of future market scenarios—it would still end up with more possible portfolio combinations than it could evaluate easily (Exhibit 1).

As a result, executives typically opt for an overly simplistic approach: They evaluate investment opportunities intuitively, considering the two or three most obvious risks and uncertainties rather than conducting a systematic analysis. They also usually assess options on a stand-alone basis, overlooking how a group of assets might affect a single portfolio. And they rank investment prospects by the ratio of NPV to investment volume, in effect shaping their corporate portfolio for the next several decades simply by ticking down the list of

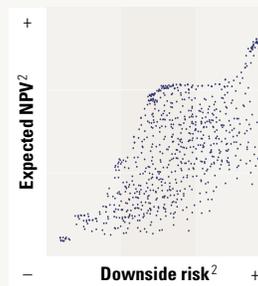
### EXHIBIT 1

#### An analytical approach to portfolio decisions

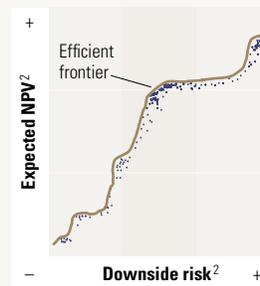
Take all possible portfolio<sup>1</sup>  
combinations . . .



. . . eliminate those that are not  
feasible . . .



. . . and analyze only those close to  
the efficient frontier<sup>3</sup>



● Individual real asset portfolios

<sup>1</sup>Clusters reflect variations on key drivers and discrete decisions; for example—should plant be fueled by coal, gas, or lignite?

<sup>2</sup>Expected NPV is additional NPV vs a “do-nothing” option; downside risk is difference between expected NPV and NPV in worst-case market scenario.

<sup>3</sup>Represents the highest return for a unit of risk.

possible investments until their funds are exhausted. At that point, few executives give much consideration to financial constraints that might emerge as the target portfolio is implemented, which can be decades.

Our work with clients in capital-intensive industries in Europe suggests a better approach to structuring portfolios. For it to be effective, companies must overcome three common obstacles. First, they must understand the relevant risks and uncertainties and how they are linked. Second, companies need to systematically sort through an infinite number of possible portfolio configurations. Last, they must apply that perspective to identify the most appropriate candidates for future portfolios. Once under way, this approach can help companies avoid locking themselves into today's vision of a single portfolio that must last 20 years. Instead, they can retain the flexibility to adapt to changing market conditions over time.

### Which uncertainties are most relevant?

Most managers have a qualitative understanding of the uncertainty of planned capital investments. But because so many variables are involved, they ultimately make decisions according to their own biases and predispositions, thus needlessly broadening and distorting the universe of risks. Many managers consider the demand for electricity to be a crucial risk factor for a power company, for example, because of its considerable impact on the market's development. Demand in Western countries is quite predictable, however, so while it may be an important variable in forecasting prices, in most cases it should not be considered a key driver of risk.<sup>1</sup>

Companies can limit the number of possible portfolio configurations they need to consider seriously. First, managers should rigorously

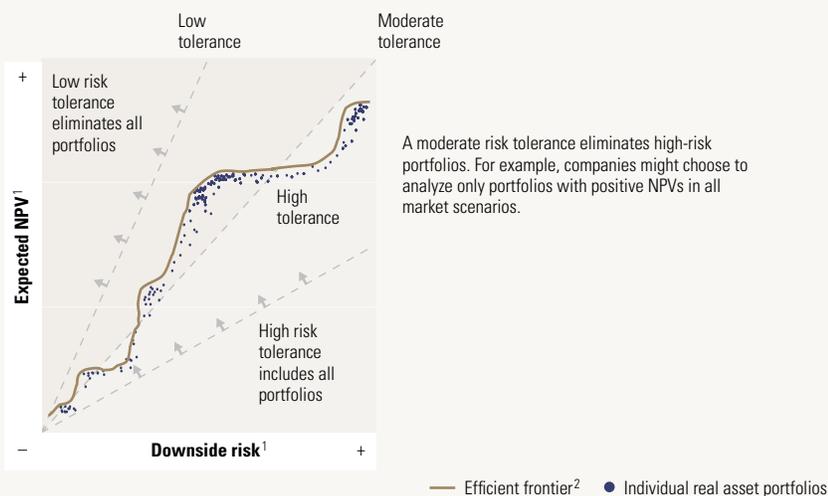
define those factors that lead to the biggest commercial risks and have a potential impact on the market's development—and hence on the investment's value.<sup>2</sup> In the power industry, fuel prices for hard coal or gas are key because their future development is highly uncertain and because they determine plant competitiveness on a short-term marginal-cost basis. While the necessity of defining these factors may seem obvious, in our experience many companies neglect to do so. As a result, they fail to rule out the least relevant uncertainties. One company we worked with had no systematic risk assessment and little consensus among different divisions—and even within departments—around which factors were the most crucial. Once managers began conducting such assessments, they realized that while their short-term analyses were correct, they needed to revise completely their assumptions for the long term.

Second, managers should determine which uncertainties are mutually exclusive. The point is not trivial; eliminating some combinations reduces the number of different scenarios that need to be considered. What are the chances that a country might force a power company to reduce both its reliance on nuclear energy and its CO<sub>2</sub> emissions at the same time, for example? It's not an implausible scenario in Europe, given environmental movements currently under way, but is it likely? Nuclear capacities are so large that they couldn't be replaced by solar and wind power alone. The only option would be to rely more heavily on fossil fuels, which unfortunately would also increase emissions. Therefore, executives might come up with a plan to meet either requirement separately, but they might well think it unlikely that the government would require both actions simultaneously, since to do so would endanger a secure supply of energy.

<sup>1</sup>Demand may be a key driver in the developing economies of Asia and Eastern Europe, for instance, where forecasts are less reliable.

<sup>2</sup>This result can be calculated by quantifying the impact of each driver on the company's financial performance—for example, on earnings before interest and taxes (EBIT). Typically, this calculation involves performing sensitivity analyses on a financial model.

EXHIBIT 2

**Explicitly define risk tolerance**

<sup>1</sup>Expected NPV is additional NPV vs a “do-nothing” option; downside risk is difference between expected NPV and NPV in worst-case market scenario.

<sup>2</sup>Represents the highest return for a unit of risk.

portfolio combination that meets both acceptable levels of risk (Exhibit 2) and executives’ expectations of returns. Obviously, a portfolio with high NPV and low risk is more favorable than one with low NPV and high risk. The most desirable portfolios have a higher NPV than all other portfolios but with the same or a lower level of risk.<sup>4</sup>

In our experience, the process of defining key performance indicators for value and risk and developing a detailed description of constraints for investments can be challenging, since often there are many possible indicators and implicit constraints that are difficult to reconcile. In each case where a company made these assumptions explicit, however, the right course to pursue with a given portfolio option became clearer to executives. One power-generation company found an explicit definition of its risk tolerance useful as a way to sharpen its perspective on risk and return trade-offs in near-term portfolio decisions. In the end, the company adjusted its industry perspective toward emission trading, changed its midterm investment plan to defer some projects while speeding up others, and incorporated risk exposure in its criteria for strategy development.

**Making individual portfolio decisions**

With a range of portfolios clearly identified, an eager management team might be tempted to narrow the pool further—down to the most attractive single portfolio. The benefit of identifying the best portfolio is questionable, however, because time will inevitably alter the outcome. When the company achieves its ten-year aspirations—a reasonable duration, given the time it takes to bring a plant on line—those goals could be five years out of date.

Adding one more layer of analysis can solve that dilemma. Because the most promising individual assets are likely to be part of a

**Narrowing portfolio choices**

Today most executives analyze their investments on a case-by-case basis. Few companies go beyond a project’s NPV, and they rarely connect the predicted cash flows of a new project to the future cash flows of the rest of the portfolio. Without such a link, however, it is at best difficult to draw conclusions about the financial performance of the whole company. One corporation found that while a specific proposal would not on its own generate positive NPV, synergies with other plants would make the investment quite attractive. Executives would not have realized which conditions would be necessary to make this investment a success if they had paid attention only to the stand-alone view.

It is possible, however, to construct a spreadsheet-based model to evaluate the financial performance of each future real asset—alone and in combination with others—in each future market scenario.<sup>3</sup> This analysis should plot each particular

<sup>3</sup>Such a model should include a detailed description of each existing asset and of each potential project and should calculate each project’s future technical and financial performance, depending on the development of each key risk driver. Furthermore, it should include a mathematical analysis that selects the best combination of assets, using performance indicators, such as NPV or downside risk, that management prefers.

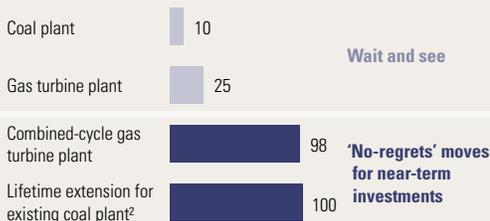
<sup>4</sup>In theory, a company could safely pursue any portfolio configuration that sits on the efficient frontier, because all are equally desirable, as long as a company has no precise preference for the level of risk or return.

EXHIBIT 3

**Without regret**

% of modeled portfolios (near efficient frontier) that contain given project as near-term investment<sup>1</sup>

**Project**



<sup>1</sup>Near term defined as over next 5 years; efficient frontier represents highest return for unit of risk.  
<sup>2</sup>Stand-alone evaluation of profitability to be calculated separately.

portfolio as a strategic direction rather than as a fixed plan to be followed for decades to come, thus allowing for periodic revisions while making individual short-term investment decisions. A power-generation company might make decisions to invest in gas-fired power plants today, for example, but could reasonably postpone investments in coal-fired plants until uncertainties with respect to the Kyoto Protocol have been resolved. Of course, it is wise to confirm the profitability of all individual projects before becoming committed to them.

large number of possible future portfolios, companies can use a straightforward analysis to review all of the acceptable options. If a certain investment project were part of, say, 98 percent of all portfolios close to the efficient frontier, then managers could confidently invest in that asset as a short-term, no-regrets move (Exhibit 3).

The benefit of this type of spreadsheet model is that managers can rerun the model periodically to alter investment decisions as conditions change instead of committing themselves to a single portfolio of investments for the long term. Executives can see a

Companies in capital-intensive industries face incredibly complex investment decisions. An approach using thorough optimization-based analysis can clarify trade-offs between risks and returns, produce a flexible portfolio strategy that responds to uncertainty, and ensure that investments are recouped in the long term. **MoF**

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