

Chapter 51

Operational Hedging Strategies to Overcome Financial Constraints during Clean Technology Start-Up and Growth

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ABSTRACT

Clean technology startups face multiple sources of uncertainty, and require specialized knowhow and longer periods for revenue growth than their counterparts in other industries. These startups require large investments and have been hit hard during the current credit squeeze. On the other hand, clean technologies create important positive externalities for the economy. Hence, loan guarantees and other incentive schemes are being developed that are conditioned upon operational benchmarks. The authors offer a framework to establish the extent wherein operational hedging can reduce risk and increase the probability of obtaining financing. They examine a variety of evidence, ranging from production outsourcing to creation of joint ventures, to posit that operational hedging may affect both the marginal cost of capital and the marginal return on investment through mitigating the informational problems in the market. However, operational hedging may not be an effective strategy in all settings: the decision for creation of such hedges ought to weigh the benefits of reduced marginal cost of capital and the opportunity cost of reduced future growth potential against a status quo.

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INTRODUCTION

Clean technology, including the clean energy (wind, solar, water, biomass, biofuels, hydrogen, geothermal, fuel cells), green transportation, green chemistry, information technology and energy efficient appliances, has been a fast growing area in startup financing (Noci & Verganti, 1999; Stern, 2006). Although the market for clean technology has recently witnessed growth and gains, it is still highly unpredictable and susceptible to the vagaries of the business cycle. During the recent financial crisis, a significant amount of capital has been lost in the global capital markets, leading to a milieu wherein a bulk of private equity and venture financing seems to have dried up (Lawskey, 2009). The clean technology startup firms are no exception to these challenges and are not protected from the current credit crisis. The term startup in this paper refers to newly founded firms, small and medium size enterprises, and even project financing situations in established firms, wherein the size of the financing is at a scale that requires access to the capital markets in order to fund the endeavor.

The clean technology industry has been hit particularly hard by the current credit squeeze because the complexity of technological and market challenges, such as production scale-up and supply chain integration, in this industry require large capital outlays. An example of such scale up is the US biofuel firm Verenium's staged growth: Verenium started out with a "laboratory" scale, 10,000 liters per year, as a demonstration of its technology in 2005, and aims to scale up its business model in a stage wise manner. In 2007 it brought on-line its "pilot" scale plant in Jennings, LA, to demonstrate a process capability to produce 50,000 gallons per year of ethanol from bagasse and energy cane. Finally, in early 2009, it brought on-line its "demonstration" scale plant in Jennings, LA to demonstrate a process capability to produce 1.4 million gallons per year (MGY) of ethanol using multiple varieties of feed stocks.

These plants are all research and development tools to optimize the production process prior to building a "commercial" scale plant with 36 MGY of capacity (Joglekar & Graber-Lopez, 2009).

The scale of these investments forces many, if not most, clean technology firms to rely on project financing from banks or other institutions to fund their capital outlays (Cheung, 2009). Startup teams are exploring alternative management strategies to overcome this squeeze, while institutions are rushing in with guarantees and other incentives to make credit available (LaMonica, 2008). However, startup firms, endowed with unique characteristics, bear significant operational and financial uncertainties, which make it very hard to assess and verify the prospects of such firms. These uncertainties exacerbate the informational gaps and asymmetries between the owners of startup companies and the resource providers (i.e., creditors) about the firm's prospects (Shane, 2003).

Hence, startups face severe financial limitations and problems in accessing capital markets and have to be creative in their search for funds from various sources at different stages of their development and growth. Verenium has been able to line up a series of grants from the Department of Energy (DoE) to support its development. For instance, in 2007 Verenium is allocated \$4.6M from DoE for enzyme development. In 2008, it was awarded a grant from a \$40 million program to support the development of small-scale cellulosic ethanol biorefinery plants. In 2008, it was awarded a three-year, \$5.4 million grant from the New Zealand Foundation for Research, Science and Technology. Most importantly for the Verenium/BP joint venture (Vercipia Biofuels), it has applied for a loan guarantee for the Highlands County, FL, commercial project from DoE.

Obviously, the capital markets for clean technology startup are not perfect. The uncertainties related to early start-up stage and growth significantly influence the availability of financing to clean technology by mitigating or amplifying the informational problems between the entrepreneurs

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