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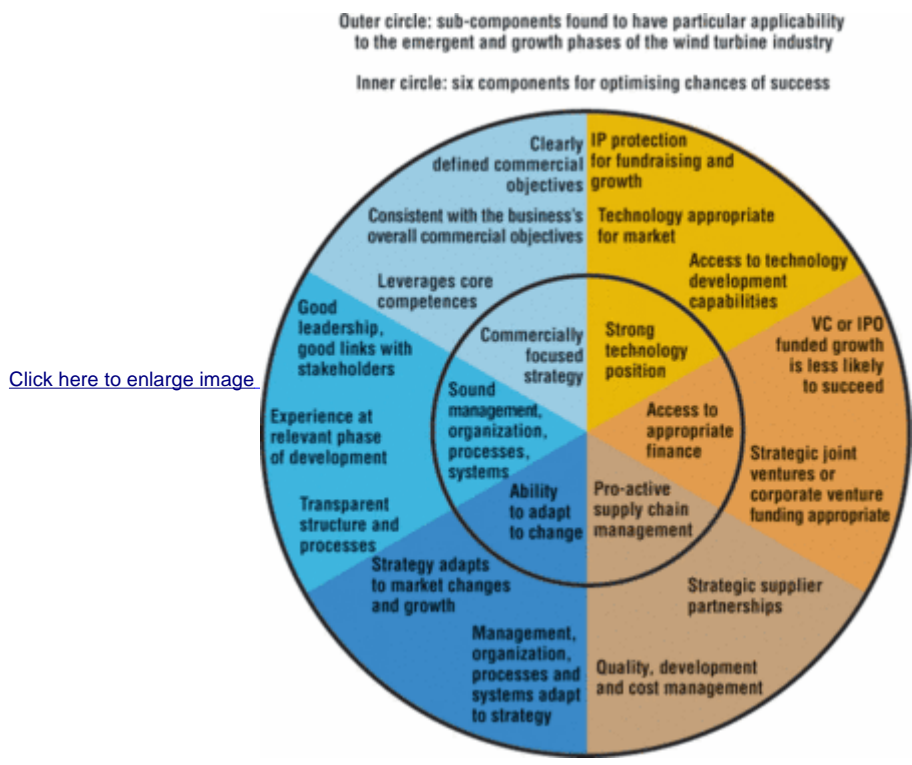
Destined for success? Key factors for successful growth in emerging energy technologies

Noel Botha guides emerging technology businesses through the early growth phase towards becoming fully independent and established commercial enterprises. Here, he outlines six key factors that characterize successful renewable energy businesses and suggests fundamental ways in which new energy technology businesses can maximize their potential and identify optimum routes for business growth.

The start up of a business and its profitable growth in environments that are highly driven by policy is inherently complex, with new ventures all too often failing to fulfil their potential and either destroying shareholder value or, at worst, ceasing to exist. Expert support and advice can help emerging technology to businesses develop, greatly improving their chances of success. To identify what distinguishes successful businesses from less successful ones in a sector in which substantial funds are being invested, Michael Ellis, my associate at Orion Innovations, conducted a detailed analysis of the key ingredients for successful growth in the wind turbine industry. While previous studies into the renewable energy sector have tended to focus on policy, regulatory and environmental factors or on the economic viability of a technology - all important factors - this research focused on company-level issues.

Renewable energy market

The renewable energy sector is entering a period of high growth, with US\$2.2 billion of venture capital and private equity flowing into the industry during the first quarter of 2007. This increase in growth has been driven largely by government policy, which has increasingly focused on the development and early adoption of cost-effective renewable energy solutions. Such policies have themselves been adopted for several reasons: environmental concerns - notably the emerging consensus that human consumption of fossil fuels is a primary cause of global warming - and unresolved concerns over the disposal of nuclear waste; uncertainty surrounding the future availability and price of oil and gas, both as a result of reserve depletion and the security of supply from geopolitically unstable regions; and an increasing global demand for energy, derived from global population growth and concurrent economic development.



As a result, there has been a recent upsurge in interest from investors looking to benefit from exposure to the renewable

energy market. Venture capitalists are investing increasing sums of money in the sector, typically on a time scale of 3-6 years, and a number of early-stage companies have raised substantial capital through listings on AIM or other equity markets.

Major multinationals are also entering the field. For example, BP has pledged to invest up to \$8 billion over 10 years in selected renewable energy technologies. These organizations are looking not only to profitability but also at the benefits derived from enhanced corporate social responsibility and from strategic alliances that provide options in a potentially high growth environment.

Factors influencing success in the wind turbine industry

Our investigation into the wind turbine industry suggests that six key factors characterize successful businesses in this sector (see Figure 1). These are outlined below:

Focused commercial strategy

A business that has a clearly articulated strategy generally outperforms one that does not. Although in an emerging technology market a focus on technical excellence and product uniqueness might be expected to be the highest priority, it is even more crucial to focus on the commercial strategy of the business. The products on offer need to meet the needs of the market at its current stage of development.

In successful wind turbine businesses, there has tended to be a clearly defined commercial objective consistent with the company's core competences and overall business objectives. A clear strategy and a detailed implementation plan improve investor confidence and allow the business to follow an optimal course, even under changing circumstances. For example, Danish company Vestas successfully focused its commercial activities on the supply of small, technologically reliable units when the market needed smaller rather than larger turbines. In contrast, during the same period, the Wind Energy Group (WEG, a joint venture between Taylor Woodrow construction, aerodynamics expert British Aerospace and GEC) developed technologically superior but considerably larger (3 MW) units. The original focus for WEG was therefore mainly technological, although it later produced smaller 250 kW versions in response to market demand. Despite the high standard of the WEG turbines, the market requirements were not initially as well matched as they were by Vestas. As the wind turbine market matured, Vestas was able to capitalize on its early success, adapting its commercial focus to fulfil the growing demand for larger and more expensive turbines. WEG, on the other hand, was forced to withdraw from the wind turbine market despite its technical competence.

Technology that is fit for purpose

During the early growth period of an industry, it is more important to develop a technology that is fit for purpose than it is to focus on innovative design. As the market matures, the technology needs to be increasingly reliable and cost effective.

In the wind turbine industry, the degree of technological innovation did not necessarily correspond to commercial success in the early growth period. The need for appropriate working technology is shown by the contrasting fortunes of James Howden & Sons, whose innovative turbines suffered blade failure and gearbox difficulties, leading to Howden's withdrawal from the industry in 1989, and the slow but successful incremental development and production of reliable machines from Vestas and Siemens Wind. New entrants to a mature market may need to differentiate their products through innovation, a current example being Clipper Wind Power's proprietary gearbox and drive train technology.

Sound management, organization, processes and plans

One major factor influencing the relative success of new ventures is the ability of the company's organization and processes, together with the roles and responsibilities of its staff, to adapt to new challenges posed by each stage of growth. The skills and structures required for a small start-up business are different to those in a growing or larger business, and a smooth transition between these stages is important.

Our research highlighted the difficulties encountered by NEG Micon, whose national divisions each had a different level of autonomy in decision-making and contract management. This led to poor control of orders and unnecessary spending on manufacturing for non-finalized contracts. It also led to problems with the quality of parts of the manufactured gearboxes. The company's structure and organization, though suited to the early stages of business development, did not adapt sufficiently to meet needs as it grew. This contrasts with the clear and transparent processes in place at Bonus Siemens, where the manufacturing schedule clearly identifies whether an order is confirmed or potential. The skills base and organization at Siemens allowed the company to adapt and cope with the growth stage and maturation of its wind turbine business.

Effective supply chain management and quality control

Proactive supply chain management is an essential requirement for all new ventures. In the wind turbine industry, blades, gearboxes and castings have proved to be bottlenecks along the supply chain, creating problems for most wind turbine businesses that are reliant on the outsourcing of their component production.

Preparing for the transition from prototype to larger volume production by securing good quality components is vital for success. Corporates are able to capitalize on their buying power at this point. For example, Siemens has recently acquired gear manufacturer Flender to supplement its in-house blade manufacturing capability, allowing it to maintain control of the manufacturing process and the quality of an essential component.



The case of Siemens also illustrates the importance of taking responsibility for the quality control of supplied components. In the early growth phase of the industry, Bonus Energy (a firm acquired by Siemens) developed integrated and committed partnerships with key suppliers, thereby allowing its suppliers to invest in and commit to co-development activities. This approach ensured that the components met specific technical and quality requirements. In contrast, the problems with Howden's blade failure derived from manufacturing errors at sub-contracted manufacturers. The attachment between the blades and the hub was misaligned, causing cracking. Replacement costs incurred by Howden were subsequently only partially recovered from the sub-contracted party.

Success comes from adapting to change

A key component of success is the ability to change the company's strategic focus as the market reaches a different stage of maturation or when new geographical market areas evolve.

Clipper Wind Power initially adopted a strategy to become a manufacturer-developer, developing wind farms using its own turbines to demonstrate their capability. However, as the availability of components and of turbines in the rapidly expanding sector became limiting, Clipper repositioned itself to accelerate its own novel turbine development and manufacture while entering into framework agreements with BP relating to turbine supply and wind farm development.

Vestas and others, by contrast, failed to adapt in time to the drop in demand from the Californian market when tax incentives were not renewed. Over-reliance on a single market and an inability to respond to change led to bankruptcy in 1986. The core members of the company reformed as Vestas Wind Systems, eventually to become one of the industry leaders.

Access to appropriate sources of finance

Study of the best source of funding for the wind turbine industry was somewhat inconclusive. Theoretically, corporate finance is better suited to early stage technologies since it is easier for these investors to take a strategic and long-term view than, for example, venture capitalists. All too often, however, this long-term strategy is also inflexible and deterministic, preventing the company from adapting appropriately to changing circumstances.

Detailed analysis identified that strategic joint ventures or corporate venture funding can be more appropriate for emergent technology industries than growth funded by venture capitalists or IPOs, but the complexity of the route to market in this industry means that ideal funding sources cannot be categorically identified.



The research highlighted examples of success and failure from all these sources of funding. Corporate venture funding was successful in the case of RES, a wind farm developer that was formed as a subsidiary of Sir Robert McAlpine, because the new business was well aligned with the corporate's core competence and risk management strategy. On the other hand, pressure from shareholders for quick profit forced Kenetech of the US from the arena after it took the high-risk strategy of placing its technology in the market too early and suffering subsequently from technical failings.

These six factors have all demonstrably impacted on the degree of success of ventures in the wind turbine industry, the importance of each factor depending on the company and its stage of development.

Conclusions and guidance for business managers

The start-up and profitable growth of businesses in environments highly driven by policy is complex. Many new ventures fail to fulfil their potential, resulting in poor shareholder returns or, in the worst case, cessation of trading.

The renewable energy sector is entering a period of high growth, driven by environmental concerns and issues about security of supply. While funding opportunities and commercial interest in the sector are positive, there are also company-scale issues that strongly influence the degree of success that ventures enjoy.

Although the wind turbine industry has unique historical, technical and geographic biases, it is a good model for other emerging renewable energy sectors. All these sectors tend to be technology dependent, to involve substantial capital expenditure, to be heavily influenced by government policy and to require interface with conventional energy generation and supply markets.

Despite the strong positive political, social and financial drivers, most companies active in the wind turbine arena in the 1990s failed to exploit the opportunities available. Many closed their interests within the decade. Examples include Boeing and Hamilton Standard (of the US), British Aerospace and GEC (of the UK), MBB and MAN (of Germany) and Kvaerner (of Norway). In contrast, several companies have succeeded, either through organic business growth (for example Vestas of Denmark), corporate buy-in into the sector (for example GE Wind of the US and Siemens of Germany) or position in a high-growth, protected market (for example Suzlon of India). The question arises as to why some of these businesses have grown while others have been less successful.

The research has identified six key company-level factors that have a strong influence on new business success:

- adopting a focused commercial strategy
- working with technology that is fit for purpose
- establishing sound management, organization and processes
- proactively managing the supply chain
- having the ability to adapt to change and

- finding an appropriate source of finance.

These factors are transferable across sectors within the field of renewable energy and, indeed, to other low-carbon technologies. Their adoption and adaptation will increase the chances of successful growth and commercialization of new ventures.

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