Wind Turbine Industry Opportunities [Abridged]

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Executive summary

- **Suzlon and Gamesa, two vertically integrated turbine suppliers, have high gross margins but low returns on invested capital ("ROIC")**
  - **Payoff from vertical integration may be too low to support additional capital base required**
- **Vestas industry leader in operating margin and ROIC despite modest gross margins**
  - **As market share leader, may get operating leverage from its scale**
- **U.S. wind farm operators put major turbine manufacturers in four groups**
  - **Blue chip, respected second tier, potential competitors, and reputation-challenged**
- **To improve performance, turbine manufacturers should:**
  1. **Place significant R&D on key areas of customer interest (gearbox, grid compatibility, serviceability)**
  2. **Explore new business opportunities such as NOCs, remote monitoring**
  3. **Mount campaign to build reputation for reliability and transparency**
     - **Develop preferred tax-equity, project finance, and equity partners (reputation-challenged vendors only)**
  4. **Design manufacturing process to minimize working capital and fixed asset needs**
  5. **Create strategic supply chain optimization program**
- **Woodlawn Associates has significant experience in these areas**
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About Woodlawn Associates

- **Management consulting firm focusing on high tech, telecommunications, and industrial clients**
  - **Most recent work in cable TV, mobile phones, wind energy, and private equity**
- **Help clients with strategy, M&A, process optimization, channel design, and supply chain management**
- **Offices in Chicago, New York, and San Francisco**
  - **Extensive experience in China, Japan, Europe, and the United States**
- **Partial team experience:**
  - **Chief Quality Officer, Fortune 100**
  - **Chief Supply Chain Officer, Fortune 100**
  - **Master Black Belt, GE Wind Energy (China)**

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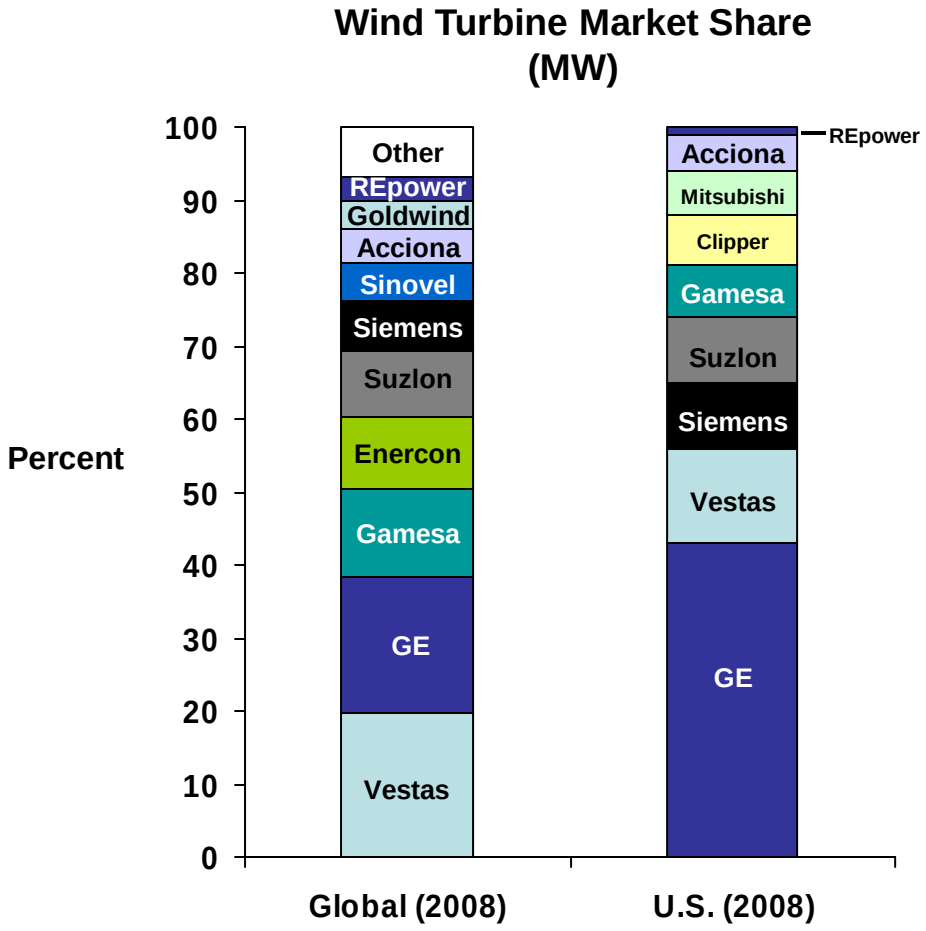
Ten companies supply more than 90% of the worldwide turbine market; Vestas is global leader, GE largest in U.S.



- **U.S.-based turbine manufacturers include GE, Clipper Windpower**
  - **DeWind and Nordic Windpower also based in U.S., but have very little market share**
- **Enercon, Vestas, Gamesa, Nordex, Siemens, Acciona, and REpower based in Europe**
  - **Enercon does not participate in U.S. market**
  - **Vestas, Gamesa, Nordex. Siemens, and Acciona have or are building U.S. R&D or manufacturing facilities**
  - **Gamesa and Acciona have both wind farm development and turbine manufacturing operations**
    - **Ensures a market for turbines but alienates some possible customers**
- **Suzlon is an Indian company supplying globally**
  - **Acquired >90% of REpower but due to German law does not have operating control**
- **Sinovel and Goldwind are Chinese companies focused mostly on that market**

Source: ***BTM Consult World Market Update 2008 (March 2009), U.S. Dept. of Energy Annual Report on Wind Power Installation…2007 (June 2008), AWEA Project Database***

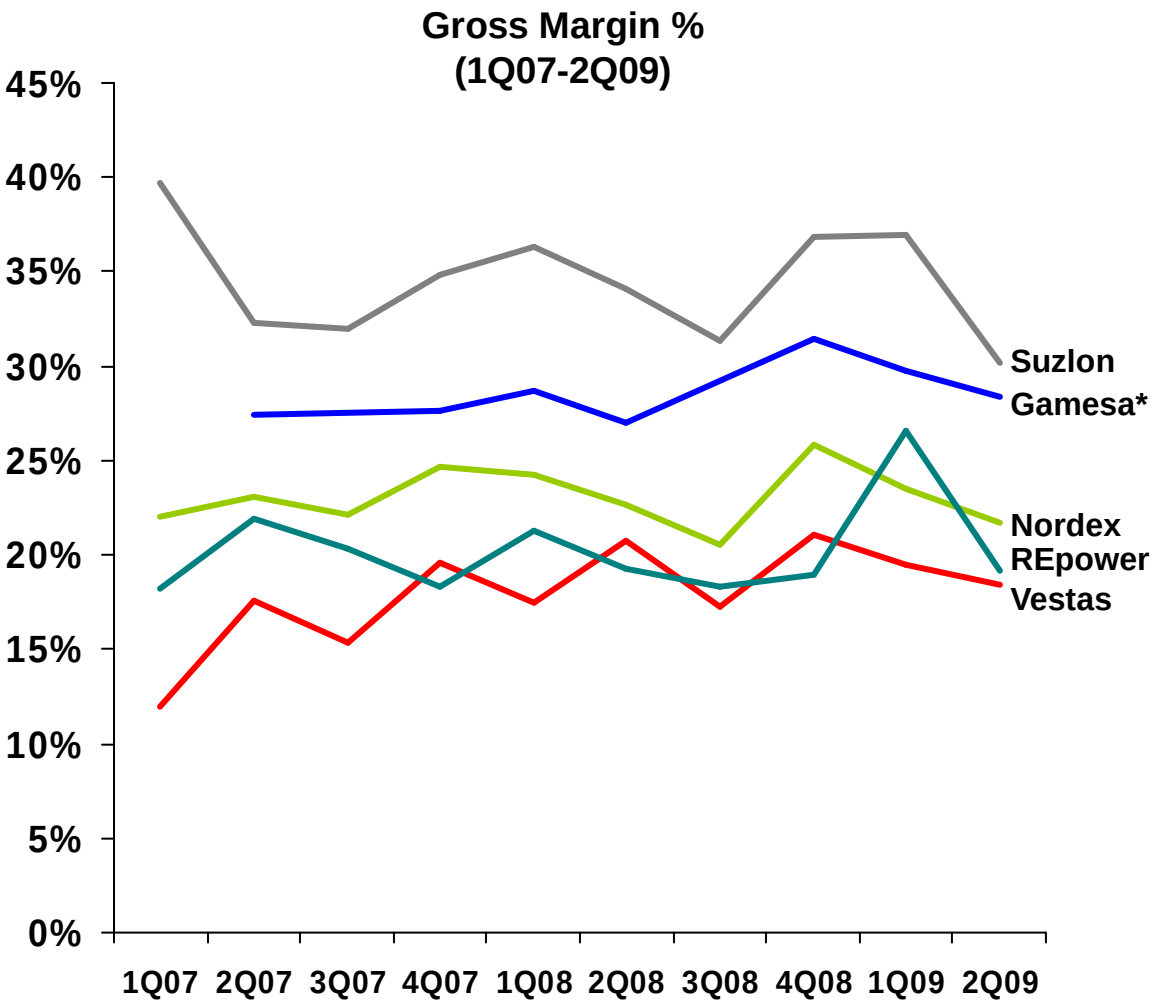
Firms have taken very different stances on the appropriate amount of vertical integration

	Blades	Gearbox	Generator	Castings	Tower	Overall
Repower	○	○	○	○	○	Very Low
Clipper	○	○	○	○	○	Very Low
Acciona	○	○	○	○	◑	Low
GE	○	◑	◑	○	○	Moderate
Nordex	◕	○	○	○	◑	Moderate
Vestas	◕	○	◔	◔	◑	Moderate
Gamesa	◕	◑	○	◔	◑	Moderate
Siemens	◕	●	◑	○	○	High
Enercon	◕	n/a*	◕	○	◕	High
Mitsubishi	●	◕	◕	○	◑	Very High
Suzlon	◕	●	◕	●	◑	Very High

○ = 100% outsourced
◔ = Some internal production, mostly outsourced
◑ = Equally internally and externally sourced
◕ = Internal, but may 2nd source in some cases
● = Sell on merchant basis

Source: *Emerging Energy Research, company reports, Woodlawn Associates analysis*
Notes: ** uses gearless design*

Suzlon and Gamesa, two of the more vertically integrated turbine suppliers, have the highest gross margins

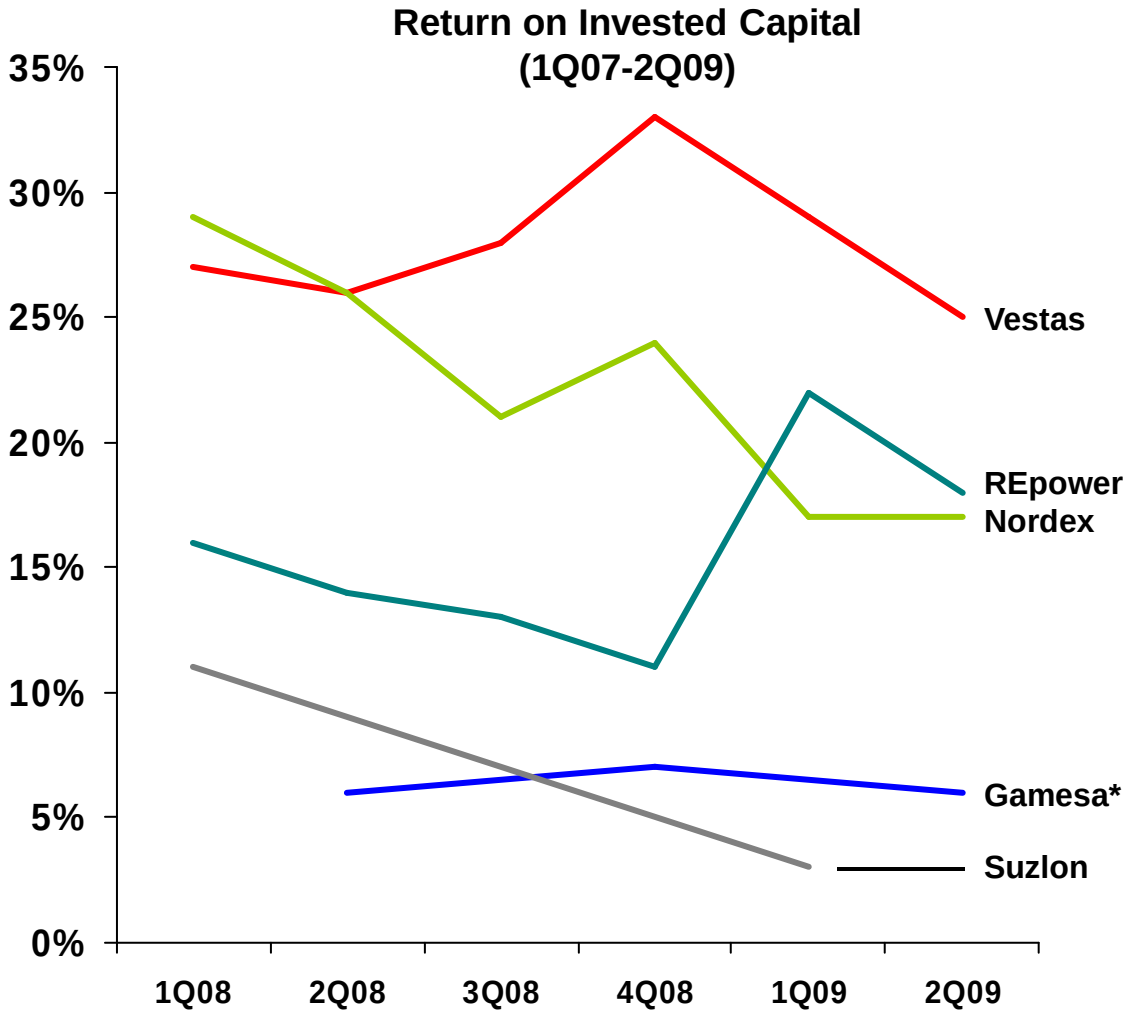


The financial data in this section refer primarily to publicly-traded, pure-play turbine manufacturers, for which such data is readily available.

- **Given their vertical integration, Gamesa and Suzlon should (and do) achieve best-in-class gross margins**
- **Industry share leader Vestas reaches only about 20%**
- **Industry gross margins have been slipping since 4Q08**
  - **Negotiating power shifted to buyers as market softened**

Source: ***Reuters, company reports***
Notes: **** Gamesa data generally available every six months. Chart includes some interpolated data points***

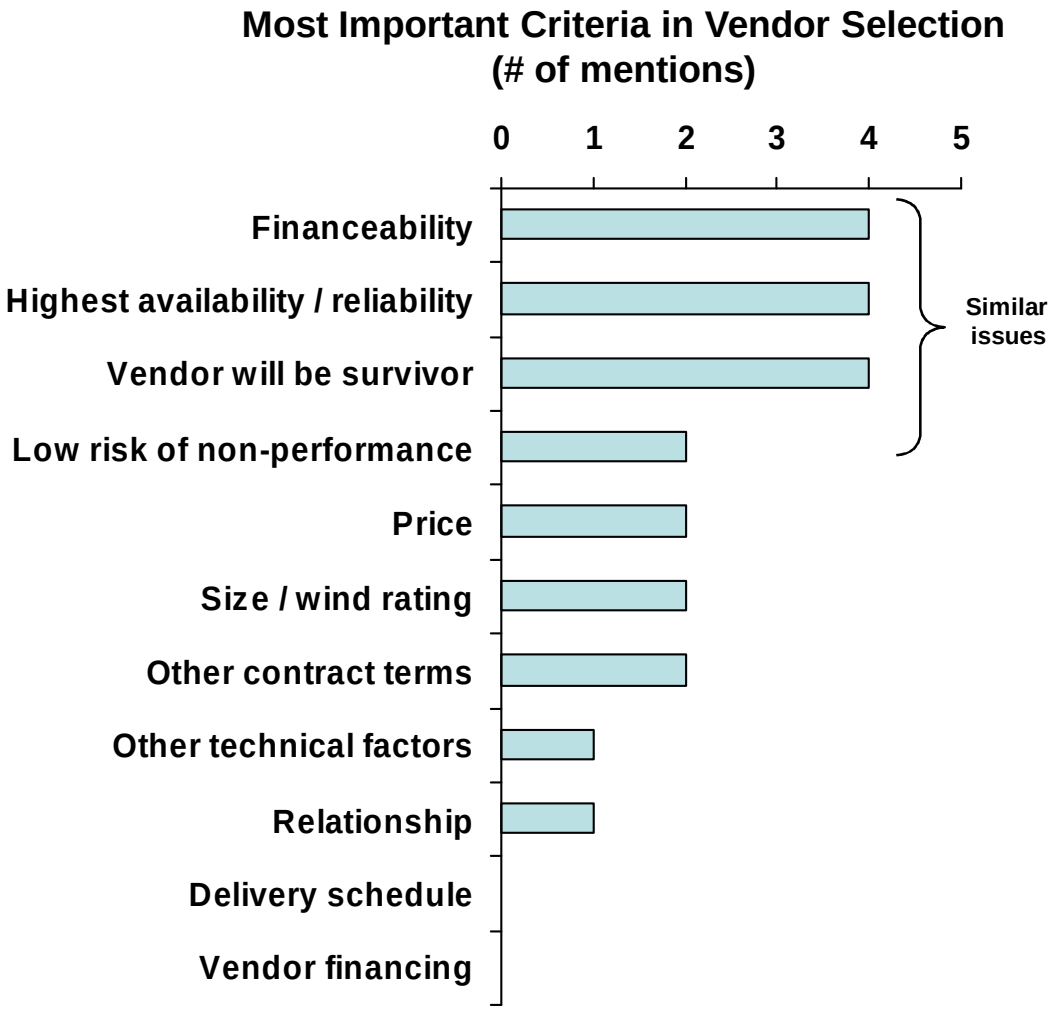
Suzlon & Gamesa have low ROIC despite high GM%. Returns from vertical integration may be too low to support additional capital base required



- **Return on Invested Capital defined as 12-month operating earnings (less taxes) over the average capital invested in the firm**
  - **Invested capital is shareholders' equity + long term debt + interest-bearing portion of short term liabilities + dividends payable**
  - **Equivalent to operating working capital + fixed assets**
- **Gamesa and Suzlon lagging. Actions to consider:**
  - **De-integrate to reduce fixed asset and working capital requirements**
  - **Manage working capital better**
  - **Reduce opex**
  - **Increase scale**
  - **Improve gross margins (focus on costs)**
- **Other firms may also want to consider these moves**

Source: ***Reuters, company reports, Woodlawn Associates analysis***
Notes: **** Gamesa data generally available every six months. Chart includes some interpolated data points***

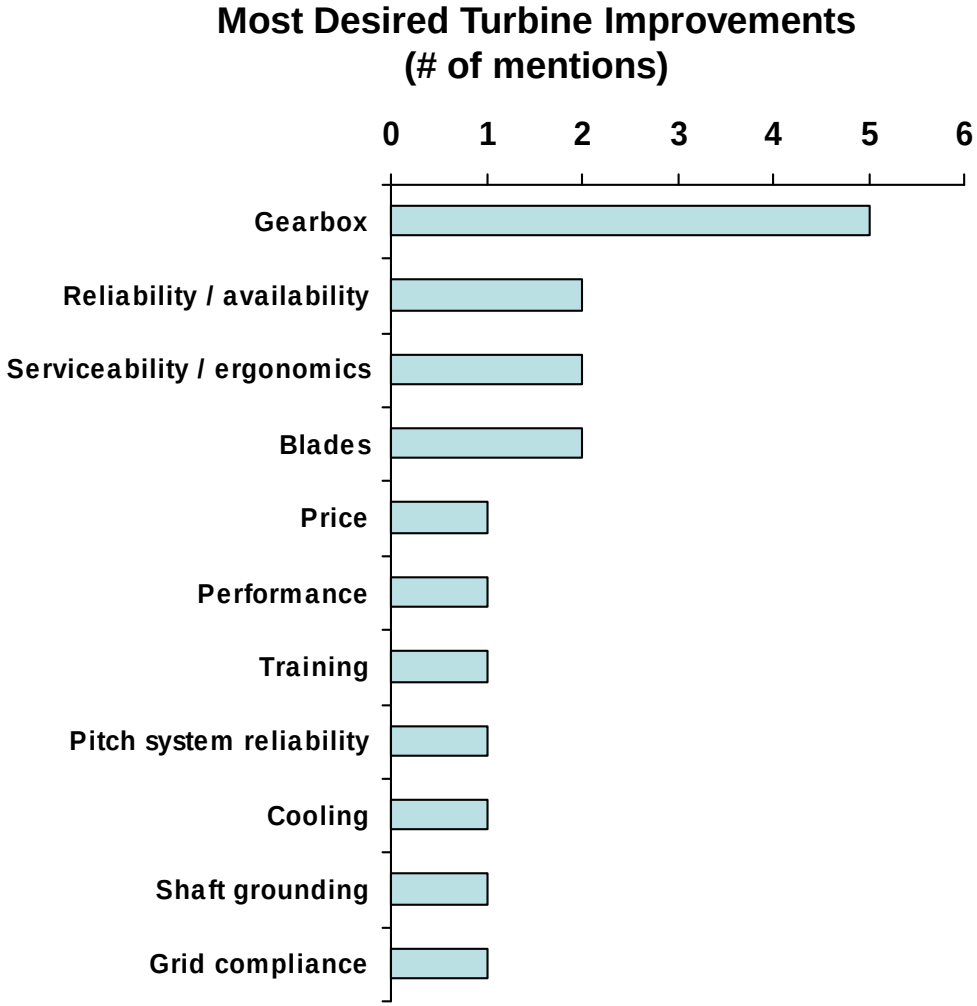
Wind farm operators say the most important criteria in turbine vendor selection are reliability-related



- **Priorities have changed since sellers' market ended**
  - **"… A couple of years ago the priority was just access to turbines…"**
    Head of Wind Development
  - **"… We are able to be more selective now than…in the past, when we would take what was available…"**
    VP, Strategy & BD
  - **"… We're seeing really, really interesting price reductions and getting more and more T's & C's amenable to us…"**
    VP, Operations & Maintenance
- **Most important criteria are related to predictability, reliability, and availability**
  - **"… Financeability is most important and wraps a lot of the other items into it…"**
    VP, Strategy & BD
  - **"… The first thing we look at in choosing a turbine supplier is what the expected Net Capacity Factor will be, which depends on the overall reliability…"**
    MD, Operations

Source: ***Woodlawn Associates interviews. n=8. Except as noted, all interviewees were with the top 20 wind farm operators in the U.S.***

The most desired turbine improvements also relate to reliability—especially of the gearbox



- **The gearbox generates the most interest in improvement**
  - **"… I would like turbines to be able to catch gearbox problems earlier. It can cost $300-400k to replace a gearbox…**
    Field Service Manager, Maintenance Provider
  - **"… We would love to see the elimination of gearboxes. It can cost $400,000 or more to replace the gearbox…"**
    VP of Strategy & BD
  - **"… We continue to have gearbox problems…"**
    Managing Director, Operations
  - **"… Various vendors have struggled with gearbox reliability…"**
    Managing Director
- **Serviceability / ergonomics also important**
  - **"… Making the machines more service-friendly would help…"**
    VP, Strategy & BD
  - **"… Turbine manufacturers only meet the minimum required safety standards to be installed. We would like to see them go many steps beyond that…we have techs get into their early 40s and they can't work anymore, but that is just when they know the most…"**
    VP, Operations & Maintenance

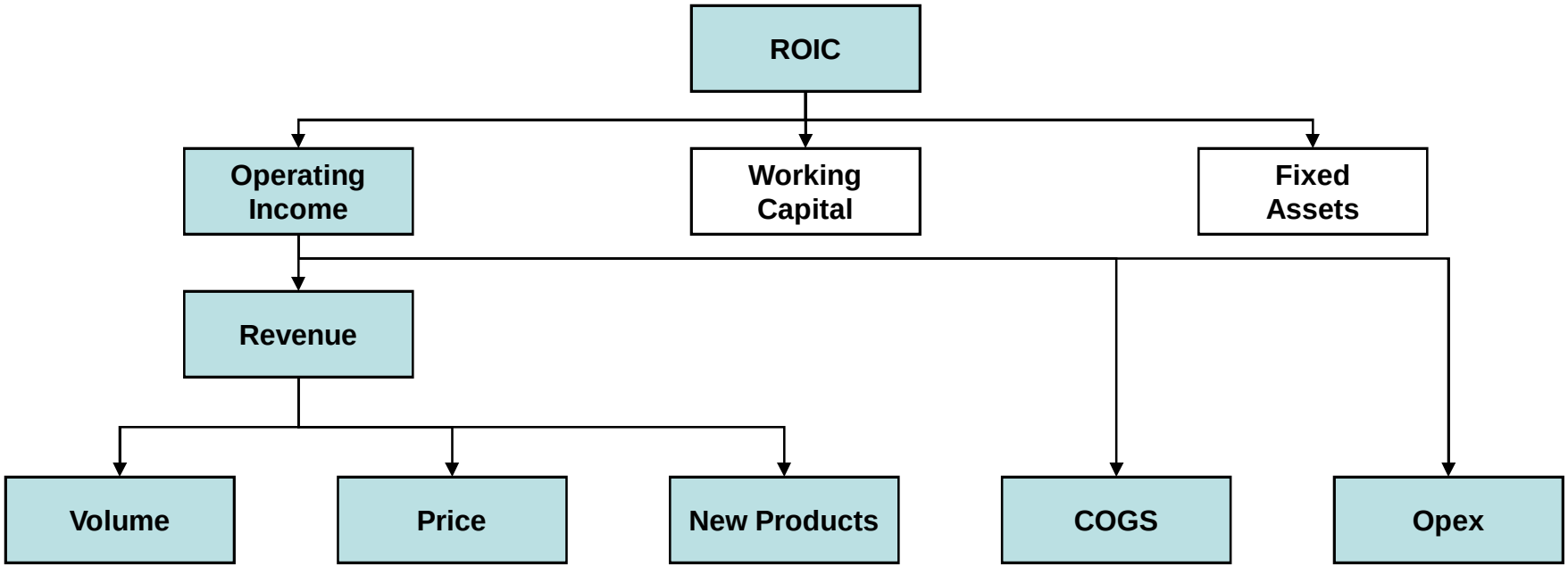
Source: ***Woodlawn Associates Interviews. n=9. Except as noted, all interviewees were with the top 20 wind farm operators in the U.S.***

Comments of 20 largest U.S. wind farm operators put major turbine manufacturers in four main groups

	Examples	Top 20 U.S. Wind Farm Operator Comments
Blue Chip	• GE • Vestas • Siemens	"… Blue chip. Easily financeable…" "… Reliable, solid, proven product…" "… Been around a long time. Considered reliable. Trustworthy and credible…" "… Probably the best turbine available in the U.S.…" "… Run and run and run…"
Respected Second Tier	• REpower • Nordex • Mitsubishi	"… Interesting offer. High quality, conservative design. Proven in other markets…" "… Interesting machine. Wouldn't be scared to go with them…" "… Very good technology. Up and comer…"
Possible Competitors	• Acciona • Gamesa	"… Pretty good turbine. Solid, large company…" ??? "… Who are they, a developer or turbine supplier? At what point would my supply be compromised so they could deliver to their own projects?" "… The only reason I would buy is they make an offer I can't refuse. I would advise them to get out of the business of farms…"
Reputation-Challenged	• Suzlon • Clipper	"… I would disqualify Clipper and Suzlon, as both have had to do mass overhauls that have left turbines off-line for days or weeks as they figured out how to make them work…" "… Impression is not the most reliable or highest quality turbine…" "… Blemished. Good company, but blade problems have hurt them. Hard to get anyone excited about financing them…" "… Terrible product, based on what I hear…"

Source: Woodlawn Associates interviews

To improve ROIC, turbine manufacturers should consider focused programs to improve profitability…



- **Price in dollars**
- **Make more use of performance guarantees**
- **Address reliability issues (PR and engineering)**

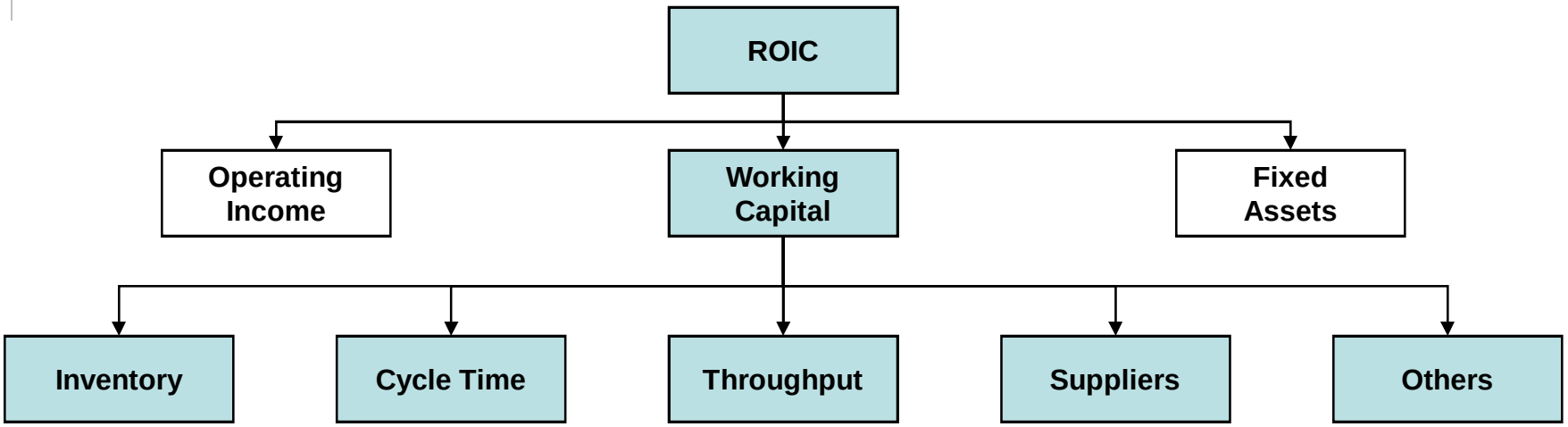
- **Move mix to higher margin products**
- **Raising prices not realistic in current buyers' market**

- **Explore NOCs, remote operations, etc.**
- **Focus R&D on areas of highest customer interest**

- **Negotiate with suppliers for better prices**
- **Create cost reduction targets for each subsystem**
- **Fill, rent, or sell excess capacity**
- **Localize supply chain for U.S. and China**

- **Benchmark SG&A, R&D versus competitors and broader industry**
- **Hiring queue through CEO**
- **Selective budget cuts**

…reduce working capital…



- **Build to orders, not inventory**
- **Enforce mathematically optimal inventory policy**
- **Effect virtual pooling of inventory**
- **Get annual vs. order volume purchase discounts and reduce volume / order**

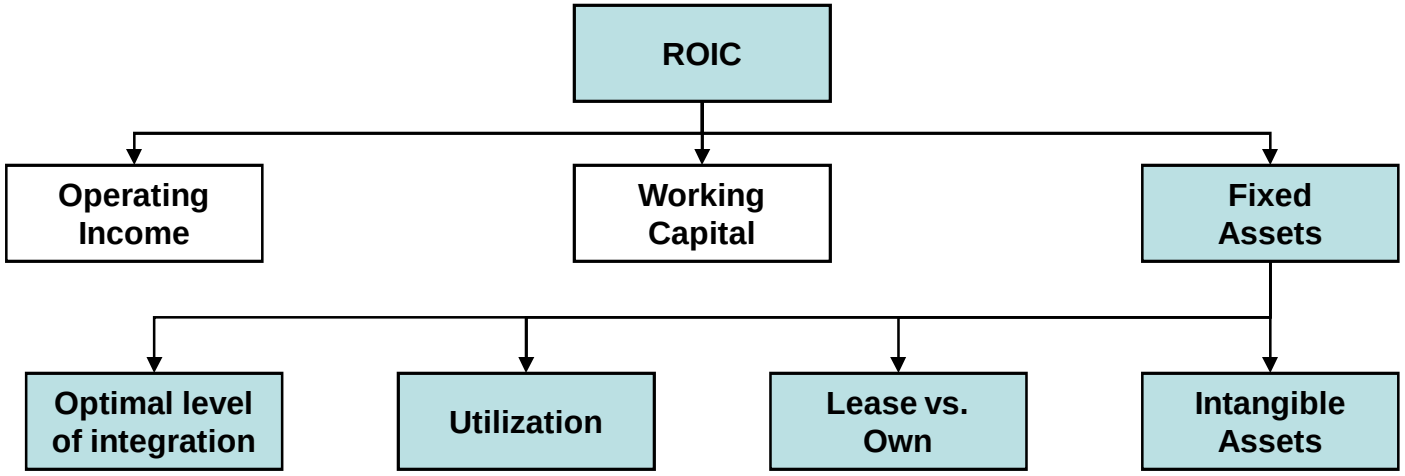
- **Reduce CT of slowest step in production**
- **Reduce wait times between steps of production (including transportation)**
- **Parallelize production process**

- **Increase capacity of bottleneck steps**

- **Outsource subsystems that don't differentiate**
- **Prefer suppliers with**
  - **Faster delivery times**
  - **Less variable delivery times**
  - **Extended payment terms**
- **Lengthen payment terms**

- **Reduce demand variability through better forecasting or innovative customer contracts**

…and reduce capital tied up in fixed assets



- **Divest or avoid non-differentiating component supply operations**
  - **Towers**
  - **Gearboxes**
  - **Generators**
  - **Castings**

- **Fill, rent, or sell excess capacity**
- **Delay investments in new plants**

- **Consider leasing facilities and equipment**

- **Where goodwill impairment is in question, take write down**
- **Stop capitalizing development expense**
- **Note: these may increase taxable income**

Notes: ***Also consider government financing to fund asset acquisitions instead of traditional investor capital***

Vendors may want to consider a focused program to build their reputations for reliability

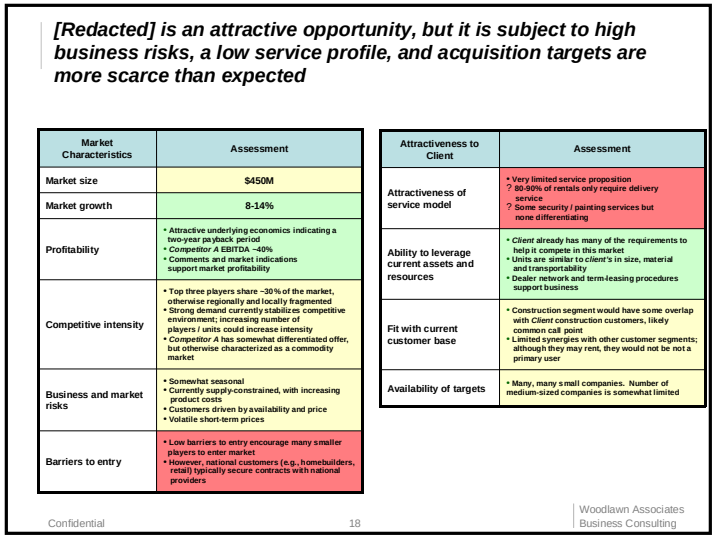
1. **Get on the speaking circuit. Describe problems, company response, positive outcome**
2. **Encourage customers to do same**
3. **Go on a road show to major tax-equity, project finance, and equity providers**
4. **Develop preferred finance partners (reputation-challenged vendors only)**
   - **Partners would agree to offer competitive terms to developers**
   - **Vendor may offer incentives such as warrants**
5. **Publish availability data for entire fleet on web site**
   - **Create employee bonuses for high availability**
   - **Develop reputation for transparency**
6. **Offer generous performance guarantees in some cases**
   - **Focus on areas near other customers and with similar wind regimes and environmental characteristics**
7. **Place significant R&D on key areas of customer interest**
   - **Gearbox**
   - **Grid compatibility and fault-ride through**
   - **Ergonomics and serviceability. World-class service manuals and training curriculum**
   - **Reduce technology risk with accelerated life testing and carefully phased rollout of new technology**

Woodlawn Associates' principal has assisted many companies in new market analysis and executed startup operating plans

Typical Steps in New Market Analysis

- **Work with management to generate a list of possible opportunities**
  - **Interview suppliers and customers for additional ideas**
- **Rate the attractiveness of each possible new market**
  - **Size, growth, profitability, capital requirements**
  - **Competitive intensity, barriers to entry**
- **Examine the fit of each market with the client's existing assets, capabilities, and business model**
- **Identify companies already offering these services**
  - **Include possible acquisition candidates**
- **List risks**
  - **Key assumptions**
  - **Market risks**
- **Build pro-forma financials**
- **Create project startup plan**
  - **What needs to happen, month-by-month or quarter-by-quarter**

Example Market Analysis and Execution Plan



[Redacted] is an attractive opportunity, but it is subject to high business risks, a low service profile, and acquisition targets are more scarce than expected

Market Characteristics	Assessment
Market size	$450M
Market growth	8-14%
Profitability	• Attractive underlying economics indicating a two-year payback period • *Competitor A* EBITDA ~40% • Comments and market indications support market profitability
Competitive intensity	• Top three players share ~30% of the market, otherwise regionally and locally fragmented • Strong demand currently stabilizes competitive environment; increasing number of players / units could increase intensity • *Competitor A* has somewhat differentiated offer, but otherwise characterized as a commodity market
Business and market risks	• Somewhat seasonal • Currently supply-constrained, with increasing product costs • Customers driven by availability and price • Volatile short-term prices
Barriers to entry	• Low barriers to entry encourage many smaller players to enter market • However, national customers (e.g., homebuilders, retail) typically secure contracts with national providers

Attractiveness to Client	Assessment
Attractiveness of service model	• Very limited service proposition ? 80-90% of rentals only require delivery service ? Some security / painting services but none differentiating
Ability to leverage current assets and resources	• *Client* already has many of the requirements to help it compete in this market • Units are similar to *client's* in size, material and transportability • Dealer network and term-leasing procedures support business
Fit with current customer base	• Construction segment would have some overlap with *Client* construction customers, likely common call point • Limited synergies with other customer segments; although they may rent, they would not be not a primary user
Availability of targets	• Many, many small companies. Number of medium-sized companies is somewhat limited

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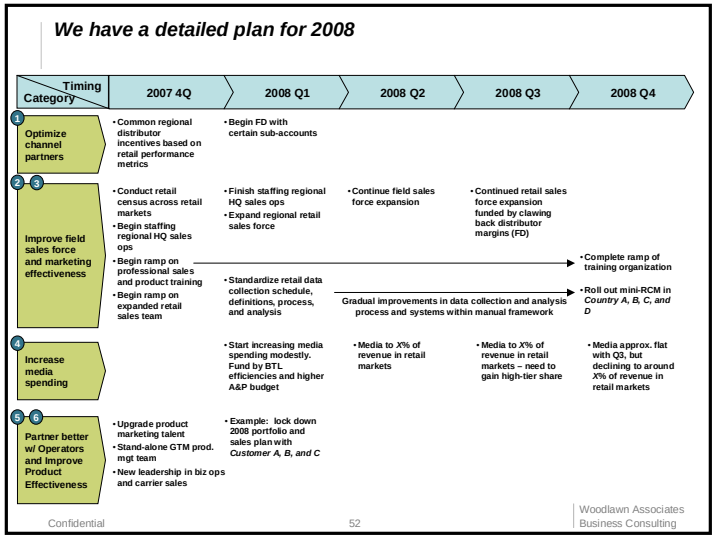

We have a detailed plan for 2008

Timing / Category	2007 4Q	2008 Q1	2008 Q2	2008 Q3	2008 Q4
1 Optimize channel partners	• Common regional distributor incentives based on retail performance metrics	• Begin FD with certain sub-accounts			
2 3 Improve field sales force and marketing effectiveness	• Conduct retail census across retail markets • Begin staffing regional HQ sales ops • Begin ramp on professional sales and product training • Begin ramp on expanded retail sales team	• Finish staffing regional HQ sales ops • Expand regional retail sales force • Standardize retail data collection schedule, definitions, process, and analysis	• Continue field sales force expansion Gradual improvements in data collection and analysis process and systems within manual framework	• Continued retail sales force expansion funded by clawing back distributor margins (FD)	• Complete ramp of training organization • Roll out mini-RCM in *Country A, B, C, and D*
4 Increase media spending		• Start increasing media spending modestly. Fund by BTL efficiencies and higher A&P budget	• Media to *X*% of revenue in retail markets	• Media to *X*% of revenue in retail markets – need to gain high-tier share	• Media approx. flat with Q3, but declining to around *X*% of revenue in retail markets
5 6 Partner better w/ Operators and Improve Product Effectiveness	• Upgrade product marketing talent • Stand-alone GTM prod. mgt team • New leadership in biz ops and carrier sales	• Example: lock down 2008 portfolio and sales plan with *Customer A, B, and C*			

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A strategic supply chain optimization program would improve both cost of goods and capital efficiency

Divide Problem

- **Divide turbine into standard subsystems**
- **Make one person responsible for both cost and performance of each subsystem (usually in R&D or manufacturing)**

Set Cost & Performance Targets

- **Set cost targets for current or future product and each subsystem**
- **Also set minimum performance and quality metrics**

Qualify and Negotiate w/ Vendors

- **Indentify possible suppliers**
- **Rate on criteria such as (historical and/or expected):**
  - Price
  - Quality
  - Technical performance
  - Capacity
  - Delivery time / flexibility
  - Shipping cost / time
  - Payment terms
  - Discount structure

Make vs. Buy Decisions

- **Determine subsystems that should be outsourced**
- **Consider:**
  - Potential for differentiation
  - Vendor pricing, quality, and tech. performance
  - Fixed asset & working capital requirements
  - Minimum efficient scale
  - Number of possible suppliers
  - Keeping design but outsourcing mfg

Integrate & Finalize

- **Ensure all subsystem interface assumptions are consistent**
- **Validate overall expected system performance in light of subsystem decisions**
- **Audit selected vendors as appropriate**
- **Iterate as necessary**

Example Outputs:

Divide turbine into subsystems and determine cost and performance targets

Cost Target Breakdown

Turbine Size (MW)	2.1		
Expected Price (000 $)	3,000		
GM Target	35%		
Allowable COGS (000 $)	1,950		
Subsystem Breakdown:			
	Cost Target (000 $)	Manager	Possible 3rd Party Suppliers
Tower	439	Smith	DMI, Trinity, Towertech
Rotor / Blades	439	Johnson	LM Glasfiber
Gearbox	244	Nagata	Winergy, Hansen
Generator	244	Liu	ABB, Siemens
Nacelle	195	Ramirez	WSL, Mitsui
Controls	195	Schnebeger	Foxcon, Flextronics
Other	195	Knight	
Total	1,950		

- **Could be for new turbine or cost-reduction program on existing design**
- **Important to have cost targets by subsystem / manager**
- **Experienced supply chain negotiation experience helpful in getting best terms from suppliers**
- **Need to consider quality, payment terms, cycle time, shipping time and cost, and discount structure in addition to price**

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The one step of a strategic supply chain optimization program would be to examine the optimal level of vertical integration

	Blades	Gearbox	Generator	Castings	Tower	Controls
Fixed Asset Req't	Low	High	Moderate	High	Moderate	Very Low
Working Capital Req't	High	High	High	High	High	Very Low
Potential for differentiation	High	Moderate	Low	Low	Low	Very High
Difficultly of integration with other subsystems	Moderate	Moderate	Moderate	Low	Low	Very High
Industry capacity bottleneck	No	Maybe	No	No	No	No
Importance of process know-how	High	Moderate	Moderate	High	Low	Low
# and quality of potential suppliers	Low	Moderate	High	High	High	High
Conclusion	Insource	Outsource	Outsource	Outsource	Outsource	Keep design, outsource mfg

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