Clipper Windpower: An Overview of Manufacturing

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Clipper®

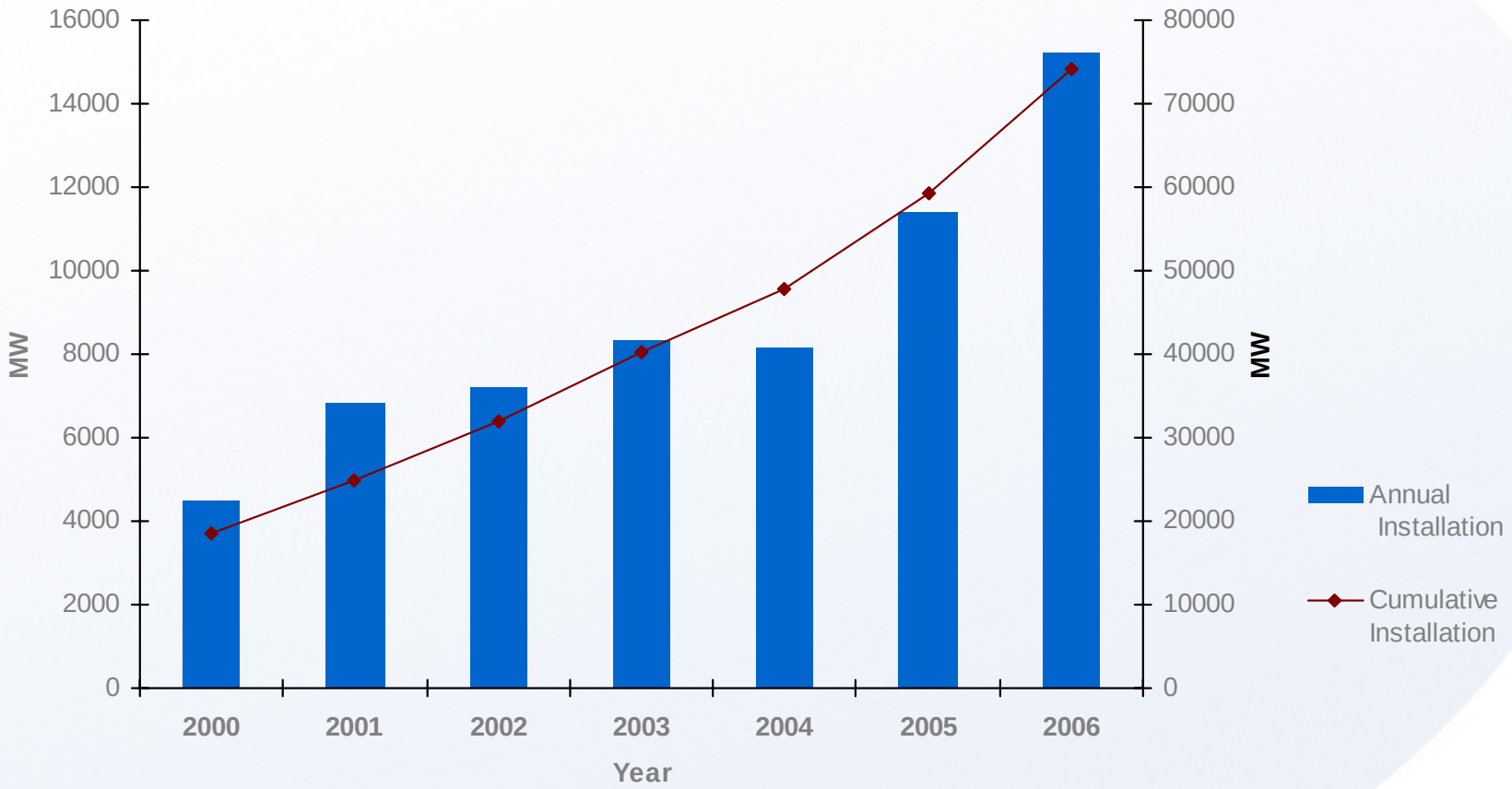
Wind Energy:
A Growing Industry

Wind Power Market

Wind power market

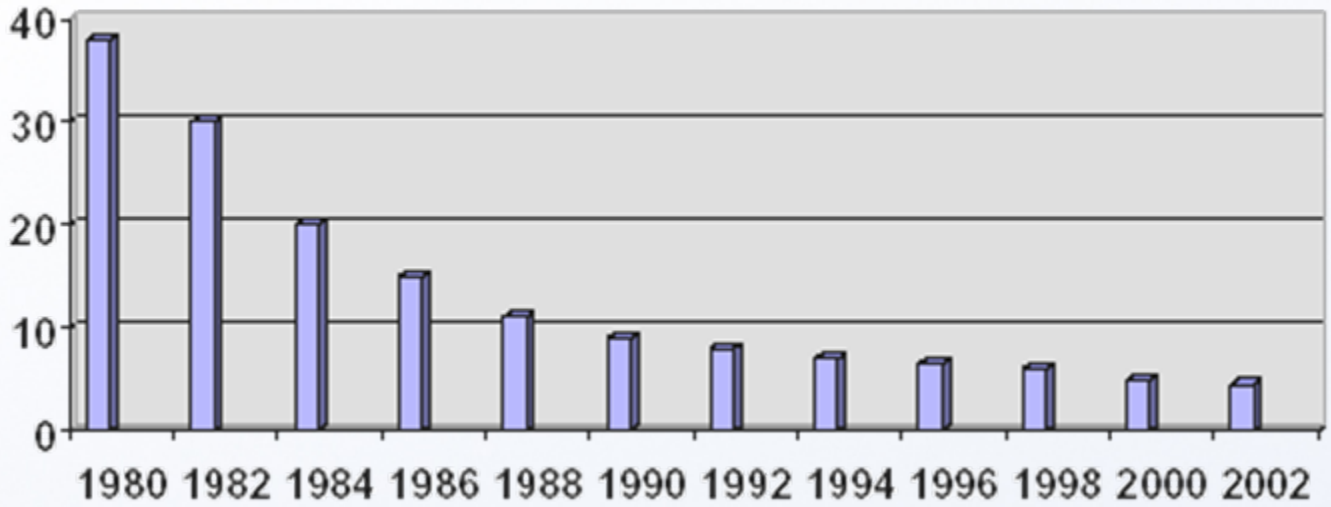
- The international wind markets grew by 32% in 2006.
- In 2006 alone, 15.2 GW were installed worldwide, bringing the total up to 74.2 GW.
- 2006 US Installations: over 11,600 MW
- The total value of new generating equipment installed in 2006 reaching €18 billion, or US$23 billion

Wind Energy Capacity has been expanding rapidly…



…while the cost of Wind Energy has declined

Cost of Wind-Generated Energy in Levelized Cents/kWh



80% Price Reduction in 20 Years!

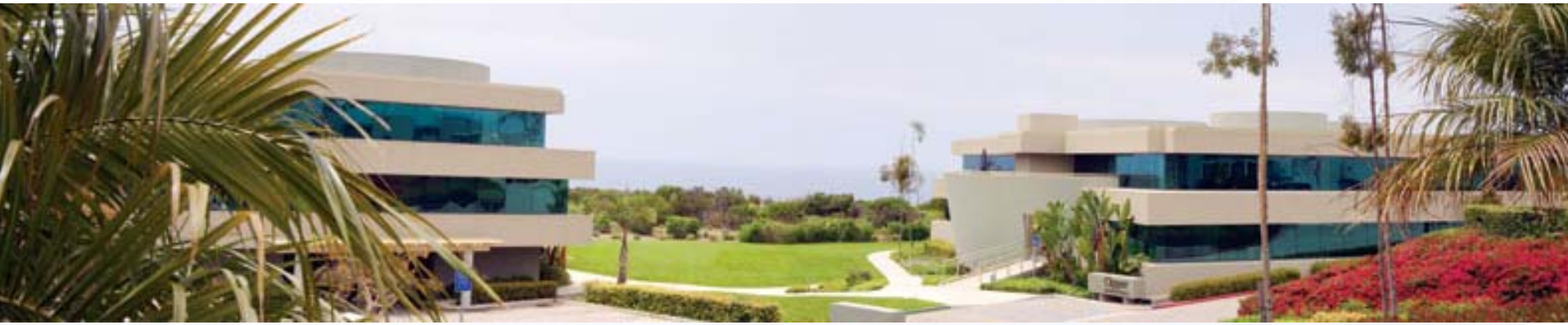
Assumptions: levelized cost at excellent wind sites, large project size, not including PTC

Supply Chain Soap Opera: Costs up 50-70%

- Still less than other energy sectors
  - Natural gas prices up much more
  - Coal prices up 50% +
  - Coal plant prices up 2x
- Causes
  - Ramp-up of wind industry demand
  - Steel and other commodity price increases
  - Competition for commodities and supplier capacity from other industries (China/India), hedge funds
  - Etc.
- Effects
  - Increasing pressure to bring costs back down
  - Difficult supply chain dynamics
    - Expressed in both PRICE and DELIVERY TIMEFRAME

Clipper Windpower

Clipper Overview



- Formed in 2000
- Headquarters:
  - Carpinteria, California, USA
  - London, United Kingdom (Europe)
- Wind Turbine Assembly: Cedar Rapids, Iowa, USA
- Publicly traded on the London AIM market
- Liberty 2.5 MW turbine series
  - C-89
  - C-93
  - C-96
  - C-99

2006 Highlights

- Wind turbine sales agreements for deliveries through 2011, with 1,079 MW in firm turbine sale commitments, approximately 2,500 MW in contingent orders
- Joint development / contingent sale agreements for over 2,000 MW of early stage projects which would deploy Clipper turbines
- Manufacturing completion of first eight Liberty 2.5 MW wind turbines.
- Increased floor space to over 215,000 square feet at Cedar Rapids assembly plant, increasing the plant's capacity to over 400 wind turbines per year.
- Raised $85.0 million in a successful share placing to finance the turnkey construction of the Endeavor project and future strategic initiatives.

Clipper's Future Strength

- Clipper has a turbine that works and is in demand in a strong market
- Clipper assembles parts made by known, qualified and experienced suppliers.
- Sales contracts provide security of payment to cover costs
- Market capitalization and ability to borrow remain strong in a market bullish on our industry and company.

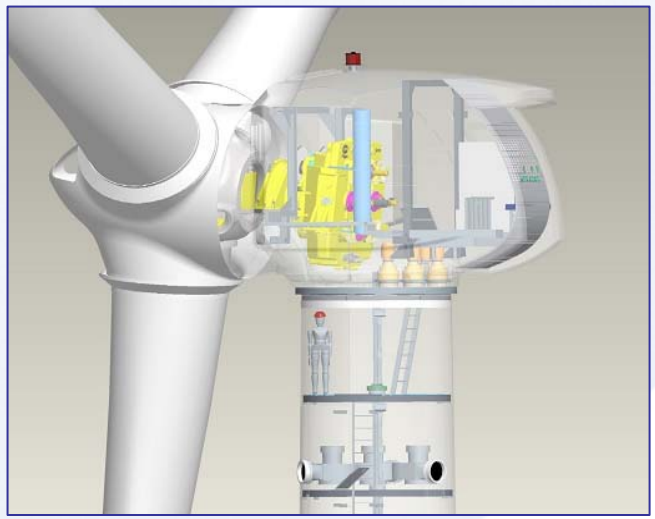
Clipper Technology:
Evolution of Industry Standard

Liberty 2.5 MW Series Wind Turbine

General Specifications

- 3 Blade Horizontal Axis
- Upwind
- Variable Speed
- Individual pitch
- Active Yaw
- 75 to 80 m Hub Height
- Swept Area: 6,793 m2

The Liberty 2.5 MW Series: Service and Maintenance

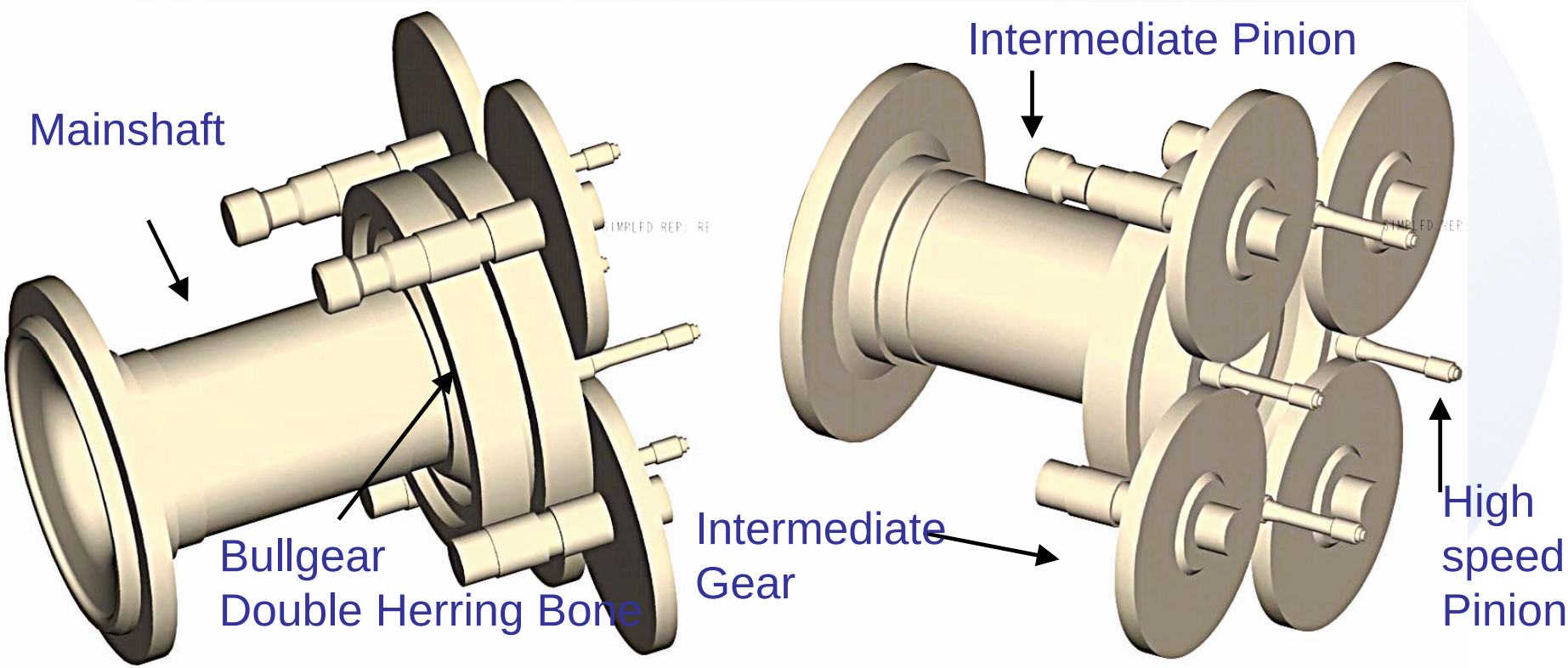


Electrical Architecture

- Permanent magnet generator
  - No current in the rotor, no slip rings, no arcing damage
    - Simple design, more reliable

Gearbox: Design out the legacy failure

- Load split 4X increases durability
- 8 points of contact to transfer load
- Design margins of 1.4 on fatigue and pitting AMGA



Designed for Ease of Maintenance and Serviceability

C-93 designed for ease of assembly, installation and maintenance

- Service Lift for up-tower access
- Full head-room and walk-around
- 2 ton jib crane services
  - Brakes
  - Generators
  - Pinion cartridges
  - Yaw motors
  - Hydraulics and cooling systems
- Hub access through nacelle ports

Predictive Maintenance

- Sensors and data recording required
  - Vibration
  - Oil particle count
  - Accelerometer
  - Temperature
  - Electrical parameters
- Data recording
  - Analysis for prediction of maintenance requirements
    - Basic trend monitoring and alarm functions
    - More to learn, upside potential
- Visual inspection ports for gears – picture worth thousand words

Manufacturing

Cedar Rapids, Iowa Manufacturing Plant

Plant Manager – Bob Loyd PE

- 32 years of heavy equipment manufacturing experience

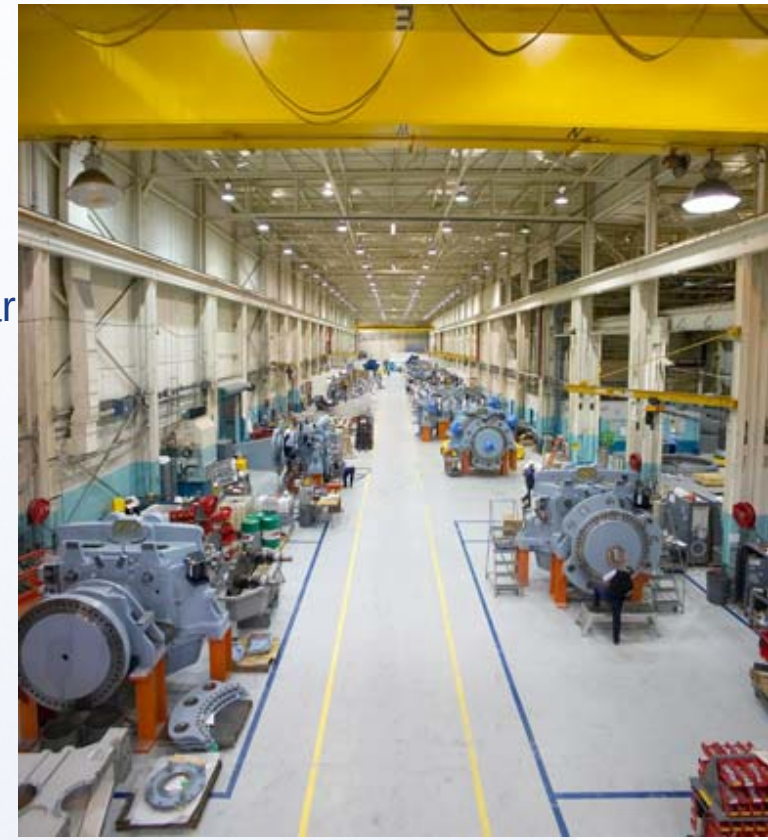
Facility

- 215,000 square feet of working space
- Capacity of 5 units per week / 350 units per year
- Location central to major road and rail services
- Significant investments made to ensure state of the art operations

On-Site Manufacturing Engineering Team

On-Site Planning and Production Coordination

Service Parts Support



Quality Strategy

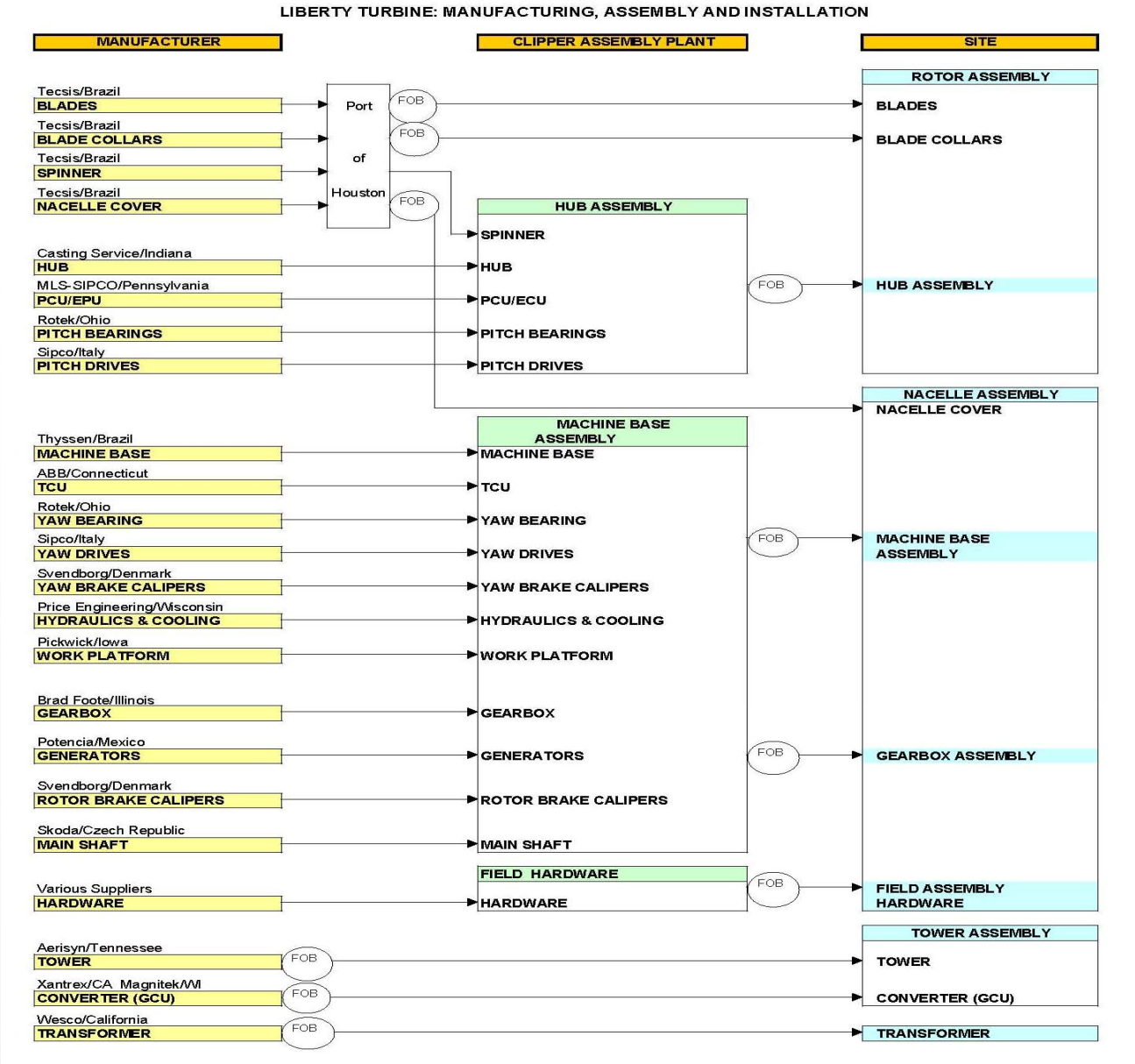
- Certify suppliers and require inspection documentation
- Provide full time Quality Engineers at key suppliers' factories
- Audit suppliers deliveries vs. 100% receiving inspection
- Maintain ISO certification
- Utilize Lean/Six Sigma approach
- Extensive lot and serial control documentation
- Extensive turbine system testing program prior to shipment
- Employee activity sign-off and accountability

Procurement Strategy

- Multiple sources: domestic and international
- Supplier contracts tie in warranty and spare part commitments
- Purchase of specialized capacity for 2006 – 2007
- Company owned designs, tools, fixtures, and patterns
- Certification of Suppliers through coordination with Quality Department

Experienced Component Vendors

- Gears - Indiana Gear and Brad Foote
- Gear box casting – Thyssen-Krupp
- Blades and Nacelle cover - Tecsis
- Shaft – Skoda
- Bearings – Timken / SKF / PFL
- Generator -- Potencia


LIBERTY TURBINE: MANUFACTURING, ASSEMBLY AND INSTALLATION
MANUFACTURER
CLIPPER ASSEMBLY PLANT
SITE
Tecsis/Brazil
BLADES
Tecsis/Brazil
BLADE COLLARS
Tecsis/Brazil
SPINNER
Tecsis/Brazil
NACELLE COVER
Port
of
Houston
FOB
FOB
FOB
ROTOR ASSEMBLY
BLADES
BLADE COLLARS
HUB ASSEMBLY
SPINNER
HUB
PCU/ECU
PITCH BEARINGS
PITCH DRIVES
Casting Service/Indiana
HUB
MLS-SIPCO/Pennsylvania
PCU/EPU
Rotek/Ohio
PITCH BEARINGS
Sipco/Italy
PITCH DRIVES
FOB
HUB ASSEMBLY
NACELLE ASSEMBLY
NACELLE COVER
MACHINE BASE ASSEMBLY
MACHINE BASE
TCU
YAW BEARING
YAW DRIVES
YAW BRAKE CALIPERS
HYDRAULICS & COOLING
WORK PLATFORM
GEARBOX
GENERATORS
ROTOR BRAKE CALIPERS
MAIN SHAFT
Thyssen/Brazil
MACHINE BASE
ABB/Connecticut
TCU
Rotek/Ohio
YAW BEARING
Sipco/Italy
YAW DRIVES
Svendborg/Denmark
YAW BRAKE CALIPERS
Price Engineering/Wisconsin
HYDRAULICS & COOLING
Pickwick/Iowa
WORK PLATFORM
Brad Foote/Illinois
GEARBOX
Potencia/Mexico
GENERATORS
Svendborg/Denmark
ROTOR BRAKE CALIPERS
Skoda/Czech Republic
MAIN SHAFT
FOB
MACHINE BASE ASSEMBLY
FOB
GEARBOX ASSEMBLY
FIELD HARDWARE
HARDWARE
Various Suppliers
HARDWARE
FOB
FIELD ASSEMBLY HARDWARE
TOWER ASSEMBLY
Aerisyn/Tennessee
TOWER
Xantrex/CA Magnitek/WI
CONVERTER (GCU)
Wesco/California
TRANSFORMER
FOB
FOB
FOB
TOWER
CONVERTER (GCU)
TRANSFORMER

Attracting Wind Manufacturing

US Manufacturing

- Largest US turbine supplier is GE, which has ~30% of market
- Dominant suppliers are European (Vestas, Enercon, Gamesa, etc.)
- Strong US market
  - 30% + annual growth
  - Potential for 350,000 MW of wind in US by 2030 (2040?) with 20% goal
    - equal to building one coal plant per week over next 20 years
  - 10,000 MW per year would create tens of thousands of jobs

BUT

- Most value-added inputs to US wind turbines likely to come from overseas

Why Jobs Likely to be Overseas

- Unstable US policy
  - Stability of wind market now generated largely from the states
  - Federal PTC is notoriously unreliable w/ 1-2 year extensions
    - All wind supporters should lobby for long-term extension
    - Minimum 5 years
  - No federal cheerleading from the top
  - Wonderful mix of rural America, wind and jobs is possible but not being driven consistently or with passion
- Wind industry is global business with global supply chain
  - Not sufficient capacity in critical areas (castings, bearings, etc.) and policy does not allow investments in new capacity that allow industry ramp-up
  - Requires huge foundries, sophisticated forgings, precision machining
    - New capacity doesn't appear overnight

Attracting Wind Manufacturing

- Clipper experience with first plant
  - 3 years ago, Clipper analyzed key factors in many states
    - Labor force, cost of living, taxes, transportation access, public school quality, etc.
    - Looked at 36 states, narrowed to 9, seriously looked at 2 states (CO, IA) and at NY for a second plant
    - Many states offered incentives, some quite substantial
  - In final analysis decision driven by:
    - Proximity to markets: IA did well, partly because of proximity to other “hot” markets
    - State commitment to wind and to Clipper:
      - Iowa had strong historical and future commitment to wind
      - straightforward place to build a plant as well as projects
      - Very strong political commitment at highest levels: Sen Grassley/Harkin & Gov Vilsack personally recruited our CEO

Attracting Wind Manufacturing

- Utility leadership matters:
  - Alliant and Mid-American were two progressive companies willing to take a leadership position in the industry and provided a foundation for the market
  - John Deere stepped into the market in a major way
  - helped Iowa take over third place in US wind capacity
- All of this done without an RPS
- Role of state economic development policies and staff
- Regional transmission expansion helped enable growth
- Transparent regulatory process

Summary

- Requires well designed plan to build wind projects AND attract jobs
- Starts with markets, which start with political commitment
- SEO and economic development offices are unlikely to be able to jumpstart without substantial cooperation and leadership from political leaders
- Windpowering America is a powerful tool for education of political leaders at all levels, as well as for developing the in-state capability and tools to build grassroots support for wind and understanding of economic benefits
- State Energy Offices can play a pivotal coordinating and energizing role
- Manufacturing incentives do matter
- Consistent policy that can help to smooth out the gaps in federal policy:
  - RPS
  - State tax incentives, particularly those that backstop federal PTC
  - Transparent and efficient siting regulation

- Wind: JOBS, SECURITY, ENVIRONMENT: Pass it on

Questions?