



FloDesign Wind Turbine

there's change in the wind

Presentation to Massachusetts Green Career Conference

October 1, 2010

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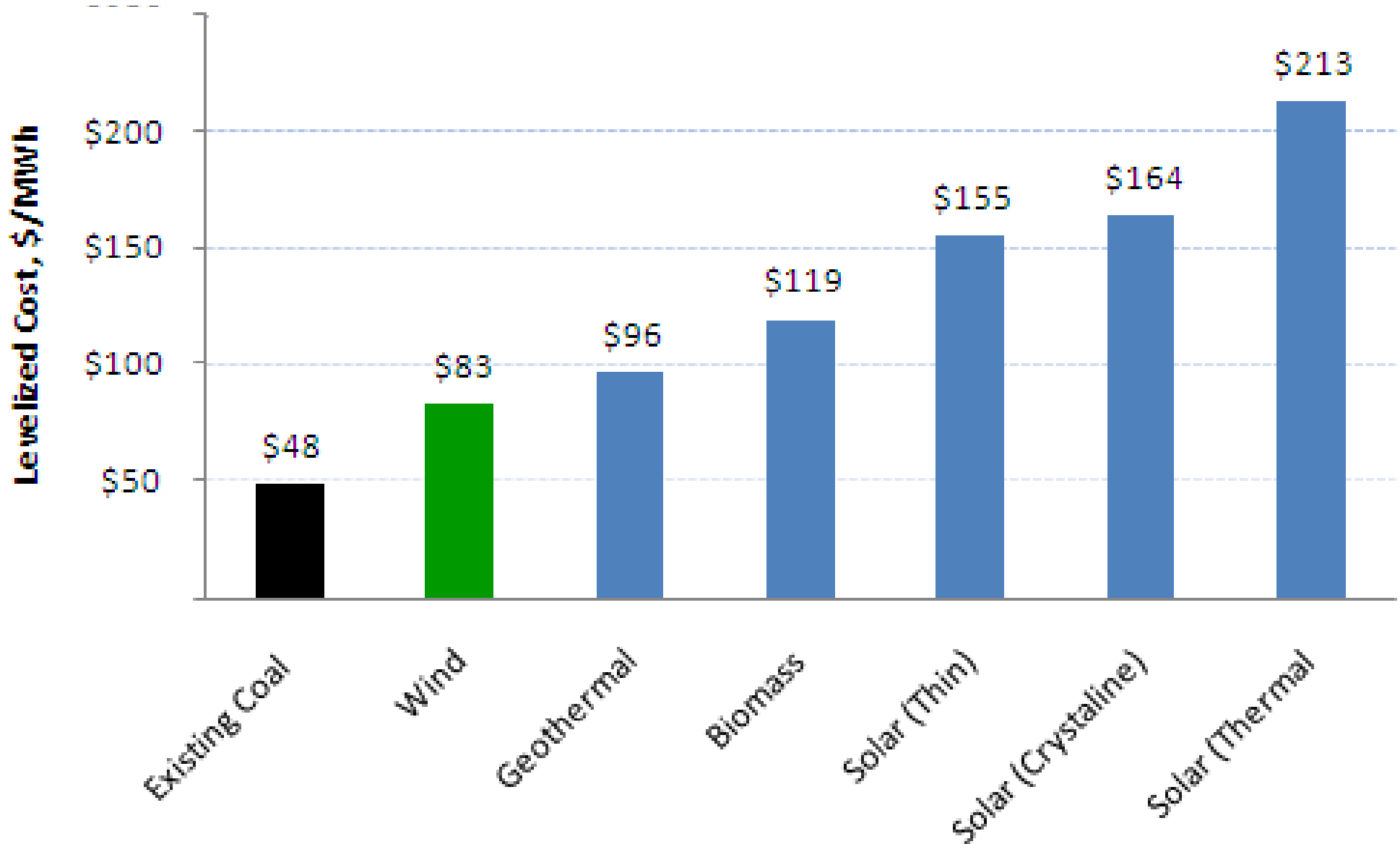
- Founded in 2007
- Headquartered in Waltham, Massachusetts
- 50 + employees
- Core expertise in jet engine and wind technologies
- 200 + patent applications (6 + awarded)
- Awards:
 - 2008 – MIT CEEP & ICE Winner
 - 2009 –  \$8.3 million award
 - 2010 – Mass CEC Financing Package, \$3 million
- Investor syndicate (over \$40 million raised):
 - Kleiner Perkins Caufield & Byers
 - Vantage Point Venture Partners
 - Goldman Sachs
 - Technology Partners



VANTAGE POINT
VENTURE PARTNERS



Wind is the **Lowest** Cost Renewable



Source: CEC Renewable Energy Transmission Initiative - RETI Phase 2B, May 2010

Problems with Traditional Wind Turbines

- **Cost Pressures**
 - Volatile cost profile
 - Mega-farms required
 - Major component bottlenecks
 - Transport & installation issues
- **Environmental & Siting Problems**
 - NIMBY
 - Avian and bat impacts
 - Noise, safety, seismic issues
 - Radar interference
- **Operational Problems**
 - Large mechanical stresses
 - Frequent component failure
 - Poor off-axis performance
- **Existing designs maxed out**
 - Aerodynamically finished
 - Near maximum efficiency
 - Only small improvements



FloDesign Wind's innovation is a mixer ejector wind turbine with disruptive performance compared to conventional wind turbines

- Mature Aerospace Methods
- Shrouded mixer-ejector design
 - Lowers back pressure, increases power
- 3x - 4x traditional turbine efficiency
 - Smaller diameter per kW
- Higher energy density per acre
 - Turbine wake quickly dissipates
- Lower maintenance
 - Shorter blades, no gearbox
- Environmentally sensitive
 - Minimizes impact to height, bird, bats, radar

Goal:
Substantially lower cost per kilowatt-hour



Conventional Vs. Shrouded

<u>Issue</u>	<u>Today's Technology</u>	<u>FloDesign Wind</u>
Energy	<ul style="list-style-type: none"> ▪ Near theoretical max (Betz Limit) 	<ul style="list-style-type: none"> ▪ Tests confirm 3-4x output for same size rotor
Placement	<ul style="list-style-type: none"> ▪ Turbines 8 diameters apart 	<ul style="list-style-type: none"> ▪ Turbines 4 diameters apart
Cost	<ul style="list-style-type: none"> ▪ Economic in class 4 winds 	<ul style="list-style-type: none"> ▪ Significantly lower cost, economic in lower winds
Supply Chain	<ul style="list-style-type: none"> ▪ High cost blades & gears, costly transport 	<ul style="list-style-type: none"> ▪ Extruded blades, direct drive, modular container transport
Safety	<ul style="list-style-type: none"> ▪ Slings ice and debris 	<ul style="list-style-type: none"> ▪ Shielded design safer, no shadow flicker, urban installations
Radar	<ul style="list-style-type: none"> ▪ Radar cross-section 	<ul style="list-style-type: none"> ▪ Low radar signature
Birds	<ul style="list-style-type: none"> ▪ Tip speed of 200+MPH 	<ul style="list-style-type: none"> ▪ Stator like venetian blind; easily visible to birds
O/M	<ul style="list-style-type: none"> ▪ Fluctuating, unsteady loads 	<ul style="list-style-type: none"> ▪ Balanced system, robust electronics
Noise Level	<ul style="list-style-type: none"> ▪ Low frequency thump 	<ul style="list-style-type: none"> ▪ Significantly quieter

Wind Tunnel and Field Testing



Ways to Get Started – Business Plan Competitions

- **Benefits of ICE / MIT CEP for FloDesign**
 - Building our team
 - Refining our business plan and pitch
 - Attracting attention of top-tier VC firms
- **Strategy for winning**
 - Consider judging criteria – talk about technology, but also address market size, team, milestones, clean energy benefits, sustainability, etc.
 - Customer engagement can be a key differentiating factor
- **Win or lose, the real prize is in building a successful clean energy business**
 - Gain valuable tools, connections and feedback from participating

Massachusetts Cleantech Business Plan Competitions

Ignite Clean Energy
Competition

www.ignitecleanenergy.com

MIT Clean Energy Prize

www.mitcep.com

MassChallenge

www.masschallenge.org

Ways to Get Started –Plug In and Show Up!

Metro Boston is Ideal for Events, Networking, Information

- New England Clean Energy Council
<http://www.cleanenergycouncil.org/>
- Young Professionals in Energy
<http://www.ypenergy.org/>
- Renewable Energy Business Network
http://groups.google.com/group/rebn_east?hl=en
- MIT Energy Club
http://mailman.mit.edu/mailman/listinfo/alt_energy
- Harvard Energy Journal Club
<https://lists.hcs.harvard.edu/mailman/listinfo/hejc-list>
- Harvard Center for the Environment
<http://list-manage.com/subscribe.phtml?id=5f1cc38adc>