Use of Carbon Fiber in Wind Turbine Blades

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Investment in New Wind Power Plants is Growing Exponentially

- Development of wind will result in investments of 12 billion dollars over the next 4 years of which 15% will be blades.
The average blade length for utility scale wind turbines has grown from 20m to 40m in 8 years time.
Blade Weight is Growing Even Faster
When the blades get larger...

... it makes more sense to use carbon.
Increasing Blade Scale Favors Carbon Over Glass

- Swept Area defines the wind energy captured by the rotor
- Energy and revenue increase by the square of the radius ($R^2$)
- Weight, cost, and blade deflection increase by the cube of the radius ($R^3$)
- The stiffness and weight advantages of carbon fiber are more desirable and cost effective in large wind turbine blades
Why Use Carbon in Wind Turbine Blades?

- Turbines are getting larger and blades longer.
- Large blades are typically designed by stiffness and deflection, rather than material strength.
- The high stiffness of carbon reduces blade deflection, allowing a larger tower diameter for a given blade-to-tower clearance.
- Lighter, stiffer blades can substantially reduce total system cost.
Input Carbon Roving
Resin Impregnator

[Image of a resin impregnator machine]

Your Premier Blade Service Company
• Carbon is added in the spar cap which is the backbone of the blade.

• The remainder of the blade is fiberglass; taking advantage of carbon only where necessary.
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