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March 2018 millions without power in North East. Build more pipelines, since Wind Farms are effected by Extreme wind events. Challenges during the construction to install turbines resilient to the local weather. Large wind turbines face adverse weather conditions such as the continuous impact of particles transported by wind at high speeds, very high or low temperatures, an abundance of dust, high exposure to ultraviolet rays, etc. high winds can magnify the problem. farms risk turbulence during normal operations, and in extreme transient events. their ability to cause torque reversals of a magnitude that can damage a turbine. effects lead to varying loads on the rotating turbine blades. This means the aerodynamic and structural design must cope with conditions shear wind causes this portion of incoming wind to flow vertically up the turbines face, in addition to the normal wind going through the blade sweep, wind farms create bad wind currents turbines cannot be placed too close together because downwind turbines, a "wake effect" turning rotor produces the wake, from the leading turbines in a field. Wakes from one row to the next. This can cause a reduction in extractable energy, as well as a significant increase in fatigue loading in the downstream turbines. The blades can be loaded non-linearly, sending varying loads going through the drivetrain. Shear winds are most often experienced by turbines on ridge tops and those located near the front edge of a plateau. Winds striking the face of these mountains deflect vertically, resulting in shearing winds, wind causes the continual variation in the incoming loads to the drivetrain. The contours of the land, obstacles, and even thermal variations can cause the wind to slow down or accelerate, seasons cause a greater or lesser increase in roughness and turbulence. As lift forces on the blades to generate torque, they have an equal but opposite effect on the wind, tending to push it around tangentially in the opposite direction. Swirls. When wind direction shift to perpendicular angle, the wake effect is greatly magnified. Rapid reversals can cause significant impact loads on bearing rollers and races. High wind gusts have caused damaging torque reversals. Some turbine manufacturers recognize this risk. torque reversals is cause of axial cracking in wind turbine gearbox bearings, long blades catch significantly more wind than needed, increased surface area, it is difficult to transient wind conditions quickly enough to mitigate the potential wind damage. Who is cleaning the blades of wind turbines? Anyone? Wear caused by dust particles suspended in the air, the accumulation of dirt and the growth of microorganisms in the blades significantly reduces their energy production efficiency due to the damage to their aerodynamic shape. One company had to repair up to 2,000 wind turbine blades because the leading edge of the blades has worn down after just a few years at sea. Resilience remains an important issue. *®

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