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Assumptions to the Annual Energy Outlook 2015

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- Capital costs for wind technologies are assumed to increase in response to: (1) declining natural resource quality as the best sites are utilized, such as terrain slope, terrain roughness, terrain accessibility, wind turbulence, wind variability, or other natural resource factors , (2) increasing costs of upgrading existing local and network distribution and transmission lines to accommodate growing quantities of remote wind power, and (3) market conditions, such as the increasing costs of alternative land uses, including aesthetic or environmental reasons. Capital costs are left unchanged for some initial share, then increased by 10%, 25%, 50%, and finally 100%, to represent the aggregation of these factors.
- Proportions of total wind resources in each category vary by EMM region. For all EMM regions combined, about 1% of windy land (107 GW of 11,600 GW in total resource) is available with no cost increase, 3.4% (390 GW) is available with a 10% cost increase, 2% (240 GW) is available with a 25% cost increase, and over 90% is available with a 50% or 100% cost increase.
- Depending on the EMM region, the cost of competing fuels, and other factors, wind plants can be built to meet system capacity requirements or as a "fuel saver" to displace generation from existing capacity. For wind to penetrate as a fuel saver, its total capital and fixed operations and maintenance costs minus applicable subsidies must be less than the variable operating costs, including fuel, of the existing (non-wind) capacity. When competing in the new capacity market, wind is assigned a capacity credit that declines based on its estimated contribution to regional reliability requirements.
- Because of downwind turbulence and other aerodynamic effects, the model assumes an average spacing between turbine rows of 5 rotor diameters and a lateral spacing between turbines of 10 rotor diameters. This spacing requirement determines the amount of power that can be generated from wind resources, about 6.5 megawatts per square kilometer of windy land, and is factored into requests for generating capacity by the EMM.
- Capacity factors for each wind class are calculated as a function of overall wind market growth. The capacity factors are assumed to be limited to about 50% for a typical Class 6 site. As better wind resources are depleted, capacity factors are assumed to go down, corresponding with the use of less-desirable sites. By 2040, the typical wind plant build will have a somewhat lower capacity factor than those found in the best wind resource areas. Capacity factors in the Reference case increase to about 40% in the best wind class resulting from taller towers, more reliable equipment, and advanced technologies, although, as noted, these may not represent the best available sites because of other site-specific factors.
- AEO2015 allows plants under construction by 2015 to claim the federal Production Tax Credit (PTC), a 2.3-cent-per-kilowatthour tax incentive for wind that was initially set to expire for wind only on December 31, 2014. Wind plants are assumed to depreciate capital expenses using the Modified Accelerated Cost Recovery System with a 5-year tax life and 5-year double declining balance depreciation.